Red Hat Enterprise Linux
5
Configuration Example - NFS Over GFS

Configuring NFS over GFS in a Red Hat Cluster Edition 3

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Configuring NFS over GFS in a Red Hat Cluster Edition 3

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Abstract

This book describes a procedure for configuring NFS over GFS in a 5-node Red Hat Cluster using Conga.
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Chapter 1. Introduction

1.1. About This Guide

This book describes a procedure for configuring NFS over GFS in a 5-node Red Hat Cluster using Conga.

1.2. Audience

This book is intended to be used by system administrators managing systems running the Linux operating system. It requires familiarity with Red Hat Enterprise Linux 5, Red Hat Cluster Suite, GFS file system administration, and basic knowledge of NFS administration.

1.3. Software Versions

Table 1.1. Software Versions

<table>
<thead>
<tr>
<th>Software</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHEL5</td>
<td>refers to RHEL5 and higher</td>
</tr>
<tr>
<td>GFS</td>
<td>refers to GFS for RHEL5 and higher</td>
</tr>
</tbody>
</table>

1.4. Related Documentation

For more information about using Red Hat Enterprise Linux, refer to the following resources:

- *Red Hat Enterprise Linux Deployment Guide* — Provides information regarding the deployment, configuration and administration of Red Hat Enterprise Linux 5.

For more information about Red Hat Cluster Suite for Red Hat Enterprise Linux 5, refer to the following resources:

- *Configuring and Managing a Red Hat Cluster* — Provides information about installing, configuring and managing Red Hat Cluster components.
- *LVM Administrator's Guide: Configuration and Administration* — Provides a description of the Logical Volume Manager (LVM), including information on running LVM in a clustered environment.
- *Using GNBD with Global File System* — Provides an overview on using Global Network Block Device (GNBD) with Red Hat GFS.
- *Linux Virtual Server Administration* — Provides information on configuring high-performance systems and services with the Linux Virtual Server (LVS).


Red Hat Cluster Suite documentation and other Red Hat documents are available in HTML, PDF, and RPM versions on the Red Hat Enterprise Linux Documentation CD and online at [http://www.redhat.com/docs/](http://www.redhat.com/docs/).
Chapter 2. NFS over GFS in a Red Hat Cluster

This document provides a procedure to configure an NFS service in a Red Hat cluster using the Conga configuration tool. The configured cluster will have the following characteristics:

- There are 5 nodes in the cluster.
- The NFS service runs over a GFS file system.
- There are five NFS clients.

Note that this configuration is not a "high capacity" configuration in the sense that more than one server is providing NFS service. In this configuration, the floating IP moves about as needed, but only one server is active at a time.

Figure 2.1, “NFS over GFS in a 5-Node Cluster” shows the NFS over GFS configuration that this procedure yields.

![NFS over GFS in a 5-Node Cluster](image)

**Figure 2.1. NFS over GFS in a 5-Node Cluster**

In this configuration, Cluster Suite assigns which server will run the NFS service. If that server goes down, the NFS service will automatically fail over to another server in the cluster. The client will not be aware of any loss of service.

The NFS resource that this configuration defines will be NFS Version 3 by default. If you need to restrict what NFS protocol your system provides to its clients, you can do this at NFS startup; this is not part of cluster configuration.

This remainder of this document is organized as follows:

- **Chapter 3, Prerequisite Configuration** describes the prerequisite configuration components that have been set up before the procedure documented in this manual beings.

- **Chapter 4, Components to Configure** summarizes the cluster resources that this procedure configures.
Chapter 2. NFS over GFS in a Red Hat Cluster

- **Chapter 5, Configuring the Cluster Resources** provides the procedures for configuring the cluster resources needed for an NFS service.
- **Chapter 6, Configuring an NFS Cluster Service** provides the procedure for configuring an NFS service in a Red Hat Cluster Suite.
- **Chapter 7, Testing the NFS Cluster Service** provides a procedure to check that the NFS service is working and that it will continue to work as expected if one of the nodes goes down.
- **Chapter 8, Troubleshooting** provides some guidelines to follow when your configuration does not behave as expected.
- **Chapter 9, The Cluster Configuration File** shows the cluster configuration file as it appears before configuring the NFS service and after configuration the NFS service in a Red Hat Cluster Suite.
- **Chapter 10, Configuration Considerations** summarizes some general concerns to consider when configuring an NFS service over a GFS file system in a Red Hat Cluster Suite.
Chapter 3. Prerequisite Configuration

This document describes a procedure for configuring cluster resources and a cluster service. Before beginning this procedure, you must configure a cluster with a fencing device configured for each node in the cluster. In addition, you must configure a logical volume with a GFS filesystem that can be shared among the nodes in the cluster.

