EMC® NetWorker®

Version 9.0.x

Cluster Integration Guide

302-001-767

REV 03

EMC²

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Published June 2016

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Preface

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions that are 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 1 Revision history

Revision	Date	Description
03	June 29, 2016	Third release of this document for EMC NetWorker 9.0.x. Updated to include information about how to configure a highly available NetWorker server on supported Windows and RHEL clusters.
02	December 16, 2015	Second release of this document for EMC NetWorker 9.0. Removed Windows 2003 content from the Configuring Backup and Recovery chapter.
01	September 24, 2015	First release of this document for EMC NetWorker 9.0.

Related documentation

The NetWorker documentation set includes the following publications, available on EMC Online Support:

- *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 https://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 Network Data Management Protocol (NDMP) User Guide*
  Describes how to use the NetWorker software to provide data protection for NDMP filers.
- *EMC NetWorker Cluster Integration 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 Command Reference Guide*
  Provides reference information for NetWorker commands and options.
- *EMC NetWorker Data Domain Boost 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 Performance Optimization Planning Guide*
  Contains basic performance tuning information for NetWorker.
- *EMC NetWorker Server Disaster Recovery and Availability Best Practices Guide*
  Describes how to design and plan for a NetWorker disaster recovery. However, it does not provide detailed disaster recovery instructions. The Disaster Recovery section of the NetWorker Procedure Generator (NPG) provides step-by-step disaster recovery instructions.
- *EMC NetWorker Snapshot Management Integration Guide*
  Describes the ability to catalog and manage snapshot copies of production data that are created by using mirror technologies on EMC storage arrays.
- *EMC NetWorker Snapshot Management for NAS Devices Integration Guide*
  Describes how to catalog and manage snapshot copies of production data that are created by using replication technologies on NAS devices.
- *EMC NetWorker VMware Integration Guide*
  Provides planning and configuration information on the use of VMware 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 REST API Getting Started Guide*
  Describes how to configure and use the NetWorker REST API to create programmatic interfaces to the NetWorker server.
- *EMC NetWorker REST API Reference Guide*
  Provides the NetWorker REST API specification used to create programmatic interfaces to the NetWorker server.
- 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 the online 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.

Special notice conventions that are used in this document

EMC uses the following conventions for special notices:

NOTICE

Identifies content that warns of potential business or data loss.

Note

Contains information that is incidental, but not essential, to the topic.

Typographical conventions

EMC uses the following type style conventions in this document:

Table 2 Style conventions

Bold	Used for names of interface elements, such as names of buttons, fields, tab names, and menu paths (what the user specifically selects or clicks)
Italic	Used for full titles of publications that are referenced in text
`Monospace`	Used for: • System code • System output, such as an error message or script • Pathnames, file names, prompts, and syntax • Commands and options
Monospace italic	Used for variables
`Monospace bold`	Used for user input
[ ]	Square brackets enclose optional values
|	Vertical bar indicates alternate selections - the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate non-essential information that is omitted from the example

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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:

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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, 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 Windows and RHEL 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` or `c:\Program Files\EMC NetWorker\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.

