Veritas NetBackup™ in Highly Available Environments Administrator's Guide

Windows, UNIX, and Linux

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VERITAS™

Veritas NetBackup™ in Highly Available Environments Administrator's Guide

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Contents

Chapter 1

NetBackup protection against single points of failure

This chapter includes the following topics:

About protecting against component failures

NetBackup comprises a number of different components, each of which has the potential to fail, and disrupt the backup or restore process.

Table 1-1 lists the component level points of failure and the related protection method.

Table 1-1 NetBackup protection against component failures

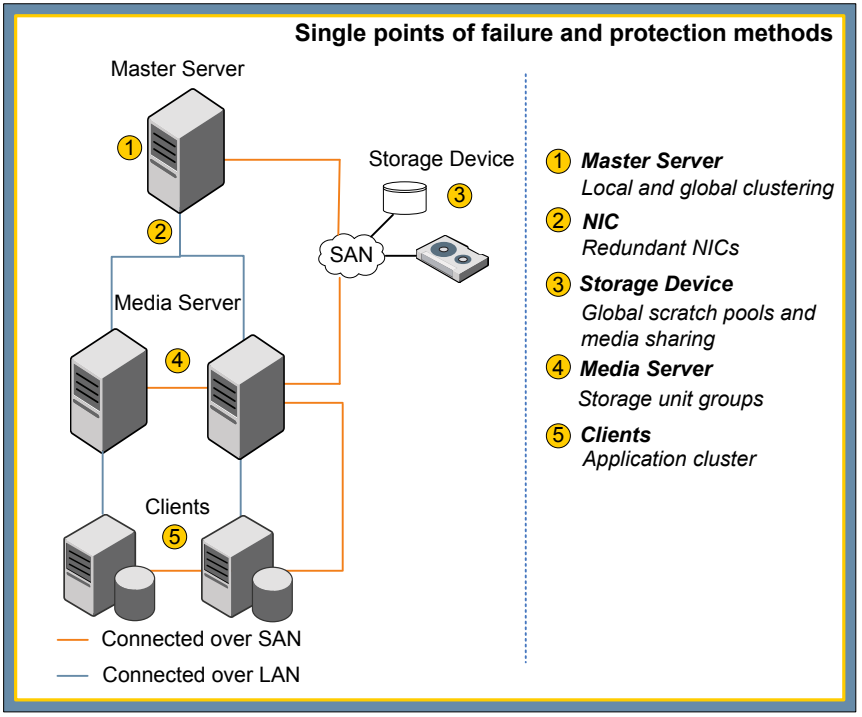
Point of failure	Protection method
Network links	See "About protecting against network link failures" on page 8.
Storage device connections	See "About protecting against storage device connection failures" on page 8.
Storage devices	See "About protecting against storage device failure" on page 9.

Table 1-1 NetBackup protection against component failures *(continued)*

Point of failure	Protection method
Media availability	See "About protecting against media availability failures" on page 9.
Master server	See "About protecting against master server failures" on page 10.
Media server	See "About protecting against media server failures" on page 11.
LAN client	See "About protecting against LAN client failures" on page 14.
SAN client	See "About protecting against SAN client failures" on page 15.

Figure 1-1 illustrates various NetBackup components and the single points of failure. The single points of failure can be eliminated at each component level either by making the component highly available or by deploying multiple components for redundancy.

Figure 1-1 Single points of failure and protection methods



About protecting against network link failures

The majority of backup traffic is transferred over network connections with 100 MB and 1Gbit speed which provide transfer rate of around 8 MB/sec and 65 MB/sec, respectively. To make network links highly available, deploy redundant network teaming. Due to cost considerations, network teaming is often restricted to backup servers and mission critical clients only. Non-mission critical clients have single network connections and the risk of connection failure (and the subsequent failure of the backup) is accepted.

About protecting against storage device connection failures

Connections to storage devices and their controllers also represent single points of failure. In case of connection failure, the device cannot be used.

See "About protecting against SAN connection failures" on page 8.

See "About protecting against robotic control connection failures" on page 8.

About protecting against SAN connection failures

SAN connections generally exist between the backup servers and the backup storage; although the NetBackup SAN client also supports SAN connections from clients to media servers. In all cases, to protect NetBackup against SAN connection failure, SANs should be configured to provide redundant connections between the source and the target components.

Most SAN-attached disk arrays have redundant SAN connections and support dynamic multi-pathing (DMP) software. This redundancy ensures that the connection to the storage is maintained even if one path fails. In many cases, DMP software also load balances traffic across SAN connections to improve the data transfer rates to and from the disk storage.

Many SAN-attached tape devices also offer two connections for redundancy, and thus they appear to servers as two separate devices. Multi-path selection is not dynamic. NetBackup selects the first available path it finds and always uses that path. The second device path is only used if the first path is broken.

About protecting against robotic control connection failures

In tape-based backup environments, the robotic control connections can be single points of failure. The inability to send instructions to the tape library prevents backup and restore operations, even if the tape drives are available.

Some tape libraries, such as Sun STK ACSLS or Quantum ATM, use a dedicated control software that runs on a server that is independent of the library. Such control

servers can be clustered. The media servers send requests to the control server, which handles the movement of tapes between slots and drives in the library.

Other tape libraries depend on a direct device connection from the NetBackup master server for control instructions to the library. If this device connection is lost, the tape library cannot be used. SAN-attached tape libraries support multiple connections to the robotic control for redundancy. You can configure these connections to provide protection against server failure. For example, you can configure one path to each node of a clustered master server. You must ensure that the paths are not active at the same time. If both paths are active, conflicting instructions can be issued, which could result in backup failure or data loss.

About protecting against storage device failure

Whether they are tapes or disks, when storage devices fail they are considered to be single points of failure. To protect against storage device failures, you should have multiple devices as backup targets.

