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EMC Corporation
Hopkinton, Massachusetts 01748-9103
1-508-435-1000 In North America 1-866-464-7381
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As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

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Note
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Purpose
This document describes how to uninstall, update and install the NetWorker software in a cluster environment.

Audience
This document is part of the NetWorker documentation set and is intended for use by system administrators during the installation and setup of NetWorker software in a cluster environment.

Revision history
The following table presents the revision history of this document.

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>January 28, 2015</td>
<td>NetWorker 8.2 SP1 released</td>
</tr>
</tbody>
</table>

Related documentation
The NetWorker documentation set includes the following publications:

- **EMC NetWorker Online Software Compatibility Guide**
  Provides a list of client, server, and storage node operating systems supported by the EMC information protection software versions. You can access the Online Software Compatibility Guide on the EMC Online Support site at support.emc.com. From the Support by Product pages, search for NetWorker using “Find a Product”, and then select the Install, License, and Configure link.

- **EMC NetWorker Administration Guide**
  Describes how to configure and maintain the NetWorker software.

- **EMC NetWorker Cluster Installation Guide**
  Contains information related to configuring NetWorker software on cluster servers and clients.

- **EMC NetWorker Installation Guide**
  Provides information on how to install, uninstall and update the NetWorker software for clients, storage nodes, and servers on all supported operating systems.

- **EMC NetWorker Updating from a Previous Release Guide**
  Describes how to update the NetWorker software from a previously installed release.
• **EMC NetWorker Release Notes**
  Contains information on new features and changes, fixed problems, known limitations, environment and system requirements for the latest NetWorker software release.

• **EMC NetWorker Avamar Devices Integration Guide**
  Provides planning and configuration information on the use of Avamar devices in a NetWorker environment.

• **EMC NetWorker Command Reference Guide**
  Provides reference information for NetWorker commands and options.

• **EMC NetWorker Data Domain Deduplication Devices Integration Guide**
  Provides planning and configuration information on the use of Data Domain devices for data deduplication backup and storage in a NetWorker environment.

• **EMC NetWorker Error Message Guide**
  Provides information on common NetWorker error messages.

• **EMC NetWorker Licensing Guide**
  Provides information about licensing NetWorker products and features.

• **EMC NetWorker Management Console Online Help**
  Describes the day-to-day administration tasks performed in the NetWorker Management Console and the NetWorker Administration window. To view Help, click Help in the main menu.

• **EMC NetWorker User Online Help**
  The NetWorker User program is the Windows client interface. Describes how to use the NetWorker User program which is the Windows client interface connect to a NetWorker server to back up, recover, archive, and retrieve files over a network.

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**Note**
Presents information that is important, but not hazard-related.

**Typographical conventions**
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*Italic*  Use for full titles of publications referenced in text

**Monospace**  Use for:
- System code
- System output, such as an error message or script
- Pathnames, file names, prompts, and syntax
- Commands and options

**Monospace italic**  Use for variables

**Monospace bold**  Use for user input

[ ]  Square brackets enclose optional values

|  Vertical bar indicates alternate selections - the bar means “or”
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CHAPTER 1

Introduction

This document describes how to configure and use the NetWorker software in a clustered environment. This guide also provides cluster specific information that you need to know before you install NetWorker on a clustered host. You must install the NetWorker software on each physical node in a cluster.

This guide does not describe how to install the NetWorker software. The *EMC NetWorker Installation Guide* describes how to install the NetWorker software on supported operating systems. You can configure the NetWorker software in a cluster in one of the following ways:

- **Stand-alone application** .......................................................... 14
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- **Highly available application** ..................................................... 14
Stand-alone application

When you install the NetWorker server, storage node, or client software as a stand-alone application, the required daemons run on each node. When the NetWorker daemons stop on a node, the cluster management software does not restart them automatically.

In this configuration:

- NetWorker does not know which node owns the shared disk. To ensure that there is always a backup of the shared disks, you must configure a NetWorker client resource for each physical node to back up the shared and local disks.
- Shared disk backups will fail for each physical node that does not own or control the shared disk.
- NetWorker writes client file index entries for the shared backup to the physical node that owns the shared disk.
- To recover data from a shared disk backup, you must determine which physical node owned the shared disk at the time of backup.

Cluster-aware application

On supported operating systems, when you configure a cluster-aware NetWorker client or server, all required daemons run on each physical node. When the NetWorker daemons stop on a node, the Cluster Management software does not restart them automatically.

A cluster-aware NetWorker application determines path ownership of the virtual applications that run in the cluster. This allows the NetWorker software to back up the shared file system and write the client file index entries for the virtual client.

When you configure a cluster-aware NetWorker application, you must:

- Create a NetWorker client resource for the virtual node in the cluster to back up the shared disk.
- Create a NetWorker client resource for each physical node to back up the local disks.
- Select the virtual node to recover data from a shared disk backup.

Highly available application

On supported operating systems, you can configure the NetWorker server software as a highly available application. A highly available NetWorker server is also called a NetWorker virtual server.

When the NetWorker server software is a highly available application:

- The active node runs the NetWorker server daemons and accesses the global /nsr directory on the shared drive.
- The passive nodes run the NetWorker client daemon, nsrexecd.
- When a failover occurs, the new active node runs the NetWorker server daemons.
- The NetWorker virtual server uses the IP address and hostname of the NetWorker virtual host, regardless of which cluster node owns the NetWorker server application.
- NetWorker determines path ownership of the virtual applications that run in the cluster. This allows the NetWorker software to back up the shared file system and write the client file index entries for the virtual client.

When you configure a highly available NetWorker server, you must:
• Create a NetWorker client resource for the virtual node in the cluster to back up the shared disk.
• Create a NetWorker client resource for each physical node to back up the local disks.
• Select the virtual node to recover data from a shared disk backup.

The following figure provides an example of a highly available NetWorker server in a general cluster configuration consisting of two nodes and one virtual server. In this illustration:

• Node 1, _clus_phy1_, is a physical node with local disks.
• Node 2, _clus_phy2_, is a physical node with local disks.
• Virtual Server, _clus_vir1_:
  ▪ Owns the shared disks. A volume manager manages the shared disk.
  ▪ Can fail over between Node 1 and Node 2. However, the NetWorker server software only runs on one node at a time.

**Figure 1** Highly-available NetWorker server
Introduction
CHAPTER 2

Configuring the Cluster

This chapter describes how to prepare for a NetWorker installation on a cluster and how to configure NetWorker on each cluster. Perform these steps after you install the NetWorker software on each physical node.

The steps to install and update the NetWorker software in a clustered environment are the same as installing and updating the software in a non-clustered environment. The *EMC NetWorker Installation Guide* describes how to install NetWorker on each supported operating system.

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Prepare to install NetWorker on a cluster

This section provides general information to review before you install the NetWorker software on the nodes in a cluster.

- On all supported cluster platforms, ensure that the cluster services start before the NetWorker services start. If the cluster services start after the NetWorker services start, then the NetWorker software exhibits undesirable behavior.
- Ensure that the physical and virtual node names are resolvable in Domain Name System (DNS) or by using a hosts file.
- Ensure that the output of the hostname command on each physical node corresponds to an IP address that can be pinged.
- You can publish the virtual host name in the DNS or Network Information Services (NIS).
- Install the most recent cluster patch for the operating system.
- Install the NetWorker software in the same location on a private disk, on each cluster node.
- Connect a dedicated shared disk and file system to each node within the cluster. The NetWorker software creates a directory on the shared disk. If the client resource for a virtual client is not properly configured in NetWorker server, then the backup of the shared drives will fail.

AutoStart

This section describes how to prepare the AutoStart cluster before you install the NetWorker software. This section also describes how to configure the NetWorker server software as a highly available application and the NetWorker client as a cluster-aware application, after you install the NetWorker software on each physical node of the cluster.

The NetWorker Installation Guide describes how to install the NetWorker software.

Note

This section does not apply when you install NetWorker as a stand-alone application.

Prepare to install NetWorker on AutoStart

Review this section before you install the NetWorker software on an AutoStart cluster.

- Always run two primary controllers. Use the AutoStart Console to promote at least one secondary node to the primary. If one node fails, then the other node automatically comes online with all of the data. The AutoStart documentation provides detailed instructions.
- AutoStart for Windows only:
  - On one node, create a folder for the managed, shared disk. For example, s:\nsr. Do not share the folder. If the AutoStart software is already installed and a managed shared disk already exists, then remove the share property. The NetWorker software installation fails when the share property exists.
  - For each physical node in the cluster, ensure that the AutoStart Console user account, NT AUTHORITY\SYSTEM, has local administrator access.
AutoStart for UNIX only, on each node, set the `FT_DIR`, `FT_DOMAIN`, and the `FT_CONSOLE_DIR` environment variables for the root account.

The following table describes how to define the environment variables for each operating system.

**Table 2 Environment variables for a highly available NetWorker server**

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Commands</th>
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| AIX              | FT_DIR=/usr/lpp/LGTOaam51  
FT_CONSOLE_DIR=${FT_DIR}/console  
FT_DOMAIN=domain_name  
export FT_DIR FT_DOMAIN FT_CONSOLE_DIR |
| HP-UX            | FT_DIR=/opt/EMCas###  
FT_CONSOLE_DIR=${FT_DIR}/console  
FT_DOMAIN=domain_name  
export FT_DIR FT_DOMAIN FT_CONSOLE_DIR |
| Linux            | FT_DIR=/opt/EMCas###  
FT_CONSOLE_DIR=${FT_DIR}/console  
FT_DOMAIN=domain_name  
export FT_DIR FT_DOMAIN FT_CONSOLE_DIR |
| Solaris          | FT_DIR=/opt/EMCas###  
FT_CONSOLE_DIR=${FT_DIR}/console  
FT_DOMAIN=domain_name  
export FT_DIR FT_DOMAIN FT_CONSOLE_DIR |

**Configuring NetWorker on AutoStart for UNIX**

This section describes how to configure the NetWorker server software as a highly available application and the NetWorker client software as a cluster-aware application on AutoStart for UNIX.

**Configuring a cluster-aware NetWorker client**

A cluster-aware NetWorker client is aware of the clustered IP address and shared file systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client, which allows you to create a client resource for the virtual node.

**Before you begin**

Perform the following steps on each physical node as the root user.

**Procedure**

1. Run the cluster configuration script `/networker_install_path/networker.cluster`.

2. At the **Enter directory where local NetWorker database is installed [/nsr]** prompt, specify the location of the local NetWorker database directory that you provided during install. For example: `/nsr`
3. At the Do you wish to configure for both NetWorker server and client? Yes or No [Yes]? prompt, type No.

Configuring a highly available NetWorker server

To configure a highly available NetWorker server, you must configure each active node and each passive node.

Configuring the active node in a UNIX AutoStart cluster

Before you begin

Perform the following steps on the active node as the root user.

Procedure

1. Run the cluster configuration script /networker_install_path/networker.cluster.
2. At the Enter directory where local NetWorker database is installed [/nsr]? prompt, specify the location of the local NetWorker database directory that you provided during install. For example: /nsr.
3. At the Do you wish to configure for both NetWorker server and client? Yes or No [Yes]? prompt, type Yes.
4. At the Do you wish to add now the site-specific values for: NSR_SHARED_DISK_DIR and NSR_SERVICE_ID Yes or No [Yes]? prompts, type Yes to ensure compatibility with other cluster environments.
5. At the Enter the Logical Hostname to be used for NetWorker? prompt, specify the published logical hostname of the highly available NetWorker server. For example: clus_vir1.
6. At the In what path will this nsr directory be created/located? prompt, specify the pathname of the globally mounted /nsr directory.

Note

To change the configuration at a later time, run the lc_config.exe -r option then run lc_config.exe again.

7. Stop the NetWorker daemons:

    nsr_shutdown

8. Edit the networker_install_path/nw_ux.lc.aam5.imp file and modify these fields with the appropriate values for the cluster configuration:

   • Virtual hostname
   • Physical cluster node names
   • Shared drive letter

Note

The #NW customise label tag appears before each field that requires modification.

9. To create the NetWorker resource group, run the ftcli command from within the networker_install_path:

   • AIX: $FT_DIR/bin/ftcli -c “import/usr/bin/nw_ux.lc.aam5.imp”
   • HPUX: $FT_DIR/bin/ftcli -c “import /opt/networker/bin/nw_ux.lc.aam5.imp”
If you use LVM software, then the AutoStart application requires two data sources: one to activate the volume group (/dev/vg03) and one to mount the shared mount point (/vg_nsr on /dev/vg03/lvol1).

- **Linux:**
  ```
  $FT_DIR/bin/ftcli -c "import /usr/sbin/nsr/nw_ux.lc.aam5.imp"
  ```
- **Solaris:**
  ```
  $FT_DIR/bin/ftcli -c "import /usr/sbin/nw_ux.lc.aam5.imp"
  ```

10. Use the **AutoStart Management Console** to verify that the import of the NetWorker resource group completed correctly.

11. Run the **networker_install_path/nwinst.sh** script file.

12. For AIX only, on each node that you can attach the logical volume to, ensure that the logical volume mount point value defined in /etc/filesystems file and in the **FullTime AutoStart Resource group** are the same.

### Note
To modify the logical volume mount point in the /etc/filesystems file, type:
```
chfs -n new_mountpoint old_mountpoint
```

13. Start the NetWorker daemons.

#### Configuring the passive node in a UNIX AutoStart cluster

**Before you begin**

Perform the following steps on each passive node as the root user.

**Procedure**

1. Run the cluster configuration script **/networker_install_path/networker.cluster**.

2. At the **Enter directory where local NetWorker database is installed [/nsr]?** prompt, specify the location of the local NetWorker directory that you provided during install. For example: /nsr.

3. At the **Do you wish to configure for both NetWorker server and client? Yes or No [Yes]?** prompt, type Yes.

4. At the **Do you wish to add now the site-specific values for: NSR_SHARED_DISK_DIR and NSR_SERVICE_ID Yes or No [Yes]??** prompts, type Yes to ensure compatibility with other cluster environments:

5. At the **Enter the Logical Hostname to be used for NetWorker?** prompt, specify the published logical hostname of the highly available NetWorker server. For example: clus_vir1.

6. At the **In what path will this nsr directory be created/located?** prompt, specify the pathname of the globally mounted /nsr directory.
Configuring NetWorker on AutoStart for Windows

This section describes how to configure the NetWorker server software as a highly available application and the NetWorker client software as a cluster-aware application on AutoStart for Windows.

Configuring a cluster-aware NetWorker client

A cluster-aware NetWorker client is aware of the clustered IP address and shared file systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client, which allows you to create a client resource for the virtual node.

Before you begin

Perform the following steps on each physical node as the administrator user.

Procedure

1. Run the `networker_install_path\lc_config` script.
2. At the `Enter shared nsr dir` prompt, specify the path name to the shared nsr directory.
3. At the `Enter the EMC Fulltime AutoStart domain name` prompt, specify the domain name for the AutoStart server.
4. At the `Is this OK [y/n]` prompt, type `y` to confirm that the information is correct.

Configuring a highly available NetWorker server

To configure a highly available NetWorker server, you must configure each active node and each passive node.

Configuring the active node in a Windows AutoStart cluster

Perform the following steps on the active node as the administrator user.

Procedure

1. Run the `networker_install_path\lc_config` script.
2. At the `Enter shared nsr dir` prompt, specify the path name to the shared nsr directory.
3. At the `Enter the EMC Fulltime AutoStart domain name` prompt, specify the domain name for the AutoStart server. For example: `galaxy`.
4. At the `Is this OK [y/n]` prompt, type `y` to confirm that the information is correct.
5. Stop the `NetWorker Backup and Recover Server` services.
6. Edit the `networker_install_path\nw_nt.aam5.imp` file and modify these fields with the appropriate values for the cluster configuration:
   - Virtual hostname
   - Physical cluster node names
   - Shared drive letter

Note

The `#NW customise label` tag appears before each field that requires modification.
7. To create the NetWorker resource group, run the `ftcli` command from within the `networker_install_path` directory:

```
"C:\Program Files\EMC\AutoStart\galaxy\bin\ftcli" -d AutoStart_domain_name -c "import nw_nt.lc.imp"
```

For example:

```
C:\Program Files\EMC NetWorker\nsr\bin>"C:\Program Files\EMC\AutoStart\galaxy\bin\ftcli" -d galaxy -c "import nw_nt.aam5.imp"
```

IP Address "guiro" Created
Process Class "nsrd" Created
Process "NSRserver" Created
Configuration "NSRserver" Created
Process Class "nsrexecd" Created
Process "NSRexecd" Created
Configuration "NSRexecd" Created
Data Source "networker_ds" Created
Resource Group "networker" Created
OK

8. Use the AutoStart Console to:
   a. Verify that the import of the NetWorker Server resource completed correctly.
   b. Share the managed shared disk (for example, s:\nsr).
   c. Bring the NetWorker virtual server online.
   d. Select the disk that the NetWorker virtual server will use as storage. Choose a disk that each physical node in the cluster manages as shared storage.
   e. Ensure that the AutoStart Management Console program manages the `networker_ds` data source for the NetWorker virtual server.