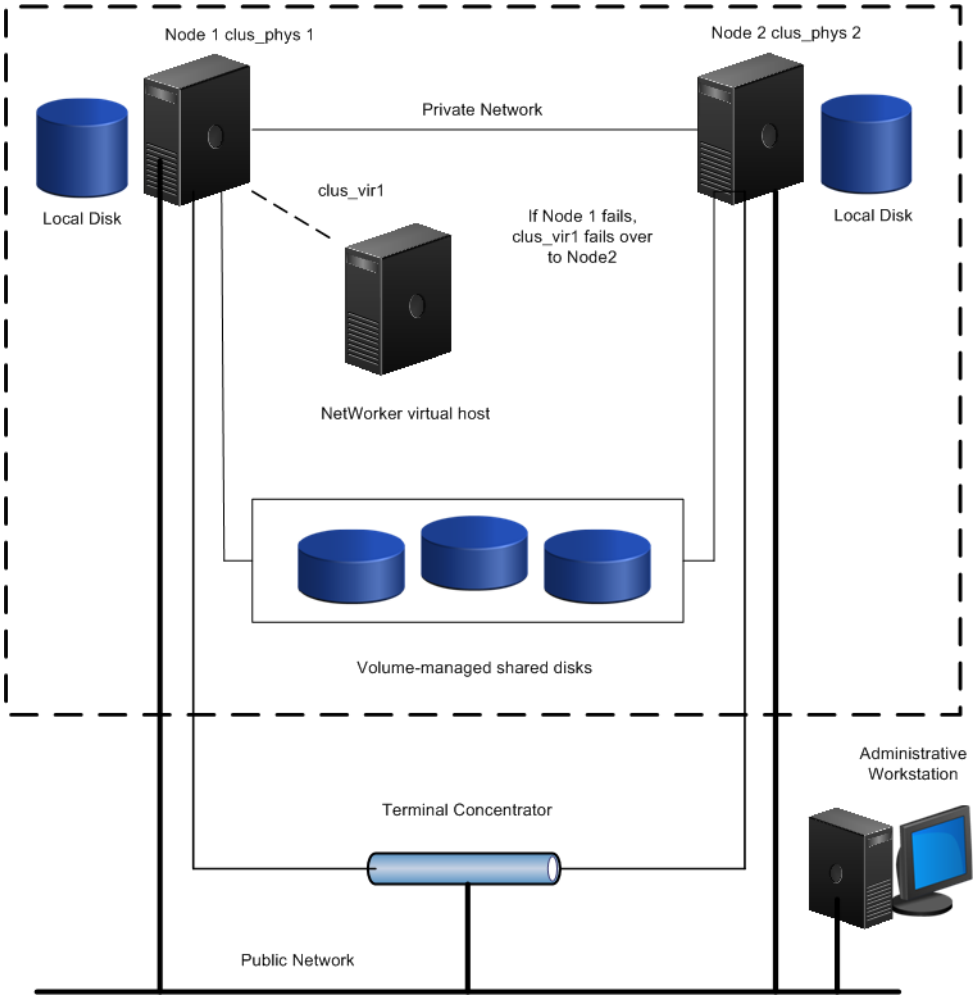
When you configure a highly available NetWorker server, you must:

- 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



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.

- 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 a 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.

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 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.
- 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.
- 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. The computer hostname must also be set to the name equivalent of the address used by the physical client's persistent IP or dedicated NIC. Whether 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.

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 you provided when you installed NetWorker. For example: `/space/nsr`.

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 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 MC/ServiceGuard