Table 3.1, “Configuration Prerequisites” summarizes the prerequisite configuration components that have been set up before this procedure begins.

Table 3.1. Configuration Prerequisites

<table>
<thead>
<tr>
<th>Component</th>
<th>Name</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>cluster</td>
<td>nfsclust</td>
<td>five-node cluster</td>
</tr>
<tr>
<td>cluster node</td>
<td>clusternode1.example.com</td>
<td>node in cluster nfsclust configured with a fencing device of nfs-apc</td>
</tr>
<tr>
<td>cluster node</td>
<td>clusternode2.example.com</td>
<td>node in cluster nfsclust configured with a fencing device of nfs-apc</td>
</tr>
<tr>
<td>cluster node</td>
<td>clusternode3.example.com</td>
<td>node in cluster nfsclust configured with a fencing device of nfs-apc</td>
</tr>
<tr>
<td>cluster node</td>
<td>clusternode4.example.com</td>
<td>node in cluster nfsclust configured with a fencing device of nfs-apc</td>
</tr>
<tr>
<td>cluster node</td>
<td>clusternode5.example.com</td>
<td>node in cluster nfsclust configured with a fencing device of nfs-apc</td>
</tr>
<tr>
<td>LVM volume</td>
<td>/dev/myvg/myvol</td>
<td>The LVM device on which the GFS file system is created</td>
</tr>
<tr>
<td>GFS file system</td>
<td>/dev/myvg/myvol</td>
<td>The GFS file system to export by means of NFS, built on LVM volume /dev/myvg/myvol, mounted at /mnt/gfs, and shared among the members of cluster nfsclust</td>
</tr>
<tr>
<td>IP address</td>
<td>10.15.86.96</td>
<td>The IP address for the NFS service</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient1.example.com</td>
<td>System that will access the NFS service</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient2.example.com</td>
<td>System that will access the NFS service</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient3.example.com</td>
<td>System that will access the NFS service</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient4.example.com</td>
<td>System that will access the NFS service</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient5.example.com</td>
<td>System that will access the NFS service</td>
</tr>
</tbody>
</table>

No failover domain has been defined for this cluster. The cluster software determines on which node to run the NFS service.

For information on configuring a cluster, see Configuring and Managing a Red Hat Cluster. For information on configuring an LVM volume, see LVM Administrator's Guide: Configuration and Administration.
Chapter 4. Components to Configure

This procedure documents the configuration of cluster resources and an NFS cluster service that will be named nfssvc.

Table 4.1, “Cluster Resources to Configure” summarizes the cluster resources that this procedure configures.

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Resource Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address</td>
<td>10.15.86.96</td>
<td>The IP address for the NFS service</td>
</tr>
<tr>
<td>GFS</td>
<td>mygfs</td>
<td>The GFS file system that will be exported through the NFS service</td>
</tr>
<tr>
<td>NFS Export</td>
<td>mynfs</td>
<td></td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient1</td>
<td>The NFS client system nfsclient1.example.com</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient2</td>
<td>The NFS client system nfsclient2.example.com</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient3</td>
<td>The NFS client system nfsclient3.example.com</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient4</td>
<td>The NFS client system nfsclient4.example.com</td>
</tr>
<tr>
<td>NFS Client</td>
<td>nfsclient5</td>
<td>The NFS client system nfsclient5.example.com</td>
</tr>
</tbody>
</table>

The procedure for configuring these resources and the specific parameters to configure are described in Chapter 5, Configuring the Cluster Resources.