A media server with access to only one tape drive cannot complete backups to tape if that tape drive goes down. To protect NetBackup against such failures, configure the media servers to access at least two tape drives. Use SAN-attached tape drives, which can be shared between media servers. This sharing ensures that the tape drives are accessible without needing large numbers of redundant devices. Typically, one or two redundant drives provide for resilience and allow restore operations to occur while backups are in progress. For example, if you configure four media servers to share five tape drives, backups can still happen even if one drive goes down. The backup may take longer, but it completes and your data remains safe. If media servers run backups at different times, the ratio of tape drives to servers may be even lower without risking backup failure.

AdvancedDisk disk pools can be created on individual media servers to protect against the failure of a single disk device.

About protecting against media availability failures

In tape-based backup solutions, failures can occur if no suitable tape media is available for use by a backup job. With NetBackup, risk of such failures can be reduced through global scratch pools and media sharing.

Table 1-2 discusses the methods of protection against media availability failures.

Table 1-2 NetBackup protection against media availability failures

Protection method	Description
Global scratch pools	For all the backup jobs and duplication jobs that are written to tapes, use the tapes that are in a specific media pool with the same retention criteria as the backed up data. If no suitable tapes are available, the backup fails. A global scratch pool is a NetBackup media pool that holds unassigned tapes that can be automatically re-assigned to a specific media pool on demand. For instance, a backup or a duplication job runs and no suitable tapes are available in the media pool specified by the job. Then an unassigned tape is transferred from the global scratch pool to the specified media pool and is used for the backup job. When this tape expires, it is automatically returned to the global scratch pool for re-use. Using a global scratch pool ensures that all unassigned tapes are available for use by any backup job, irrespective of the media pool specified by the job.
Media sharing	Media sharing allows multiple media servers to use partially full tapes until they are full. It ensures the most efficient use of tape. Only one media server at a time can write to a tape. When that tape is not in use, a different media server that requires a tape from that media pool can use it. To enable media sharing, set the **Volume Pool** properties to use the **Maximum number of partially full media** property. This property restricts the number of partially full tapes in a media pool. Until all tapes are full, empty tapes cannot be assigned to the pool. Until one tape is full, another empty tape cannot be assigned to the pool.

About protecting against master server failures

A single master server for each NetBackup domain controls all the backup activity within the domain. Thus, the master server represents the most obvious single point of failure in the data protection environment. Without the master server, backups and restores are not possible. To protect NetBackup against such failures, the master servers must be highly available.

More information about installing and configuring NetBackup on these cluster technologies is available in the *NetBackup Clustered Master Server Administrator's Guide*.

https://www.veritas.com/support/en_US/article.DOC5332

The master servers that are running in virtual machines can be protected using the Hypervisor's high availability tools. For details refer to http://www.veritas.com/docs/000006177.

About protecting against media server failures

Although media servers can be configured with redundant network and SAN connections, the servers themselves remain single points of failure. Methods of protecting NetBackup against media server failures may vary depending on the type of media servers that you use.

Table 1-3 lists the different types of media servers and the protection method.

Table 1-3 Type of media servers and protection method

Type of media server	Description
Dedicated media servers	Run only the media server software and exclusively back up data from other systems. See "About protecting against dedicated media server failures" on page 11.
Non-dedicated media servers	Run other applications also that require backing up. Also back up data from other systems. See "About protecting against non-dedicated media servers failures" on page 12.
SAN media servers	Run other applications also that require backing up. Do not back up data from other systems. See "About protecting against SAN media server failures" on page 13.

About protecting against dedicated media server failures

Storage unit groups can be used to protect NetBackup against the failure of a single media server. Storage unit groups can also be used for load balancing across multiple media servers to ensure optimal backup and restore performance.

Table 1-4 discusses the different modes in which you can configure the storage unit groups.

Table 1-4 Modes for configuring storage unit groups

Mode	Description
Failover	In the failover mode, the first storage unit is always used, unless the media server is down. Excess jobs are queued rather than being directed to the next storage unit. The failover mode functions similarly to what would be seen if two media servers were configured as an active or a passive cluster.
Prioritized	In the prioritized mode, the first available storage unit in the list is used. In this mode, jobs that exceed the total number the storage unit can handle, are directed to the next storage unit in the list. If the media server is down, all backups are directed to the next storage unit.
Round robin	In the round robin mode, different storage units from the list are used in a cycle for each job. If each storage unit is on a different media server, this acts as a load balancing mechanism.
Load balanced	The load balance mode only works with Flexible Disk and Media Manager storage unit types. In the load balance mode, NetBackup carries out checks on activity and resources available on each media. The check is carried out before the backup are directed to the media with the lightest load.

As a best practice, when using prioritized and failover groups to configure two storage unit groups, use two media servers, as follows:

- Configure each media server to have a single storage unit. For example, so Node A has STU A and Node B has STU B.
- Configure two storage unit groups with the storage units in a specific order in each one. In this example, SUG AB contains STU A, followed by STU B. SUG AB contains STU B followed by STU A.
- Backup policies are then evenly shared between SUG AB and SUG BA.

During operation, the backup traffic is normally shared between the two nodes, but if one node fails, all backups automatically go to the other node.

About protecting against non-dedicated media servers failures

Storage unit groups can also be used to protect against the failure of non-dedicated media servers. However such use does not protect other applications running of a given media server from the failure of that media server. In some cases

non-dedicated media servers may form part of cluster supporting other applications. These applications can be protected using virtual storage units.

About protecting against SAN media server failures

Unlike regular media servers, SAN media servers only protect themselves. A SAN media server connects directly to the backup storage in the same way as a regular media server. But it does not receive data from other client systems over a network or SAN link.

