



Microsoft File and Print Service 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 service failover for File and Print.

Expected Audience

This document is intended to help in the installation, configuration and administration of Microsoft Cluster Server with File and Print 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 File and Print
- Installing, configuring, and administering Microsoft Cluster Server

Text Conventions

Table 1-1 lists the conventions used to distinguish elements of text found within this document:

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.
<i>c:\dirname\filename.exe</i>	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.
<i>USER INPUT</i>	Information to be entered by the user is shown in uppercase and in a different typeface.

Chapter 2

Overview of a Service Failover

What Is a Service Failover?

A service failover is a cluster strategy that allows high levels of server availability to be obtained. This can be achieved in a number of ways, but for this TechNote, Microsoft Cluster Server is used.

In a service failover configuration, a service is defined to Microsoft Cluster Server as a resource. Once defined, its 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 server 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 a common name.

A more elegant model is the resource failover, which takes advantage of Independent Software Vendor's cluster-aware resource DLLs to execute the failover. These cluster-aware resource DLLs replace the use of one or more non-cluster-aware generic service resources used to implement a service failover.

What are the Advantages of a Service Failover?

Service failover provides a highly available computing environment with relative simplicity. Microsoft Cluster Server uses existing services defined on both servers to build new resources that can be stopped and re-started on any machine in the cluster, enabling a system that has fault tolerance and fault recovery features.

Service failover can be used both for planned and unplanned service outages. A planned outage occurs when one of the nodes in the cluster is taken offline for upgrades or maintenance. An unplanned outage occurs when one of the cluster nodes or the software on that node fails to function correctly. During both kinds of outages, service failover can move the services running on one of the cluster nodes to another cluster node that can take that load transparently to the client systems.

Note: *This depends on the mechanism that allows the client and the clusters to re-establish a live connection to continue the services. As an example, building or acquiring smart clients that automatically re-establish connections provides transparent failover.*

A service outage may be very costly. By reducing the probability of a service outage, service failover directly addresses a solution to minimize losses in almost any industry.

The ability to failover the services running on a cluster node to another node allows the clients to continue using the servers. In cases of scheduled server maintenance, a service failover implementation provides mutual benefit to the clients and the people that maintain the servers. It also reduces the downtime cost for the business.

What are the Disadvantages of a Service Failover?

One disadvantage is the fact that the application is not monitored for any state information. This means that every time the application fails over to the other node, an entire new instance of the application is started. Any work in progress is lost and in some cases the clients may have to reconnect. Another problem with a service failover is load balance. When you depend on a service call in NT to start an application in Microsoft Cluster Server it is not possible to balance any of the processes between the two nodes. With a service failover there is no true active monitoring of the application by Microsoft Cluster Server. In most applications that run as a service in NT, it is quite possible for the service call to be up and running but the application itself is no longer available due to an error within the application itself. Using a service failover does not allow Microsoft Cluster Server to actively monitor any of the applications with the exception of the service call itself, so in the case above Microsoft Cluster Server would never know that the application failed and would not failover the application to the other node.

It is important to note that while there are some disadvantages to a service failover, it still provides the best solution for clustered high availability in NT. As of the writing of this paper most applications are not cluster aware, and as such they have no way of compensating for the disadvantages mentioned above; however, these applications can still be clustered in NT using Microsoft Cluster Server, providing high availability to end users in a way never before possible.

Chapter 3

Model Service 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 implement a print spooler, a network printer must be installed.

Note: To provide a Highly Available print spooler, only network printers can be used. Printers directly connected to the servers can not be made Highly Available.

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.

3-2 Model Service Failover Environment

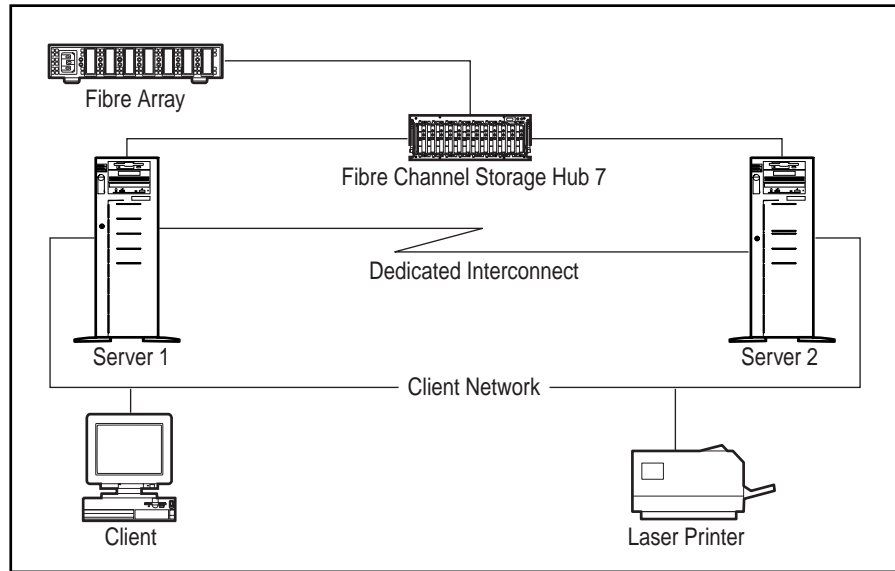


Figure 3-1. Standard ProLiant Cluster Configuration

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

Model Environment Naming Conventions

Table 3-1
System and Cluster Specifics

Operating System	Windows Enterprise Server 4.0 w/ Service Pack 3
Domain Name	XDOMAIN
Name of Server 1	FP_NODE1
IP Address of Server 1	110.110.110.20 (subnet mask 255.255.255.0)
IP Address of Interconnect	110.2.2.1 (subnet mask 255.255.255.0)
Name of Server 2	SQL_NODE2
IP Address of Server 2	110.110.110.21 (subnet mask 255.255.255.0)
IP Address of Interconnect	110.2.2.2 (subnet mask 255.255.255.0)
Name of Cluster	FP_CLUSTER
IP Address of Cluster	110.110.110.25 (subnet mask 255.255.255.0)
Name of Printer	ClusterPrinter
IP Address of Printer	110.110.110.6 (subnet mask 255.255.255.0)
Shared Disk(s)	V:\
Name of Virtual Server 1	FILESHARE
IP Address of Virtual Server 1	110.110.110.30 (subnet mask 255.255.255.0)
Name of Virtual Server 2	PRINTSPOOLER
IP Address of Virtual Server 2	110.110.110.35 (subnet mask 255.255.255.0)

3-4 Model Service Failover Environment

**Table 3-2
File Share Specifics**

Resource	FILE SHARE RESOURCE
Location of File Share	V:\FILE_SHARE

**Table 3-3
Print Spooler Specifics**

Resource	PRINT SPOOLER RESOURCE
Location of Spooler	V:\SPOOL

Hardware Requirements

Server Configuration

Two Compaq ProLiant 5000 servers, each with:

- 4P, P5/200 Processor, 512-Mb memory
- Integrated Compaq Netelligent 10/100 NIC (All Network Communications)
- Compaq Fibre Channel Host Controller /P

Compaq Fibre Channel Array with:

- Compaq Fibre Channel Array Controller
- Compaq Fibre Channel Storage Hub

For detailed server configuration information, see the Appendix.

Client Configuration

Compaq ProLiant 1500 server with:

- 2P, P5/133 Processor, 64-Mb memory

Software Requirements

Microsoft Windows NT Server Enterprise 4.0 with:

- Microsoft Windows NT Service Pack 3

Compaq Utilities:

- Compaq System Configuration Utility version 2.35 or later
- Compaq Array Configuration Utility version 1.20 or later
- Compaq NT Software Support Disk version 2.00 or later

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 neither server in a cluster be used as a Primary or Backup domain controller.

Chapter 4

Software Installation Process

Installation of Microsoft Cluster Server

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.

Server 1

Table 4-1
Microsoft Cluster Server Installation

Domain Name	XDOMAIN
Cluster Name (to form)	FP_CLUSTER
Cluster IP address	110.110.110.25 (subnet mask 255.255.255.0)
Shared Disk(s)	V:
Cluster Admin User / Password	WOLFPACK / <password>
Location of Cluster Executables	Default (C:\WINNT\SYSTEM32)
Quorum Disk	Disk V:

Server 2

Table 4-2
Microsoft Cluster Server Installation

Domain Name	XDOMAIN
Cluster Name (to join)	FP_CLUSTER
Cluster Admin Password	<password>
Location of Cluster Executables	Default (C:\WINNT\SYSTEM32)

Installation of File Share

There is no formal installation process for File Share. Just be sure that there is no pre-existing file share of the same name on either node.

Installation of Print Spooler

Microsoft Cluster Server requires that each node have the necessary ports and print drivers installed. The following sections provide detailed information on how to perform this installation. For this document a Hewlett Packard printer with a Hewlett Packard JetDirect Network card installed as the shared printer is used.

For the example in this document a Hewlett Packard printer with a Hewlett Packard JetDirect Network card installed is used as the shared printer. The JetDirect software, available from the Hewlett Packard website, must be installed on each of the servers in the cluster.

Chapter 5

Printer Port and Driver Installation

The ports and drivers must be installed on each node. Microsoft Cluster Server 1.0 requires that each node have the necessary ports and drivers. Go to each node's local print folder and install all drivers and create all ports the cluster spooler will need. The port used by the clustered spooler must have the same name on each node.