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

- 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 NetWorker 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
   ```

   Note

   Ensure everyone has read ownership and access permissions for the `.nsr_cluster` file.

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:

     ```
     [3ffe:80c0:22c:74:230:6eff:fe4c:2128]:/share/nw
     ```

   - IPv4 address:

     ```
     192.168.109.10:/share/nw
     ```

Note

An HP-UX MC/ServiceGuard package that does not contain a disk resource does not require an entry in the `.nsr_cluster` file. If an online diskless package is the only package on that cluster node, cmgetconf messages may appear in the /var/admin file during a backup.
To avoid these messages, allocate a mounted file system to a mount point, then add this mount point, the package name, and the IP address to the `.nsr_cluster` file. The NetWorker software does not back up the file system. However, you can mount the file system on each cluster node that the diskless package might fail over to.

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`**.

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_synth_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 on Windows 2012

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

Procedure

1. On one cluster node, type **`regcnsrd -c`** to create the NetWorker server resource.
2. On the remaining cluster nodes, type **`regcnsrd -r`** to register the NetWorker server resource.

   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. From the **Action** menu, select **Configure Role...**

   The **High Availability Wizard** appears.
5. On the **Before You Begin** page, click **Next**.
6. On the **Select Role** page, 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:

    ```
    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. On the **Roles** window, select the new NetWorker role, and then perform the following steps 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.

Note

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

e. On the **Parameter** tab, in the **NsrDir** field, specify the path on the shared drive in which NetWorker will create the `nsr` directory. For example, `e:\nsr`.

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.

A dependency is set between the NetWorker server resource and the shared disk.

13. Right-click the NetWorker cluster resource and select **Start Role**.

    The NetWorker server resource starts.

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

Changing the default timeout of NetWorker daemons

A NetWorker server fail over occurs when the time to start up any NetWorker server daemon exceeds 10 minutes.

To prevent a fail over, use the **Failover Cluster Manager** program to change the default timeout of the NetWorker daemons.

Procedure

1. 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**.
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, `ServerStartupTimeout=`*`time`*
   where *time* is a numeric value in seconds.

   Note

   The *ServerStartupTimeout* keyword is case sensitive.

Configuring a highly available NetWorker server on Windows 2008

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

Procedure

1. On one cluster node, type **`regcnsrd -c`** to create the NetWorker server resource.
2. On the remaining cluster nodes, type **`regcnsrd -r`** to register the NetWorker server resource.

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. From the **Action** menu, select **Configure a Service or Application**.

   The **High Availability Wizard** appears.
5. On the **Before You Begin** page, click **Next**.
6. On the **Select Service or Application** page, 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:

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

11. Click **Finish**.
12. Expand **Services and Applications**, select the new NetWorker server resource, and then perform the following steps:
    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.

Note

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

e. On the **Parameter** tab, in the **NsrDir** field, specify the path on the shared drive in which NetWorker will create the `nsr` directory. For example, `e:\nsr`.

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.

A dependency is set between the NetWorker server resource and the shared disk.

13. Right-click the NetWorker cluster service and select **Bring this service or application online**.

    The NetWorker server resource starts.

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

Changing the default timeout of NetWorker daemons

A NetWorker server fail over occurs when the time to start up any NetWorker server daemon exceeds 10 minutes.

To prevent a fail over, use the **Failover Cluster Manager** program to change the default timeout of the NetWorker daemons.

Procedure

1. 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, `ServerStartupTimeout=`*`time`*
   where *time* is a numeric value in seconds.

   Note

   The *ServerStartupTimeout* keyword is case sensitive.

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 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.

SLES HAE provides three cluster management tools: Pacemaker GUI, HA Web Konsole, and the crm shell.

Note

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

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`.

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 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

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_lv"`**
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 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.
- 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. 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:
  clresourcetype list
- If required, register the HAStoragePlus resource type within the cluster:
  clresourcetype 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/db and /global/space, type:

  clresource create -g *backups* -t SUNW.HAStoragePlus -x \ FilesystemMountPoints=/global/db,\ /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/db,/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

VERITAS Cluster Server

This section describes how to configure the NetWorker client as a cluster-aware application on a VERITAS Cluster Server (VCS). Before configuration, you must install the NetWorker software separately 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 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 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 3 NWClient resource type attributes

Required attributes	Type and dimension	Definition
IPAddress	string, scalar	IP address of the virtual NetWorker client. An IP type resource with a matching Address attribute must exist in the service group.
Owned_paths	string, vector	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.

Example 1 NWClient resource sample configuration

The following is a sample of a configured NWClient resource:

```
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`**.

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`.

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:

   - 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 for the file that is located in the VCS configuration directory:

   - 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:

   a. Type the following command:

      ```
      include "NWClient.cf"
      ```

   b. Save and close the file.

   c. Verify the syntax of the `main.cf` file, type:

      ```
      hacf -verify config
      ```

   d. Log in on the remaining nodes in the cluster, type:

      ```
      hastart
      ```

e. Start the VCS engine, type:

```
hastart
```

f. Verify the status of all service groups, type:

```
hagrp -display
```

g. 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

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 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 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 runs and the nsrexecd program restarts.

To edit the cluster cache timeout value, 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:

```
nsradmin -p nsrexecd
```

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 that the attribute was updated, type:

   `print type:NSRLA`

   NetWorker updates the NSRLA database with the new cache value. The updated value takes effect after the next cache update, which is based on the previous timeout value.