SAN media servers are usually deployed on the servers that support large, mission-critical applications, which are often clustered. While the application may be clustered, you do not need to cluster the SAN media server itself. Instead, install the SAN media server software on each member node of the cluster and create application cluster definitions in the NetBackup EMM database for each virtual name the cluster uses. Then create a storage unit using the virtual name of the cluster as the media server. The associated application with a given virtual name use the storage unit that is associated with the same virtual name for backups.

Restoring tape backups using an alternative media server

Generally, while restoring files, NetBackup expects to use the same media server and client that it used for the original backup. However, for disaster recovery, you use a different media server to restore the backup to a different client. The media servers and clients at the disaster recovery site are likely to have different names from those at the primary site.

NetBackup lets you configure failover restore media servers to handle restores in the event that the original media server is unavailable.

To configure failover restore media servers:

- On Windows master server, you can configure failover restore media servers using the **NetBackup Administration Console**.
  Go to **Host Properties** > **Master Server** > **Restore Failover**.
- On UNIX and Linux master servers , you must create FAILOVER_RESTORE_MEDIA_SERVER entry in the `bp.conf` file.

Restoring disk backups using an alternative media server.

NetBackup can share disk storage pools between multiple media servers. During restore, by default, NetBackup balances the job load and automatically directs the restore to the least busy media server rather than the one that made the backup. However, this process can cause problems if the media server selected to perform the restore is licensed as a SAN media server or does not have network access to the client which requires a restore.

There are three options available if you encounter this problem:

- Configure the force restore media server setting as follows:
  - On UNIX and Linux master servers, you create FORCE_RESTORE_MEDIA_SERVER entry in the `bp.conf` file.
  - On Windows master server, you can define this setting in the **NetBackup Administration Console**.
    Go to **Host Properties** > **Master Server**.
    This setting works on a per-server basis. It lets you specify a media server for restore operations based on the media server that is used to make the backup. To ensure that the same media server is used to make the backup and the restore, specify the same name for the backup and restore server.
- Create the touch file USE_BACKUP_MEDIA_SERVER_FOR_RESTORE, as follows:
  - On UNIX and Linux master server, create the file in `/usr/openv/netbackup/db/config`
  - On Windows master server, create the file in `<install path>\veritas\netbackup\db\config`.
    USE_BACKUP_MEDIA_SERVER_FOR_RESTORE is a global setting and always forces restore to the server that did the backup.

  Note: When the USE_BACKUP_MEDIA_SERVER_FOR_RESTORE touch file is created, all FAILOVER_RESTORE_MEDIA_SERVER and FORCE_RESTORE_MEDIA_SERVER settings are ignored.

- Run the restore from the command line using the `bprestore -disk_media_server` command. This setting works on a per job level. It also lets you specify the media server that is required for the specific restore job. Unlike the other two options, this setting is dynamic and can be applied when needed.

About protecting against LAN client failures

The NetBackup client package (including the application agents) is not cluster aware and must be installed separately on each node of a cluster that is being protected as a NetBackup client. When backing up clustered applications specify the virtual server name associated with the application as the client name in the backup policy. This will ensure that the correct node of the cluster is selected during the backup operation.

About protecting against SAN client failures

The SAN client, like the SAN media server, does not send backup traffic over the network to the media server. However unlike SAN media servers, which send backup data directly to the storage devices, SAN clients send backup data over a SAN connection to a remote media server.

SAN clients are often used to protect clustered applications. To protect NetBackup against SAN client failures when used in this way, configure the SAN client as application clusters in EMM. This configuration also ensures that the media server controlling the backup always opens a fiber transport connection to the active node of the cluster when a backup is initiated.

About protecting against site failures

Local clustering provides local failover for each site. However, these configurations do not provide protection against large-scale disasters such as major floods, hurricanes, and earthquakes that cause outages for an entire region. The entire cluster can get affected by such an outage. In such situations, global clustering or wide area clustering ensures data availability by migrating applications to the remote clusters that are located considerable distances apart.

Global cluster architecture supports deployment of two or more datacenters, clusters, and subnets that are separated by a larger distance. A global cluster with replicated master server cluster can monitor and manage the replication jobs and clusters at each site. In case of a site outage, it controls the shift of replication roles to the secondary site. It brings up the critical applications and redirects client traffic, from one cluster to the other.

Auto image replication is a NetBackup feature which allows individual disk based backups to be replicated between NetBackup domains. Because the backups are automatically recorded in the NetBackup catalog of the target domain there is not need for catalog replication of complex catalog recovery procedures when using auto image replication. For more information, refer to the *NetBackup Administrator's Guide, Volume I*.

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About protecting catalog in highly available environments

The NetBackup catalog contains information about both existing backups and the backup policy, including what gets backed up when and to where and how long the backup is kept for. As such the catalog is a single point of failure and needs to be

protected. Using the RAID storage provides some protection against storage failure. Replication can also protect against storage failure and site loss. Regular backups of the catalog can protect against corruption and accidental data loss.

See Table 1-5 on page 16. discusses the various methods for protecting NetBackup catalogs.

Table 1-5 NetBackup catalog protection in highly available environments

Protection Method	Description
Catalog backups	The catalog backup protects the NetBackup catalog on the master server against both hardware failure and data corruption and catalog backups should be made on a regular basis, ideally at least daily. The catalog backup is policy-based so it has all of the scheduling flexibility of a regular backup policy. As the policy allows for incremental backups, catalog backup times for large catalogs can be significantly reduced. However it should be noted that recovery from incremental backups can take longer due to the need to restore. Catalog backups written to tape use media from the Catalog Backup volume pool only. For more information, refer to the `NetBackup Administrator's Guide, Volume I`.
Catalog replication	Catalog replication is the process of creating and managing duplicate versions of a catalog database. Catalog replication copies a database and synchronizes a set of replicas so that the changes that are made to one replica are reflected in all the others. Replicating the catalog to a standby master server at the disaster recovery or secondary site ensures rapid catalog recovery at the disaster recovery site. Continuous replication ensures that the catalog is as up to date as the replication link allows. **Note:** Replication does not protect against catalog corruption or accidentally deleting or expiring images. You must make regular scheduled catalog backups. See "About NetBackup catalog replication" on page 27. See "About catalog recovery" on page 18.