For the example in this document a Hewlett Packard printer with a Hewlett Packard JetDirect Network card installed is used as the shared printer. The JetDirect software, available from the Hewlett Packard website, must be installed on each of the servers in the cluster.

After this software is installed on both servers, install the port and printer drivers on each server. To install the port and printer drivers:

1. Go to the server's printer folder. Double click the "Add Printer" icon.



Figure 5-1. Printers Dialog Box

5-2 Printer Port and Driver Installation

2. The following dialog box appears. Select “My Computer” as the computer to manage all settings for this printer, then click **NEXT**.

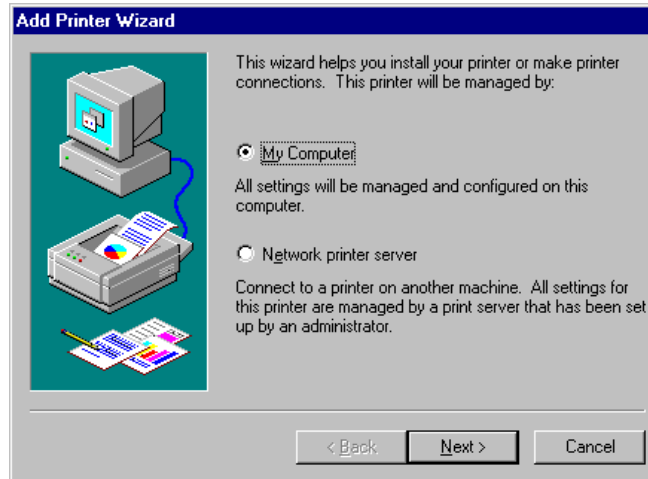


Figure 5-2. Add Printer Wizard Dialog Box

3. If the needed port is not on the list, click **Add Port** to see a list of installed ports. If the JetDirect software was correctly installed, HP JetDirect Port is on this list. Select this port, then click **New Port**.

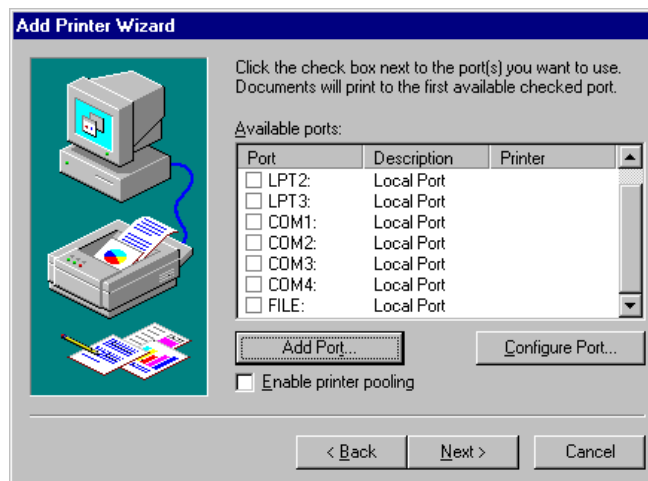


Figure 5-3. Add Printer Wizard Dialog Box - Adding a Port

- The Add port wizard attempts to locate existing installed JetDirect cards on the network. If the wizard does not find the printer, just click **NEXT**.

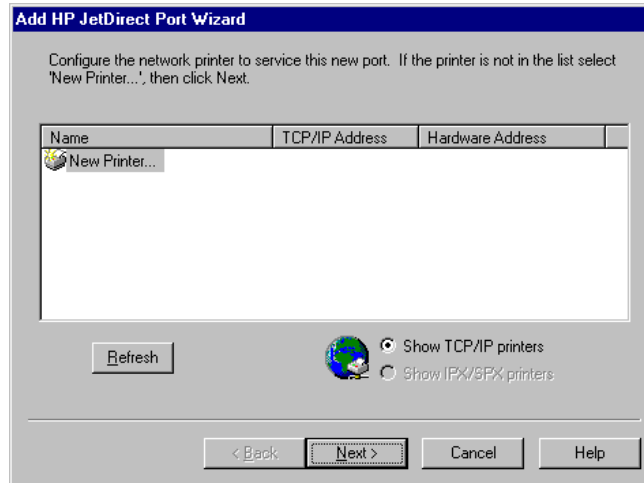


Figure 5-4. Add HP JetDirect Port Wizard Dialog Box - Locating the Printer

- It is only necessary to enter the actual IP address of the Printer, then click **NEXT**.

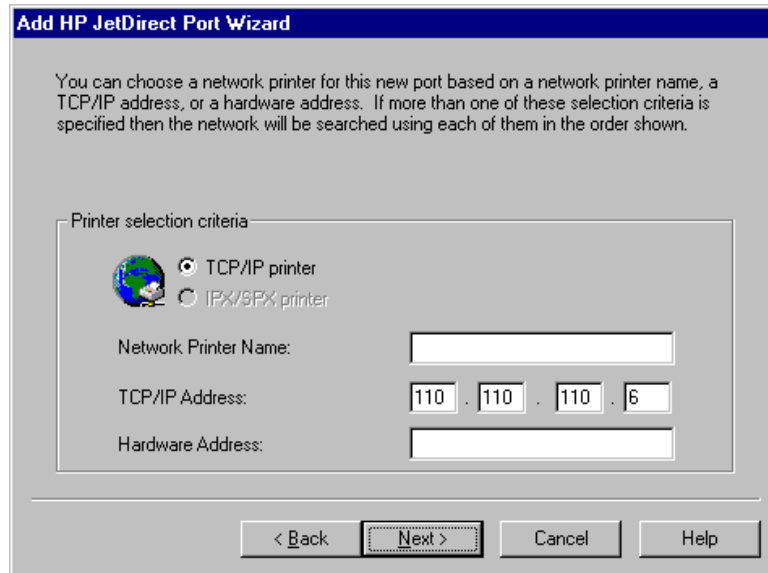


Figure 5-5. Add HP JetDirect Port Wizard Dialog Box - Adding the IP Address

5-4 Printer Port and Driver Installation

6. The following box appears. Click **OK**.

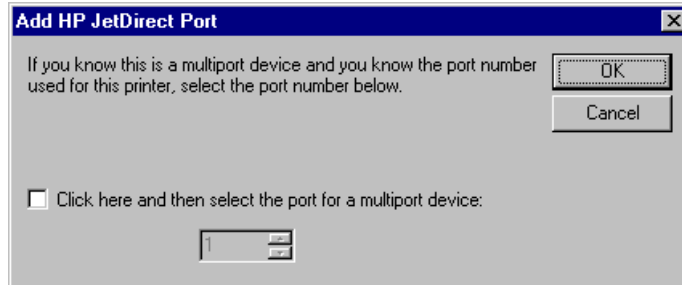


Figure 5-6. Add HP JetDirect Port Dialog Box

7. The last dialog of the Add port wizard appears. The port name entered here must be identical on both servers. Enter the port name, then click **FINISH**.