You configure a Cluster service by adding a service and defining the composition of the service, which consists of the resources that the service requires. In this procedure, you will create an NFS cluster service named nfssvc. Table 4.2, “Parameters to Configure for NFS Cluster Service nfssvc” summarizes the resource configuration of nfssvc. The names of the resources are those that you assign when you define them, as noted in Table 4.1, “Cluster Resources to Configure”

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Name</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address Resource</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GFS Resource</td>
<td>mygfs</td>
<td></td>
</tr>
<tr>
<td>NFS Export Resource</td>
<td>mynfs</td>
<td>NFS Export resource mynfs is a child of GFS resource mygfs.</td>
</tr>
<tr>
<td>NFS Client Resource</td>
<td>nfsclient1</td>
<td>NFS Client resource nfsclient1 is a child of NFS Export resource mynfs.</td>
</tr>
<tr>
<td>NFS Client Resource</td>
<td>nfsclient2</td>
<td>NFS Client resource nfsclient2 is a child of NFS Export resource mynfs.</td>
</tr>
<tr>
<td>NFS Client Resource</td>
<td>nfsclient3</td>
<td>NFS Client resource nfsclient3 is a child of NFS Export resource mynfs.</td>
</tr>
<tr>
<td>NFS Client Resource</td>
<td>nfsclient4</td>
<td>NFS Client resource nfsclient4 is a child of NFS Export resource mynfs.</td>
</tr>
<tr>
<td>NFS Client Resource</td>
<td>nfsclient5</td>
<td>NFS Client resource nfsclient5 is a child of NFS Export resource mynfs.</td>
</tr>
</tbody>
</table>

The procedure for configuring the NFS service is described in Chapter 6, Configuring an NFS Cluster Service.
Chapter 5. Configuring the Cluster Resources

This chapter provides the procedures for configuring the cluster resources needed for an NFS service. For the procedure for configuring the NFS service itself, see Chapter 6, Configuring an NFS Cluster Service.

Before you can configure an NFS service for a GFS file system in a cluster, you must add the following resources to your cluster:

- The IP address for the NFS service, as described in Section 5.1, “Configuring an IP Address Resource”.
- The GFS file system, as described in Section 5.2, “Configuring a GFS Resource”.
- The NFS export, as described in Section 5.3, “Configuring an NFS Export Resource”.
- The NFS clients, as described in Section 5.4, “Configuring NFS Client Resources”.

To add a resource to your cluster using Conga, perform the following procedure:

1. As an administrator of luci Select the cluster tab.
2. From the Choose a cluster to administer screen, select the cluster to which you will add resources. In this example, that is the cluster with the name nfsclust.
3. At the menu for cluster nfsclust (below the clusters menu), click Resources. This causes the display of menu items for resource configuration: Add a Resource and Configure a Resource.
4. Click Add a Resource. Clicking Add a Resource causes the Add a Resource page to be displayed.

The following sections provide instructions for adding the resources you need for an NFS service.

5.1. Configuring an IP Address Resource

Use the following procedure to add the IP Address resource 10.15.86.96 to cluster nfsclust.

1. At the Add a Resource page for cluster nfsclust, click the drop-down box under Select a Resource Type and select IP Address.
2. For IP Address, enter 10.15.86.96.
3. Leave the Monitor Link checkbox selected to enable link status monitoring of the IP address resource.
4. Click Submit. Clicking Submit displays a verification page. Verifying that you want to add this resource displays a progress page followed by the display of Resources page, which displays the resources that have been configured for the cluster.

5.2. Configuring a GFS Resource

Use the following procedure to add the GFS file system resource mygfs to cluster nfsclust.

1. At the Add a Resource page for cluster nfsclust, click the drop-down box under Select a Resource Type and select GFS file system.
2. For Name, enter mygfs.
3. For **Mount point**, enter `/mnt/gfs`. This is the path to which the GFS file system is mounted.

4. For **Device**, enter `/dev/myvg/myvol`. The is the LVM logical volume on which the GFS file system was created.

5. The **Options** field specifies the mount options for the GFS file system. For this example, we are mounting the file system with the **rw** (read-write) and **localflocks** option.

6. Leave the **File System ID** field blank. Leaving the field blank causes a file system ID to be assigned automatically after you click **Submit** at the **File System Resource Configuration** dialog box.

7. Leave the **Force Unmount** checkbox unchecked. **Force Unmount** kills all processes using the mount point to free up the mount when it tries to unmount. With GFS resources, the mount point is *not* unmounted at service tear-down unless this box is checked.

8. Click **Submit** and accept the verification screen.

### 5.3. Configuring an NFS Export Resource

Use the following procedure to add NFS export resource **mynfs** to cluster **nfsclust**.