   **Note**
   The NetWorker resource group defines the data source for the NetWorker virtual server.

9. Run the `networker_install_path\nwinst.bat` script.

   The `nwinst.bat` script generates AutoStart warning messages similar to the following:

   ```
   ```

   These messages do not indicate a problem and you should ignore them.

10. Start the NetWorker Backup and Recover Server service.

**Configuring the passive node in a Windows AutoStart cluster**

Perform the following steps on each passive node, as the root user.

**Procedure**

1. Run the `networker_install_path\lc_config` script.
2. At the Enter shared nsr dir prompt, specify the pathname to the shared nsr directory.
3. At the Enter the EMC Fulltime AutoStart domain name prompt, specify the domain name for the AutoStart server.
4. At the Is this OK [y/n] prompt, type y to confirm that the information is correct.

AIX HACMP/PowerHA SystemMirror

This section describes how to prepare the AIX HACMP/PowerHA SystemMirror cluster before you install the NetWorker software. This section also describes how to configure the NetWorker server software as a highly available application and the NetWorker client as a cluster-aware application, after you install the NetWorker software on each physical node of the cluster.

The NetWorker Installation Guide describes how to install the NetWorker software.

Note

This section does not apply when you install NetWorker as a stand-alone application.

Preparing to install NetWorker on HACMP/PowerHA SystemMirror

Review this section before you install the NetWorker software on HACMP/PowerHA SystemMirror.

- To back up a physical client:
  - Each node requires persistent IPs or an extra NIC that is configured outside of the control of the HACMP environment.
  - NetWorker requires an address that uniquely connects to a physical client. The service and boot addresses of HACMP for AIX do not meet this requirement because a cluster configured with IP address takeover (IPAT) replaces the boot address with the service address, when a resource group is attached.

- Define a service IP label for the NetWorker virtual server.

- If you use IP address takeover (IPAT) and you do not define a resource group, then you must use the boot address to connect to the host. Service addresses are associated with a resource group, not physical nodes.

- Set the hostname to the name equivalent to the address that the dedicated NIC of the physical client uses. Configure this NIC as the primary network adapter, for example, en0. A highly available NetWorker server does not require an extra NIC outside of the control of HACMP/PowerHA SystemMirror.

- Service addresses are associated with a resource group, not physical nodes. The output of the hostname command on a computer must correspond to a pingable IP address. If you use persistent IP or dedicated NIC, you must use the primary network adapter (for example, en0).

Configuring a cluster-aware NetWorker client

A cluster-aware NetWorker client is aware of the clustered IP address and shared file systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client, which allows you to create a client resource for the virtual node.

Before you begin

Perform the following steps on each physical node as the root user.
Configuring a highly available NetWorker server

To configure a highly available NetWorker server, you must configure each active node and each passive node.

Before you begin

Perform the following steps on each physical node as the root user.

Procedure

1. Run the cluster configuration script /usr/sbin/networker.cluster.
2. At the Do you wish to continue? [Yes]? prompt, type Yes.
3. At the Enter directory where local NetWorker database is installed [/nsr]? prompt, specify the location of the local NetWorker database directory that you provided when you installed NetWorker. For example: /space/nsr.
4. At the Do you want to configure NetWorker virtual server?[y/n] prompt, type Yes.
5. At the Do you wish to add now the site-specific values for: NSR_SHARED_DISK_DIR and NSR_SERVICE_ID Yes or No [Yes]? prompt, type Yes to ensure compatibility with other cluster environments.
6. In the Enter the published Service IP Label to be used for NetWorker? prompt, type the hostname of the virtual node. For example, clus_vir1.
7. In the In what path will this nsr directory be created/located? specify the shared nsr mount directory. For example /nsr_shared_mnt_pt.

Note

To change the configuration at a later time, run the lc_config.exe -r option then run lc_config.exe again.

8. Verify that the following values are set:

   NSR_SERVERHOST = virtual_hostname
   NSR_SHARED_DISK_DIR = shared_nsr mount_directory

For example:

   NSR_SERVERHOST = clus_vir1
   NSR_SHARED_DISK_DIR = /nsr_shared_mnt_pt

9. Create a NetWorker application server resource:

   a. From a command prompt, type: smit hacmp

   b. From the main smit window, select these options:

      • For HACMP: Cluster Configuration > Cluster Resource > Define Application Server > Add an Application Server.
• For PowerHA: Cluster Applications and Resources > Resources > Configure User Applications (Scripts and Monitors) > Application Controller Scripts > Add Application Controller Scripts

c. Specify the following values:

```
Server name: networker
Start script: /usr/bin/nw_hacmp.lc start
Stop script: /usr/bin/nw_hacmp.lc stop
```

10. Configure a NetWorker resource group for the NetWorker server. Include the following resources:

- Application Server or Application Controllers
- Disks or Volume Groups
- Service IP or Service IP Labels/Addresses

The HACMP/PowerHA for AIX documentation describes how to define and monitor a resource group in an HACMP/PowerHA for AIX environment.

11. Create a NetWorker application monitor:

- For PowerHA: Select Cluster Applications and Resources > Resources > Configure User Applications (Scripts and Monitors) > Application Monitors > Configure Process Application Monitors > Add a Process Application Monitor.

12. Configure the Application Monitor attributes as follows:

- Application Controller(s) to Monitor: networker
- Monitor Mode: long-running monitoring
- Processes to Monitor: nsrd nsrindexd nsrmmdbd nsrjobd nsrexecd
- Process Owner: root
- Instance Count: 1
- Stabilization Interval: 200
- Restart Count: 3
- Restart Interval: 660
- Action on Application Failure: notify
- Cleanup Method: /usr/bin/nw_hacmp_clean
- Restart Method: /usr/bin/nw_hacmp_start

---

**Note**

Adjust the Stabilization Interval, the Restart Count, and the Restart Interval attributes according to the requirements of the environment.

---

13. To enable a scheduled backup of raw volumes that are owned by a resource group (virtual client), perform the following steps:

a. Under Volume Groups in the resource group configuration, ensure that the volume group to which the logical volume belongs appears.

b. Use the `chlv` command to set the logical volume type to `raw`:

```
chlv -t 'raw' logical_volume_name
```
The NetWorker software does not support the use of raw volumes for concurrent access.

**HP MC/ServiceGuard**

This section describes how to prepare the HP MC/ServiceGuard cluster before you install the NetWorker software. This section also describes how to configure the NetWorker server software as a highly available application and the NetWorker client as a cluster-aware application, after you install the NetWorker software on each physical node of the cluster.

The *NetWorker Installation Guide* describes how to install the NetWorker software.

This section does not apply when you install NetWorker as a stand-alone application.

### Preparing to install NetWorker on MC/ServiceGuard

Review this section before you install the NetWorker software on MC/ServiceGuard.

- NetWorker 8.0 and later does not support an MC/ServiceGuard NetWorker server running on the PA_RISC architecture. The *NetWorker Online Software Compatibility Guide* provides the most up-to-date information about software requirements.
- To ensure the cluster services automatically start after a reboot, set the `AUTOSTART_CMCLD=1` value in the `/etc/rc.config.d/cmcluster` file.
- For HP-UX11.11/ServiceGuard11.16 only, perform the following steps to ensure that the NetWorker daemons start:
  1. Edit the `/opt/networker/bin/nsr_mk_cluinfo.sg`
  2. Search for the following line:
     ```
     FS=`cmgetconf -v 0 -p ${pkg_name}
     ```
  3. Remove the `0` from the `-v` option:
     ```
     FS=`cmgetconf -v -p ${pkg_name}
     ```
  4. Save the file.

### Configuring the NetWorker on MC/ServiceGuard

After you install the NetWorker software on each physical node, you can use the LC integration framework method or the non-LC integration framework method to configure the NetWorker software.

The benefits of using the LC integration framework method include:

- Support for multiple IPs in one package.
- Support for the lcmap caching mechanism.
- Does not require the creation and configuration of the `NetWorker.clucheck` and `.nsr_cluster` files. The configuration process automatically creates and uses the `nsr_mk_cluinfo` and `lcmap` files in the `/opt/networker/bin` directory.
Non-LC integration framework method only - creating configuration files

This section describes how to create the configuration files that the non-LC integration framework method requires when you configure the NetWorker package in the cluster.

Procedure

1. On the active node, create the NetWorker.clucheck and .nsr_cluster file in the /etc/cmcluster directory.
   
   For example:
   
   ```
   touch /etc/cmcluster/NetWorker.clucheck
   touch /etc/cmcluster/.nsr_cluster
   ```

2. Define the mount points that the MC/ServiceGuard or MC/LockManager package owns in the .nsr_cluster file. Include the NetWorker shared mount point.
   
   For example:
   
   ```
   pkgname:published_ip_address:owned_path[:...]
   ```

   where:
   
   - `published_ip_address` is the IP address assigned to the package that owns the shared disk. Enclose IPv6 addresses in square brackets. You can enclose IPv4 addresses in square brackets, but it is not necessary.
   - `owned_path` is the path to the mount point. Separate additional paths with a colon.

   For example:
   
   - IPv6 address:
     
     ```
     networker:[3ffe:80c0:22c:74:230:6eff:fe4c:2128]:/share/nw
     ```
   - IPv4 address:
     
     ```
     networker:192.168.109.10:/share/nw
     ```

3. Copy the NetWorker.clucheck and .nsr_cluster file to the /etc/cmcluster directory, on each passive node.
Configuring a cluster-aware NetWorker client

A cluster-aware NetWorker client is aware of the clustered IP address and shared file systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client, which allows you to create a client resource for the virtual node.

Before you begin
Perform the following steps on each physical node as the root user.

Procedure

1. To define the resource types that the NetWorker software requires, run the cluster configuration script file /opt/networker/bin/networker.cluster.
2. At the Do you wish to continue? [Yes]? prompt, type Yes.
3. At the Enter directory where local NetWorker database is installed [/nsr]? prompt, specify the location of the local NetWorker database directory provided during the install procedure.
4. At the Do you wish to use the updated NetWorker integration framework? Yes or No [Yes]? prompt:
   - To use the non-LC integration method, type No.
   - To use the LC integration method, type Yes.
5. At the Do you wish to configure for both NetWorker server and client? Yes or No [Yes] prompt, type No.

Configuring a highly available NetWorker server

To configure a highly available NetWorker server, you must configure each active node and each passive node.

Configuring a highly available NetWorker server on the Active node

Before you begin
Perform the following steps on the active node as the root user.

Procedure

1. To define the resource types that the NetWorker software requires, run the cluster configuration script file /opt/networker/bin/networker.cluster.
2. At the Do you wish to continue? [Yes]? prompt, type Yes.
3. At the Enter directory where local NetWorker database is installed [/nsr]? prompt, specify the location of the local NetWorker database directory provided during the install procedure.
4. At the Do you wish to use the updated NetWorker integration framework? Yes or No [Yes]? prompt:
   - To use the non-LC integration method, type No.
   - To use the LC integration method, type Yes.
5. At the Do you wish to configure for both NetWorker server and client? Yes or No [Yes] prompt, type Yes.
6. At the Select the type of package for the NetWorker Server(1-modular or 2-legacy) [2]? prompt, type 1 for the modular mode and 2 for legacy mode.
7. At the Do you wish to generate a new control file for NetWorker package [No]? prompt, type Yes
8. At the Enter the IP address to use to monitor this package? prompt, type the IP address of the NetWorker server package.

9. At the Enter the IP subnet to monitor for this package? prompt, type the subnet for the IP address of the NetWorker server package.

10. At the Enter the DNS name for NetWorker service? prompt, type the hostname associated with the IP address of the NetWorker server package.

11. At the Select which Volume Management will be used for the disk resource (1-LVM or 2-VxVM) [1]? prompt, choose the volume manager to define the logical volumes or volume groups the NetWorker software will use.

   • To use Logical Volume Manager (LVM), type 1 then:
     - At the Enter the volume group resource for this package? prompt, specify the name of the volume group resource. For example: vgshare1.
     - At the Enter the mounted logical volume name for this package? prompt, specify the mounted logical volume name. For example: /dev/vgshare1/lvoll.
     - At the Enter the mount path for this package prompt, specify the mount path. For example: /vgshare1.
     - At the Enter the type of the file system for this package [hfs]? prompt, specify the file system. For example: hfs.

   • To use Veritas Volume Manager (VxVM), type 2, and then:
     - At the Enter the VxVM disk resource for this package? prompt, specify the name of the disk resource. For example: nsrdg.
     - At the Enter the mounted logical volume name for this package? prompt, specify the logical volume name. For example: dev/vx/dsk/nsrdg/nsrdg/nsrvol.
     - At the Enter the mount path for this package? prompt, specify the mount path. For example: /nsrdata.
     - At the Enter the type of the file system for this package [vxfs]? prompt, press Enter.

12. For Legacy mode only, perform the following steps:

   a. At the Do you wish to generate a new pkg.conf file for NetWorker package [No]? prompt, type Yes.

   b. At the Enter the IP subnet to monitor for this package? prompt, type the subnet for the IP address of the NetWorker server package.

   c. At the Enter node number 1 for this package [no more]? prompt, specify the name of the active node.

   d. At the Enter node number 2 for this package [no more]? prompt, specify the name of the passive node.

   e. At the Enter node number 3 for this package [no more]? prompt, specify the name of another passive node or press Enter.

13. For Modular mode only, perform these steps:

   a. At the Do you wish to generate a new monitor script for NetWorker package [No]? prompt, type Yes.

   b. At the Do you wish to generate a new external script for NetWorker package [No]? prompt, type: Yes.
c. At the **Do you wish to generate a new external_pre script for NetWorker package [No]?** prompt, type **Yes**

14. To confirm that the NetWorker software correctly creates the configuration file in the `/etc/cmcluster/networker` directory, use the `cmcheckconf` command.

For example:
- **Legacy mode:** `cmcheckconf -P pkg.conf`
- **Modular mode:** `cmcheckconf -P networker.conf`

```
cmcheckconf: Verification completed with no errors found
Use the cmapplyconf command to apply the configuration.
```

15. To create the package, use the `cmapplyconf` command.

For example:
- For **Legacy mode**, type: `cmapplyconf -P pkg.conf`
- For **Modular mode**, type: `cmapplyconf -P networker.conf`

The following output appears:
```
Modify the package configuration ([y]/n)? y
Completed the cluster update
```

16. Copy the following files located in `/etc/cmcluster/networker` directory to the same directory on each passive node:

- **Legacy mode:**
  - `legato.control`
  - `pkg.conf`

- **Modular mode:**
  - `networker.conf`
  - `networker.monitor`
  - `networker.script`
  - `networker.pre_script`

---

**Note**
Ensure that the files have execute permission.

---

**Configuring a highly available NetWorker server in Passive node**

**Before you begin**
Perform the following steps on each passive node as the root user.

**Procedure**

1. Run the cluster configuration script file `/opt/networker/bin/networker.cluster`

2. In the **Do you wish to continue? [Yes]?** prompt, type **Yes**.

3. At the **Enter directory where local NetWorker database is installed [/nsr]?** prompt, specify the location of the local NetWorker directory provided during the install.

4. At the **Do you wish to use the updated NetWorker integration framework? Yes or No [Yes]?** prompt:
To use the non-LC integration method, type No.

To use the LC integration method, type Yes.

5. At the Do you wish to configure for both NetWorker server and client? Yes or No [Yes] prompt, type Yes.

6. At the Select the type of package for the NetWorker Server(1-modular or 2-legacy) [2]? prompt, type 1 for the modular mode and 2 for legacy mode.

7. For Legacy mode only, at the Do you wish to generate a new control file for NetWorker package [No]? prompt, type no.

8. For modular mode only, perform these steps:
   - At the Do you wish to generate a new package configuration file for NetWorker package [No]? prompt, type No.
   - At the Do you wish to generate a new package configuration file for NetWorker package [No]? prompt, type No.
   - At the Do you wish to generate a new monitor script for NetWorker package [No]? prompt, type No.
   - At the Do you wish to generate a new external script for NetWorker package [No]? prompt, type No.
   - At the Do you wish to generate a new external_pre script for NetWorker package [No]? prompt, type No.