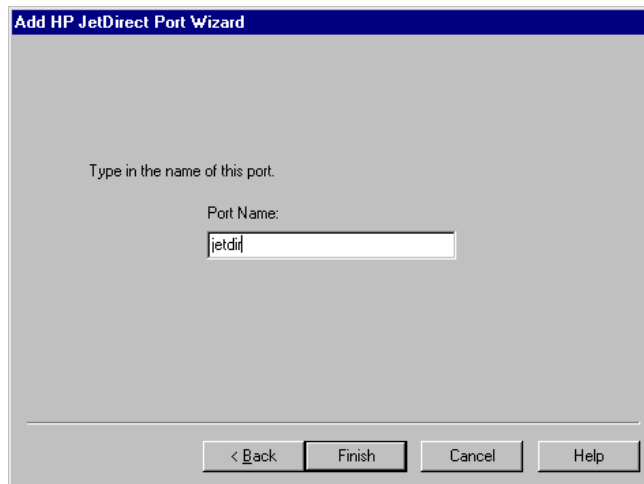


Figure 5-7. Add HP JetDirect Port Wizard Dialog Box - Adding the Port Name

8. The Add Printer Wizard reappears after the port has been installed. Click **NEXT**.

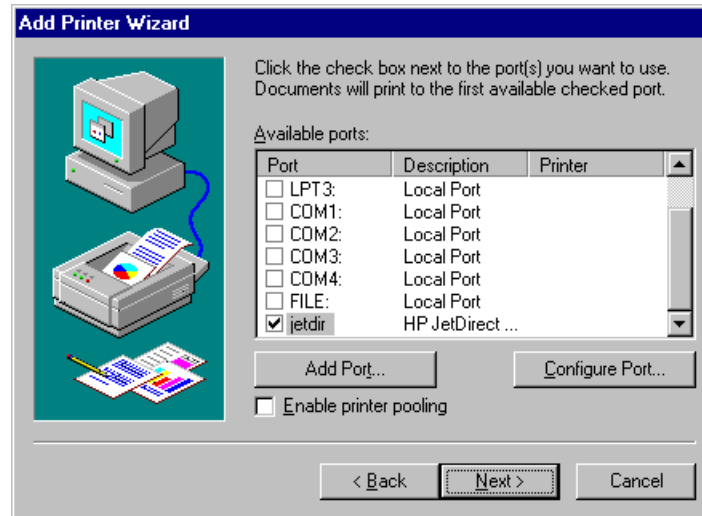


Figure 5-8. Add Printer Wizard Dialog Box

9. The printer driver selected must be identical on both servers. Select the printer driver, then click **NEXT**.

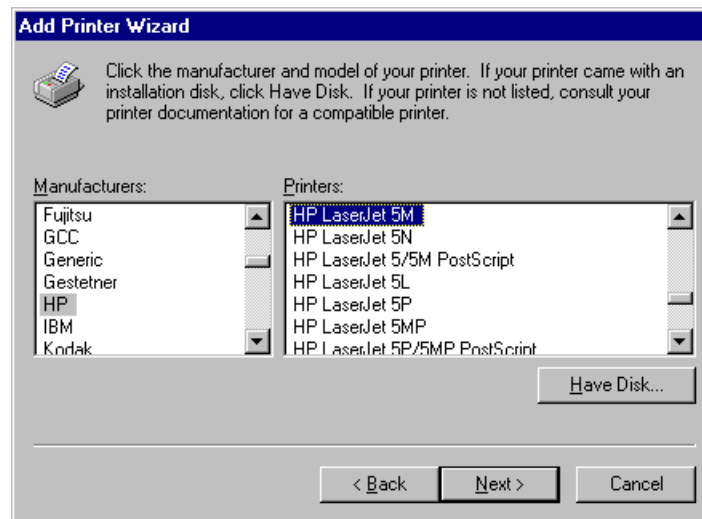


Figure 5-9. Add Printer Wizard Dialog Box - Selecting the Printer Driver

5-6 *Printer Port and Driver Installation*

10. If the driver already exists, click **NEXT**, otherwise install the driver from NT4.0 CD, floppies, or a network share containing the required drivers.



Figure 5-10. Add Printer Wizard Dialog Box - Installing the Printer Driver

11. The selections in the following dialog boxes have no effect on the Cluster Printer Spooler being installed because the clients will connect to the Cluster Printer Spool through the cluster, not from this point.

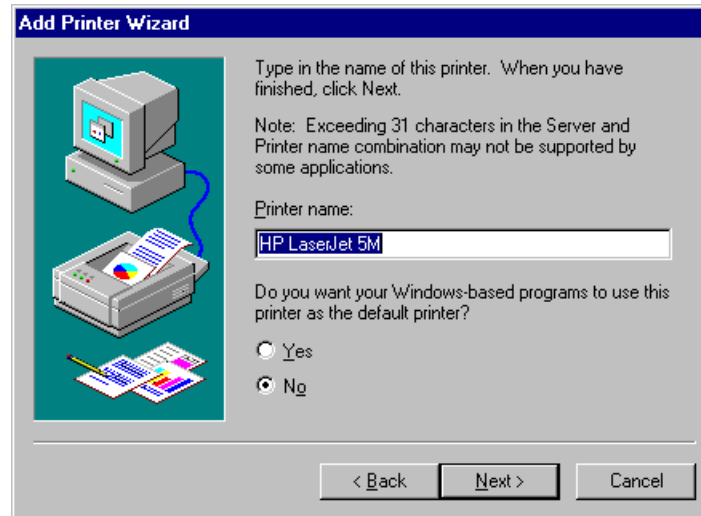


Figure 5-11. Add Printer Wizard Dialog Box

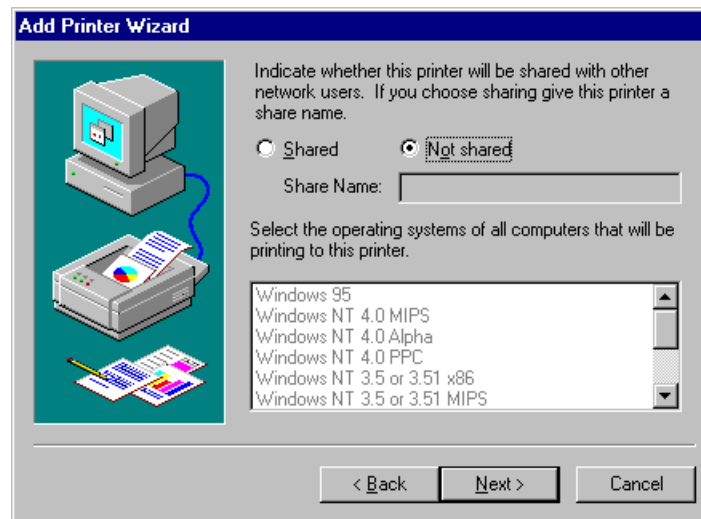


Figure 5-12. Add Printer Wizard Dialog Box

5-8 *Printer Port and Driver Installation*

12. Click **FINISH** to complete setting up the port and printer. Repeat on the second server.



Figure 5-13. Add Printer Wizard Dialog Box - Completing the Setup

Chapter 6

Creating the Print Spooler Resources

Creating the Print Spooler Group

Before creating the resources, the IIS Resource Group must first be created. Start the **Cluster Administrator**, select **Disk Group 1** and then click the right mouse button to bring up the floating menu. Select **Rename** and change the name of the resource group from **Disk Group 1** to **PrintSpooler**. Once the resource group has been created, the necessary resources can be created for the group.

Table 6-1
PrintSpooler Group

Resource Group Name	FileShare
Preferred Nodes	FP_NODE1, FP_NODE2
Failover Option	Default
Failback Option	Default

6-2 Creating the Print Spooler Resources

Print Spooler Resource Group

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

Table 6-2
Resource Group (PrintSpooler)

Physical Disk(s)	V:	V:
IP Address	ip_PrintSpooler	110.110.110.35
Network Name	nm_PrintSpooler	PRINTSPOOLER
Resource Type	Print Spooler	Print Spooler

The following section details the configuration of each resource.

Normally, the **Shared Disk Resource** already exists in the cluster and does not have to be created. Copy this resource to the resource group(s) that are created or rename the group where this resource is located.

Creating the Print Spooler IP Address Resource

1. To create the **IP Address Resource**, select the Print Spooler resource group, then click the right mouse button. Select **New → Resource** from the floating menu and the **New Resource** dialog box is displayed.
2. Enter a name, `ip_PrintSpooler`, for the IP Address Resource.
3. Enter desired text for the **Description**.
4. Select **IP Address** for the **Resource Type** from the drop down box.
5. Select **PrintSpooler** for the **Group** from the drop down box.
6. Click **Next** to continue.

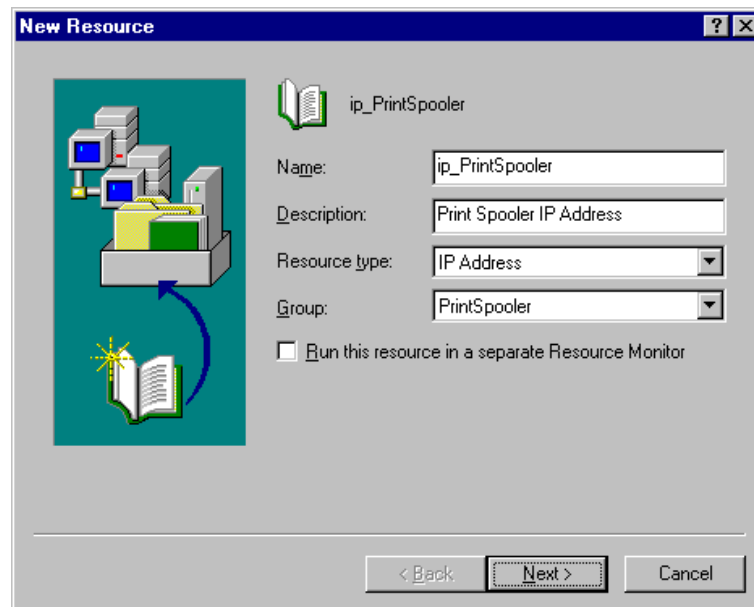


Figure 6-1. New Resource Dialog Box

6-4 Creating the Print Spooler Resources

7. At the **Possible Owners** dialog box, both servers should be in the **Possible Owners** list box. Accept this default and click **Next**.