Chapter 2

About site disaster recovery with catalog backup and recovery

This chapter includes the following topics:

Disaster recovery packages

For increased security, a disaster recovery package is created during each catalog backup. The disaster recovery package stores the identity of the master server host. NetBackup requires this package to get the identity of the master server back after a disaster. Once you have recovered the host identity, you can perform the catalog recovery.

The disaster recovery package contains the following information:

- Security certificates and private keys of the master server and the NetBackup CA (Certificate Authority)
- Information about the hosts in the domain
- Security settings

Note: You must set a passphrase for the disaster recovery package for the catalog backups to be successful.

About catalog recovery

A major problem users encounter during site disaster recovery is that the disaster recovery (DR) site is not a mirror image of the production site. To perform DR operations you need a copy of the NetBackup catalog from the production master server. The NetBackup catalog backup and recovery process is primarily intended for recovering from catalog storage or master server failure rather than site loss. The default situation is that NetBackup restores the complete catalog including the EMM database. The EMM database includes details of the media servers, backup devices, and storage units. Master server use this information to direct backups and restores. Master servers also use this information to interrogate the media servers, to establish the status of the backup devices. In a DR environment which does not contain these media servers, the performance of the master server can be affected. Also, the ability to carry out restore operations can be affected, as polling operations fail to connect and time out.

Use the following approaches to recover the NetBackup environment at a DR site where the arrangement of media servers and clients is different from the main production site. Both approaches have advantages and disadvantages.

- In the full catalog recovery approach the whole catalog is recovered and then unwanted configuration elements can be removed or disabled.
  See "About full catalog recovery" on page 18.
- In the partial catalog recovery the EMM and the BMR databases are not restored.
  See "About partial catalog recovery" on page 22.

The most appropriate method for recovery can be determined by the nature of the DR facility and how similar it is to the production facility.

When creating your disaster recovery plan, ensure that it is in line with the approaches discussed in the following sections:

- See "Planning a cross domain replication disaster recovery domain" on page 34.
- See "Performing full catalog restore" on page 19.
- See "Performing partial catalog restore" on page 23.

About full catalog recovery

Full catalog recovery is primarily used to recover the catalog if the data is corrupted or storage is lost at the production site. Full catalog recovery is recommended for single domain configurations. Full catalog recovery is used if the DR site has the same number of media servers with the same names as those used at the production site.

Full catalog recovery has the following advantages over partial catalog recovery:

- It restores the relational database components, which include the storage unit definitions, media assignment, and history.
- It retains the tape information from the primary site including the media pool and other assignment information.
- It restores the BMR data.
- It enables backups to be run at the DR site using the same policies and tapes that are used at the production site.

With full catalog recovery, there are the following limitations:

- When you recover the relational database components, the device configuration and the server configuration set up at the DR site before recovery is lost. You must set it again after recovery. The information that exists in the relational database about production servers and devices may not exist at the DR site. To ensure smooth operation in the DR environment, these server entries must be disabled and the devices associated with them should be removed.
- Full catalog recovery overwrites the device configuration and the server configuration in the relational database. You must rediscover the DR domain server and device configuration after the catalog is restored.

Performing full catalog restore

With full catalog recovery the complete catalog backup is recovered to the DR master server. The media servers that do not exist in the DR environment are deactivated to avoid unnecessary pooling. All device records are removed because the device configuration at the DR site can be different to the production site. Device discovery is run to update the EMM database. You must perform the following procedure before restores can be started. Also, document the procedure in your DR plan.

To prepare for full catalog restore

1. On UNIX and Linux master servers, create copies of the `bp.conf` and `vm.conf` files.
2. Run the `bprecover` command to recover the entire catalog.

   Note: The DR master server must have the same name and topology as the production master server. If the production master server is a cluster then the DR master server must also be a cluster. The number of member nodes and the names of the nodes can be different.

   Note: If a catalog backup that was created on a separate media server is used, then a media server with the same name is required for the catalog recovery.

3. After you run the `bprecover` command, set a passphrase for disaster recovery package for the subsequent catalog backups to be successful.

   See "Disaster recovery packages" on page 17.

4. During catalog recovery, security certificates for cluster nodes are not recovered. Only the virtual name certificate is recovered.

   For successful host communication, you must deploy host name-based and host ID-based certificates on all cluster nodes after a disaster.

   For more details, refer to the *Generating a certificate on a clustered master server after disaster recovery installation* chapter from the *NetBackup Security and Encryption Guide*.

   https://www.veritas.com/docs/DOC5332

5. Deactivate all the backup policies to prevent backups from starting automatically.
   - You can do this manually using the **NetBackup Adminstration Console**
   - Or run the `bpplinfo <policy> -modify -inactive` CLI.
6. Shut down NetBackup.
7. On UNIX and Linux master servers, replace the `bp.conf` and the `vm.conf` files that were restored from the catalog backup with the copies created in step 1.
8. Start the NetBackup Relational Database Manager, NetBackup PBX, and EMM services on the new master server.
   - On UNIX and Linux master servers, run the following commands:

- `/usr/openv/netbackup/bin/nbdbms_start_stop start`
- `start /opt/VRTSpbx/bin/pbx_exchange`
- `/usr/openv/netbackup/bin/nbemm`

- On Windows master servers, start the following Windows services:
  - NetBackup Relational Database Manager
  - Veritas Private Branch Exchange
  - NetBackup Enterprise Media Manager

Note: The PBX process may already be running because the NetBackup commands do not stop and start PBX.

For more information about NetBackup Relational Database Manager service, see the NetBackup Troubleshooting Guide.