1. At the **Add a Resource** page for cluster **nfsclust**, click the drop-down box under **Select a Resource Type** and select **NFS Export**

2. For **Name**, enter **mynfs**.

3. Click **Submit** and accept the verification screen.

The NFS Export resource that this configuration defines will be NFS Version 3 by default. If you need to restrict what NFS protocol your system provides to its clients, you can do this at NFS startup; this is not part of cluster configuration.

### 5.4. Configuring NFS Client Resources

This example procedure configures five NFS client resources for cluster **nfsclust**. The procedure for configuring the first two clients only is laid out explicitly.

Use the following procedure to add NFS client resource **nfsclient1** to cluster **nfsclust**.

1. At the **Add a Resource** page for cluster **nfsclust**, click the drop-down box under **Select a Resource Type** and select **NFS client**

2. For **Name**, enter **nfsclient1**.

3. For **Target**, enter **nfsclient1.example.com**. This is the first NFS client system.

4. This **Options** field species additional client access rights. Specify **rw** (read-write) in this field. For more information, refer to the General Options section of the **exports**(5) man page.

5. Check the **Allow Recover** checkbox. This indicates that if someone removes the export from the export list, the system will recover the export inline without taking down the NFS service.

6. Click **Submit** and accept the verification screen.

Use the following procedure to add NFS client resource **nfsclient2** to cluster **nfsclust**.
1. At the Add a Resource page for cluster nfsclust, click the drop-down box under Select a Resource Type and select NFS client.

2. For Name, enter nfsclient2.

3. For Target, enter nfsclient2.example.com. This is the second NFS client system.

4. Leave the Options field blank.

5. Check the Allow Recover checkbox.

6. Click Submit and accept the verification screen.

Use the same procedure to configure the remaining three NFS client resources, using nfsclient3, nfsclient4, and nfsclient5 as the names of the resources and using nfsclient3.example.com, nfsclient4.example.com, and nfsclient5.example.com as the targets.
Chapter 6. Configuring an NFS Cluster Service

This chapter provides the procedure for configuring an NFS service in a Red Hat Cluster Suite.

In order to configure an NFS service for a GFS file system in a cluster, you need to perform the following steps:

- Add a service to the cluster and provide a name for the service, as described in Section 6.1, “Add a Service to the Cluster”.
- Add an IP address resource to service, as described in Section 6.2, “Adding an IP Address Resource to an NFS Service”.
- Add a GFS resource to the service, as described in Section 6.3, “Adding a GFS Resource to an NFS Service”.
- Add an NFS export resource to the service, as described in Section 6.4, “Adding an NFS Export Resource to an NFS Service”.
- Add the NFS client resources to the services, as described in Section 6.5, “Adding NFS Client Resources to an NFS Service”.

Some Red Hat Cluster resources must be configured as parent or child resources in a service. A resource that is configured as a parent resource is started before the children of that resource are started. All resources that are configured as child resources of a parent must stop cleanly before a parent resource may be stopped. For a resource that is configured as a parent resource to be considered in good health, all the resources configured as its child resources must be in good health.

When you configure the NFS export resource for an NFS service, you must configure it as a child of the GFS resource. You must configure each NFS client resource for an NFS service as a child of the NFS export resource.

6.1. Add a Service to the Cluster

To add a service to your cluster using Conga, perform the following procedure:

1. As an administrator of luci Select the cluster tab.

2. From the Choose a cluster to administer screen, select the cluster to which you will add resources. In this example, that is the cluster with the name nfsclust.

3. At the menu for cluster nfsclust (below the clusters menu), click Services. This causes the display of menu items for service configuration: Add a Service and Configure a Service.

4. Click Add a Service. Clicking Add a Service causes the Add a Service page to be displayed.

5. For Name, enter nfssvc.

6. Leave the checkbox labeled Automatically start this service checked, which is the default setting. When the checkbox is checked, the service is started automatically when a cluster is started and running. If the checkbox is not checked, the service must be started manually any time the cluster comes up from the stopped state.

7. Leave the Run Exclusive checkbox unchecked. The Run Exclusive checkbox sets a policy wherein the service only runs on nodes that have no other services running on them. Since an NFS service consumes few resources, two services could run together on the same node without contention for resources and you do not need to check this.
8. For **Failover Domain**, leave the drop-down box default value of **None**. In this configuration, all of the nodes in the cluster may be used for failover.