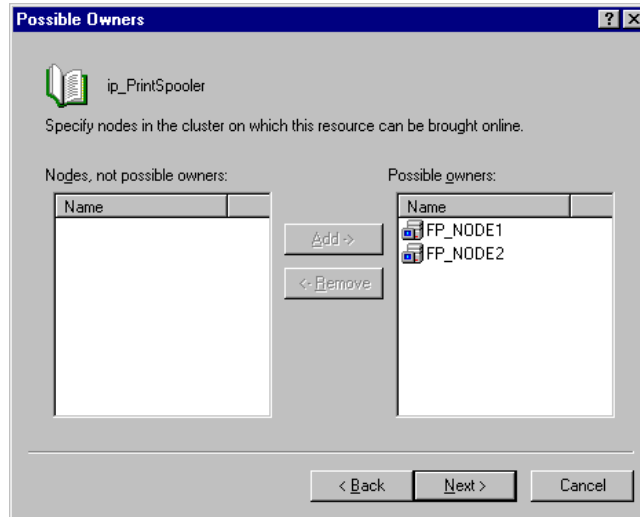


Figure 6-2. Possible Owners Dialog Box

8. There are no dependencies, so accept the defaults in the **Dependencies** dialog box and click **Next**.

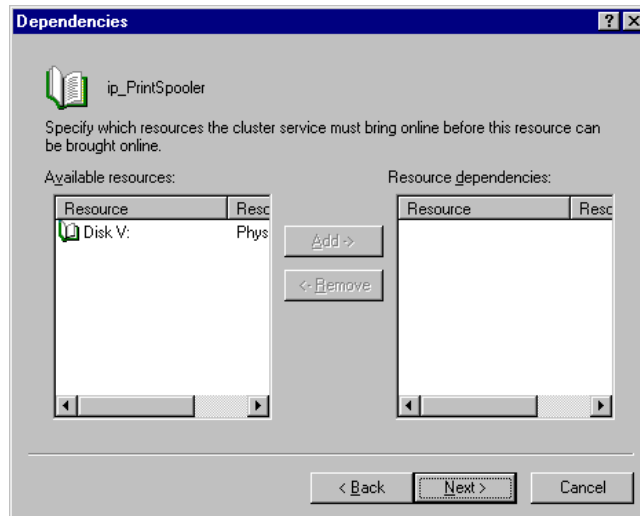


Figure 6-3. Dependencies Dialog Box

9. From the **TCP/IP Address Parameters** dialog box, select the client network as the **Network to use**.
10. Enter the **IP Address** of the cluster.
11. Enter the correct **Subnet Mask**.
12. Verify that the correct **Network to use** is selected.
13. Click **Finish** to complete creating the **IP Address Resource**.

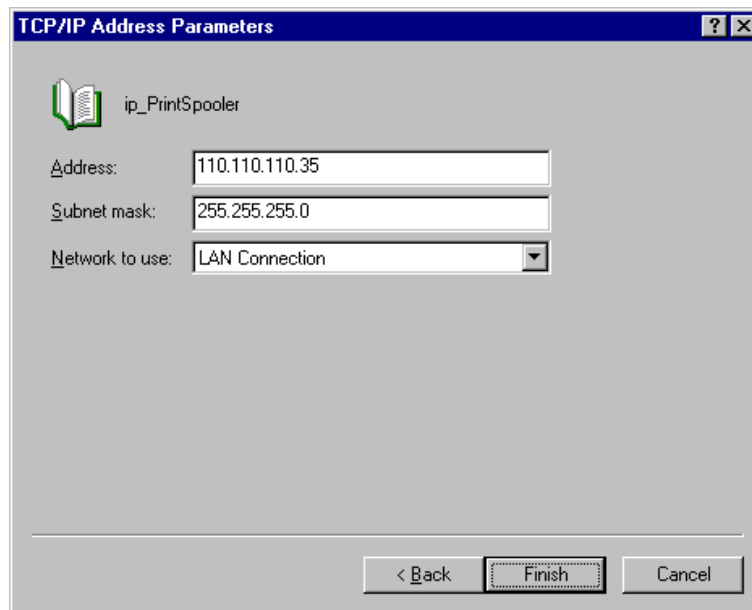


Figure 6-4. TCP/IP Address Parameters Dialog Box

Creating the Print Spooler Network Name Resource

1. To create the **Network Name Resource**, select the **PrintSpooler** resource group and then click the right mouse button. Select **New → Resource** from the floating menu and the **New Resource** dialog box is displayed.

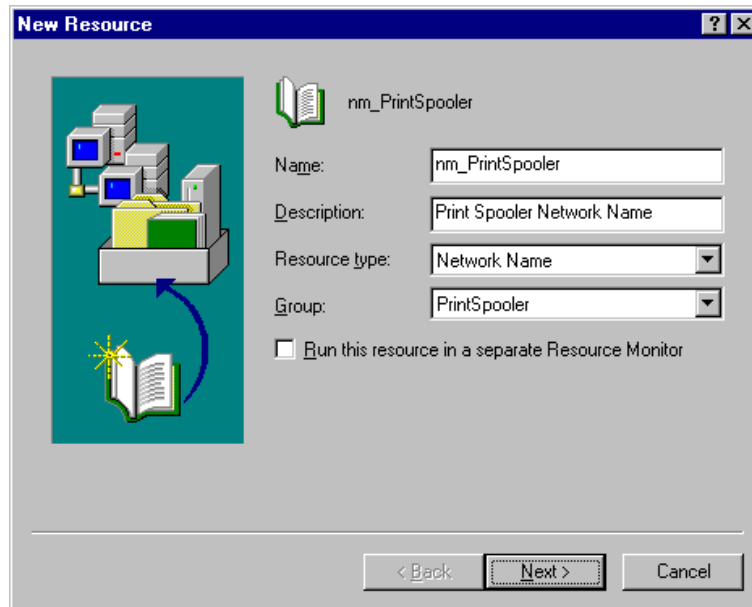


Figure 6-5. New Resource Dialog Box

2. Enter a name, nm_ PrintSpooler, for the Network Name Resource.
 3. Enter desired text for the Description.
-

4. Select Network Name for the Resource Type from the drop down box.
5. Select PrintSpooler for the Group from the drop down box.
6. Click Next to continue.
7. At the **Possible Owners** dialog box, both servers should be in the Possible Owners list box. Accept this default and click **Next**.

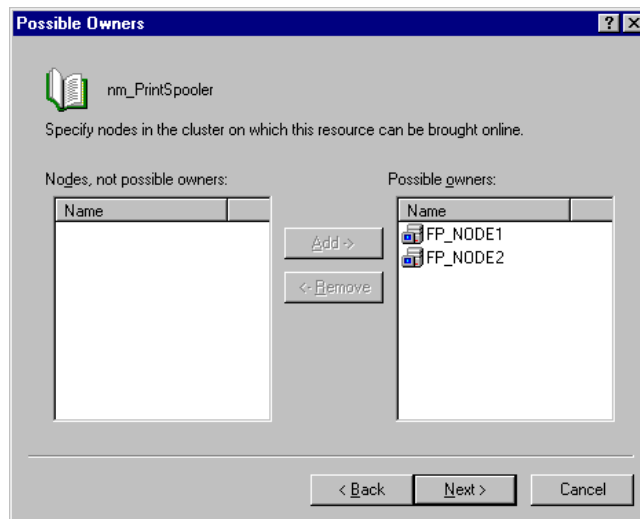


Figure 6-6. Possible Owners Dialog Box

6-8 *Creating the Print Spooler Resources*

8. The only dependency required is the IP Address Resource, **ip_**
PrintSpooler, so move it to **the Resource Dependencies** list box and
click **Next**.

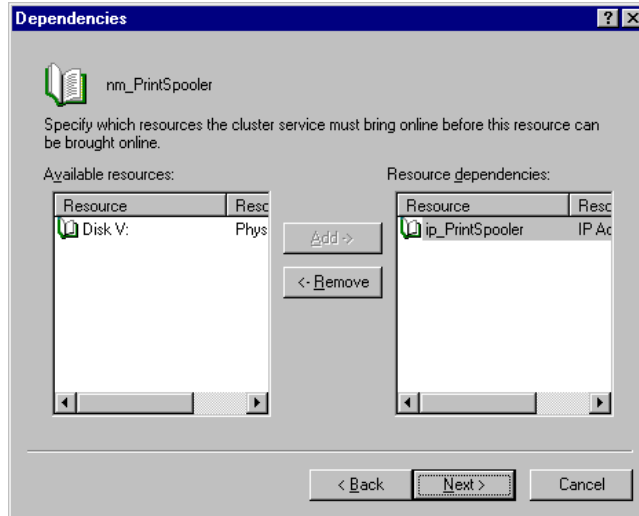


Figure 6-7. Dependencies Dialog Box

9. From the **Network Name Parameters** dialog box, enter a Network name to use.
10. Click **Finish** to complete creating the **Network Name Resource**.

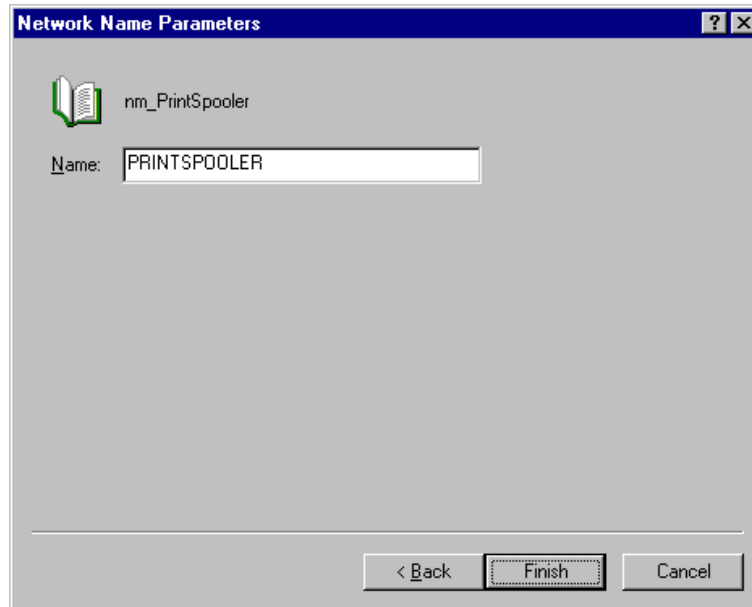


Figure 6-8. Network Name Parameters Dialog Box

Creating the Print Spooler Resource

1. To create the **PrintSpooler Resource**, select the **PrintSpooler** resource group and then click the right mouse button. Select **New → Resource** from the floating menu and the **New Resource** dialog box is displayed.
2. Enter a name, `ps_PrintSpooler`, for the Print Spooler Resource Name.
3. Enter desired text for the **Description**.
4. Select **Print Spooler** for the **Resource Type** from the drop down box.
5. Select **PrintSpooler** for the **Group** from the drop down box.
6. Click **Next** to continue.