9. Confirm the nsrexced daemon starts on each node:

   ```bash
   ps -ef | grep nsrexced
   ```

   **Note**

   To change the configuration at a later time, run the `lc_config.exe -r` option then run `lc_config.exe` again.

10. Enable and run the package:

    ```bash
    cmmodpkg -e networker
    cmrunpkg networker
    ```

**Microsoft Failover Cluster Server 2008, 2012 and 2012 R2**

This section describes how to prepare the Microsoft Failover Cluster Server (MSFCS) cluster, including AD-Detached Clusters before you install the NetWorker software. This section also describes how to configure the NetWorker server software as a highly available on each physical node of the cluster after you install the NetWorker software on each physical node of the cluster.

The *NetWorker Installation Guide* describes how to install the NetWorker software.

**Note**

This section does not apply when you install NetWorker as a stand-alone application.
Preparing to install NetWorker on MSFCS clusters

Review this section before you install the NetWorker software on a MSFCS cluster.

- Reboot the cluster node after you install the NetWorker software. If you do not reboot, you cannot start the cluster administrator program. If you cannot start the cluster administrator program, then close the cluster administrator interface and reload the software by running the following command, from the command line:

  `regsvr32 /u nsrdresex.dll`

- To back up a host that is a member of multiple domains, an Active Directory (AD) domain, and a DNS domain, you must define the AD domain name in:
  - The host file on the NetWorker server.
  - The Alias attribute for the Client resource on the NetWorker server.

- The WINDOWS ROLES AND FEATURES save set includes the MSFCS database. When you back up the WINDOWS ROLES AND FEATURES save set, NetWorker will automatically back up cluster configuration. The cluster maintains the MSFCS database synchronously on two nodes, as a result the database backup on one node might not reflect changes made on the other node.

- The NetWorker Server and Client software supports backup and recovery of file system data on Windows Server 2012 and Windows Server 2012 R2 File Servers configured for Windows Continuous Availability with Cluster Shared Volumes (CSV). Support of CSV and deduplicated CSV backups include levels Full, Incremental, and incr_synrh_full. NetWorker supports CSV and deduplicated CSV backups with the following restrictions:
  - The volume cannot be a critical volume.
  - NetWorker cannot shadow copy a CSV and local disks that are in the same volume shadow copy set.

---

**Note**

The NetWorker software does not protect the Microsoft application data stored on a CSV or deduplicated CSV, such as SQL databases or Hyper-V virtual machines. To protect Microsoft application data use the NetWorker Module for Microsoft (NMM) software. The NMM documentation provides more information about specific backup and recovery instructions of Microsoft application data.

The section *Windows Optimized Deduplication* in the *NetWorker Administration Guide* provides more information about performing a backup and recovery of deduplicated CSV volumes.

---

Configuring a highly available NetWorker server

To configure a highly available NetWorker server, you must configure each active node and each passive node.

Perform the following steps on each physical node as the administrator user.

**Procedure**

1. On one cluster node, create the NetWorker server resource type:

   `regcnsrd -c`
2. On the remaining cluster nodes, register the NetWorker server resource type:

```
regcnsrd -r
```

If prompted with a message similar to the following, then type `y`:

```
Is this machine a member of the cluster on which you want to register Resource Extension for NetWorker Server resource?
```

3. Verify that a **NetWorker Server** resource type exists:

   a. In the **Failover Cluster Management** program, right-click the name of the cluster and select **Properties**.

   b. From the **Resource Types** tab, verify that the **User Defined Resource Types** list contains the **NetWorker Server** resource.

4. Start the **High Availability Wizard**:

   - Windows 2008: From the **Action** menu, select **Configure a Service or Application**.
   - Windows 2012: From the **Action** menu, select **Configure Role**.

5. On the **Before You Begin** page, click **Next**.

6. On the **Select Service or Application** page (Windows 2008) or the **Select Role** page (Windows 2012), select **Other Server**, and then click **Next**.

   **Note**

   Do not create a Generic Application resource for the NetWorker virtual server.

7. On the **Client Access Point** page, specify a hostname that does not exist in the ID and an available IP address, and then click **Next**.

   **Note**

   The **Client Access Point** resource type defines the virtual identity of the NetWorker server, and the wizard registers the hostname and IP address in DNS.

8. On the **Select Storage** page, select the shared storage volume for the shared nsr directory, and then click **Next**.

9. In the **Select Resource Type** list, select the NetWorker Server resource type, and then click **Next**.

10. On the **Confirmation** page, review the resource configurations and then click **Next**. The **High Availability Wizard** creates the resources components and the group.

    **When the Summary page appears, a message similar to the following appears, which you can ignore:**

    **Windows 2008:**

    The group will not be brought online since the resources may need additional configuration. Please finish configuration and bring the group online.

    **Windows 2012:**

    The clustered role will not be started because the resources may need additional configuration. Finish configuration, and then start the clustered role.

11. Click **Finish**.

12. Set a dependency between NetWorker server resource and the shared disk:
• Windows 2008: Expand **Services and Applications** and select the new NetWorker server resource.

• Windows 2012: In the **Roles** window, select the new NetWorker role and click on the **Resources** tab.

  a. In the **Server Name** section, expand the NetWorker server resource then right-click the new IP Address resource and then select **Properties**.

  b. On the **Dependencies** tab, select the shared disk associated with the NetWorker server resource from the **Dependencies** list and then click **Ok**.

  c. In the **Other Resources** section, right-click **New NetWorker server** and select **Properties**.

  d. On the **Dependencies** tab, in the **Resource** list, select the name of the NetWorker resource.

  e. On the **Dependencies** tab, in the **Resource** list, select the name of the NetWorker resource.

  **Note**

  Leave the **ServerName** and **AdditionalArguments** fields blank.

  f. Click **OK**.

  **NOTICE**

  Do not create multiple NetWorker server resources. Creating more than one instance of a NetWorker Server resource interferes with how the existing NetWorker Server resources function.

13. Start the NetWorker server resource:

• Windows 2008: Right-click on the NetWorker cluster service and select **Bring this service or application online**.

• Windows 2012: Right-click the NetWorker cluster resource and select **Start Role**.

14. Confirm that the state of the **NetWorker Server** resource changes to **Online**.

### Changing the default timeout of NetWorker daemons

A NetWorker server failover occurs when the time to start up any NetWorker server daemons exceeds 10 minutes.

To modify the timeout parameter:

**Procedure**

1. Use the **Failover Cluster Manager** program to change the default timeout of the NetWorker daemons.

   • Windows 2012: Expand the cluster and then select **Roles**. On the **Roles** window, select the new NetWorker role. On the **Resources** tab, right-click the **New NetWorker Server** resource, then select **Properties**.

   • Windows 2008: Expand the cluster, and then expand **Services and Applications**. In the **Server Name** section, expand the NetWorker server resource then right-click the **New NetWorker server** resource, then select **Properties**.

2. On the **Parameters** tab of the NetWorker Server cluster resource, edit the value for the **AdditionalArguments** field and add the **ServerStartupTimeout** keyword. For example:

   ```plaintext
   ServerStartupTimeout=time
   ```
where \textit{time} is a numeric value in seconds.

\textbf{Note}

The \textit{ServerStartupTimeout} keyword is case sensitive.

\section*{SLES High Availability Extension}

This section describes how to prepare the SLES High Availability Extension (SLES HAE) cluster before you install the NetWorker software. This section also describes how to configure the NetWorker server software as a highly available application and the NetWorker client as a cluster-aware application, after you install the NetWorker software on each physical node of the cluster.

The \textit{NetWorker Installation Guide} describes how to install the NetWorker software.

SLES HAE provides three cluster management tools: Pacemaker GUI, HA Web Konsole, and the \texttt{crm} shell. This section only describes how to use the \texttt{crm} shell to configure the NetWorker server software.

\textbf{Note}

This section does not apply when you install NetWorker as a stand-alone application.

\section*{Configuring a cluster-aware NetWorker client}

A cluster-aware NetWorker client is aware of the clustered IP address and shared file systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client, which allows you to create a client resource for the virtual node.

\textbf{Before you begin}

Perform the following steps on each physical node as the root user.

\textbf{Procedure}

1. To define the resource types that the NetWorker software requires, run the cluster configuration script file, \texttt{/usr/sbin/networker.cluster}.

2. At the \texttt{Enter directory where local NetWorker database is installed [/nsr]?} prompt, specify the location of the local NetWorker database directory provided during the install procedure. For example: \texttt{/nsr}.

3. At the \texttt{Do you wish to configure for both NetWorker server and client?} \texttt{Yes or No [Yes]?>} prompt, type \texttt{No}.

\section*{Configuring a highly available NetWorker server in the cluster}

To configure a highly available NetWorker server, you must configure each active node and each passive node.

\textbf{Before you begin}

Perform the following steps on each physical node as the root user.

\textbf{Procedure}

1. To define the resource types that the NetWorker software requires, run the cluster configuration script file, \texttt{/usr/sbin/networker.cluster}.

2. At the \texttt{Enter directory where local NetWorker database is installed [/nsr]?} prompt, specify the location of the local NetWorker database directory provided during the install procedure. For example: \texttt{/nsr}.
3. At the **Do you wish to configure for both NetWorker server and client?** prompt, type **Yes**.

4. At the **In what path will the shared nsr directory be created/located?** prompt, specify the pathname of the globally mounted `/nsr` directory that contains the configuration information for the highly available NetWorker server. For example: `/share1`.

5. At the **Enter the Logical Hostname to be used for NetWorker?** prompt, specify the published logical hostname for the highly available NetWorker server. For example: `clus_virl`.

   To change the configuration at a later time, run the `networker.cluster -r` option and then run the `networker.cluster` command again.

6. On one node, create the required resource groups for the NetWorker resources:
   
a. Start the `crm` tool:

   ```
crm configure
   ```

b. Create a file system resource to for the nsr directory. For example, type:

   ```
   primitive fs ocf:heartbeat:Filesystem \ 
   operations $id="fs-operations" \ 
   op monitor interval="20" timeout="40" \ 
   params device="/dev/sdb1" directory="/share1" fstype="ext3"
   ```

c. Create an IP address resource for the NetWorker server name. For example, type:

   ```
   primitive ip ocf:heartbeat:IPaddr \ 
   operations $id="ip-operations" \ 
   op monitor interval="5s" timeout="20s" \ 
   params ip="10.5.172.250" cidr_netmask="255.255.254.0" nic="eth1"
   ```

d. Create the NetWorker server resource. For example, type:

   ```
   primitive nws ocf:EMC_NetWorker:Server \ 
   operations $id="nws-operations" \ 
   op monitor interval="100" timeout="100" \ 
   op start interval="0" timeout="120" \ 
   op stop interval="0" timeout="60" \ 
   op migrate_to interval="0" timeout="60" \ 
   op migrate_from interval="0" timeout="120" \ 
   op meta-data interval="0" timeout="10" \ 
   op validate-all interval="0" timeout="10" \ 
   meta is-managed="true"
   ```

   **Note**

   Adjust the timeout values, as required for your environment.

e. Define the NetWorker server resource group that contains the filesystem, NetWorker server, and IP address resources. For example, type:

   ```
group NW_group fs ip nws
   ```

f. To commit the changes, type:

   ```
   commit
   ```

---

**Red Hat Enterprise Linux High Availability**

This section describes how to prepare the Red Hat Enterprise Linux (RHEL) High Availability Add-on before you install the NetWorker software. This section also describes
how to configure the NetWorker server software as a highly available application and the
NetWorker client as a cluster-aware application, after you install the NetWorker software
on each physical node of the cluster.

Note
This section does not apply when you install NetWorker as a stand-alone application.
The *NetWorker Installation Guide* describes how to install the NetWorker software.

Preparing to install NetWorker on RHEL

Review this section before you install the NetWorker software on RHEL.
Before you install and configure the NetWorker server software, perform the following
task:

- Create a shared volume group and a logical volume in the cluster.
- Install the Conga web interface and start the *luci* service. For example:

  ```
  yum install luci
  service luci start
  ```

Configuring a cluster-aware client

A cluster-aware NetWorker client is aware of the clustered IP address and shared file
systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client,
which allows you to create a client resource for the virtual node.

**Before you begin**
Perform the following steps on each physical node as the root user.

**Procedure**

1. To define the resource types that the NetWorker software requires, run the cluster
   configuration script file, `/usr/sbin/networker.cluster`.
   The cluster configuration script detects the Red Hat Cluster Manager.
2. At the *Would you like to configure NetWorker for it [Yes]?* prompt, type: *Yes*.
3. At the *Enter directory where local NetWorker database is installed [/nsr]?* prompt,
   specify the location of the local NetWorker database directory provided during the
   install procedure. For example: `/nsr`.
4. At the *Do you wish to configure for both NetWorker server and client? Yes or No [Yes]?* prompt, type *No*.

Configuring a highly available NetWorker server in the cluster

To configure a highly available NetWorker server, you must configure each active node
and each passive node.

**Before you begin**
Perform the following steps on each physical node as the root user.

**Procedure**

1. To define the resource types that the NetWorker software requires, run the cluster
   configuration script file, `/usr/sbin/networker.cluster`.
   The cluster configuration script detects the Red Hat Cluster Manager.
2. At the Would you like to configure NetWorker for it [Yes]? prompt, type: Yes.

3. At the Do you wish to continue? [Yes]? prompt, type: Yes.

   The configuration script stops the NetWorker services.

4. At the Enter directory where local NetWorker database is installed [/nsr]? prompt, specify the location of the local NetWorker database directory provided during the install procedure. For example: /nsr.

5. At the Do you wish to configure for both NetWorker server and client? Yes or No [Yes]? prompt, type: Yes.

6. At the Do you wish to add now the site-specific values for: NSR_SHARED_DISK_DIR and NSR_SERVICE_ID in /usr/sbin/nw_redhat? Yes or No [Yes]? prompt, type Yes.

7. At the In what path will the shared nsr directory be created/located? prompt, specify the pathname of the globally mounted /nsr directory that contains the configuration information for the highly available NetWorker server. For example: /vg1.

8. At the Enter the Logical Hostname to be used for NetWorker? prompt, specify the published logical hostname for the highly available NetWorker server. For example: clus_vir1.

   To change the configuration at a later time, run the networker.cluster -r option and then run the networker.cluster command again.

   The configuration script creates the nw_redhat file and the lcmap file.

9. Create a service group:
   a. Connect to the Conga web interface.
   b. On the Service tab, click Add.
   c. In the Service Name field, specify a name for the resource. For example, rg1.

10. Add an LVM resource for the shared volume to the service group:
   a. Click Add resource.
   b. From the Global Resources drop down, select HA LVM.
   c. In the Name field, specify the name of the resource. For example, ha_lvm_vg1.
   d. In the Volume Group Name field, specify the name of the volume group for the shared disk that contains the /nsr directory. For example, vg1.
   e. In the Logical Volume Name field, specify the logical volume name. For example, vg1_1v.

11. Add a file system resource for the shared file system to the service group.
   a. After the HA LVM Resource section, click Add Child Resource.
   b. From the Global Resources drop down, select Filesystem.
   c. In the Name field, specify the name of the file system. For example, ha_fs_vg1.
   d. In the Mount point field, specify the mount point. For example: /vg1.
   e. In the Device, FS label or UUID field, specify the device information. For example, device "/dev/vg1/vg1_1v"

12. Add an IP address resource to the group:
   a. After the Filesystem section, click Add Child Resource.
b. From the **Global Resources** drop down, select **IP Address**.

c. In the **IP Address** field, specify the IP address of the virtual NetWorker server.

d. Optionally, in the **Netmask** field, specify the netmask that is associated with IP address.

13. Add a script resource to the group:

   a. After the IP address section, click **Add Child Resource**.

   b. From the **Global Resources** drop down, select **Script**.

   c. In the **Name** field, specify the name for the script resource. For example, *nwserver*.

   d. In the **Path** field, specify the path to the script file. For example, */usr/sbin/nw_redhat*.

14. Click **Submit**.

### Sun Cluster and Oracle Solaris Cluster

This section describes how to prepare the Sun Cluster or Oracle Solaris Cluster before you install the NetWorker software. This section also describes how to configure the NetWorker server software as a highly available application and the NetWorker client as a cluster-aware application, after you install the NetWorker software on each physical node of the cluster.

The *NetWorker Installation Guide* describes how to install the NetWorker software.

---

**Note**

This section does not apply when you install NetWorker as a stand-alone application.