6. To make the timeout value take effect immediately, delete the cache file on the physical node:
   - UNIX: **/tmp/lcmap.out**
   - Windows: *NetWorker_install_path***nsr\bin\lcmap.out**

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 nsrexec 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 nsrexec prog 390113 vers 1
on `
```

The error also appears when the `nsrexecd` 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 `nsrexecd` 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 36
- Configuring an autochanger with non-shared tape devices 37
- Configuring the robotics on a stand-alone host 39

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 shares 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 62 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.

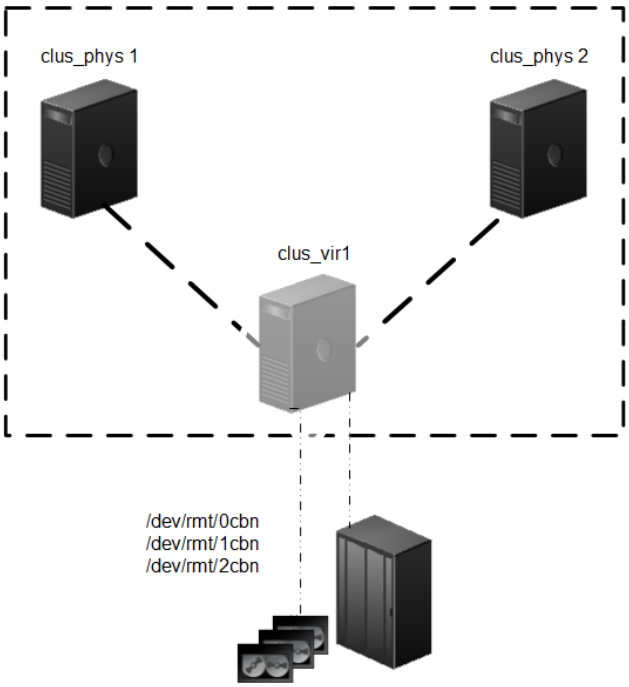
   Note

   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 that is 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 might be required 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.

Figure 2 Autochanger with shared devices



6. 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.
7. 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.
   a. When prompted for the hostname to use as a prefix, specify the virtual server name, clus_vir1.
   b. When prompted to configure shared devices, select **Yes**.

      The *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:
   - clus_phys1: **`clus_phys1`**
   - clus_phys2: **`clus_phys2`**
   - clus_vir1: **`nsrserverhost`**

   Configuring backup and recovery on page 41 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) does not automatically restart on the new failover node.

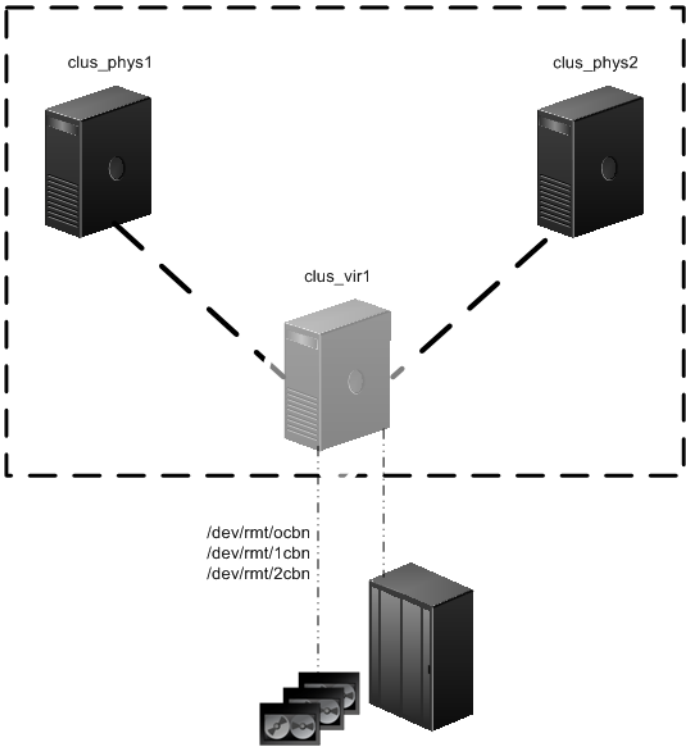
Configuring an autochanger with non-shared tape devices

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*

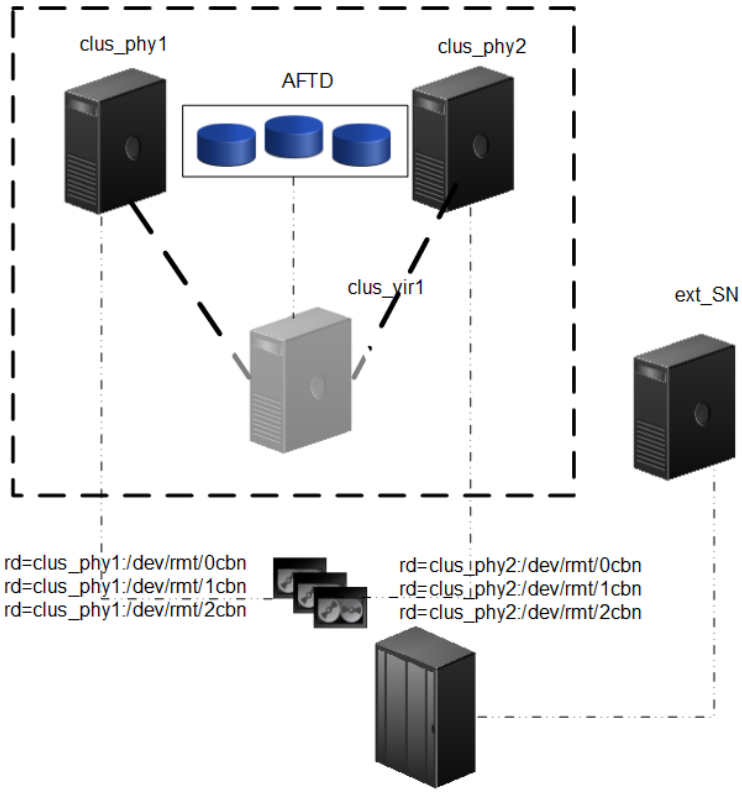
Configuring backup and recovery on page 41 describes how to configure the Client resource for each cluster node.

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:

- 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 `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 41 describes how to configure the Client resource for each cluster node.

CHAPTER 4

Configuring Backup and Recovery

This chapter describes how to backup virtual and physical nodes in a cluster, and how to configure a virtual client to backup to a local storage node.

Note

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 that is 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.

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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 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 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 RHEL, type:
2. On each node, stop the NetWorker processes:
   - From a command prompt on Linux or 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 that the hostnames defined in the global servers file are the same as the local servers file on each physical node.

6. For Linux 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 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 RHEL, type:

     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 addresses for a resource group. 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 RHEL physical node. For each Windows physical node, specify the administrator and the system account for each Windows physical node.

   For example:

   RHEL 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 RHEL 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**.

Note

When you configure the NetWorker server to use a lockbox, you must update the **Remote Access** field before the virtual node fails over to another cluster node. If you do not update the **Remote Access** field before failover, you must delete and create the lockbox resource. The *EMC NetWorker Security Configuration Guide* describes how to configure the lockbox resource.

Creating client resources for physical node backups

This section describes how to create a NetWorker client resource 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 **Protection** 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 45.
   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 NetWorker client resource 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. Click **Protection**, and then create a **Policy** and **Workflow** to back up the cluster node, or select an existing workflow.
3. Create a NetWorker client resource for the virtual node.

   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 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(1 of 2)** 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 tries 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 start 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 tries 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 try 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=MachineName1,MachineName2,MachineName3...
```