9 Deactivate the media servers that are not part of the DR environment. Run the following command:

```
nbemmcmd -updatehost -machinename <Media Server> -machinestateop
set_admin_pause -machinetype media -masterserver <Master Server>
```

10 Delete all the tape devices from the EMM database. Run the following command:

```
nbemmcmd -deletealldevices -allrecords
```

11 Restart NetBackup.

12 Using the **Device Configuration** wizard create the new tape drive and library configuration.

13 If bar code masking rules were used at step 8, ensure that the same rules are set here. If necessary, add them.

14 Using the **NetBackup Adminstration Console**, verify if all the recovery media are set to non-robotic.

15
- If some recovery media still need to be set to non-robotic, do the following:
- Select the robotic media, right-click and select **Move**.
- Change the robot field to **Standalone**.
- Click **OK** to save the changes.

16 Once all the recovery media are set to non-robotic, in the **Inventory all the tape libraries** field ensure that the media are identified in the correct library.

You can now start restore and recovery operations of the client data that is backed up at the production datacenter.

If you have configured a third-party certificate for the NetBackup web server, you must run the `configureTPCerts` command on all inactive nodes to ensure that the third-party certificate is used after the failover.

For more information on the command, see the NetBackup Commands Reference Guide.

Making the DR environment consistent after a full catalog restore

In the event of a major incident at the production site, operate from the DR site for some time after the basic recovery is completed. The following additional tasks may be optionally carried out once the DR environment is operational to make the DR environment consistent.

To make the DR environment consistent

1. Modify the backup policies, including the catalog backup policy, to use the storage units available at the DR site and enable them.
2. Delete the backup policies that are no longer required.
3. Delete the storage units that are associated with the media servers and are not part of the DR environment.
4. Modify any Storage Lifecycle Policies that use storage units that you have deleted.

About partial catalog recovery

Partial catalog recovery is recommended for multi-domain configurations. Partial catalog recovery is used for DR sites where the server layout is different from the production site with fewer media servers, different library types, etc. Partial catalog recovery is a variation of the Recovery without import method. It is subjected to many of the same constraints. For more information, go to the following link:

Partial catalog recovery recovers only the flat file components and not the relational database. Thus, the details of the existing infrastructure (servers, devices etc.) at the DR site is not lost during the recovery process. It also means that the media server information that is associated with the backups is not recovered. The media server must be manually added to the database and is unassigned. Ensure that the media server are placed in a pool where they cannot get accidentally overwritten.

Partial catalog recovery has the following advantages over full catalog recovery:

- No elements of the configuration need to be removed or rediscovered. The recovery process does not affect the general configuration of the DR environment.
- It does not affect the server topology. The master server topology at the DR site does not need to reflect the topology at the production site. Thus, a catalog backup from a clustered master server can be restored to a standalone master server at the DR site.
- The DR site can be a production site, provided the client names, backup policy names, and tape label ranges used in the two environments are unique. Also, it must be possible to do a partial recovery to another production backup domain.

With partial catalog recovery, you cannot recover the tape information from the primary site at the DR site. Ensure that the tapes are not accidentally overwritten. These tapes must not be easily used for backups at the DR site.

Performing partial catalog restore

With partial catalog approach, it is assumed that restore operations do not need tapes to be assigned or located in specific media pools. It is also assumed that a tape exists in EMM and NetBackup can mount and read the tape for restoring. The following steps must be carried out before restores can be started:

To prepare for partial catalog restore

1. On UNIX and Linux master servers create copies of the `bp.conf` and `vm.conf` files.
2. Recover only the NetBackup catalog image and configuration files.
   - When using the **NetBackup Administration Console**, select the **Partial catalog recovery** option when prompted.
   - Or run the `bprecover -wizard` command.

   Note: The DR master server must have the same name as the production master server.

   Note: If a catalog backup that was created on a separate media server is used, a media server with the same name is required for the catalog recovery.

3. Run the `cat_export -all -staging` to export the metadata from the replicated relational database backup.

4. Run the command `cat_import -all` to import the exported metadata into the active relational database. Alternatively, set the parameter LIST_FS_IMAGE_HEADERS to YES in the bp.conf file or the registry depending on the master server platform. This will cause the next catalog cleanup job to automatically import the exported metadata.
5. Deactivate all the backup policies to prevent backups from starting automatically.
   - You can do this manually using the **NetBackup Adminstration Console**.
   - Or run the `bpplinfo <policy> -modify -inactive` CLI.
6. Shut down NetBackup.
7. On UNIX and Linux master servers, replace the `bp.conf` and the `vm.conf` files that were restored from the catalog backup with the copies created in step 1
8. Start NetBackup.
9. Inventory all the tape libraries to ensure that the tapes are added to the non-scratch media pool. This pool prevents tapes from being accidentally overwritten by active backup policies at a later time.

You can now start restore and recovery operations of client data that is backed up at the production datacenter.

Making the DR environment consistent after a partial catalog restore

In the event of a major incident at the production site, operate from the DR site for some time after the basic recovery is completed. The following additional tasks may be optionally carried out once the DR environment is operational to make the DR environment consistent.

To make the DR environment consistent

1. Modify and enable backup policies, and the catalog backup policy, that is required at the DR site.
2. Delete the policies that are no longer required.

About disk recovery in DR domain

With introduction of OpenStorage and other AdvancedDisk types, deduplication disk as a backup storage medium is preferred over tape storage. Using disk storage you can replicate the contents of a disk device to another disk device in a secondary location. This replication eliminates the need to transport the physical backup media to a disaster recovery site.

Disk recovery in single-domain replication DR environment

You can use the storage lifecycle policies, to optimize replication of deduplicating disks when duplicating backups within the same NetBackup domain. This is an efficient way to create duplicate copies of backup images at a disaster recovery site, which is controlled by the same master server as the production site. However, optimized deduplication is effective only for single-domain replication.