### Preparing to install NetWorker on Sun and Oracle Solaris Clusters

Review this section before you install the NetWorker software on Sun and Oracle Solaris Clusters.

Before you install the NetWorker software:

- Install Volume Manager software in the cluster. For example: Solaris Volume Manager.
- Configure a shared disk as a mount point for the global file system to contain the shared /nsr directory.
- Ensure that the PATH environment variable includes the */usr/sbin* and */usr/cluster/bin* directories.
- Ensure that a resource group owns each globally mounted file system (except the /global/.devices/... file system). To enable a resource group to own a globally mounted file system (except the /global/.devices/... file systems), specify the file system in only one NetWorker Client type resource. If you incorrectly configure the ownership of global file systems in a NetWorker client type resource, then multiple backup copies occur for each cluster node.
Configuring a cluster-aware NetWorker client

A cluster-aware NetWorker client is aware of the clustered IP address and shared file systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client, which allows you to create a client resource for the virtual node.

Before you begin
Perform the following steps on each physical node as the root user.

Procedure
1. To define the resource types that the NetWorker software requires, run the cluster configuration script file /usr/sbin/networker.cluster.
2. At the Enter directory where local NetWorker database is installed [/nsr]? prompt, specify the location of the local NetWorker database directory provided during the install procedure. For example: /nsr.
3. At the Do you wish to configure for both NetWorker server and client? > Yes or No [Yes]? prompt, type No.
4. On one node in the cluster, create a resource group for the backup and a resource instance for the LGTO.clnt resource:
   a. Create a resource group:

   ```
   clresourcegroup create resource_group_name
   ```
   For example, to create the resource group backups, type:

   ```
   clresourcegroup create backups
   ```
   
   **Note**

   A resource group must own all globally mounted file systems (except the / global/ .devices/... file systems). All globally mounted filesystems (except the / global/.devices/... file systems) must have a NetWorker Client resource type. A misconfigured file system results in multiple backup copies for each cluster node.
   
   b. Add the logical hostname resource type to the new resource group:

   ```
   clreslogicalhostname create -g resource_group_name logical_name
   ```
   For example, when the logical hostname is clus_vir1, type:

   ```
   clreslogicalhostname create -g backups clus_vir1
   ```
   c. Optionally, to create an instance of the SUNW.HAStoragePlus resource type:

   • Determine if the HAStoragePlus resource type is registered within the cluster:

   ```
   clresource type list
   ```
   • If required, register the HAStoragePlus resource type within the cluster:

   ```
   clresource type register SUNW.HAStoragePlus
   ```
   • Create the SUNW.HAStoragePlus resource:

   ```
   clresource create -g resource_group_name -t SUNW.HAStoragePlus -x
   ```
Configure the Cluster

```
FilesystemMountPoints=pathname_1,pathname_2[,...]-x
AffinityOn=True hastorageplus
```

For example, to create the resource with mount points /global/nw and /global/space, type:

```
clresource create -g backups -t SUNW.HAStoragePlus -x FilesystemMountPoints=/global/nw, \
/global/space -x AffinityOn=True hastorageplus
```

The Sun Cluster documentation provides more information about the SUNW.HAStoragePlus resource and locally mounted global systems.

d. Create an instance of the LGTO.clnt resource:

```
clresource create -g resource_group_name -t LGTO.clnt -x clientname=virtual_hostname -x owned_paths=pathname_1,pathname_2[,...]client
```

where:
- `virtual_hostname` is the name of the resource used by the Sun Cluster logical hostname (SUNW.LogicalHostname) or shared address (SUNW.SharedAddress) that you want to configure as a virtual hostname.
- `owned_paths` is a list of filesystems or raw devices on a shared storage device to back up, separated by commas.

For example:

```
clresource create -g backups -t LGTO.clnt -x clientname=clus_vir1 -x owned_paths=/global/nw,/global/space client
```

When the logical host resource name differs from the hostname it specifies, define the `clientname` variable as the virtual hostname, then set the `network_resource` property to the logical host resource name.

For example:

```
clresource create -g resource_group_name -t LGTO.clnt -x clientname=virtual_hostname -x network_resource=virtual_hostname -x owned_paths=pathname_1,pathname_2[,...]client
```

Configuring a highly available NetWorker server

To configure a highly available NetWorker server, you must configure each active node and each passive node.

Before you begin

Perform the following steps on each physical node as the root user.

Procedure

1. To define the resource types that the NetWorker software requires, run the cluster configuration script file `/usr/sbin/networker.cluster`.

2. At the **Enter directory where local NetWorker database is installed [/nsr]** prompt, specify the location of the local NetWorker database directory provided during the install procedure. For example: `/nsr`.

3. At the **Do you wish to configure for both NetWorker server and client? Yes or No [Yes]** prompt, type **Yes**.
4. At the Do you wish to add now the site-specific values for: NSR_SHARED_DISK_DIR and NSR_SERVICE_ID Yes or No [Yes]? prompt, type Yes to ensure compatibility with other cluster environments.

5. At the Enter the Logical Hostname to be used for NetWorker? prompt, specify the published logical hostname of the highly available NetWorker server. For example: clus_vir1.

6. At the In what path will this nsr directory be created/located? prompt, specify the pathname of the globally mounted /nsr directory that contains the configuration information for the highly available NetWorker server For example: /global/nw.

---

**Note**

To change the configuration at a later time, run the lc_config.exe -r option then run lc_config.exe again.

7. On one node in the cluster, create a resource group for the backup and resource instances for the NetWorker resources:

   a. Create a resource group:

   ```
clresourcegroup create resource_group_name
   ```
   
   For example, to create the resource group networker, type:

   ```
clresourcegroup create networker
   ```

   b. Add the logical hostname resource type to the new resource group:

   ```
clreslogicalhostname create -g resource_group_name logical_name
   ```
   
   For example, when the logical hostname is clus_vir1, type:

   ```
clreslogicalhostname create -g networker clus_vir1
   ```

   c. Optionally, to create an instance of the SUNW.HAStoragePlus resource type:

   - Determine if the HAStoragePlus resource type is registered within the cluster:

   ```
clresource type list
   ```
   
   - If required, register the HAStoragePlus resource type within the cluster:

   ```
clresource type register SUNW.HAStoragePlus
   ```
   
   - Create the SUNW.HAStoragePlus resource:

   ```
clresource create -g resource_group_name -t SUNW.HAStoragePlus -x FilesystemMountPoints=pathname_1,pathname_2[,...] -x AffinityOn=True hastorageplus
   ```
   
   For example, to create the resource with mount points /global/nw and /global/space, type:

   ```
clresource create -g networker -t SUNW.HAStoragePlus -x FilesystemMountPoints="/global/nw,\ /global/space" -x AffinityOn=True hastorageplus
   ```

   The Sun Cluster documentation provides more information about the SUNW.HAStoragePlus resource and locally mounted global systems.
d. Create an instance of the LGTO.clnt resource:

```bash
clresource create -g resource_group_name -t LGTO.clnt -x
  clientname=virtual_hostname -x
  owned_paths=pathname_1,pathname_2[,...] client
```

where:

- `virtual_hostname` is the name of the resource used by the Sun Cluster logical hostname (SUNW.LogicalHostname) or shared address (SUNW.SharedAddress) that you want to configure as a virtual hostname.
- `owned_paths` is a list of filesystems or raw devices on a shared storage device to back up, separated by commas.

For example:

```bash
clresource create -g networker -t LGTO.clnt -x
  clientname=clus_vir1 -x
  owned_paths=/global/nw,/global/space
```

When the logical host resource name differs from the hostname it specifies, define the clientname variable as the virtual hostname, then set the network_resource property to the logical host resource name.

For example:

```bash
clresource create -g resource_group_name -t LGTO.clnt -x
  clientname=virtual_hostname -x
  network_resource=virtual_hostname -x
  owned_paths=pathname_1,pathname_2[,...] client
```

e. For a highly available NetWorker server, create an instance of the LGTO.serv resource:

```bash
clresource create -g resource_group_name -t LGTO.serv -y
  Resource_Dependencies=virtual_hostname -x
  config_dir=configuration_directory
```

For example, when the configuration directory on the globally mounted filesystem is `/global`, type:

```bash
clresource create -g backups -t LGTO.serv -y
  Resource_Dependencies=clus_vir1 -x
  config_dir=/global
```

When the logical host resource name is different than the hostname it specifies, set the optional servername property to the virtual hostname:

```bash
clresource create -g resource_group_name -t LGTO.serv -y
  Resource_Dependencies=virtual_hostname -x
  servername=virtual_hostname -x
  config_dir=configuration_directory
```

f. Optionally, if you created an SUNW.HAStragePlus resource, then:

- Define a dependency for the NetWorker server resource:

  ```bash
clresource set -y Resource_Dependencies=virtual_hostname,hasstorageplus_server
```

- Verify that the resource dependencies are correctly set. For example:

  ```bash
clresource show -v server | grep Resource_dependencies
```
Example Sun Cluster configurations

The section provides two Sun Cluster configuration examples:

Example1: A highly available Informix database server

In this example, the Informix database server uses the DNS registered hostname informix_lhrs.

An existing failover resource group informix_rg contains:
- SUNW.informix resource named informix_res
- SUNW.LogicalHostname resource named informix_lhrs

This SUNW.informix database server accesses data on a global file system under /global/informix/config and /global/informix/db.

To add a NetWorker virtual client to the existing resource group informix_rg, type:

```
clresource create -g informix_rg -t LGTO.clnt \\
-x clientname=informix_lhrs \\
-x owned_paths=/global/informix/config,/global/informix/db \\
informix_clntrs
```

To help understand this example, study the following output that was created by running the `scstat -g` command after the running the `scrgadm` command. The `scstat -g` command output displays the `informix_rg` group and its resources, assuming that the `informix_rg` group is the only resource group configured in the cluster.

```
<table>
<thead>
<tr>
<th>Group Name</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>informix_rg</td>
<td>informix_res informix_lhrs informix_clntrs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Node Name</th>
<th>state</th>
<th>Suspended</th>
</tr>
</thead>
<tbody>
<tr>
<td>informix_rg</td>
<td>phynode-1</td>
<td>Offline</td>
<td>No</td>
</tr>
<tr>
<td>informix_rg</td>
<td>phynode-2</td>
<td>Offline</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resource Name</th>
<th>Node Name</th>
<th>state</th>
<th>Suspended</th>
</tr>
</thead>
<tbody>
<tr>
<td>informix_res</td>
<td>phynode-1</td>
<td>Offline</td>
<td>Offline</td>
</tr>
<tr>
<td>informix_res</td>
<td>phynode-2</td>
<td>Offline</td>
<td>Offline</td>
</tr>
<tr>
<td>informix_lhrs</td>
<td>phynode-1</td>
<td>Offline</td>
<td>Offline - LogicalHostname offline.</td>
</tr>
<tr>
<td>informix_lhrs</td>
<td>phynode-2</td>
<td>Offline</td>
<td>Offline - LogicalHostname offline.</td>
</tr>
<tr>
<td>informix_clntrs</td>
<td>phynode-1</td>
<td>Offline</td>
<td>Offline</td>
</tr>
<tr>
<td>informix_clntrs</td>
<td>phynode-2</td>
<td>Offline</td>
<td>Offline</td>
</tr>
</tbody>
</table>
```
Example 2: A scalable Apache web server

In this example, an Apache web server uses the DNS registered hostname `apache_sars`. An existing scalable resource group `apache_rg` contains:

- SUNW.apache resource named `apache_res`
- SUNW.SharedAddress resource named `apache_sars`

The Apache web server accesses data on a global file system under `/global/web/config` and `/global/web/data`.

To add a NetWorker virtual client to the existing resource group `apache_rg`, type:

```
clresource create -g apache_rg -t LGTO.clnt \
x clientname=apache_sars \
x owned_paths=/global/web/config,/global/web/data \
apache_clntrs
```

To help understand this example, study the `scstat -g` output. The `scstat -g` command displays the `apache_rg` group and its resources, assuming that the `apache_rg` group is the only resource group configured in the cluster.

**Note**

The `scstat -g` command runs after the `scrgadm` command completes.

<table>
<thead>
<tr>
<th>-- Resource Groups and Resources --</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Name</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Resource:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>-- Resource Groups --</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Name</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Group:</td>
</tr>
<tr>
<td>Group:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>--Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Name</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Resource:</td>
</tr>
<tr>
<td>Resource:</td>
</tr>
<tr>
<td>Resource:</td>
</tr>
<tr>
<td>Resource:</td>
</tr>
<tr>
<td>Resource:</td>
</tr>
<tr>
<td>Resource:</td>
</tr>
</tbody>
</table>
VERITAS Cluster Server

This section describes how to prepare the VERITAS cluster before you install the NetWorker software. This section also describes how to configure the NetWorker server software as a highly available application and the NetWorker client as a cluster-aware application, after you install the NetWorker software on each physical node of the cluster. The *NetWorker Installation Guide* describes how to install the NetWorker software.

**Note**

This section does not apply when you install NetWorker as a stand-alone application.

Preparation to install NetWorker on VERITAS cluster

Review this section before you install the NetWorker software on a Linux or Solaris VERITAS cluster.

- When the VERITAS Cluster Server installation and configuration directories are not the default directories, set the following environment variables:
  - `VCS_HOME`
    The default directory is `/opt/VRTSvcs`.
  - `VCS_CONF`
    The default directory is `/etc/VRTSvcs`.
- Ensure that the `PATH` environment variable includes the `/usr/sbin` and `$VCS_HOME/bin` directories. The default `$VCS_HOME` directory is `/opt/VRTSvcs/bin`.

Configuring NetWorker on a VERITAS cluster

This section also describes how to configure the NetWorker server software as a highly available application and the NetWorker client as a cluster-aware application, after you install the NetWorker software on each physical node of the cluster on a VERITAS Cluster Server (VCS).

Creating NetWorker Client resource instances

This section applies to Windows and UNIX.

**Procedure**

- A NetWorker virtual server requires an instance of the NWClient resource type in any VCS group that:
  - Contains raw devices or raw logical volumes to back up.
  - Contains more than one IP type resource.
  - Contains storage resources that are not automatically detected. For example:
    - Storage resources defined in dependent groups.
    - Storage resources that are not of the type Mount or CFSmount.
- Optionally create an instance of the NWClient resource type for a NetWorker virtual server in the following configurations:
  - The failover VCS group has only one IP type resource.
The owned file systems on the shared devices are instances of the mount type resource contained in the same service group.

**About the NWClient resource**

Before you create a NWclient resource, review this section to become familiar with the structure of the NWClient resource.

The following table describes the required NWClient resource attributes.

<table>
<thead>
<tr>
<th>Required attributes</th>
<th>Type and dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPAddress</td>
<td>string, scalar</td>
<td>IP address of the virtual NetWorker client. An IP type resource with a matching Address attribute must exist in the service group.</td>
</tr>
<tr>
<td>Owned_paths</td>
<td>string, vector</td>
<td>A list of file systems or raw devices on a shared storage device. The virtual NetWorker client specified by the IP Address attribute owns these file systems or raw devices.</td>
</tr>
</tbody>
</table>

**Example 1 NWClient resource sample configuration**

The following is a sample of a configured NWClient resource:

```plaintext
NWClient nw_helene (
   IPAddress="137.69.104.251"
   Owned_paths={ "/shared1", "/shared2", "/dev/rdsk/c1t4d0s4" }
```

**Configuring a cluster-aware NetWorker client on Solaris and Linux**

A cluster-aware NetWorker client is aware of the clustered IP address and shared file systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client, which allows you to create a client resource for the virtual node.

**Before you begin**

Perform the following steps on each physical node as the root user.

**Procedure**

1. To define the resource types that the NetWorker software requires, run the cluster configuration script file `/usr/sbin/networker.cluster`.
2. At the **Would you like to configure NetWorker for it [Yes]**? prompt, type **Yes**.
3. At the **Do you wish to continue? [Yes]**? prompt, type **Yes**.
4. At the **Enter directory where local NetWorker database is installed [/nsr]**? prompt, specify the location of the local NetWorker database directory that you provided when you installed NetWorker. For example: `/space/nsr`.
5. At the **Do you want to configure NetWorker virtual server?[y/n]** prompt, type **No**.
Configuring a cluster-aware NetWorker client on Windows

A cluster-aware NetWorker client is aware of the clustered IP address and shared file systems in a cluster. Perform these steps to configure a cluster-aware NetWorker client, which allows you to create a client resource for the virtual node.

Before you begin

Perform the following steps on each physical node as the administrator user.