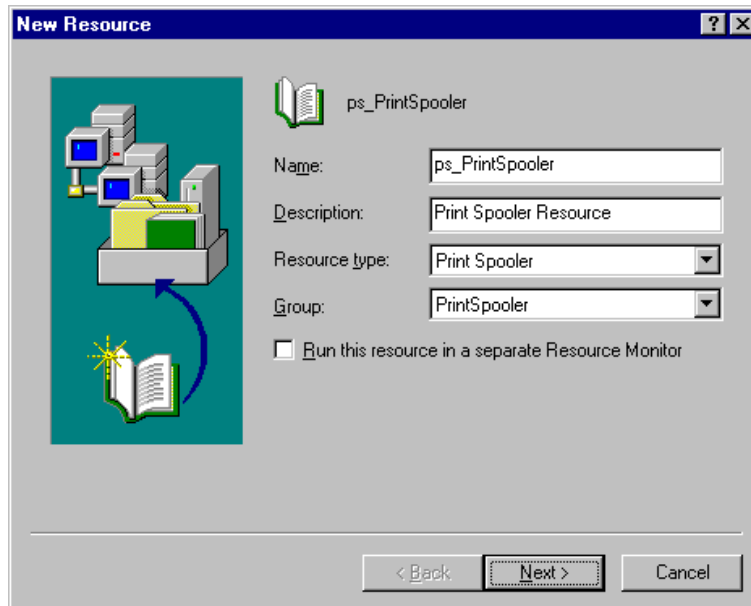


Figure 6-9. New Resource Dialog Box

7. At the **Possible Owners** dialog box, both servers should be in the **Possible Owners** list box. Accept this default and click **Next**.

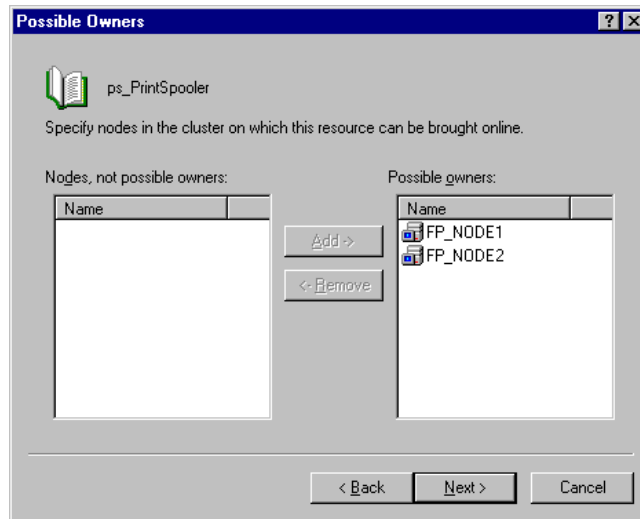


Figure 6-10. Possible Owners Dialog Box

6-12 *Creating the Print Spooler Resources*

8. The **Print Spooler Resource** has several resource dependencies. Move all the resources from the Available Resources list box to the **Resource Dependencies** list box and click **Next**.

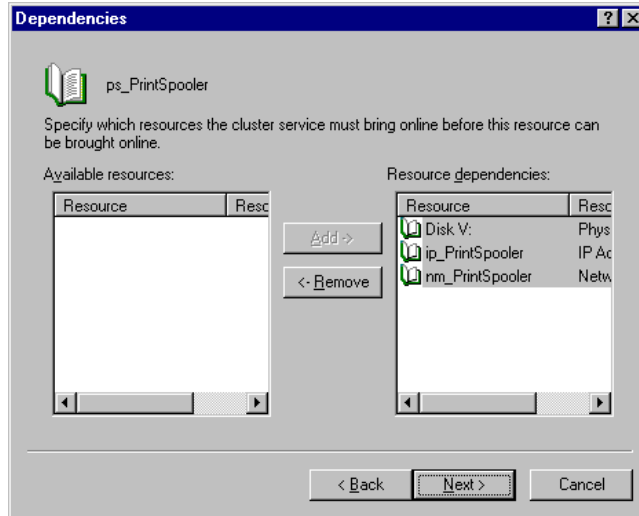


Figure 6-11. Dependencies Dialog Box

9. From the **Print Spooler Parameters** dialog box, enter the path to the spool file on the shared disk.
10. Click **Finish** to complete creating the **Print Spooler Resource**.

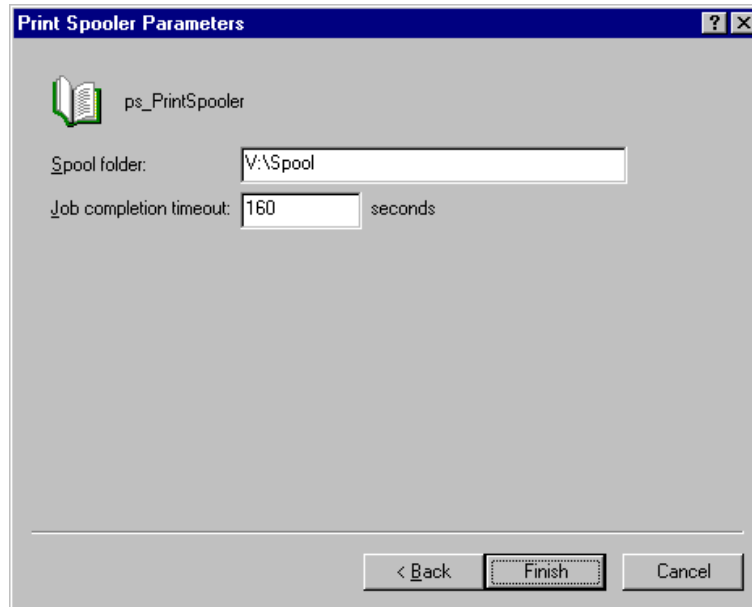


Figure 6-12. Print Spooler Parameters Dialog Box

Chapter 7

Creating the Print Queue

Once the port has been configured, the print queue must be created and administrated using the remote print folder.

1. Select **Start** → **Run**, then enter the Network Name just created.

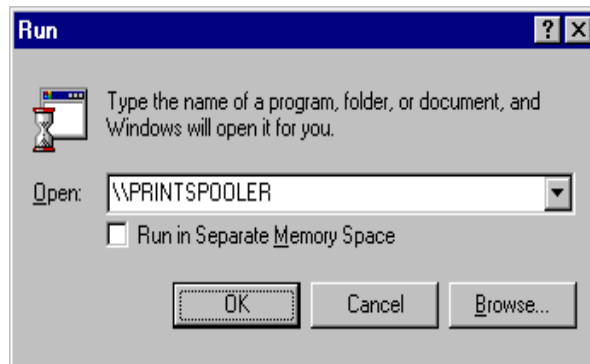


Figure 7-1. Run Dialog Box

2. The following dialog box appears. Double click the “Printers” icon.

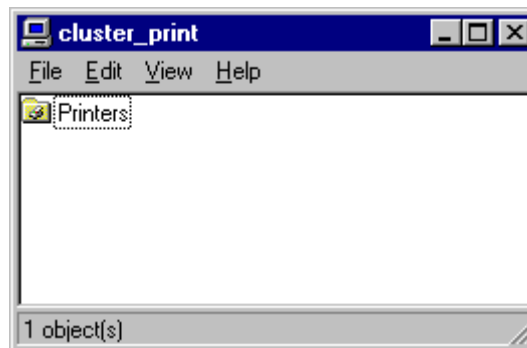


Figure 7-2. nm_PrintSpooler Dialog Box

7-2 Creating the Print Queue

3. Double click "Add Printer".

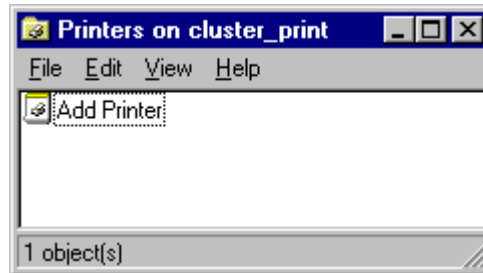


Figure 7-3. Printers on nm_PrintSpooler Dialog Box

4. The Add Printer Wizard returns. There is now a new option in this Wizard, the Remote print server. Click **NEXT**.

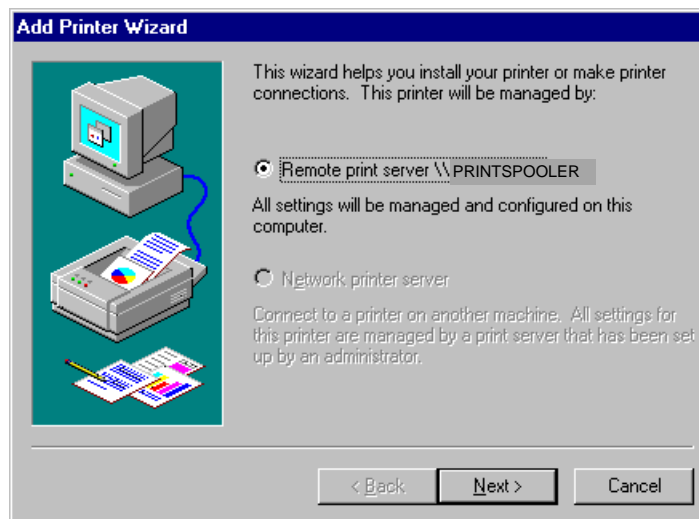


Figure 7-4. Add Printer Wizard Dialog Box - Selecting a Remote Print Server

- The jetdir port should appear on the list. This port is not selected by default. Select it, then click **NEXT**.