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 ensures 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 *EMC NetWorker Administration 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 of 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.

Note

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.

Troubleshooting backups

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

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 the follow.

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

To distinguish between these types of file system, NetWorker uses a criteria that is 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 that is 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 that is owned by a virtual client.
- The save set attribute for a virtual Client resource contains a file system that is owned by a physical client.

Resolve this issue in one of the following ways outlined in the following sections.

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 `nsrpolicy` command to check the NetWorker path-ownership rules and display the list of file systems owned by the client.
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 indicates 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 the save set information 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 Savegrp 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 16 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 *EMC NetWorker Administration Guide* provides more information.

To recover Windows clusters, the chapter Windows Bare Metal Recovery (BMR) in the *EMC NetWorker Administration Guide* provides more information.

To recover data that is backed up from a *shared disk* that belongs to a virtual client, perform the following steps:

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 trying 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 the NetWorker User application and select **Run as Administrator**.
- To start a recover operation from the command prompt, right-click 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 **currechost** 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 **currechost** keyword only applies to virtual client recoveries. 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 **currechost** on the network.
- Do not specify **currechost** in the Clone storage nodes attribute of a virtual client storage node resource.
- Do not apply the **currechost** 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 **currechost** 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.

CHAPTER 5

Uninstalling the NetWorker Software in a Cluster

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 *EMC NetWorker Installation Guide* describes how to remove the NetWorker software.

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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 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 *EMC NetWorker Installation Guide* provides complete instructions.

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. Shut down the NetWorker daemons:

   ```
   nsr_shutdown
   ```

2. Remove the NetWorker configuration from the cluster:

   ```
   /opt/networker/bin/networker.cluster -r
   ```

3. Uninstall the NetWorker software. The *EMC NetWorker Installation Guide* provides complete instructions.
4. If you used the non-LC integration method to configure the NetWorker software, remove the `/etc/cmcluster/NetWorker.clucheck` file.

Uninstalling NetWorker from MSFCS

Procedure

1. Uninstall the NetWorker software on each node. The *EMC NetWorker Installation Guide* provides complete instructions.

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. The *EMC NetWorker Installation Guide* provides instructions for uninstalling.

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. 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 *EMC NetWorker Installation Guide* provides complete instructions.

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 each node of the cluster:
   a. Stop the NetWorker daemons:

      ```
      nsr_shutdown
      ```

   b. Remove the NetWorker configuration from the cluster:

      ```
      networker.cluster -r
      ```

2. Uninstall the NetWorker software. The *EMC NetWorker Installation Guide* provides complete instructions.

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. 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 *EMC NetWorker Installation Guide* provides complete instructions.

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. 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 *EMC NetWorker Installation Guide* provides complete instructions.

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 55 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 15 describes how to configure the NetWorker software in each supported cluster.

GLOSSARY

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 Name or value property of a resource.

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 an entire computer system, stored separately from the original, which can be used to recover the original if it is lost 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 disaster recovery procedures. The bootstrap consists of three components that reside on the NetWorker server: the media database, the resource database, and a server index.

C

client Host on a network, such as a computer, workstation, or application server whose data can be backed up and restored with the backup server software.

client file index Database maintained by the NetWorker server that tracks every database object, file, or file system 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.

D

database

1. Collection of data arranged for ease and speed of update, search, and retrieval by computer software.
2. 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 data and business operations in the event of hardware failure or software corruption.

E

enabler code Unique code that activates the software:

- Evaluation enablers or temporary enablers 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.

F

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.

G

group One or more client computers that are configured to perform a backup together, according to a single designated schedule or set of conditions.

H

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.

L

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.

M

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 life cycle 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 by starting from the root directory and working down the directory tree.
- A relative pathname indicates how to find a file by 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 backup storage to a client and apply transaction (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 at an offsite location that stores a copy of data from a primary storage device for disaster recovery.

resource Software component whose configurable attributes define the operational properties of the NetWorker server or its clients. Clients, devices, schedules, groups, and policies are all NetWorker resources.

resource database NetWorker database of information about each configured resource.

resource group (application service) The AutoStart defined name for a 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

1. Group of tiles or a file system copied to storage media by a backup or snapshot rollover operation.
2. NetWorker media database record for a specific backup or rollover.

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 Storage disk that is connected to multiple nodes in a cluster.

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 Computer that manages physically attached storage devices or libraries, whose backup operations are administered from the controlling NetWorker server. Typically a “remote” storage node that resides on a host other than the 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.