Procedure

1. To define the resource types that the NetWorker software requires, run the cluster configuration binary NetWorker_installation_path\lc_config.exe.
2. At the Do you want to configure NetWorker virtual server?[y/n] prompt, type No.

Configuring a highly available NetWorker server

To configure a highly available NetWorker server, you must configure each active node and each passive node. First run the NetWorker cluster configuration script file and then create a NetWorker resource group.

Creating the service group

This section provides a high-level overview of how to create and configure the NetWorker server service group.

- Add the IP type resource. Use the IP address for the virtual NetWorker server specified in the NetWorker service group.
- For Windows and VxVM: Add the VMDg and MountV type resources for the shared disk to the NetWorker service group.
- For Solaris and Linux: Add the Mount type resource for the shared disk to the NetWorker service group.
- Set the CleanProgramTimeout attribute of the NetWorker server process to a minimum value of 180. Set the StopProgramTimeout attribute to a minimum of value of 120.

Example 2  An instance of a NetWorker resource group definition on Linux

The following example shows an instance of the NetWorker resource group defined in the /etc/VRTSvcs/conf/config/main.cf VCS cluster configuration file.

```
group networker ( 
  SystemList = { arrow = 0, canuck = 1 } 
) 
Application nw_server ( 
  StartProgram = "/usr/sbin/nw_vcs start"
  StopProgram = "/usr/sbin/nw_vcs stop"
  CleanProgram = "/usr/sbin/nw_vcs stop_force"
  MonitorProgram = "/usr/sbin/nw_vcs monitor"
  MonitorProcesses = {"/usr/sbin/nsrd -k avro"}
)
IP NW_IP ( 
  Device = eth0 
  Address = "137.69.104.104"
)
Mount NW_Mount ( 
  MountPoint = "/mnt/share" 
  BlockDevice = "/dev/sdc3" 
  FSType = ext2 
  FsckOpt = "-n"

```
Example 2  An instance of a NetWorker resource group definition on Linux (continued)

```bash
)NW_IP requires NW_Mount
nw_server requires NW_IP
// resource dependency tree
//
// group networker
// {
// Application nw_server
// {
//  IP NW_IP
//  {
//   Mount NW_Mount
//  }
// }
// }
```

Example 3  An instance of a NetWorker resource group definition on Windows

The following example, shows an instance of the NetWorker resource group defined in the C:\Program Files\Veritas\cluster server\conf\config\main.cf VCS cluster configuration file.

group networker (  
  SystemList = { BU-ZEUS32 = 0, BU-HERA32 = 1 }  
)

IP NWip1 (  
  Address = "10.5.163.41"
  SubNetMask = "255.255.255.0"
  MACAddress @BU-ZEUS32 = "00-13-72-5A-FC-06"
  MACAddress @BU-HERA32 = "00-13-72-5A-FC-1E"
)

MountV NWmount1 (  
  MountPath = "S:\"  
  VolumeName = SharedVolume1
  VMDGResName = NWdg_1
)

Process NW_1 (  
  Enabled = 0
  StartProgram = "D:\Program Files\EMC NetWorker\nsr\bin\nw_vcs.exe start"
  StopProgram = "D:\Program Files\EMC NetWorker\nsr\bin\nw_vcs.exe stop"
  CleanProgram = "D:\Program Files\EMC NetWorker\nsr\bin\nw_vcs.exe stop_force"
  MonitorProgram = "D:\program files\EMC NetWorker\nsr\bin\nw_vcs.exe monitor"
  UserName = "bureng\administrator"
  Password = BHFlGhDNDpGkNNkN"
)

VMDg NWdg_1 (  
  DiskGroupName = "32dg1"
)

NWip1 requires NWmount1
NWmount1 requires NWdg_1
NW_1 requires NWip1
// resource dependency tree
//
// group networker
// {
//  Process NW_1
//  {
//   IP NWip1
```
Example 3 An instance of a NetWorker resource group definition on Windows (continued)

```c
//            {
//            MountV NWmount1
//            {  
//              VMDg NWdg_1
//            }  
//          }  
//      }  
```

Configuring NetWorker on Solaris and Linux

To configure a highly available NetWorker server, you must configure each active node and each passive node.

**Before you begin**

Perform the following steps on each physical node as the root user.

**Procedure**

1. To define the resource types that the NetWorker software requires, run the cluster configuration script file `/usr/sbin/networker.cluster`.
2. At the Veritas Cluster Server is detected. Would you like to configure NetWorker for it [Yes]? prompt, type Yes.
3. At the Do you wish to continue? [Yes]? prompt, type Yes.
4. At the Enter directory where local NetWorker database is installed [/nsr]? prompt, specify the location of the local NetWorker database directory that you provided when you installed NetWorker. For example: `/space/nsr`.
5. At the Do you want to configure NetWorker virtual server?[y/n] prompt, type Yes.
6. At the Do you wish to add now the site-specific values for: NSR_SHARED_DISK_DIR and NSR_SERVICE_ID Yes or No [Yes]? prompt, type Yes to ensure compatibility with other cluster environments.
7. At the ln what path will the shared nsr directory be created/located? prompt, specify the pathname of the globally mounted `/nsr` directory that contains the configuration information for the highly available NetWorker server. For example: `/global/nw`.
8. At the Enter the Logical Hostname to be used for NetWorker? prompt, specify the published logical hostname that the highly available NetWorker server uses. For example: `clus_virl`.

**Note**

To change the configuration at a later time, run the `lc_config.exe -r` option then run `lc_config.exe` again.

Configuring the NetWorker software on Windows

To configure a highly available NetWorker server, you must configure each active node and each passive node.

**Before you begin**

Perform the following steps on each physical node as the administrator user.
Procedure

1. Bring the NetWorker server service group online.

2. To define the resource types that the NetWorker software requires, run the cluster configuration binary, NetWorker_installation_path\lc_config.exe.

3. At the Do you want to configure NetWorker virtual server?[y/n] prompt, type Yes.

4. At the Enter shared nsr dir: prompt, specify the pathname of the shared nsr directory that will contain the configuration information for the highly available NetWorker server. For example: S:\nsr.

5. At the Enter the directory in which your Veritas Cluster Server software is installed (typically something like C:\Program Files\Veritas\cluster server): prompt, specify the location where you installed the Veritas Cluster Server.

6. At the Is this OK [y/n] prompt, type Y to update the configuration.

Note
To change the configuration at a later time, run the lc_config.exe -r option then run lc_config.exe again.

Adding the NetWorker server resource to the NetWorker service group

The NetWorker server is an Application resource type on UNIX and a Process resource type on Windows. Add these resource types to the NetWorker service group.

Before you add the NetWorker server resource to the NetWorker service group, ensure that the following dependencies are resolved.

- For UNIX:
  - Process resource depends on the IP resource.
  - IP resource depends on the MountV resource.

- For Windows systems:
  - Application resource depends on the IP resource.
  - IP resource depends on the Mount resource

Example 4 NWserver resource on VCS for UNIX

The following example, shows an instance of the Application resource type defined on a UNIX VCS cluster.

```
"Resource type: "Application"
"Attributes:
User = root
StartProgram = "/usr/sbin/nw_vcs start"
StopProgram = "/usr/sbin/nw_vcs stop"
CleanProgram = "/usr/sbin/nw_vcs stop_force"
MonitorProgram = "/usr/sbin/nw_vcs monitor"
MonitorProcesses = "/usr/sbin/nsrd -k Virtual_server_hostname"
```

Example 5 NWserver resource on VCS for Windows

The following example, shows an instance of the Process resource type defined on a Windows VCS cluster.
Example 5  NWserver resource on VCS for Windows (continued)

"Resource type:  "Process"
"Attributes:
StartProgram = "C:\program files\EMC NetWorker\nsr\bin\nw_vcs.exe start"
StopProgram = "C:\program files\ EMC NetWorker \nsr\bin\nw_vcs.exe stop"
CleanProgram = "C:\program files\ EMC NetWorker \nsr\bin\nw_vcs.exe stop_force"
MonitorProgram = "C:\program files\ EMC NetWorker \nsr\bin\nw_vcs.exe monitor"
UserName = "<administrator user name>"
Password = "<administrator password>"
Domain = "<Active Directory domain name>"

Registering the resource type and creating resource instances

Register the NWClient resource and create NWClient resource instances on Windows and UNIX.

Before you begin

Perform the following steps as the root user on UNIX or the administrator user on Windows.

Procedure

1. To save the existing VCS configuration and prevent further changes while you modify the main.cf file, type:

   haconf -dump -maker

2. To stop the VCS software on all nodes and leave the resources available, type:

   hastop -all -force

3. To make a backup copy of the main.cf file, type:

   - For UNIX systems, type:
     
     cd /etc/VRTSvcs/conf/config
     cp main.cf main.cf.orig

   - For Windows systems, type:
     
     cd C:\Program Files\Veritas\cluster server\conf\config
     cp main.cf main.cf.orig

4. To copy the NWClient resource definition file located in the VCS configuration directory, type:

   - For UNIX systems, type:
     
     cp /etc/VRTSvcs/conf/NWClient.cf /etc/VRTSvcs/conf /config/NWClient.cf

   - For Windows systems, type:
     
     cp C:\Program Files\Veritas\cluster server\conf\NWClient.cf C:\Program Files\Veritas\cluster server\conf\config\NWClient.cf
5. To add the NWClient resource type and the NWClient resource type instances to the main.cf file, type:

   include "NWClient.cf"

6. Save and close the file.

7. To verify the syntax of the main.cf file, type:

   hacf -verify config

8. To start the VCS engine, type:

   hastart

9. Log in on the remaining nodes in the cluster and start the VCS engine. To start the engine, type:

   hastart

10. To verify the status of all service groups, type:

    hagrp -display

11. Add a NWClient resource instance for the service groups that require the resource.

## Troubleshooting configuration

This section describes how to troubleshoot NetWorker configuration issues in a cluster.

- Slow backups or slow nsrd startup times on page 54
- NetWorker virtual server fails to start nsrmmd on page 56

### Slow backups or slow nsrd startup times

The lcmap program, queries cluster nodes and creates a map that includes information such as path ownership of resource groups. In large cluster configurations, lcmap may take a long time to complete and thus slow down certain operations. This is most often noticed in slow NetWorker server (nsrd) start times or in very long backup times.

In these situations, consider adjusting cluster cache timeout. This attribute specifies a time, in seconds, in which to cache the cluster map information on a NetWorker client.

Edit the cluster cache timeout attribute with caution. Values for the attribute can vary from several minutes to several days and depends on the following factors:

- How often the cluster configuration changes.
- The possibility of resource group failover.
- The frequency of NetWorker operations.

If you set the value too large, then an out-of-date cluster map can result and cause incorrect path resolution. For example, if the cluster cache timeout value is set to 86400 (one day), then any changes to the cluster map will not be captured for up to one day. If cluster map information changes before the next refresh period, then some paths may not resolve correctly.
Note

If you set the value too small, then cache updates can occur too frequently, which negatively affects performance. Experiment with one physical cluster node to find a satisfactory timeout value. If you cannot obtain a significant improvement in performance by adjusting this attribute, then reset the attribute value to 0 (zero). When the attribute value is 0, NetWorker does not use the attribute.

Editing the cluster cache timeout attribute

The cluster cache timeout attribute resides in the NSRLA database of the NetWorker client and is visible only when NetWorker is configured for a cluster. For example on UNIX, a NetWorker client is configured for a cluster when the networker.cluster script is executed and nsrexecd is restarted.

NOTICE

If the timeout value will be modified, it is recommended that you edit the initial cluster cache timeout value before bringing the highly available NetWorker server online.

To edit the cluster cache timeout value, take the highly available NetWorker server offline and perform these steps on each physical node as the root user on UNIX or an administrator on Windows:

Procedure

1. Connect to the NSRLA database.
   - For the passive node, type:
     
     nsradmin -p nsrexecd

   - For the active node, type:
     
     nsradmin -d directory

     where directory is the location of the local NSRLA database:
     -Windows: NetWorker_install_path\res\nsrladb.

2. Display the current settings for attributes in the NSRLA resource. For example, type:
   print type:NSRLA

3. Change the value of the cluster cache timeout attribute. For example, type:
   update cluster cache timeout: value

   where value is the timeout value in seconds. A value of 0 (zero) specifies that the cache is not used.

4. When prompted to confirm the change, type Yes.

5. Confirm the attribute updated successfully. Type:
   print type:NSRLA

6. Bring the highly available NetWorker server online. NetWorker updates the shared NSRLA database with the new cache value.

   The updated value takes effect after the next cache update, based on the previous timeout value.

   To make the timeout value take effect immediately, delete the cache file on the physical node that owns the NetWorker virtual server:
NetWorker virtual server fails to start nsrmmd

When the NetWorker virtual server cannot start an nsrmmd process on a NetWorker storage node, then a message similar to the following appears in the NetWorker server daemon.raw file:

```
06/08/00 10:00:11 nsrmon #217: connect to nsrexe prog 390113 vers 1
on `uranus' failed: RPC error: Remote system error
06/08/00 10:00:11 nsrd: media notice: check storage node: uranus (RPC
error: Remote system error)
06/08/00 10:00:11 nsrd: media info: restarting nsrmmd #1 on uranus in
2 minute(s)
06/08/00 10:02:12 nsrd: media info: restarting nsrmmd #1 on uranus now
06/08/00 10:02:42 nsrmon #183: connect to nsrexe prog 390113 vers 1
on ````
```

The error also appears when the nsrexe daemon on a UNIX host or the NetWorker Remote Exec service on a Windows host is not running on the storage node.

To resolve this issue, start the nsrexe process on UNIX or the NetWorker Remote Exec service on Windows.
CHAPTER 3

Configuring Devices for a Highly Available NetWorker Server

NetWorker supports the use of tape, AFTD, and Data Domain devices to back up cluster host data. This chapter describes three common configuration scenarios when using autochangers and tape devices to back up a highly available NetWorker server. The information that describes how to configure AFTD and Data Domain devices in the *NetWorker Administration Guide* and *Data Domain Integration Guide* applies to clustered and non-clustered hosts.

- Configuring an autochanger with shared tape devices ........................................... 58
- Configuring an autochanger with non-shared tape devices ................................. 59
- Configuring the robotics on a stand-alone host ............................................... 61
Configuring an autochanger with shared tape devices

In this configuration, the NetWorker virtual server manages the robotic arm. NetWorker uses Dynamic Drive Sharing (DDS) to allow the virtual node and each physical node to share tape devices. Each physical and virtual node sends backup data directly to a tape device and not over the network. Use this configuration when most of the backup data originates from the inactive physical node.

Before you configure a shared autochanger and DDS devices, perform the following steps:

Procedure

1. Ensure that the device-sharing infrastructure on page 90 supports complete isolation and protection of the path session between the autochanger and the node that owns the NetWorker server resource. Protect the path from stray bus signals and unauthorized session access from the other nodes.

Note

If processes on nodes other than the one that owns on the NetWorker server can access the tape devices, data corruption might occur. The NetWorker software might not detect the data corruption.

2. Zone the robotic arm and all drives to each physical node in the cluster.

3. Configure the same path (bus, target and LUNs) to the robotics and tape drives on each node.

4. If you configured the bridge with node device-reassignment reservation commands, then add these commands to the nsrrc startup script on the NetWorker virtual server. The NetWorker Administration Guide describes how to modify the nsrrc script.

5. Install the cluster vendor-supplied special device file for the robotic arm on each physical node. The special device file creates a link to the tape or autochanger device driver. Ensure that the name assigned to the link is the same on each node for the same device. If you do not have matching special device files across cluster nodes, you may need to install fibre HBAs in the same PCI slots on all the physical nodes within the cluster.

The following figure provides a graphical view of this configuration option.

Configuring Devices for a Highly Available NetWorker Server
6. To configure the autochanger and devices by using the NMC device configuration wizard, specify the hostname of the virtual server, \textit{clus\_vir1}, when prompted for the storage node name and the prefix name. The \textit{NetWorker Administration Guide} describes how to use NMC to configure autochangers and devices.

7. To configure the autochanger and devices by using the \textit{jbconfig} command, run \texttt{jbconfig -s clus\_vir1} on the physical node that owns the NetWorker server resource.
   a. When prompted for the hostname to use as a prefix, specify the virtual server name, \textit{clus\_vir1}.
   b. When prompted to configure shared devices, select \textbf{Yes}.
      The \textit{NetWorker Administration Guide} describes how to use NMC to configure autochangers and devices.

8. The storage node attribute value for each host is as follows:
   - \textit{clus\_phys1}: clus\_phys1
   - \textit{clus\_phys2}: clus\_phys2
   - \textit{clus\_vir1}: nsrserverhost
      \textbf{Configuring backup and recovery on page 63} describes how to configure the Client resource for each cluster node.

9. When a failover occurs, NetWorker relocates and restarts savegroup operations that were in progress on the failover node. Standard autochanger operations however, (for example: performing an inventory, labeling, mounting or unmounting a volume) will not automatically restart on the new failover node.

\section*{Configuring an autochanger with non-shared tape devices}

In this configuration, the robotic arm and tape devices are configured for the virtual node only. The NetWorker virtual server and the physical node that owns the NetWorker server
resource sends backup data directly to the tape devices. The inactive physical node sends backup data to the tape devices over the network. Use this configuration when most of the backup data originates from the active physical node, the shared disk resource, and hosts external to the cluster.

The following figure provides a graphical view of this configuration option.

**Figure 3** Autochanger with non-shared devices

In this example:

**Procedure**

1. To configure the autochanger and devices by using the NMC device configuration wizard, specify the hostname of the virtual server, **clus_vir1**, when prompted for the storage node name and the prefix name. The *NetWorker Administration Guide* describes how to use NMC to configure autochangers and devices.

2. To configure the autochanger and devices by using the **jbconfig** command, run `jbconfig -s clus_vir1` on the physical node that owns the NetWorker server resource.
   - When prompted for the hostname to use as a prefix, specify the virtual server name, **clus_vir1**.
   - When prompted to configure shared devices, select **Yes**. The *NetWorker Administration Guide* describes how to use **jbconfig** to configure autochangers and devices.

3. The storage node attribute value for each host is as follows:
   - **clus_phys1**: **nsrserverhost**
   - **clus_phys2**: **nsrserverhost**
   - **clus_vir1**: **nsrserverhost**
**Configuring backup and recovery on page 63** describes how to configure the Client resource for each cluster node.

## Configuring the robotics on a stand-alone host

You can set up a stand-alone physical host as a storage node outside the cluster to control the robotic arm when you cannot match bus target LUNs across the cluster nodes or when you do not have a NetWorker server within the cluster. The stand-alone physical host can control the robotic arm through a Fibre Channel or SCSI connection. Each node in the cluster sends backup data over the network to the tape devices. The NetWorker virtual server requires a local device to back up the indexes and bootstrap.

The following figure provides a graphical view of this configuration option.

### Figure 4  External stand-alone storage node

In this example:

#### Procedure

- The NetWorker virtual server uses local device AFTD1 to back up the bootstrap and indexes.
- To configure the autochanger and devices by using the NMC device configuration wizard, specify the hostname of the stand-alone host, `ext_SN`, when prompted for the storage node name and the prefix name.
- To configure the autochanger and devices by using the `jbconfig` command, run
  
  ```bash
  jbconfig -s clu_vir1 on the ext_SN. The NetWorker Administrators Guide describes how to use jbconfig to configure autochangers and devices.
  ```
  
  - When prompted for the hostname to use as a prefix, specify the external storage node, `ext_SN`. 
When prompted to configure shared devices, select Yes.

- The Storage nodes attribute value in the Client resource for each host is as follows:
  - clus_phys1: clus_phys1
  - clus_phys2: clus_phys2
  - clus_vir1: nsrserverhost

Configuring backup and recovery on page 63 describes how to configure the Client resource for each cluster node.
CHAPTER 4

Configuring Backup and Recovery

This chapter describes how to configure a NetWorker virtual server, backup virtual and physical nodes in a cluster, and how to configure non-clustered clients to backup to a NetWorker virtual server.

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- Setting NetWorker environment variables in a cluster .......................... 66
- Limiting NetWorker server access to a client ........................................ 66
- Configuring the NetWorker virtual server .......................................... 68
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Registering NetWorker virtual server licenses

NetWorker uses the hostid of the NetWorker server to generate authorization codes for the license keys. For a NetWorker virtual server, you must determine the hostid of the each physical node and create a composite hostid. A composite hostid is a combination of the hostids for each node, that makes up a highly-available NetWorker server. NetWorker stores the composite hostid value in a hostids file in the shared nsr directory.

Use the composite hostid to register and license a highly-available NetWorker server. When a failover occurs, the licenses for the NetWorker virtual server do not require authorization.

---

**Note**

The *NetWorker Licensing Guide* describes how to obtain NetWorker licenses and how to add them to a NetWorker server.

---

To create a composite hostid:

**Procedure**

1. Determine the hostid of a physical node:
   - On each UNIX physical node, type `hostid` from a system prompt and record the value.
     For example:
     ```
     # hostid
     84f8c879
     ```
   - On each Windows physical node:
     a. Connect to the NetWorker virtual server by using NMC.
     b. In the Configuration window, select Licensing.
     c. Right-click one of the listed licenses and select Properties.
     d. Record the value in the hostid attribute.
     e. Move the NetWorker resource group to each cluster node then repeat step a through to step d.

2. Log in to the system that runs the NetWorker virtual server and create the hostids file in the shared `/nsr/res/` directory on UNIX or the share `NetWorker_install_path
nsr\res` directory on Windows.

3. Specify the hostid of each cluster node in this file, separated by a colon (:).
   For example:
   ```
   12345678:87654321
   ```

4. Restart the NetWorker virtual server:
   a. Take the NetWorker application offline in the cluster.
      - For AutoStart, use the AutoStart Console to take the NetWorker virtual server offline.
      - For HACMP/PowerHA, type: `#/usr/bin/nw_hacmp.lc stop`
For MSFCS Windows 2008, in the Failover Cluster Management program, right-click on the NetWorker cluster service and select **Take this service or application Offline**.

For MSFCS Windows 2012, in the Failover Cluster Management program, right-click the NetWorker cluster resource and select **Stop Role**.

For MC/ServiceGuard, type: `cmhaltpkg networker`

For SLES HAE, type: `crm resource stop NetWorker_server_resource_group`

For SunCluster, type: `clresourcegroup offline NetWorker_server_resource_group`

For VCS, type: `hagrp -offline NetWorker_service_group -sys system` where `system` is the node name.

b. Stop the NetWorker daemons.

c. Start the NetWorker daemons.

d. Bring the NetWorker application online in the cluster.

   • For AutoStart, use the AutoStart Console to bring the NetWorker virtual server online.
   
   • For HACMP/PowerHA, type: `/usr/bin/nw_hacmp -lc start`
   
   • For M/C ServiceGuard, type: `cmrunpkg networker`
   
   • For SLES HAE, type: `crm resource start NetWorker_server_resource_group`
   
   • For SunCluster, type: `clresourcegroup online NetWorker_server_resource_group`
   
   • For MSFCS Windows 2008, in the Failover Cluster Management program, right-click on the NetWorker cluster service and select **Bring this service or application online**.
   
   • For MSFCS Windows 2012, in the Failover Cluster Management program, right-click the NetWorker cluster resource and select **Start Role**.
   
   • For VCS, type: `hagrp -online NetWorker_service_group -sys system` where `system` is the node name.

5. Connect to the NetWorker virtual server by using NMC.

6. In the **Configuration** window, select **Licensing**.

7. Right-click one of the listed licenses and select **Properties**.

8. Record the new composite hostid value in the **hostid** attribute to provide to Licensing.

---

**Note**

Do not change the logical hostname for the highly-available NetWorker server. If you change it after you update the software, you must permanently license and authorize the highly-available NetWorker server.
Setting NetWorker environment variables in a cluster

In a UNIX cluster, specify environment variables for a highly-available NetWorker server in the global /nsr/nsrrc file. The NetWorker Administration Guide describes how to use the /nsr/nsrrc file.

To define environment variables for the cluster-aware or stand-alone UNIX NetWorker host, modify or create the /nsr/nsrrc file in the local /nsr directory.

Limiting NetWorker server access to a client

By default, any NetWorker server can back up a NetWorker host and perform a directed recover to any NetWorker host. Use the servers files on a NetWorker host to limit NetWorker server access.

A highly available NetWorker or server or cluster-aware client uses multiple servers files. To limit NetWorker server access to a cluster node, you must create and edit these servers files:

- Global servers file, located on the shared drive.
- Local servers file on for each physical cluster node.

A stand-alone NetWorker application on a cluster node uses one servers file, located in the /nsr/res.servers on UNIX or the NetWorker_installation_path
\nsr\res on Windows.

To limit NetWorker server access to a cluster node:

Procedure

1. For a highly available NetWorker server or cluster-aware NetWorker client, take the NetWorker virtual server offline on the active cluster node:
   - For AutoStart, use the AutoStart Console to take the NetWorker virtual server offline.
   - For HACMP/PowerHA, type: /usr/bin/nw_hacmp.lc stop
   - For MSFCS on Windows 2008, in the Failover Cluster Management program, right-click on the NetWorker cluster service and select Take this service or application Offline.
   - For MSFCS on Windows 2012, in the Failover Cluster Management program, right-click the NetWorker cluster resource and select Stop Role.
   - For MC/ServiceGuard, type: cmhaltpkg networker
   - For SLES HAE, type: crm resource stopNetWorker_server_resource_group
   - For SunCluster, type: crlresourcegroup offline NetWorker_server_resource_group
   - For VCS, type: hagrp -offline NetWorker_service_group -sys system
     where system is the node name.

2. On each node, stop the NetWorker processes:
   - From a command prompt on UNIX, type: nsr_shutdown
   - On Windows, stop the NetWorker Remote Exec service. This also stops the NetWorker Backup and Recover service on a NetWorker server.
3. On each physical node, edit or create the servers file:
   - UNIX: `/nsr/res/servers`
   - Windows: `NetWorker_installation_path\nsr\res\servers`

4. Specify the shortname and FDQN for each NetWorker server, one per line, that requires access to the NetWorker host.
   When the NetWorker server is highly available:
   a. Add an entry for the NetWorker logical or virtual hostname first.
   b. Add entries for each physical host
      
      For example:

      ```
      clus_vir1
      clus_vir1.emc.com
      clus_phys1
      clus_phys1.emc.com
      clus_phys2
      clus_phys2.emc.com
      ```

   When the servers file does not contain any hosts, any NetWorker server can back up or perform a directed recovery to the host.

5. On the node with access to the shared disk, edit the global servers file.

   **Note**
   
   Ensure the hostnames defined in the global servers file are the same as the local servers file on each physical node.

6. For UNIX only, edit the NetWorker boot-time startup file, `/etc/init.d/networker` and delete any `nsrexecd -s` arguments that exist.
   
   For example, when the `/etc/init.d/networker` contains the following entry:

   ```
   nsrexecd -s venus -s mars
   ```

   Modify the file so the entry appears as:

   ```
   nsrexecd
   ```

7. Start the NetWorker daemons on each node.

8. For a highly available NetWorker host only, bring the NetWorker application online:
   - For AutoStart, use the **AutoStart Console** to bring the NetWorker virtual server online.
   - For HACMP/PowerHA, type: `/usr/bin/nw_hacmp -lc start`
   - For M/C ServiceGuard, type: `cmrunpkg networker`
   - For SLES HAE, type: `crm resource start NetWorker_server_resource_group`
   - For SunCluster, type: `c1resourcegroup online NetWorker_server_resource_group`
   - For MSFCS on Windows 2008, in the Failover Cluster Management program, right-click on the NetWorker cluster service and select **Bring this service or application online**.
   - For MSFCS on Windows 2012 in the Failover Cluster Management program, right-click the NetWorker cluster resource and select **Start Role**.
   
   Confirm that the state of the NetWorker server resource changes to Online.
• For VCS, type: `hagrp -online NetWorker_service_group -sys system`
  where `system` is the node name.

**Configuring the NetWorker virtual server**

This section only applies to a highly-available NetWorker server and describes how to configure the NetWorker virtual server and how to backup the shared disk.

NetWorker supports the use of multiple IP address for a resource group (resource service for MC/ServiceGuard). However, use only one of these IP addresses to configure the virtual client resource. The name of the NetWorker Client resource can be the short name, the FQDN corresponding to the IP address, or the IP address.

For example: resgrp1 is a resource group defined in a cluster and there are two IP resources defined in the group, `IP1` and `IP2`. If the IP address for `IP1` is defined as a NetWorker Client resource, then all shared paths in `resgrp1` are saved under the IP address for `IP1` index.

To configure the NetWorker virtual server:

**Procedure**

1. Use NMC to connect to the NetWorker virtual server.
2. In the Configuration window, right-click the NetWorker server and select Properties.
3. In the Administrator attribute, specify the root user account for each UNIX physical node. For each Windows physical node, specify the administrator and the system account for each Windows physical node.

   For example:

   UNIX physical nodes:

   ```
   root@clus_phys1
   root@clus_phys2
   ```

   Windows physical nodes:

   ```
   administrator@clus_phys1
   system@clus_phys1
   administrator@clus_phys2
   system@clus_phys2
   ```

4. Click OK.
5. For NetWorker servers configured to use the lockbox only:
   a. In the left navigation pane, select Clients.
   b. Right-click the client resource for the NetWorker virtual service and select Modify Client Properties.
   c. On the Globals (2 of 2) tab specify the name of each cluster node in the Remote Access field.

   • For UNIX cluster nodes, specify the name of the host that appears when you use the `hostname` command.
   • For Windows cluster nodes, use the full computer name that appears in the Control Panel > System > Computer name field.

6. Click OK.
Creating client resources for physical node backups

This section describes how to create a client resource on a NetWorker server to back up the local disks of a physical cluster node.

Procedure

1. Connect to the NetWorker server in NMC. For a highly-available NetWorker server connect by using the virtual node name.
2. Click Configuration and select Groups. Configure a Group resource or select an existing group to back up the physical nodes.
3. Create a NetWorker client for each physical node within the cluster:
   a. Right-click Clients and select Create.
   b. In the Name attribute, type the name of the physical client.
   c. In the Save set field, specify the local disks or ALL.

   **Note**
   For Windows, do not specify the quorum disk.

   The ALL save set:
   • Does not include shared disks.
   • Includes local disk that belongs to the physical node.
   • Includes the DISASTER_RECOVERY:\ save set for Windows clusters
   • Includes the WINDOWS ROLES AND FEATURES save set for Windows 2012 clusters.
   d. In the Group attribute, select the Group configured in step 2 on page 69.
   e. Define the remaining attributes in the Client properties window, as required, and click Ok.

Creating a client resource for virtual client backups

This section describes how to create a client resource on a NetWorker server to back up a shared disk or Cluster Shared Volume (CSV), including deduplication-enabled CSV. These steps apply to cluster-aware clients and the NetWorker virtual server.

Procedure

1. Connect to the NetWorker server by using NMC. For a highly available NetWorker server, connect by using the virtual node name.
2. Create a Group resource to back up the cluster node or select an existing group. To ensure that backups for the virtual node restart when a NetWorker server failover occurs, enable the Autorestart attribute and disable the Manual Restart option.
3. Create a client resource for the virtual node, or edit the **Client** resource that NetWorker automatically creates for a NetWorker virtual server.

   For Microsoft Failover Cluster, ensure that you configure a network name resource for the virtual client and that you add the resource to the resource group that contains the disks for backup. The full name of the network name resource should match the name of the NetWorker client resource or one of its aliases.

4. Specify the save set to backup in the **Save set** field. To back up:
   - All of the shared drives and CSVs that a virtual client owns, specify **All**.
   - A single drive volume of shared disk that a virtual client owns, specify the drive volume letter.
     
     For example, to backup a single drive volume, specify `G:\`.
     
     To backup a single CSV, specify `C:\clusterstorage\volumeX`, where `X` is the volume number, and `C:` is the system drive.

   **Note**

   If you specify the subdirectory of a deduplicated CSV volume, except in the case where the subdirectory is the root of a mount point, then NetWorker creates an unoptimized data deduplication backup.

5. For HACMP only, add the boot adapter name in the **Aliases** attribute.

6. On the **Globals** tab, in the **Remote Access** field, specify the root user account for each UNIX physical node or the system account for each Windows physical node within the cluster.

   For UNIX physical nodes:

   ```
   root@clus_phys1
   root@clus_phys2
   ```

   For Windows physical nodes:

   ```
   system@clus_phys1
   system@clus_phys2
   ```

7. On the **Apps and Modules** tab, in the **Application Information** field, specify environment variables, as required.
   
   - For Snapshot Management backups only, use the **NSR_PS_SHARED_DIR** variable to specify the share directory. For example:
     
     ```
     NSR_PS_SHARED_DIR=P:\share
     ```

     The *NetWorker Snapshot Management Integration Guide* describes how to configure Snapshot backups.

   - For Windows Server 2012 and Windows 2012 R2 CSV and deduplicated CSV backups only:

     As part of a deduplicated CSV backup, the preferred node attempts to move ownership of the CSV volume to itself. If the ownership move succeeds, then NetWorker performs a backup locally. If the ownership move fails, then NetWorker performs the backup over SMB. When the CSV ownership moves, NetWorker restores the ownership to the original node after the backup completes.

     You can optionally specify the preferred cluster node to perform the backup. To specify the preferred server, use the NetWorker client Preferred Server Order List (PSOL) variable **NSR_CSV_PSOL**.
When you do not specify a PSOL, NetWorker performs the backup by using the Current Host Server node (virtual node).

Review the following information before you specify a PSOL:

- The `save.exe` process uses the first available server in the list to initiate the CSV backup. The first node that is available and responds becomes the preferred backup host. If none of the specified nodes in the PSOL are available, then NetWorker attempts the backup on the Current Host Server node.
- The Remote access list attribute on the NetWorker client must contain the identified cluster nodes.
- Use the NetBIOS name when you specify the node names. You cannot specify the IP address or FQDN of the node.

To specify the PSOL, include a key/value pair in the client resource **Application information** attribute. Specify the key/value pair in the following format:

```
NSR_CSV_PSOL=MachineName1,MachineName2,MachineName3...
```

For example, physical node `clus_phys2` owns the cluster resources for virtual node `clus_vir1`. By default, `clus_vir1` runs the backup request. To offload operations, define `clus_phy1` as the preferred node to start the save operation. If `clus_phy1` is unavailable, then NetWorker should attempt to use `clus_phy2` to start the save operation.

The `NSR_CSV_PSOL` variable in the `clus_vir1` client resource is set to:

```
NSR_CSV_PSOL=clus_phy1,clus_phy2
```

When a physical node performs the backup, NetWorker saves the backup information to the client file index of the virtual client resource. When you recover the CSV backup, specify `clus_vir1` as the source client.

8. For deduplicated CSV backups only, to configure an unoptimized deduplication backup, specify `VSS:NSR_DEDUP_NON_OPTIMIZED=yes` in the **Save operations** attribute.

9. Define the remaining attributes in the Client properties window, as required, and then click **OK**.

### Configuring a backup device for the NetWorker virtual server

The NetWorker virtual server requires a local backup device to save the bootstrap and the server indexes. To ensure that the device is always available, configure a device that belongs to the NetWorker virtual server and is shared between the physical nodes.

**Procedure**

1. Edit the properties of the client resource for the NetWorker virtual server by using NMC.
2. Select **Globals (2 of 2)**.
3. In the **Storage nodes** attribute, specify the hostnames of each physical cluster node followed by `nsrserverhost`. 
Note
MSFCS does not support shared tapes. You cannot configure the NetWorker virtual server with tape devices connected to a shared bus. MSFCS supports disk devices connected to a shared bus. EMC recommends that you do not use file type devices connected to a shared bus.

Configuring a virtual client to back up to a local storage node

By default, NetWorker sends the data from a virtual client to the first storage node listed in the Storage Nodes attribute in the virtual client resource.

Use the keyword `curphyhost` to direct virtual client backups to a storage node device on the physical host that currently owns the virtual client.

The `curphyhost` keyword is only applicable to virtual clients. Do not specify this keyword in the clone storage nodes attribute in the Storage node resource or to the client resource of a NetWorker virtual server. This can cause unexpected behavior. For example, NetWorker might write the bootstrap and index backups to the local storage node for the virtual clients, instead of a local device on the NetWorker virtual server.

Note
If you enable the Autoselect storage node attribute in the client resource, then NetWorker will override the `curphyhost` setting for the client. The *NetWorker Administrators Guide* provides more information about the Autoselect storage node attribute.

For example, consider a two-node cluster where:

- Nodes A and B are the two physical nodes in the cluster.
- The virtual client is saturn, which can reside on Node A or fail over to Node B.

During a backup without `curphyhost` listed in the Storage Nodes attribute for the virtual client, NetWorker directs the backup data to the remote device (rd=) on Node A. When saturn fails over to Node B and a backup for saturn starts, NetWorker still directs the backup data to the remote device (rd=) on Node A.

When you specify `curphyhost` first in the Storage Nodes attribute for saturn, if saturn fails over to Node B and a backup for saturn starts, NetWorker directs the backup data to the remote device (rd=) on Node B. This action takes place because, after the failover, saturn resides on Node B—the current physical host.

To use `curphyhost`:

Procedure
1. Edit the properties of the virtual client resource in NMC.
2. Select **Globals (2 of 2)**.
3. In the **Storage nodes** attribute, add the **curphyhost** keyword.

Performing manual backups of a cluster node

You can perform manual backups of the physical or virtual nodes in a cluster from the command prompt on UNIX and Windows or from the NetWorker User GUI, on Windows only.

This section describes how to configure NetWorker to allow a non-root or non-administrator account perform manual backups and how to perform a manual backup.
Configuring manual backups for non-root or non-administrator users

The backup operation uses the lcmap script to query the cluster and determine path ownership. When you perform a manual backup with a non-root account on UNIX or a non-administrator account on Windows, NetWorker cannot determine path ownership information. As a result, NetWorker writes the backup information to the client file index of the physical node that owns the file system instead of the client file index for the virtual node.

This sections describes how to configure each supported operating system to allow the lcmap script to query the cluster and determine path ownership for non-root or non-administrator users.

Using non-root accounts on AutoStart for UNIX

Before you perform a manual backup of data from a virtual cluster client with non-root privileges on AutoStart for UNIX, use the ftconsole program to add non-root users to the security access list for the FT domain.

Using non-root accounts on HP MC/ServiceGuard

Before you perform a manual backup of data from a virtual cluster client with non-root privileges on HP MC/ServiceGuard, perform one of the following tasks:

- On each node in the cluster, ensure that the .rhosts file in the home directory of the non-root account includes the hostname of each cluster node. For example:

  nodeA
  nodeB

- As the root user on each node in the cluster, edit or create the /etc/cmcluster/cmclnodelist file and add the following information to the file:

  nodeA user_name
  nodeB user_name

  **Note**

  If the cmclnodelist file exists, the cluster software ignores any .rhosts file.

Using non-administrator accounts on MSFCS

Before you perform a manual backup of data from a virtual cluster client with non-administrator privileges on MSFCS, modify the security descriptor properties on the cluster so that the user can access the cluster resources.

For example:

```
Cluster ClusterName/prop "security descriptor"=DOMAIN \USER ,grant,f:security
```

Using non-root accounts on VCS for UNIX

When you perform a manual backup of a physical or virtual cluster client in VCS as a non-root user, the operating system might prompt you for a password.

To avoid the password prompt:

- In VCS 4.0, set the AllowNativeCliUsers attribute to 1.
- In VCS version 4.1 or later, use the VCS halogin command to store authentication information.
For information on how to set up VCS authentication, see the VCS documentation.

Using non-administrator accounts on VCS for Windows

For VCS 6.0 on Windows 2008 and Windows 2008 R2, to perform a backup you must start the NetWorker User application or command prompt window, as an administrator.

For example:

- To start a backup operation from the NetWorker User application: Right-click the NetWorker User application and select Run as Administrator.
- To start a backup operation from the command prompt, right-click the command prompt application and select Run as Administrator.

Performing manual backups from the command prompt

To perform a manual backup of a virtual or physical node, use the save command.

For example:

```
save -c client save_set
```

where:

- `client` is the virtual hostname to back up shared disk data or the physical node hostname to back up data that is local to the node on which you run the save command.
- `save_set` specifies the path to the backup data.

Performing manual backups from NetWorker User

You can use the NetWorker User program on a Windows physical node to back up shared or local data.

To back up shared data, open NetWorker User on the active physical node. While NetWorker User on a Windows 2003 passive node displays the shared drives and VSS SYSTEM save sets, when you attempt to back up the shared drives, error messages similar to the following appear:

```
77259:winworkr: VSS reports adding volume [shared_drive] to snapshot set failed for both hardware/software provider.
7281:winworkr: VSS snapshot failed with error 0x80042308 -- The specified object does not exist..
7284:winworkr: Networker will save the files without the snapshot.
84687:winworkr: Unable to get volume information of file system 'shared_drive': The device is not ready. (Win32 error 0x15).
```

Troubleshooting backups

This section provides resolutions for the following common backup and configuration errors:

- **RAP error: Unable to extract resource info for client on page 75**
- **Filesystems omitted during a scheduled save on page 75**
- **Filesystem backup information written to the wrong client file index on page 76**
No matching devices found when backing up to HACMP devices on page 76

**RAP error: Unable to extract resource info for client**

This message appears when the NetWorker server fails to back up a virtual cluster client because a NetWorker client resources does not exist for each physical node.

To resolve this issue, create a client resource for each physical node that is allowed to own the virtual cluster client and then start the backup.

**File systems omitted during a scheduled save**

In a cluster environment, the NetWorker software must distinguish between:

- File systems associated with a physical client.
- File systems managed by a resource group (a virtual client).

To distinguish between these types of file system, NetWorker uses a criteria called the path-ownership rules. These rules determine which client file index should contain the information about a backup save set. By default, when a conflict in the path-ownership rules occurs, the NetWorker software does not:

- Back up scheduled save sets, which prevents a virtual NetWorker client from writing save set information to multiple client file indexes.
- Consider there to be a match between the client that owns the file system and the client resource configured to backup the file system.

The following conditions cause NetWorker to omit a file system backup during a scheduled save:

- The Save set attribute for a physical client resource contains a file system owned by a virtual client.
- The Save set attribute for a virtual Client resource contains a file system owned by a physical client.

Resolve this issue in one of the following ways:

- **Correct the save set attribute for the client on page 75**
- **Override default path-ownership rules on page 75**

**Correct the save set attribute for the client**

Configure the NetWorker client to only back up the file systems that the client owns.

1. Use the `savegrp` command to check the NetWorker path-ownership rules and display the list of filesystems owned by the client:

   ```bash
   savegrp -p -c client_name
   ```

2. Modify the **Save set** attribute for the client to contain only the file systems that the client owns.

**Override default path-ownership rules**

To force NetWorker to back up file systems that a client does not own, you can create the `pathownerignore` file in the NetWorker `bin` directory on the client. This file causes
NetWorker to ignore default path-ownership rules and write information about the file system save set to the client file index of the correct owner.

Note
Use the mminfo command to confirm that the backup information saves to the correct client file index. By design, the NMC server Group Details window and the Savegroup completion report state that the backup corresponds to the physical client where you configured the save set.

File system backup information written to the wrong client file index

When the pathownerignore file exists on a client at the time of a backup, NetWorker will back up save sets that a client does not own but writes information about the backup save set to the client file index of the host that owns the file system.

To determine which client file index will contain save set information, run a test probe with the verbose option set. For example: savegrp -pv -c client_name group_name where:

- client_name is the name of the cluster client.
- group_name is the name of a group that contains the client backup.

To force NetWorker to write the save set information to the client that does not own the file system, perform one of the following tasks:

- For a manual save operation, use the -c option with the save command to specify the name of the client with the save set information.
- For a scheduled save operation, to force NetWorker to write save set information to the index of the client that backs up the save set:
  1. Edit the properties of the client in NMC.
  2. Select the Apps & Module tab.
  3. In the Backup command attribute, specify the save command with the name of the client to receive the save set information:

```
save -c client_name
```

Note
Use the mminfo command to confirm that the backup information saves to the correct client file index. By design, the NMC server Group Details window and the Savegroup completion report state that the backup corresponds to the physical client where you configured the save set.

No matching devices found when backing up to HACMP devices

This error message appears when backups to devices attached to an AIX HACMP cluster fail because the physical node name is not configured with an IP address that is attached to the primary NIC.

To resolve this issue, configure the physical node IP address on primary NIC. Preparing to install NetWorker on HACMP on page 24 provides more information.
Recovering data

This section describes how to recover data from shared disks that belong to a virtual client.

Note

The steps to recover data that originated on a private disk on a physical cluster client are the same as when you recover data from a host that is not part of a cluster. The NetWorker Administrators Guide provides more information. To recover Windows clusters, the chapter Windows Bare Metal Recovery (BMR) in the NetWorker Administrators Guide provides more information.

To recover data backed up from a shared disk that belongs to a virtual client:

Procedure

1. Ensure that you have correctly configured remote access to the virtual client:
   a. Edit the properties of the virtual client resource in NMC.
   b. On the Globals (2 of 2) tab, ensure that the Remote Access attribute contains an entry for the root or Administrator user for each physical cluster node.

2. To recover a CSV backup for a client that uses the NSR_CSV_PSOL variable, ensure that the system account for each host in the preferred server order list is a member of the NetWorker Operators User Group.

   For example, if you configure the virtual node client resource that specifies the CSV volumes with the following variable: NSR_CSV_PSOL=clu_virt1, clu_virt2, specify the following users in the NetWorker Operators User Group:

   system@clu_virt1
   system@clu_virt2

3. Mount the file systems of the virtual client.

4. Recover the data.
   - When you use the NetWorker User program on Windows, the source client is the virtual client.
   - When you perform a command line recovery, use the recover command with the -c option to specify the name of the client you are attempting to recover. For example:

     recover -s server_name -c virtual_client

Note

The -c virtual_client is optional when you run the recover command from the global file system that the virtual client owns. The recover man page or the EMC NetWorker Command Reference Guide provide information. To recover data from a VCS 6.0 on Windows 2008 and Windows 2008 R2 you must also start the NetWorker User program or command prompt window, as administrator. To start a recover operation from the NetWorker User application, right-click on the NetWorker User application and select Run as Administrator.

To start a recover operation from the command prompt, right-click on the command prompt application and select Run as Administrator.
Configuring a virtual client to recover from a local storage node

During a recover operation of virtual client data, NetWorker attempts to mount the required volume in a device on the first storage node listed in the Recovery Storage Nodes attribute in the virtual client resource.

Use the keyword curphyhost to instruct a virtual client recovery to mount the required volume in a storage node device on the physical host that owns the virtual client.

Note

The curphyhost keyword only applies to virtual clients. Do not specify this keyword in the clone storage nodes attribute in the Storage node resource or to the client resource of the NetWorker virtual server. This can cause unexpected behavior, for example, the NetWorker software writes the bootstrap and index backups to the local storage node for the virtual clients, instead of a local device on the NetWorker virtual server.

The following restrictions apply when you configure the recovery of virtual client data from a local storage node:

- Ensure that there are no hosts or machines named curphyhost on the network.
- Do not specify curphyhost in the Clone storage nodes attribute of a virtual client storage node resource.
- Do not apply the curphyhost keyword to the Storage nodes attribute or the Recover Storage Nodes attribute of the virtual server’s Client resource.

To configure the virtual client to recover data from a local storage node:

Procedure

1. Edit the properties of the virtual client resource in NMC.
2. In the Globals (2 of 2) tab, in the Storage nodes attribute or the Recover storage nodes attribute, add the curphyhost keyword. Position the keyword in the list based on the required priority. The keyword at the top of the list has the highest priority. Ensure that this keyword is not the only keyword in the list.

Troubleshooting recovery

This section provides resolutions to issues that you may encounter when recovering data from a cluster node backup.

NSR server ‘nw_server_name’: client ‘virtual_hostname’ is not properly configured on the NetWorker Server

This message appears when you attempt to recover data from the physical node of a highly available NetWorker server that was backed up by a NetWorker server that is external to the cluster. To resolve this issue, create a client resource for the highly available virtual NetWorker server on the external NetWorker server and retry the recover operation.
Before you remove the NetWorker server software, you must remove the NetWorker configuration from the cluster. This section describes how to take a highly available NetWorker server offline and remove the NetWorker configuration from the cluster.

This section does not apply when the NetWorker server software is a stand-alone application (not cluster managed) or when only the client software is installed.

The process of removing the NetWorker software from a cluster is the same as removing the software on a stand-alone machine. The *NetWorker Installation Guide* describes how to remove the NetWorker software.

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Uninstalling NetWorker from AutoStart

This section describes how to remove NetWorker from AutoStart for Windows and AutoStart for UNIX clusters.

Uninstalling NetWorker on AutoStart for Windows

Before you begin
Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the administrator user.

Procedure
1. Perform the following steps on one node in the cluster by using the AutoStart Console:
   a. Take the NetWorker Resource Group offline.
   b. Select and delete the NetWorker Resource Group from the Current Resource Group list.
   c. Select and delete the NSRserver and the NSRexecd services.
   d. Select and delete the networker_ds resource.
   e. Select and delete the NetWorker virtual server IP Address.
2. Perform the following steps on each node in the cluster:
   a. Shut down the NetWorker services.
   b. Remove the NetWorker configuration:
      lc_config.exe -r
   c. Uninstall the NetWorker software. The NetWorker Installation Guide provides more information.
3. If you will reinstall the NetWorker software to the same location, ensure that you delete these files from the NetWorker_installation_path\nsr\bin subdirectory:
   • NetWorker.clustersvr
   • lcfmap.bat
   • nwinst.bat

Uninstalling NetWorker on AutoStart for UNIX

Before you begin
Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the root user.

Procedure
1. Perform the following steps on one node in the cluster by using the AutoStart Console:
   a. Take the NetWorker Resource Group offline.
   b. Select and delete the NetWorker Resource Group from the Current Resource Group list.
c. Select and delete the NSRserver and the NSRexecd services.

d. Select and delete the networker_ds resource.

e. Select and delete the NetWorker virtual server IP Address.

2. Perform the following steps on each node in the cluster:

   a. Shut down the NetWorker client services on the node:

      

      nsr_shutdown

   b. Ensure that the $FT_DIR and $FT_DOMAIN environment variables are set. Prepare to install NetWorker on AutoStart on page 18 provides more information.

   c. Remove the NetWorker configuration, type the following command:

      - AIX: /usr/bin/networker.cluster -r
      - HP-UX: /opt/networker/bin/networker.cluster -r
      - Linux and Solaris: /usr/sbin/networker.cluster -r

   d. Uninstall the NetWorker software. The NetWorker Installation Guide provides more information.

---

**Uninstalling NetWorker from HACMP**

**Before you begin**

Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the root user.

**Procedure**

1. Perform the following steps on one node in the cluster:

   a. Stop the NetWorker server services:

      /usr/bin/nw_hacmp.lc stop

   b. Remove the following NetWorker resources:

      - NetWorker Application server resource for HACMP, or NetWorker Application controller scripts for PowerHA.
      - NetWorker resource group.
      - For PowerHA only, the NetWorker Application monitor, if configured.

2. Perform the following steps on each cluster node:

   a. Shut down the NetWorker daemons:

      nsr_shutdown

   b. Remove the NetWorker configuration:

      networker.cluster -r

   c. Uninstall the NetWorker software. The NetWorker Installation Guide provides more information.
Uninstalling NetWorker from HP MC/ServiceGuard

Before you begin

Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps on each physical node as the root user.

Procedure

1. Halt the NetWorker package:
   ```
   cmhaltpkg networker
   ```

2. Remove the NetWorker package:
   ```
   cmdeleteconf -p networker
   ```

3. Stop the NetWorker services:
   ```
   nsr_shutdown
   ```

4. Remove the NetWorker configuration from the cluster:
   ```
   /opt/networker/bin/networker.cluster -r
   ```

5. Uninstall the NetWorker software. The *NetWorker Installation Guide* provides more information.

6. If you used the non-LC integration method to configure the NetWorker software, remove the `/etc/cmcluster/NetWorker.clucheck` file.

Uninstalling NetWorker from MSFCS

Before you begin

Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the administrator user:

Procedure

1. Log in to one node in the cluster.
   a. Take the NetWorker server application offline:
      * On Windows 2008, in the Failover Cluster Management program, right-click the NetWorker cluster service and select *Take this service or application Offline*.
      * On Windows 2012, in the Failover Cluster Management program, right-click the NetWorker cluster resource and select *Stop Role*.

   b. Select *Action > Delete* to delete the *NetWorker Server* resource from *Microsoft Failover Cluster*.

   c. Close the *Failover Cluster Management* program on all the nodes where you plan to uninstall NetWorker software.

2. From a command prompt, on all but one node in the cluster, type: `regcnsrd -u`.

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Note
If you are prompted with the following message, then type \texttt{y}:

\begin{verbatim}
Is this machine a member of the cluster on which you want to un-register Resource Extension for NetWorker Server resource?
\end{verbatim}

3. From a command prompt on the last node of the cluster, type: \texttt{regcnsrd -d}.
4. Uninstall the NetWorker software on each node. The \textit{NetWorker Installation Guide} provides more information.

**Uninstalling NetWorker from RHEL High Availability**

**Before you begin**
Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the root user.

**Procedure**
1. One node in the cluster, connect to the Conga web interface.
2. On the \textbf{Service Groups} tab, select the NetWorker resource group, then click \textbf{Delete}.
3. On the \textbf{Resources} tab, delete the Script, IP Address, File System, and Logical Volume Management resources that were in the NetWorker service group.

**Uninstalling NetWorker from SLES HAE**

**Before you begin**
Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the root user.

**Procedure**
1. Log in to one node in the cluster and perform the following steps:
   a. Take the NetWorker server resource group offline. For example, type:
      \begin{verbatim}
      crm resource stop NetWorker_server_resource_group
      \end{verbatim}
   b. Start the \texttt{crm} tool:
      \begin{verbatim}
      crm configure
      \end{verbatim}
   c. Delete the NetWorker resource group. For example, type:
      \begin{verbatim}
      delete NetWorker_resource_group
      \end{verbatim}
   d. Delete the NetWorker server resource. For example, type:
      \begin{verbatim}
      delete NetWorker_server_resource
      \end{verbatim}
   e. Commit the changes:
      \begin{verbatim}
      commit
      \end{verbatim}
Uninstalling the NetWorker Software in a Cluster

f. Exit the crm tool:

```
exit
```

2. Perform the following steps on each node in the cluster:

a. Stop the NetWorker daemons:

```
nsr_shutdown
```

b. Remove the NetWorker configuration:

```
networker.cluster -r
```

c. Uninstall the NetWorker software. The *NetWorker Installation Guide* provides more information.

**Uninstalling NetWorker from SUN Cluster and Oracle Solaris Cluster**

**Before you begin**

Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the root user.

**Procedure**

1. Perform the following steps on one node in the cluster:

a. Take the NetWorker resource group offline. For example, type:

```
clresourcegroup offline networker_resource_group
```

b. Remove the NetWorker resources and configuration from the cluster. For example, type:

```
clresource disable networker_client_resource
clresource disable networker_server_resource
clresource delete networker_client_resource
clresource delete networker_server_resource
```

c. Remove the hastorageplus resource, if it exists:

```
clresource disable hastorageplus
clresource delete hastorageplus
```

2. Perform the following steps on each node of the cluster:

a. Stop the NetWorker daemons:

```
nsr_shutdown
```

b. Remove the NetWorker configuration from the cluster:

```
networker.cluster -r
```

3. On the last node in the cluster, remove the NetWorker resource group from the cluster. For example, type:

```
clresourcegroup delete networker_resource_group
```

4. Uninstall the NetWorker software. The *NetWorker Installation Guide* provides more information.
Uninstalling NetWorker from VCS

This section describes how to remove the NetWorker configuration from the cluster and remove the NetWorker software on Solaris, Linux and Windows.

Uninstalling NetWorker on VCS for Solaris and Linux

Before you begin

Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the root user.

Procedure

1. Perform the following steps on one node in the cluster:
   a. Take the NetWorker resource group offline. For example, type:

   ```
   ha grp -offline NetWorker_service_group -sys system
   ```

   where `system` is the node name.
   b. Remove all the instances of the NWClient resource type and remove the NWClient type definition from the configuration.

   For information, refer to the hares (1m) and hatype(1m) man pages.

2. Perform the following steps on each cluster node:
   a. Shut down the NetWorker daemons:

   ```
   nsr_shutdown
   ```

   b. Remove the NetWorker configuration:

   ```
   networker.cluster -r
   ```

   c. Uninstall the NetWorker software. The NetWorker Installation Guide provides more information.

Uninstalling NetWorker on VCS for Windows

Before you begin

Before you uninstall the NetWorker software from each node in the cluster, first remove the NetWorker configuration from the cluster, then remove the NetWorker software. Perform the following steps as the administrator user.

Procedure

1. Perform the following steps on one node in the cluster:
   a. Take the NetWorker resource group offline.
   b. Remove all the instances of the NWClient resource type and remove the NWClient type definition from the configuration.

2. Perform the following steps on each node in the cluster:
   a. Stop the NetWorker services.
b. From a command prompt, remove the NetWorker configuration from the cluster. For example, type:

```
lc_config.exe -r
```

c. Uninstall the NetWorker software. The *NetWorker Installation Guide* provides more information.
CHAPTER 6

Updating a Highly Available NetWorker Application

This chapter provides an overview of how to update the NetWorker software in a highly available cluster.

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Updating a NetWorker application

Perform these steps on each node in the cluster.

Procedure

1. Uninstall the NetWorker software from each node in the Cluster. Uninstalling the NetWorker software in a cluster on page 79 describes how to remove the NetWorker software in each supported cluster.

2. Install the NetWorker software on each node in the cluster. The NetWorker Installation Guide describes how to install the NetWorker software.

3. Configure the NetWorker software in the cluster. Configuring the cluster on page 17 describes how to configure the NetWorker software in each supported cluster.
This glossary contains definitions for terms used in this guide.

A

Administrator
Person who normally installs, configures, and maintains software on network computers, and who adds users and defines user privileges.

Advanced File Type Device (AFTD)
Disk storage device that uses a volume manager to enable multiple concurrent backup and recovery operations and dynamically extend available disk space.

Attribute
Feature of a NetWorker resource. It is a setting or information that the resource provides.

Authorization Code
Unique code that in combination with an associated enabler code unlocks the software for permanent use on a specific host computer. See license key

B

Backup
1. Duplicate of database or application data, or entire computer system, stored separately from the original, which can be used to recover the original if it is destroyed or damaged.
2. Operation that saves data to a volume for use as a backup.

Backup Group
See group

BMR
Windows Bare Metal Recovery, formerly known as Disaster Recovery. For more information on BMR, refer to the Windows Bare Metal Recovery chapter in the EMC Networker Administration Guide.

Boot Address
The address used by a node name when it boots up, but before HACMP/PowerHA for AIX starts.

Bootstrap
Save set that is essential for NetWorker disaster recovery procedures with the NetWorker server. The bootstrap consists of three components that reside on the NetWorker server: the media database, the resource database, and a server index.

C

Client
Computer, workstation, or application server whose data can be backed up and restored with the NetWorker software.

Client File Index
Database maintained by the NetWorker server that tracks every database object, file, or filesystem backed up. The NetWorker server maintains a single index file for each client computer. The tracking information is purged from the index after the browse time of each backup expires.
Client resource  NetWorker server resource that identifies the save sets to be backed up on a client. The Client resource also specifies information about the backup, such as the schedule, browse policy, and retention policy for the save sets.

cluster client  A NetWorker client within a cluster; this can be either a virtual client, or a NetWorker Client resource that backs up the private data that belongs to one of the physical nodes.

cluster virtual server  Cluster network name, sometimes referred to as cluster server name or cluster alias. A cluster virtual server has its own IP address and is responsible for starting cluster applications that can fail over from one cluster node to another.

Console server  See NetWorker Management Console (NMC)

current host server  Cluster physical node that is hosting the Cluster Core Resources or owns the Cluster Group. The cluster virtual server resolves to the current host server for a scheduled NetWorker backup.

database  1. A collection of data arranged for ease and speed of update, search, and retrieval by computer software.

            2. An instance of a database management system (DBMS), which in a simple case might be a single file containing many records, each of which contains the same set of fields.

datazone  Group of clients, storage devices, and storage nodes that are administered by a NetWorker server.

device  1. Storage folder or storage unit that can contain a backup volume. A device can be a tape device, optical drive, autochanger, or disk connected to the server or storage node.

            2. General term that refers to storage hardware.

            3. Access path to the physical drive, when dynamic drive sharing (DDS) is enabled.

device-sharing infrastructure  The hardware, firmware, and software that permit several nodes in a cluster to share access to a device.

disaster recovery  Restore and recovery of business operations and data in the event of hardware failure or software corruption.

enabler code  Unique code that activates the software:

            • Evaluation enablers or temporary enablers, such as a Powerlink entitlement for NetWorker, expire after a fixed period of time.

            • Base enablers unlock the basic features for software.

            • Add-on enablers unlock additional features or products, for example, library support.

See license key
failover  A means of ensuring application availability by relocating resources in the event of a hardware or software failure. Two-node failover capability allows operations to switch from one cluster node to the other. Failover capability can also be used as a resource management tool.

failover cluster  Windows high-availability clusters, also known as HA clusters or failover clusters, are groups of computers that support server applications that can be reliably utilized with a minimum of down-time. They operate by harnessing redundant computers in groups or clusters that provide continued service when system components fail.

group  Client computer or group of clients that are configured to back up files during a NetWorker scheduled backup, according to a single designated schedule or set of conditions.

Highly available application  An application that is installed in a cluster environment and configured for failover capability. On an MC/ServiceGuard cluster this is called a highly-available package.

Highly available package  An application that is installed in a HP MC/ServiceGuard cluster environment and configured for failover capability.

host  Computer on a network.

host ID  Eight-character alphanumeric number that uniquely identifies a computer.

hostname  Name or address of a physical or virtual host computer that is connected to a network.

license key  Combination of an enabler code and authorization code for a specific product release to permanently enable its use. Also called an activation key.

managed application  Program that can be monitored or administered, or both from the Console server.

media index  Database that contains indexed entries of storage volume location and the lifecycle status of all data and volumes managed by the NetWorker server. Also known as media database.
**n**

**networker_install_path** The path or directory where the installation process places the NetWorker software.
- AIX: /usr/sbin
- Linux: /usr/bin
- Solaris: /usr/sbin
- HP-UX: /opt/networker/bin
- Windows (New installs): C:\Program Files\EMC NetWorker\nsr\bin
- Windows (Updates): C:\Program Files\Legato\nsr\bin

**NetWorker Management Console (NMC)** Software program that is used to manage NetWorker servers and clients. The NMC server also provides reporting and monitoring capabilities for all NetWorker processes.

**NetWorker server** Computer on a network that runs the NetWorker server software, contains the online indexes, and provides backup and restore services to the clients and storage nodes on the same network.

**node** A physical computer that is a member of a cluster. See physical client

**node name** The HACMP/PowerHA for AIX defined name for a physical node. See physical client

**p**

**pathname** Set of instructions to the operating system for accessing a file. An absolute pathname indicates how to find a file starting from the root directory and working down the directory tree. A relative pathname indicates how to find a file starting from the current location.

**physical client** The client associated with a physical node. For example the / and /usr file systems belong to the physical client.

**Physical host address (physical hostname)** The address used by the physical client. For HACMP for AIX 4.5, this is equivalent to a persistent IP address.

**private disk** A local disk on a cluster node. A private disk is not available to other nodes within the cluster.

**R**

**recover** To restore data files from a backup volume to a client disk and apply transactional (redo) logs to the data to make it consistent with a given point in time.

**remote device** 1. Storage device that is attached to a storage node that is separate from the NetWorker server.
2. Storage device located at an offsite location that stores a copy of data from a primary storage device for disaster recovery.

**resource** Software component that describes details of the NetWorker server or its clients. Clients, devices, schedules, groups, and policies are all NetWorker resources. Each resource has configurable attributes that define its properties.
resource database  NetWorker database of information about each configured resource.

resource group (application service)  The AutoStart defined name for a virtual server. See virtual server

S

save  NetWorker command that backs up client files to backup media volumes and makes data entries in the online index.

save set  Group of files or a filesystem that has been backed up on storage media by using the NetWorker software.

scheduled backup  Type of backup that is configured to start automatically at a specified time for a group of one or more NetWorker clients. A scheduled backup generates a bootstrap save set.

service address  The address used by highly-available services in an HACMP/PowerHA for AIX environment.

shared disk  A disk that is shared by the cluster nodes.

stand-alone server  A NetWorker server that is running within a cluster, but not configured as a highly-available application. A stand-alone server does not have failover capability.

storage device  See device

storage node  Storage device physically attached to a computer other than the NetWorker server, whose backup operations are administered from the controlling NetWorker server.

V

virtual client  A NetWorker Client resource that backs up data that belongs to a highly-available service or application within a cluster. Virtual clients can fail over from one cluster node to another. For HACMP/PowerHA for unix the virtual client is the client associated with a highly-available resource group. The file system defined in a resource group belongs to a virtual client. The virtual client uses the service address. The HACMP/PowerHA for AIX resource group must contain an IP service label to be considered a NetWorker virtual client.

virtual server  A NetWorker server configured to run as a highly-available application. A virtual server can fail over from one cluster node to another.
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