9. For **Recovery Policy**, the drop-down box displays **Select a recovery policy**. Click the drop-down box and select **relocate**. This policy indicates that the system should relocate the service before restarting; it should not restart the node where the service is currently located.

10. Add the NFS service resources to this resource, as described in the following sections.

11. After you have added the NFS resources to the service, click **Submit**. The system prompts you to verify that you want to create this service. Clicking **OK** causes a progress page to be displayed followed by the display of **Services** page for the cluster. That page displays the services that have been configured for the cluster.

### 6.2. Adding an IP Address Resource to an NFS Service

Use the following procedure to add an IP Address resource to the NFS cluster service **nfssvc**.

1. At the **Add a Service** page for cluster **nfsclust**, click **Add a resource to this service**. Clicking **Add a resource to this service** causes the display of two drop-down boxes: **Add a new local resource** and **Use an existing global resource**.

   For this example, we will use global resources, which are resources that were previously added as global resources. Adding a new local resource would add a resource that is available only to this service.

2. In the drop-down box underneath the **Use an existing global resource** display, click on the **Select a resource name** display. This displays the resources that have been defined for this cluster.

3. Select **10.15.86.96 (IP Address)**. This returns you to the **Add a Service** page with the IP Address resource displayed.

   Leave the **Monitor link** checkbox selected, which is the default value. This enables link status monitoring of the IP address resource.

### 6.3. Adding a GFS Resource to an NFS Service

Use the following procedure to add a GFS resource to the NFS cluster service **nfssvc**.

1. At the **Add a Service** page for cluster **nfsclust**, click **Add a resource to this service**.

2. In the drop-down box underneath the **Use an existing global resource** display, click on the **Select a resource name** display.

3. Select **mygfs (GFS)**. This returns you to the **Add a Service** page with the GFS resource displayed, with the parameters that you defined in **Section 5.2, “Configuring a GFS Resource”**

### 6.4. Adding an NFS Export Resource to an NFS Service

Configure the NFS Export resource as a child of the GFS resource by following this procedure:

1. At the **Add a Service** page for cluster **nfsclust**, below the **GFS Resource Configuration** display, click **Add a child**. This causes the display of two drop-down boxes: **Add a new local resource** and **Use an existing global resource**.
2. In the drop-down box underneath the **Use an existing global resource** display, click on the **Select a resource name** display.

3. Select **mynfs (NFS Export)**. This returns you to the **Add a Service** page with the NFS Export resource displayed.

### 6.5. Adding NFS Client Resources to an NFS Service

Configure the NFS Client resources as children of the NFS export resource by following this procedure for each NFS client:

1. At the **Add a Service** page for cluster **nfsclust**, below the **NFS Export Resource Configuration** display, click **Add a child**. This causes the display of two drop-down boxes: **Add a new local resource** and **Use an existing global resource**.

2. Click on the **Select a resource name** display in the drop-down box underneath the **Use an existing global resource** display.

3. Select **nfsclient1 (NFS Client)**. This returns you to the **Add a Service** page with the NFS client resource displayed with the parameters you defined in [Section 5.4, "Configuring NFS Client Resources"](#).

Follow the same procedure to add a second, third, fourth, and fifth NFS client resource, selecting **nfsclient2 (NFS Client)**, **nfsclient3 (NFS Client)**, **nfsclient4 (NFS Client)**, and **nfsclient5 (NFS Client)** as the resources to add.

After you have added the NFS client resources to the service, you can click **Submit**. The system prompts you to verify that you want to create this service. Clicking **OK** causes a progress page to be displayed followed by the display of **Services** page for the cluster. That page displays the services that have been configured for the cluster.
Chapter 7. Testing the NFS Cluster Service

After you have configured the NFS service, you can check to be sure that the NFS service is working and that it will continue to work as expected if one of the nodes goes down. The following procedure tests an NFS mount on a client, fences the node on which the NFS service is running, and then checks to be sure that the NFS client can still access the file system.