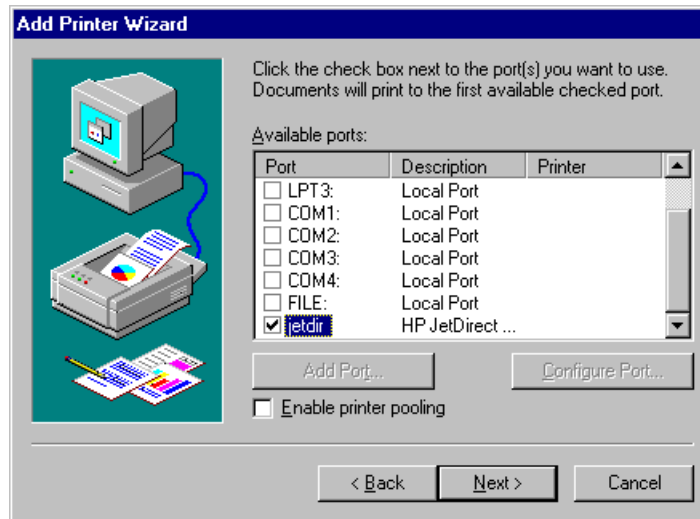


Figure 7-5. Add Printer Wizard Dialog Box - Selecting the Port

- Select the desired Printer, then click **NEXT**.

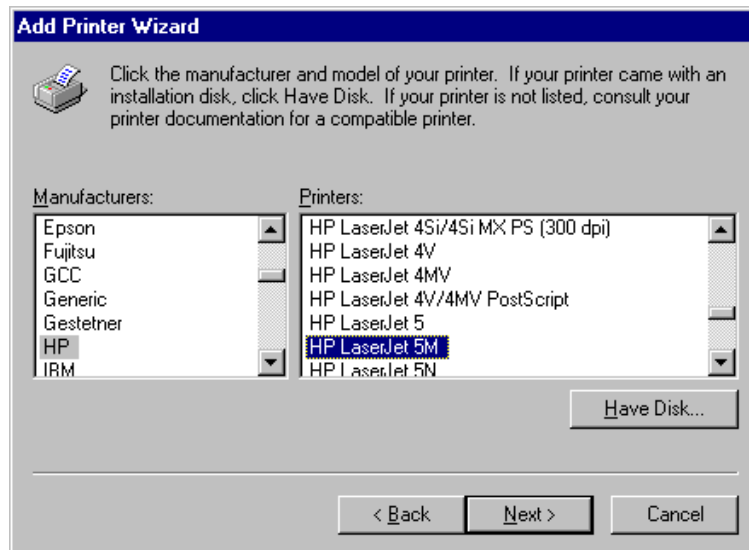


Figure 7-6. Add Printer Wizard Dialog Box - Selecting the Printer

7-4 Creating the Print Queue

7. Click **NEXT** to keep the existing driver, or install the printer driver if needed.



Figure 7-7. Add Printer Wizard Dialog Box - Selecting the Existing Driver

8. Name the printer, then click **NEXT**.

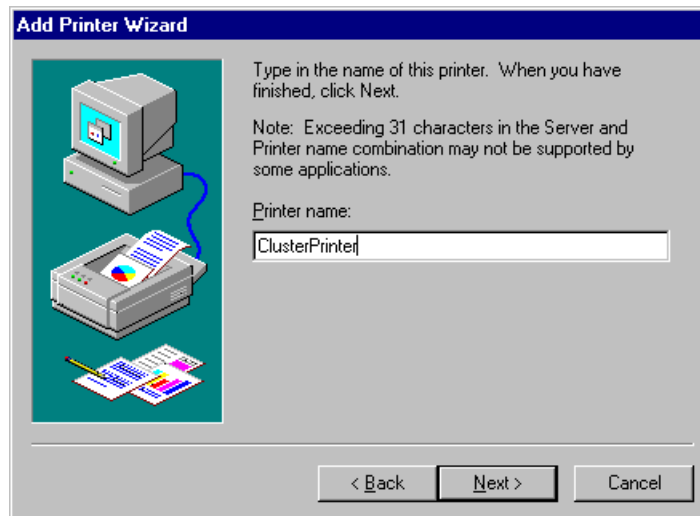


Figure 7-8. Add Printer Wizard Dialog Box - Assigning the Printer Name

9. Set up sharing, if needed.

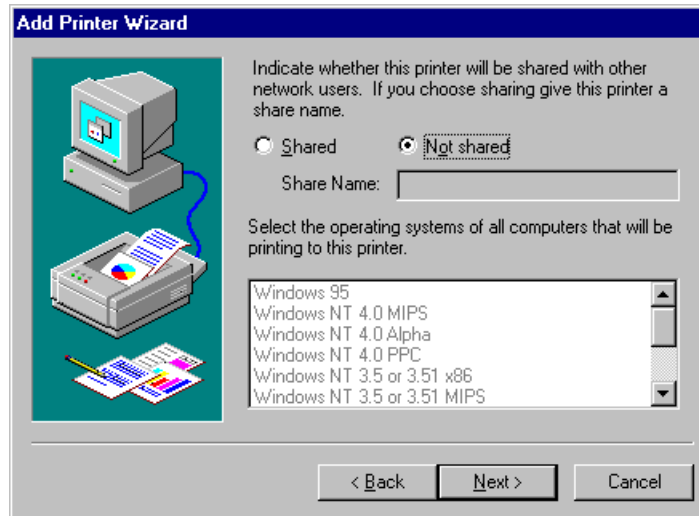


Figure 7-9. Add Printer Wizard Dialog Box - Selecting a Sharing Option

10. Select **YES** to print a test page and verify that everything was installed properly, then click **FINISH**.



Figure 7-10. Add Printer Wizard Dialog Box - Printing a Test Page

7-6 *Creating the Print Queue*

The printer is now added to the PrintSpooler virtual server. To setup clients to use the printer, select **Start** → **Run** → **PrintSpooler** on the clients and they will see the same printer installed.

Note: Clustered print queues are accessed by clients exactly like regular remote print queues. Clients can use either the Network Name or TCP/IP address as the server name. When a print spooler resource is moved or taken offline, Microsoft Cluster Server waits until all jobs that are spooling to the printers are finished.

Chapter 8

Creating the File Share Resources

Creating the FileShare Resource Group

Before creating the resources, the IIS Resource Group must first be created. Start **Cluster Administrator**, select **Disk Group 1** and then click the right mouse button to bring up the floating menu. Select **Rename** and change the name of the resource group from **Disk Group 1** to **FileShare**. Once the resource group has been created, the necessary resources can be created for the group.

Table 8-1
FileShare Group

Resource Group Name	FileShare
Preferred Nodes	FP_NODE1, FP_NODE2
Failover Option	Default
Failback Option	Default

8-2 *Creating the File Share Resources*

Creating the File Share Resources

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

Table 8-2
Resource Group (FileShare)

Physical Disk(s)	V:	V:
IP Address	ip_FileShare	110.110.110.30
Network Name	nm_FileShare	FILESHARE
Resource Type	File Share	File Share

The following section details the configuration of each resource.

Normally, the **Shared Disk Resource** already exists in the cluster and does not have to be created. Copy this resource to the resource group(s) that are created or rename the group where this resource is located.

Creating File Share IP Address Resource

1. To create the **IP Address Resource**, select the **FileShare** resource group and then click the right mouse button. Select **New → Resource** from the floating menu and the **New Resource** dialog box is displayed.
2. Enter a name, `ip_FileShare`, for the IP Address Resource.
3. Enter desired text for the **Description**.
4. Select **IP Address** for the **Resource Type** from the drop down box.
5. Select **FileShare** for the **Group** from the drop down box.
6. Click **Next** to continue.