Auto Image Replication

Auto Image Replication extends the concept of duplicating backups to separate domains, allowing individual backup copies to be sent to a DR domain. As backup copies created using auto image replication are automatically cataloged in the DR domain there is not need for additional recovery steps within the DR domain. Refer to the NetBackup Administrator's Guide, Volume I for more information about auto image replication.

Disk recovery in cross-domain replication DR environment

If the disk technology being used does not support Auto Image Replication, an alternative approach is simply to replicate the entire storage and then use a combination of catalog recovery and the `nbcatsync` utility to populate the catalog at the disaster recovery location.

The `nbcatsync` utility facilitates replication even if disk media IDs recorded at the EMM database and at the metadata component of the image database are different. The `nbcatsync` utility aligns the disk media IDs in the image database metadata with the media IDs in the disaster recovery domain's EMM database. The regular backups and catalog backups that are made at the production site are written to the replicating disk storage. The catalog backup's disaster recovery file is sent to the disaster recovery domain.

The `nbcatsync` utility is supported on all master server platforms. You can use it with all Advanced Disk types supported by NetBackup.

To recover disk in a cross-domain replication environment in the event of a disaster, perform the following steps on the DR domain's master server:

1. Align the disk media ID information in the catalog backup's DR file with the disk media ID information in the DR domain's EMM database. For this, run the following command:

   ```
   nbcatsync -sync_dr_file <DR file name>
   ```

2. Perform a partial catalog recovery from the replicated catalog backup by running the command,

   ```
   bprecover -wizard
   ```

3. Run the command `cat_export -all -staging` to export the metadata from the replicated relational database backup.

4. Run the command `cat_import -all` to import the exported metadata into the active relational database.

5. Align the disk media IDs associated with the image records recovered by the partial catalog recovery with the disk media IDs present in the DR domain. For this, run the command

   ```
   nbcatsync -backupid <restored catalog backup ID>
   ```

Chapter 3

About site loss protection with auto image and catalog replication

This chapter includes the following topics:

About Auto Image Replication (AIR)

The Auto Image Replication feature allows backups to be duplicated between the NetBackup domains and it automatically creates the catalog entries in the target domain as the backups are duplicated. Veritas recommends the use of Auto Image Replication instead of live catalog replication as a means of populating the NetBackup catalog at a disaster recovery site. Refer relevant section in NetBackup Administrator's Guide for more information on Auto Image Replication. The document discusses alternative methods of replicating the catalog data are in case the network environment does not lend itself to the use of Auto Image Replication.

About NetBackup catalog replication

To decide the NetBackup data protection strategy, you need to decide whether the DR site should be part of the same NetBackup domain or be a separate NetBackup domain.

NetBackup can be configured with catalog replication in the following ways:

- Multi-site single domain replication

See "About multi-site single domain replication" on page 30.

- Multi-site cross domain replication
  See "About multi-site cross domain replication" on page 33.

About conditions for support of replicated NetBackup catalogs

A NetBackup environment set up for replication is supported in the same way as any other NetBackup server. If the replicated catalog volume fails and is unrecoverable within a reasonable amount of time, NetBackup support recommendations are the same as in the case of an unrecoverable disk failure of a non-replicated catalog. You should restore the catalog from the latest available catalog backup on the primary master server.

Note: Data can be lost in any data replication solution. To protect the NetBackup catalog, you must not solely rely on the replication technology due to the risk of failure of the replication technology. Data on the primary NetBackup server can get corrupted due to replication to the secondary hot standby NetBackup server. Therefore, you must frequently back up the NetBackup server catalogs.

Warning: Replication can adversely affect the application performance. Since additional time is required to commit changes to the NetBackup catalog, it may affect the overall backup times. Use replication at your own risk. Veritas shall have no liability for any replication failure based on your failure to properly install, configure, and monitor your replication solution.

The conditions of support for replication of NetBackup catalogs are as follows:

- The replication technology that is employed must maintain a consistent and write-ordered copy of the data at all times.
- The use of asynchronous replication technologies is allowed, if write-order fidelity can be maintained.
- The use of scheduled replication technologies such as hourly snapshots is not supported.
- The NetBackup master server must reside on the same virtual server that is controlled as a single entity.
- The primary and the secondary master servers must be of similar type, specification, operating system, and use the same virtual host name.
- The secondary master server must not have any other NetBackup function, neither in the same domain as the primary master server, nor in another domain. For example, you cannot use the secondary master server as a media server

if it is not used as a master server. You also cannot use it as a master server for another NetBackup domain. Catalogs are replicated but cannot be merged.

- Configure both the clustered and the non-clustered environments to use a virtual hostname and IP address for the NetBackup master server that is separate from the physical host names and IP addresses of the servers. Separate virtual hostname and IP address let you control the active master server node through DNS routing. It also prevents the primary and the secondary master servers from being active in the domain at the same time. For clustered environments this requirement is met automatically by the cluster configuration. For non-clustered environments the virtual hostname must be specified during installation.
- Ensure that the primary master server and the secondary master server use the same version of NetBackup and dependent component. Verify that the operating system, NetBackup binaries, EEBs, and configurations files that are not included in the paths are specified for replication.
- Replication between clustered and non-clustered master servers is not possible. Server pairs must be either clustered or non-clustered.
- The NetBackup catalog mount point must be the same at both the primary and the secondary sites.
- Only the catalog data is replicated between servers and must all be co-located on a single volume or volume set for replication. For clustered master servers the cluster common volume is replicated.