1. If the GFS file system in the nfsclust cluster is currently empty, populate the file system with test data.
2. Log in to one of the client systems you defined as a target.
3. Mount the NFS file system on the client system, and check to see if the data on that file system as available.
4. On the Luci server, select Nodes from the menu for nfsclust. This displays the nodes in nfsclust and indicates which node is running the nfssvc service.
5. The drop-down box for each node displays Choose a task. For the node on which the nfssvc service is running, select Fence this node.
6. Refresh the screen. The nfssvc service should now be running in a different node.
7. On the client system, check whether the file system you mounted is still available. Even though the NFS service is now running on a different node in the cluster, the client system should detect no difference.
8. Restore the system to its previous state:
   - Unmount the file system from the client system.
   - Delete any test data you created in the GFS file system.
   - Click on Choose a task in the drop-down box for the node which you fenced and select Reboot this node.

Note
For advanced troubleshooting once a system has gone into production, it is sometimes necessary to set up the netconsole and kdump services on a system. You may find it useful to implement and test these tools before a system goes into production, to help in troubleshooting down the line.
Chapter 8. Troubleshooting

If you find that you are seeing error messages when you try to configure your system, or if after configuration your system does not behave as expected, you can perform the following checks and examine the following areas.

Connect to one of the nodes in the cluster and execute the `clustat(8)` command. This command runs a utility that displays the status of the cluster. It shows membership information, quorum view, and the state of all configured user services.

The following example shows the output of the `clustat(8)` command.

```
[root@clusternode4 ~]# clustat
Cluster Status for nfsclust @ Wed Dec 3 12:37:22 2008
Member Status: Quorate

Member Name                  ID   Status
------- -------               ---- ------
clusternode5.example.com      1    Online, rgmanager
clusternode4.example.com      2    Online, Local, rgmanager
clusternode3.example.com      3    Online, rgmanager
clusternode2.example.com      4    Online, rgmanager
clusternode1.example.com      5    Online, rgmanager

Service Name          Owner (Last)                     State
------- ---              ----- ------                     ----- ----
service:nfssvc    clusternode2.example.com         starting
```

In this example, `clusternode4` is the local node since it is the host from which the command was run. If `rgmanager` did not appear in the `Status` category, it could indicate that cluster services are not running on the node.

Connect to one of the nodes in the cluster and execute the `group_tool(8)` command. This command provides information that you may find helpful in debugging your system. The following example shows the output of the `group_tool(8)` command.

```
[root@clusternode1 ~]# group_tool

type level name id state
fence 0 default 00010005 none
[1 2 3 4 5]
dlm 1 clvmd 00020005 none
[1 2 3 4 5]
dlm 1 rgmanager 00030005 none
[3 4 5]
dlm 1 mygfs 007f0005 none
[5]
gfs 2 mygfs 007e0005 none
```

The state of the group should be `none`. The numbers in the brackets are the node ID numbers of the cluster nodes in the group. The `clustat` shows which node IDs are associated with which nodes. If you do not see a node number in the group, it is not a member of that group. For example, if a node ID is not in dlm/rgmanager group, it is not using the rgmanager dlm lock space (and probably is not running rgmanager).
The level of a group indicates the recovery ordering. 0 is recovered first, 1 is recovered second, and so forth.

Connect to one of the nodes in the cluster and execute the `cman_tool nodes -f` command. This command provides information about the cluster nodes that you may want to look at. The following example shows the output of the `cman_tool nodes -f` command.

```
[root@clusternode1 ~]# cman_tool nodes -f
<table>
<thead>
<tr>
<th>Node</th>
<th>Sts</th>
<th>Inc</th>
<th>Joined</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>752</td>
<td>2008-10-27 11:17:15</td>
<td>clusternode5.example.com</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>752</td>
<td>2008-10-27 11:17:15</td>
<td>clusternode4.example.com</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>760</td>
<td>2008-12-03 11:28:44</td>
<td>clusternode3.example.com</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>756</td>
<td>2008-12-03 11:28:26</td>
<td>clusternode2.example.com</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>744</td>
<td>2008-10-27 11:17:15</td>
<td>clusternode1.example.com</td>
</tr>
</tbody>
</table>
```

The `Sts` heading indicates the status of a node. A status of M indicates the node is a member of the cluster. A status of X indicates that the node is dead. The `Inc` heading indicating the incarnation number of a node, which is for debugging purposes only.

Check whether the `cluster.conf` is identical in each node of the cluster. If you configure your system with Conga, as in the example provided in this document, these files should be identical, but one of the files may have accidentally been deleted or altered.