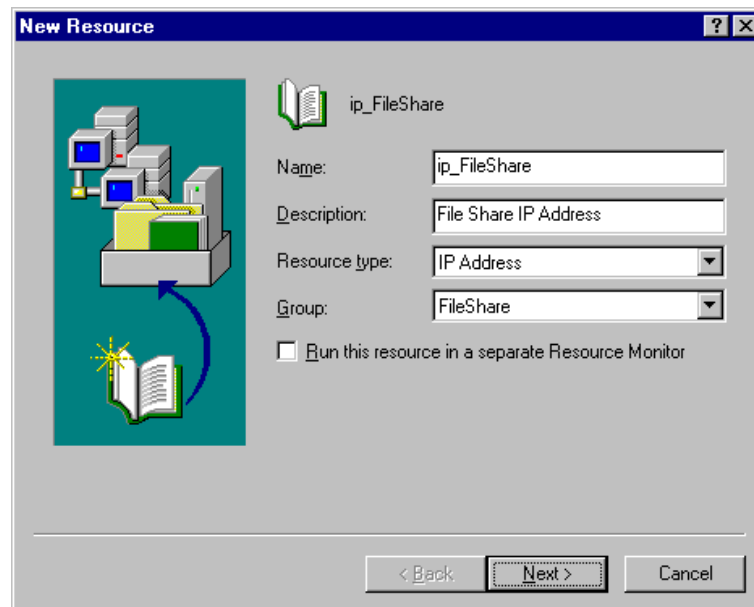


Figure 8-1. New Resource Dialog Box

8-4 Creating the File Share Resources

7. At the **Possible Owners** dialog box, both servers should be in the **Possible Owners** list box. Accept this default and click **Next**.

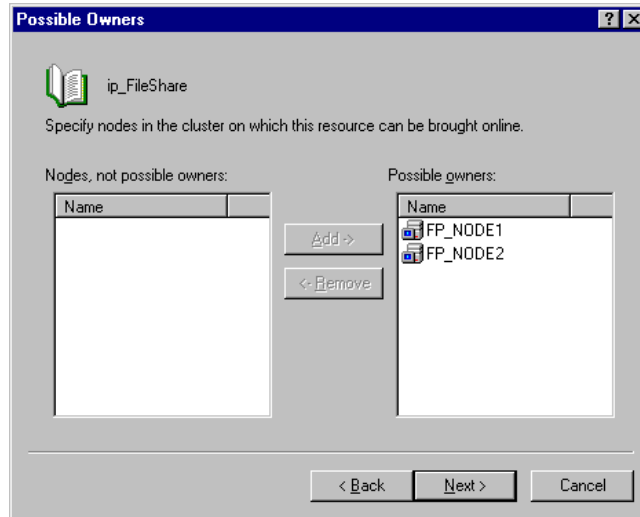


Figure 8-2. Possible Owners Dialog Box

8. There are no dependencies, so accept the defaults in the **Dependencies** dialog box and click **Next**.

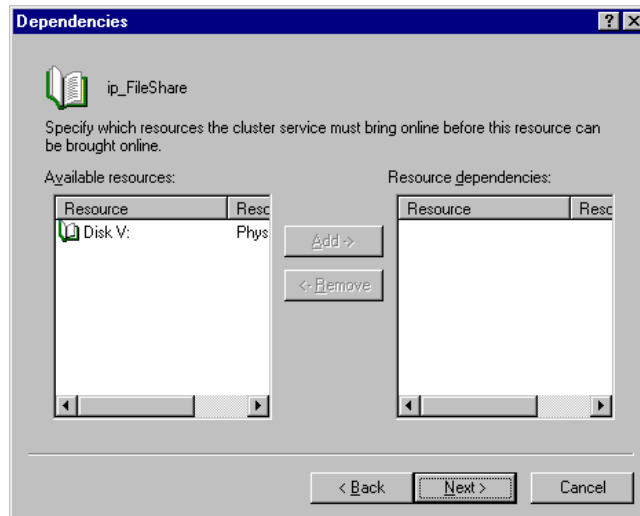


Figure 8-3. Dependencies Dialog Box

9. From the **TCP/IP Address Parameters** dialog box, select the client network as the **Network to use**.
10. Enter the **IP Address** of the cluster.
11. Enter the correct **Subnet Mask**.
12. Click **Finish** to complete creating the **IP Address Resource**.

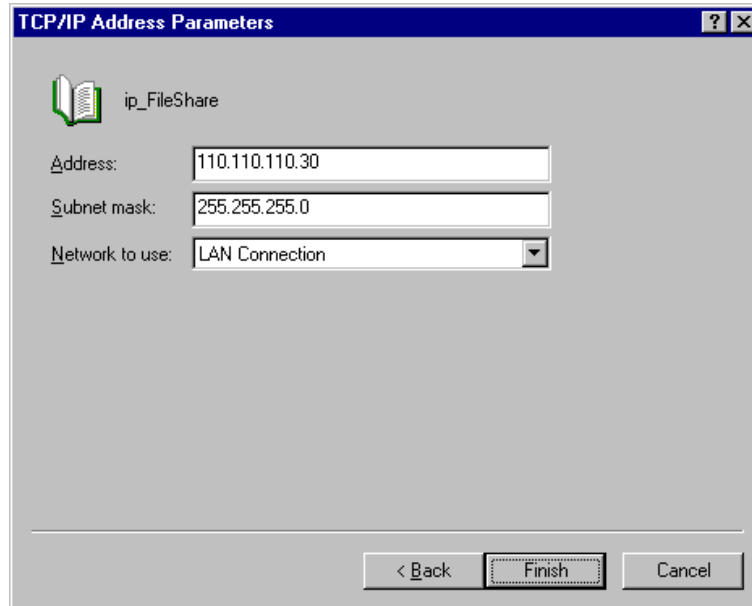


Figure 8-4. TCP/IP Address Parameters Dialog Box

Creating the File Share Network Name Resource

1. To create the **Network Name Resource**, select the **FileShare** resource group and then click the right mouse button. Select **New → Resource** from the floating menu and the **New Resource** dialog box is displayed.
2. Enter a name, nm_FileShare, for the Network Name Resource.
3. Enter desired text for the **Description**.
4. Select **Network Name** for the **Resource Type** from the drop down box.
5. Select **FileShare** for the **Group** from the drop down box.
6. Click **Next** to continue.

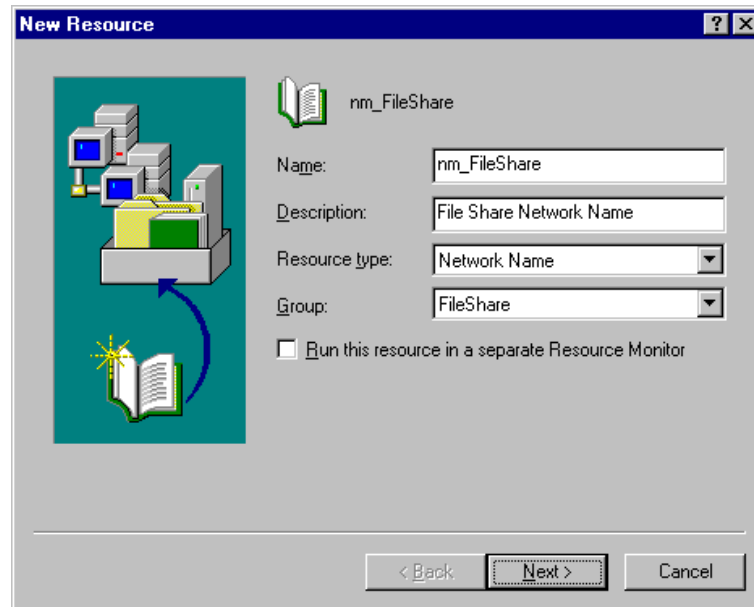


Figure 8-5. New Resource Dialog Box

7. At the **Possible Owners** dialog box, both servers should be in the Possible Owners list box. Accept this default and click **Next**.

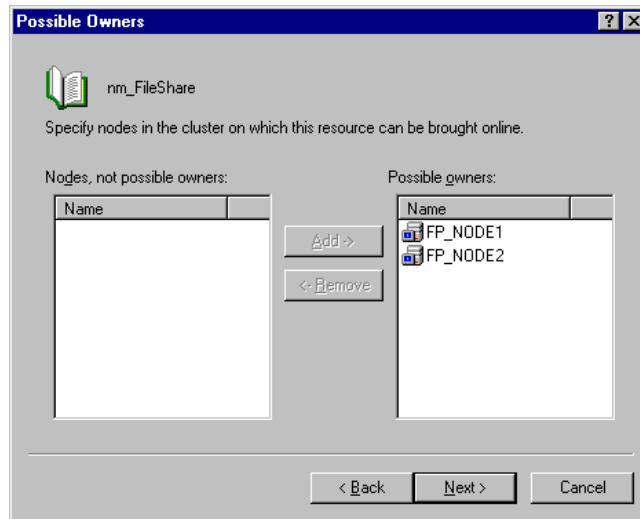


Figure 8-6. Possible Owners Dialog Box

8. The only dependency required is the IP Address Resource, **ip_Test**, so move it to the **Resource Dependencies** list box and click **Next**.

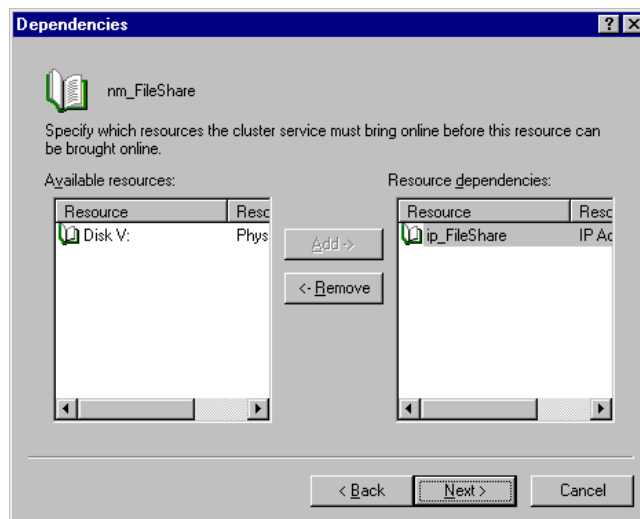


Figure 8-7. Dependencies Dialog Box

8-8 *Creating the File Share Resources*

9. From the **Network Name Parameters** dialog box, enter a Network name to use.
10. Click **Finish** to complete creating the **Network Name Resource**.