  For non-clustered master servers, for details of the paths that must be linked to a volume set for replication,
- Ensure that the virtual name or DNS alias does not resolve to both the primary and the secondary hosts at the same time.
- Catalog replication does not remove the requirement for catalog backup. Regularly back up the NetBackup catalog from the primary master server to protect against accidental image expiration or other inconsistencies that are introduced in the catalog on the primary site and replicated to the secondary site.
- If catalogs are replicated between NetBackup domains (rather than to a secondary server that can access the primary domain’s media servers) only the backups that are written to the tape and the replicated BasicDisk storage can be restored in the disaster recovery domain.
- Replication of the catalogs to a secondary master server lets you restore data during a short-term outage of the primary master server. In cross domain replication configurations, ensure that backups can be run after a failover. The catalogs should be able to be failed back to the primary server at a later date

without data loss. Consider this support condition when you plan making backups at the DR site during a prolonged outage and then moving back to the primary site without losing information about the backups that are created at the DR site.

- Verify if NetBackup comes up using the replicated copy on the secondary site. This usage is not a requirement for support.
- Both the catalog and the backup images must be accessible at the secondary site.
  Users need to address the procedures that are related to availability of valid copies of the backup images. Users should also define procedures for enabling the NetBackup server to restore from the images at the secondary site. This document does not address these procedures.
- Users are responsible for installing, configuring, and monitoring their data replication solution. Users must ensure that the replication technology continuously maintains a consistent write-ordered copy of the NetBackup catalog volume.
- Microsoft Distributed File System Replication (DFSR) technology is not supported as it does not guarantee write-ordered consistency of the files being replicated.
  For more information, see
  https://www.veritas.com/support/en_US/article.100043283

About catalog synchronization

Replication is a near instantaneous activity compared to the movement of tapes between sites. Replicated catalog data that is presented in the DR domain can be more current than the stock of tapes available in the DR domain which are dispatched from the production domain some time earlier. During restore operations, select only the backups that are created before the tapes were dispatched from the production domain for restore.

About multi-site single domain replication

Multi-site single domain is used where clients and media servers at both sites are under control of a common master server. Since both servers are part of the same domain, they see the same media servers and clients, and the NetBackup catalog is completely valid on the secondary master server.

In the multi-site single domain model, NetBackup catalogs are replicated between the sites. In the event of a problem at the primary site, the master server is failed over to a standby node on the secondary site. Backups are created on both sites (either by in-line copy or duplication depending on the configuration). Thus, the loss of a single site does not represent a true disaster, but loss of a number of application

servers. Because the backup domain spans both sites, the loss of a single site results in reduction of the backup and restore capability, rather than destroying the backup environment. The multi-site single domain model uses a combination of master server clustering and storage replication. This combination allows the master server to be relocated easily and quickly to the secondary location.

The multi-site single domain model can be configured in following ways:

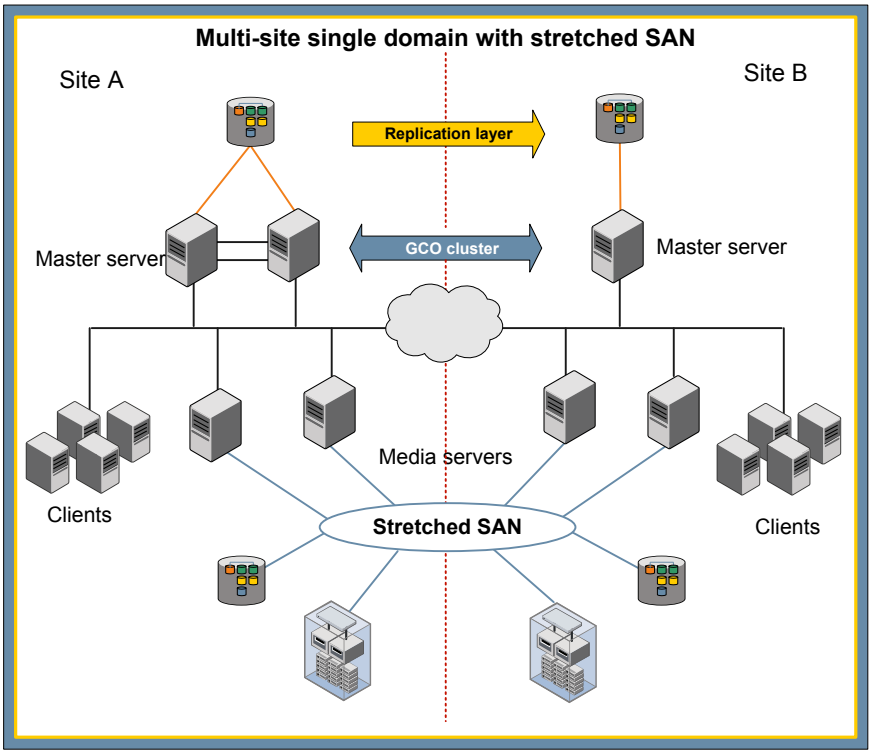
- Multi-site single domain with stretched SAN
  See “About multi-site single domain with stretched SAN ” on page 31.
- Multi-site single domain with optimized duplication
  See “About multi-site single domain with optimized duplication” on page 32.

About multi-site single domain with stretched SAN

To configure a multi-site single domain with stretched SAN, the media servers at each site must be configured with SAN access to backup devices at both sites. This access allows media servers to write and duplicate backups between the sites. This configuration works well for distances of up to 50 miles between sites, but becomes less effective as distance and latency increase.

Figure 3-1 displays how a replicated global cluster is configured with multi-site single domain with stretched SAN.