In addition to using Conga to fence a node in order to test whether failover is working properly as described in Chapter 7, Testing the NFS Cluster Service, you could disconnect the ethernet connection between cluster members. You might try disconnecting one, two, or three nodes, for example. This could help isolate where the problem is.

If you are having trouble mounting or modifying an NFS volume, check whether the cause is one of the following:

- The network between server and client is down.
- The storage devices are not connected to the system.
- More than half of the nodes in the cluster have crashed, rendering the cluster inquorate. This stops the cluster.
- The GFS file system is not mounted on the cluster nodes.
- The GFS file system is not writable.
- The IP address you defined in the `cluster.conf` is not bounded to the correct interface / NIC (sometimes the `ip.sh` script does not perform as expected).

Execute a `showmount -e` command on the node running the cluster service. If it shows up the right 5 exports, check your firewall configuration for all necessary ports for using NFS.

If SELinux is currently in enforcing mode on your system, check your `/var/log/audit.log` file for any relevant messages. If you are using NFS to serve home directories, check whether the correct SELinux boolean value for `nfs_home_dirs` has been set to 1; this is required if you want to use NFS-based home directories on a client that is running SELinux. If you do not set this value on, you can mount the directories as root but cannot use them as home directories for your users.

Check the `/var/log/messages` file for error messages from the NFS daemon.

If you see the expected results locally at the cluster nodes and between the cluster nodes but not at the defined clients, check the firewall configuration at the clients.
Chapter 9. The Cluster Configuration File

Configuring a cluster with Conga modifies the cluster configuration file. This chapter shows the cluster configuration file before and after the procedures documented in Chapter 5, Configuring the Cluster Resources and Chapter 6, Configuring an NFS Cluster Service were performed.

Before the cluster resources and service were configured, the cluster.conf file appeared as follows.

```xml
<?xml version="1.0"?>
<cluster alias="nfsclust" config_version="1" name="nfsclust">
    <fence_daemon post_fail_delay="0" post_join_delay="3"/>
    <clusternodes>
        <clusternode name="clusternode1.example.com" nodeid="1" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="1"/>
                </method>
            </fence>
        </clusternode>
        <clusternode name="clusternode2.example.com" nodeid="2" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="2"/>
                </method>
            </fence>
        </clusternode>
        <clusternode name="clusternode3.example.com" nodeid="3" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="3"/>
                </method>
            </fence>
        </clusternode>
        <clusternode name="clusternode4.example.com" nodeid="4" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="4"/>
                </method>
            </fence>
        </clusternode>
        <clusternode name="clusternode5.example.com" nodeid="5" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="5"/>
                </method>
            </fence>
        </clusternode>
    </clusternodes>
</cluster>
```
After the cluster resources and service were configured, the cluster.conf file appeared as follows.

```xml
<?xml version="1.0"?>
<cluster alias="nfsclust" config_version="10" name="nfsclust">
    <fence_daemon clean_start="0" post_fail_delay="0" post_join_delay="3"/>
    <clusternodes>
        <clusternode name="clusternode1.example.com" nodeid="1" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="1"/>
                </method>
            </fence>
        </clusternode>
        <clusternode name="clusternode2.example.com" nodeid="2" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="2"/>
                </method>
            </fence>
        </clusternode>
        <clusternode name="clusternode3.example.com" nodeid="3" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="3"/>
                </method>
            </fence>
        </clusternode>
        <clusternode name="clusternode4.example.com" nodeid="4" votes="1">
            <fence>
                <method name="apc-nfs">
                    <device name="apc1" switch="3" port="4"/>
                </method>
            </fence>
        </clusternode>
    </clusternodes>
</cluster>
```
Chapter 9. The Cluster Configuration File

```xml
<clusternode name="clusternode5.example.com" nodeid="5"
votes="1">
  <fence>
    <method name="apc-nfs">
      <device name="apc1" switch="3" port="5"/>
    </method>
  </fence>
</clusternode>
</clusternodes>

<cman/>
<fencedevices>
  <fencedevice name="apc1" agent="fence_apc" ipaddr="link-apc"
login="apc" passwd="apc"/>
</fencedevices>
<failoverdomains/>
<resources>
  <ip address="10.15.86.96" monitor_link="1"/>
  <clusterfs device="/dev/myvg/myvol"
force_unmount="0" fsid="39669" fstype="gfs" mountpoint="/mnt/gfs"
  name="mygfs" options="rw,localflocks"/>
  <nfsexport name="mynfs"/>
  <nfsexport allow_recover="1" name="nfssclient1" options="rw"
    target="nfssclient1.example.com"/>
  < nfssclient allow_recover="1" name="nfssclient2"
    target="nfssclient2.example.com"/>
  < nfssclient allow_recover="1" name="nfssclient3"
    target="nfssclient3.example.com"/>
  < nfssclient allow_recover="1" name="nfssclient4"
    target="nfssclient4.example.com"/>
  < nfssclient allow_recover="1" name="nfssclient5"
    target="nfssclient5.example.com"/>
</resources>
<service autostart="1" exclusive="0" name="nfssvc"
recovery="relocate">
  <ip ref="10.15.86.96"/>
  <clusterfs ref="mygfs">
    <nfsexport ref="mynfs">
      <nfssclient ref="nfssclient1"/>
      <nfssclient ref="nfssclient2"/>
      <nfssclient ref="nfssclient3"/>
      <nfssclient ref="nfssclient4"/>
      <nfssclient ref="nfssclient5"/>
    </nfsexport>
  </clusterfs>
</service>
```