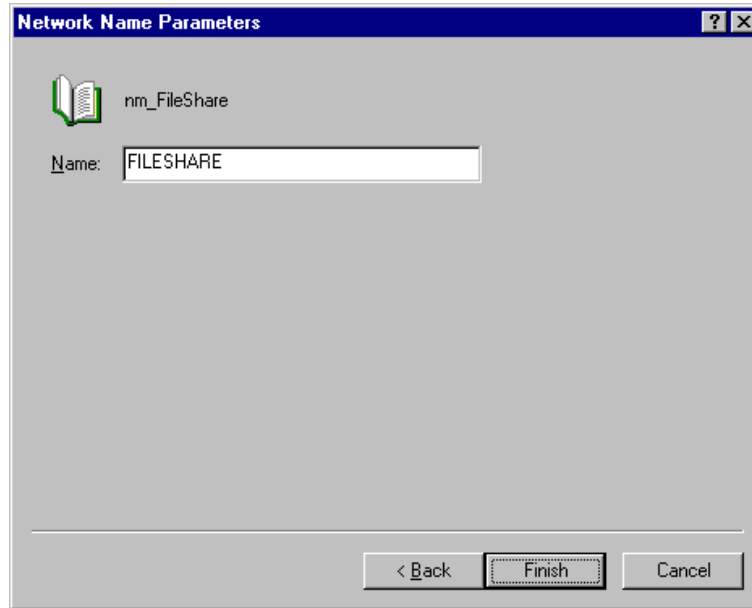


Figure 8-8. Network Name Parameters Dialog Box

Creating the File Share Resource

1. To create the **File Share Resource**, select the **FileShare** resource group and then click the right mouse button. Select **New → Resource** from the floating menu and the **New Resource** dialog box is displayed.
2. Enter a name, fs_FileShare, for the File Share Resource Name.
3. Enter desired text for the **Description**.
4. Select **File Share** for the **Resource Type** from the drop down box.
5. Select **FileShare** for the **Group** from the drop down box.
6. Click **Next** to continue.

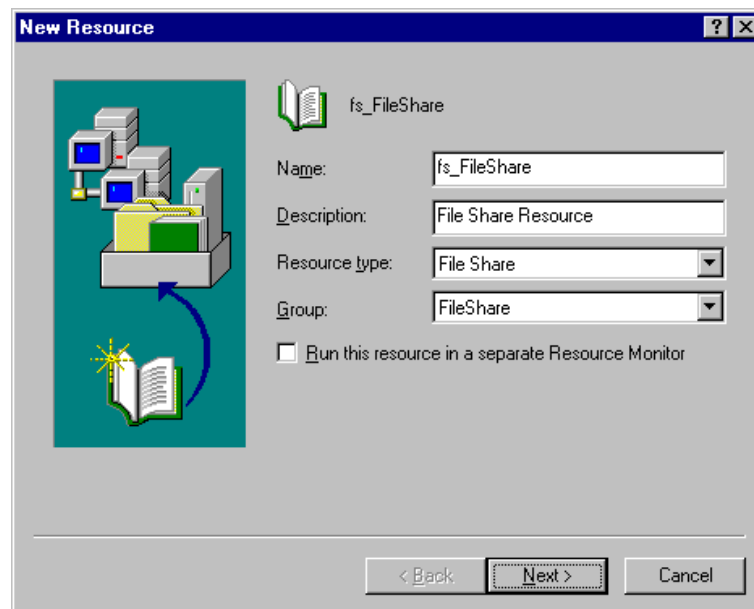


Figure 8-9. New Resource Dialog Box

8-10 *Creating the File Share Resources*

7. At the **Possible Owners** dialog box, both servers should be in the **Possible Owners** list box. Accept this default and click **Next**.

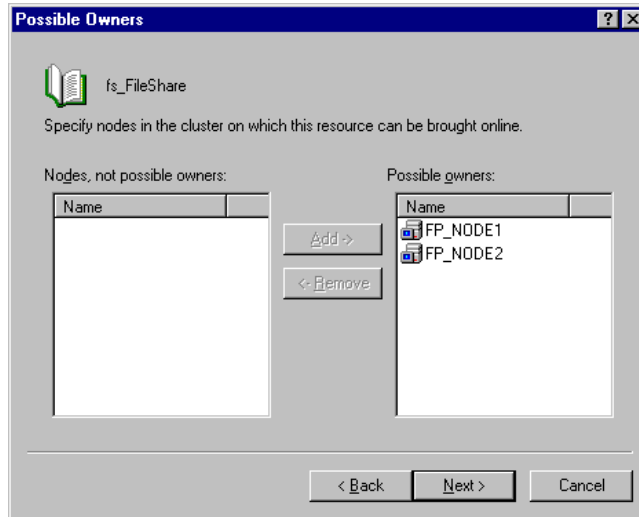


Figure 8-10. Possible Owners Dialog Box

8. The **File Share Resource** has several resource dependencies. Move all the resources from the Available Resources list box to the **Resource Dependencies** list box and click **Next**.

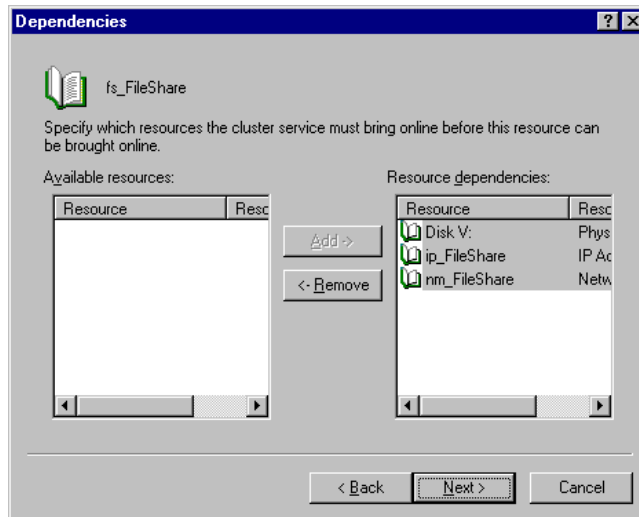


Figure 8-11. Dependencies Dialog Box

9. From the **File Share Parameters** dialog box, enter the name of **File Share** for **Share Name**.
10. Enter the path to the folder created on the shared drive and set the user and group permissions for this share.
11. Use the **Permissions** button to assign the desired users/groups to the file share and to set the desired levels of access to the share.
12. Click **Finish** to complete creating the **File Share Resource**.

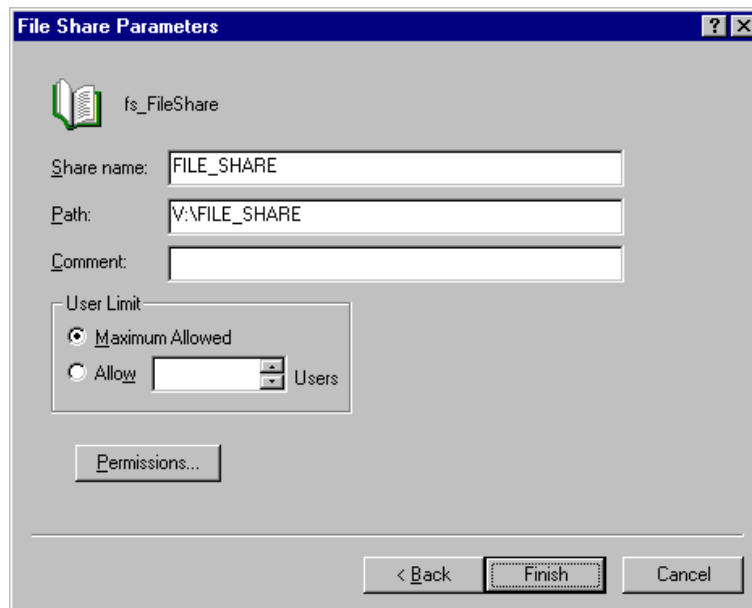


Figure 8-12. File Share Parameters Dialog Box

Chapter 9

Verifying the Failover

To verify that File Share failover is working properly, perform the following steps:

1. Connect to the file share on a client workstation.
2. Open a document.
3. Shutdown one of the two servers.
4. Make sure you can still work with the document.

To verify that the Print Spooler failover is working properly, perform the following steps:

1. Logon on to the Client workstation.
2. Create a document, for example Microsoft Word, Microsoft Excel or Microsoft PowerPoint.
3. Send a print job to the network printer. Make sure that the spooling process is finished.
4. Shutdown one of the two servers. Microsoft Cluster Server recognizes that one server is down and activates the Print Spooler Resource on the other Server.
5. Reprint the document that had been created.

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.

G-2 Glossary

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	<i>See</i> 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.
System	A complete computer system capable of operating independently (either a single processor system or an SMP system), for example, a PC.

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