</service>
    </rm>
</cluster>
Chapter 10. Configuration Considerations

This chapter describes the caveats you should take into account when configuring an NFS service over a GFS or GFS2 file system.

10.1. Locking Considerations

Warning

When a GFS or GFS2 filesystem is exported via NFS then you must mount the filesystem with the localflocks option. The intended effect of this is to allow the NFS server to manage locks on the GFS or GFS2 filesystem without the extra overhead of passing through the GFS and GFS2 locking layers.

For more information on the localflocks mount option and when it may be required, see the Global File System and Global File System 2 manuals.

10.2. Additional Configuration Considerations

In addition to the locking considerations, you should take the following into account when configuring an NFS service over a GFS or GFS2 file system.

- Red Hat supports only Red Hat Cluster Suite configurations using NFSv3 with locking in an active/passive configuration with the following characteristics:
  - The backend file system is a GFS or GFS2 file system running on a 2 to 16 node cluster.
  - An NFSv3 server is defined as a service exporting the entire GFS/GFS2 file system from a single cluster node at a time.
  - The NFS server can fail over from one cluster node to another (active/passive configuration).
  - No access to the GFS/GFS2 file system is allowed except through the NFS server. This includes both local GFS/GFS2 file system access as well as access through Samba or Clustered Samba.
  - The GFS or GFS2 file system must be mounted with the localflocks option.
  - There is no NFS quota support on the system.

  This configuration provides HA for the file system and reduces system downtime since a failed node does not result in the requirement to execute the fsck command when failing the NFS server from one node to another.

- The fsid= NFS option is mandatory for NFS exports of GFS/GFS2.

- There is currently an issue with failover and failback when using NFSv3 over GFS with TCP when the following scenario comes into play:
  - Client A mounts from server 1.
  - The system administrator moves NFS service from server 1 to server 2.
  - The client resumes I/O operations.
The system administrator moves NFS service from server 2 to server 1.

In this situation, the NFS service on server 1 does not get shut down because this would render other NFS services inoperable.

Should this situation arise, you should move all NFS services off of server 1 and run the `service nfs restart`. After this you can safely migrate your NFS services back to server 1.

If problems arise with your cluster (for example, the cluster becomes inquorate and fencing is not successful), the clustered logical volumes and the GFS/GFS2 file system will be frozen and no access is possible until the cluster is quorate. You should consider this possibility when determining whether a simple failover solution such as the one defined in this procedure is the most appropriate for your system.
Appendix A. Revision History

Revision 3-17.33.400  2013-10-31  Rüdiger Landmann
  Rebuild with publican 4.0.0

Revision 3-17.33  July 24 2012  Ruediger Landmann
  Rebuild for Publican 3.0

Revision 1.0-2  Thu Jul 21 2011  Steven Levine
  Resolves: #676406
  Clarifies information about necessity for mounting GFS file systems with the localflocks option.

Revision 1.0-1  Tue Aug 3 2010  Steven Levine
  Resolves: #562251
  Clarifies support issues in "Configuration Considerations" chapter.
  Resolves: #614526
  Adds note about issues of Samba support to "Configuration Considerations" chapter.

Revision 1.0-0  Thu Jan 29 2009  Steven Levine
  First edition

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