Figure 3-1 Multi-site single domain with stretched SAN

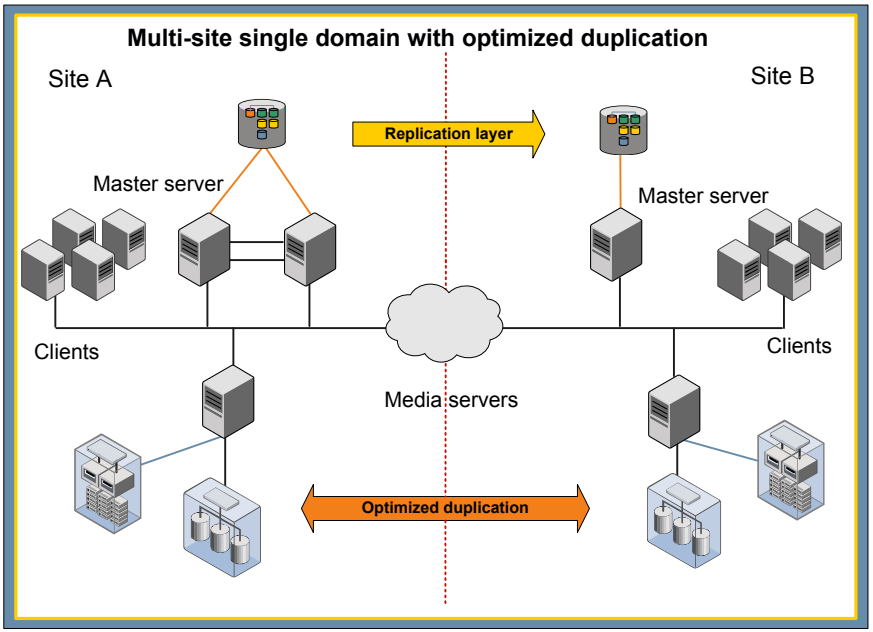


About multi-site single domain with optimized duplication

To configure a multi-site single domain with optimized duplication, the stretched SAN must be replaced with a connection between the OpenStorage devices carrying out optimized duplication. In this configuration, the geographical separation can be greater because smaller data volumes are exchanged between sites. Using the hierarchical duplication capability in storage lifecycle policies, it is possible to create backups in the OpenStorage device at one site. You can then duplicate the backups to the OpenStorage device at the other site and finally duplicate the duplicated copy to tape for long-term storage.

Figure 3-2 displays how a replicated global cluster is configured with multi-site single domain with optimized duplication.

Figure 3-2 Multi-site single domain with optimized duplication



About multi-site cross domain replication

Multi-site cross domain replication is used when the DR site is a separate NetBackup domain than the production domain. The DR site has different media servers and devices.

Multi-site cross domain replication is only supported for tape and BasicDisk storage. AdvancedDisk types have specific media server or device configuration requirements that do not allow them to be accessed in disaster recovery domains.

About multi-site cross domain and BasicDisk storage

You can replicate the images that are stored on non-staging BasicDisk storage between domains. The replication target must be mounted against the same mount point on a media server in the DR domain. Also, set the FAILOVER_RESTORE_MEDIA_SERVER parameter to ensure that the correct media server is selected. For example, you can replicate a BasicDisk storage unit using the mount point /BD1 on media server prdmed1 in the production domain to the DR domain. /BD1 can be mounted on a media server drmed1, if the `bp.conf` file on the DR master server is edited to set FAILOVER_RESTORE_MEDIA_SERVER = prdmed1 drmed1. This setting is only

possible for the BasicDisk storage units that do not act as staging storage units and are not supported with staging storage units or other disk types.

Planning a cross domain replication disaster recovery domain

To use the replicated catalog data on the secondary master server in the DR domain, ensure that the master server, media servers, network connections, and NetBackup software are functional.

Veritas recommends that you document the DR configuration steps, particularly if the DR domain is not normally configured. This documentation is particularly important if the domain is a facility provided by a specialist DR services company. Refer following stpes while preparing a DR plan:

Planning a cross domain replication disaster recovery domain

1. Install the same NetBackup version on the master server, media servers, and clients in the DR domain that is used at the production domain.

   Note: If the production domain has media servers with older versions of NetBackup, do not install the older version on the media servers in the DR domain. Use the same version for the master server and the media servers in the DR domain.

   If the full catalog replication method is used and the master server at the production domain is clustered, a clustered master server must also exist in the DR domain. The member nodes of the cluster do not need to be the same as those nodes at the production domain. If the partial catalog replication method is used then a clustered master server in the DR domain is not required.

   ---

2. Test the network connectivity and authentication between the clients and servers using test backup policies. Disable the policies after testing.
3. Tape drives and libraries must be connected to the media servers. The tape drives used in the DR domain must be read-compatible with the tapes from the production domain. They must be configured as the same media type in NetBackup.
4. Set the FAILOVER_RESTORE_MEDIA_SERVER parameter to allow backups to be written to the media servers at the production domain so that backups can be restored using the media servers in the DR domain.
5. If partial replication method is used, create a non-scratch Media Pool which is not used by any backup policy. Configure bar code rules to ensure that the backup tapes are automatically added to that pool.

6. If different library types are used in the DR domain and at the production domain, ensure that the barcode masking operates in the same way. Remove the trailing characters wherever required. You can configure rules to manage this operation.
7. Ensure the following:
   - If the original backup tapes are used for DR purposes, they must be loaded in the tape libraries in the DR domain.
   - If backups are duplicated to secondary tapes for DR purposes, then load the off-site tapes in the tape libraries. Also the ALT_RESTORE_COPY_NUMBER file is created with the appropriate copy number in it.

Note: Veritas recommends that the tapes are physically write-locked before they are placed in libraries in the DR domain. This locking reduces the risk of accidental overwriting of valid backups.

About full catalog replication

In full catalog replication, all parts of the catalog are replicated to the secondary master server. In full catalog replication, the tape information from the production domain, the media pool, and other assignments is retained. Backups can be run in the DR domain using the same policies and tapes that are used at the production domain. The replication can be reversed, which simplifies a transition back to the production domain. However, replicating the relational database components implies that the device configuration and the server configuration of the production domain is replicated to the DR domain. This configuration information cannot be used and the configuration in the DR domain must be discovered after recovery.

Full catalog replication is not recommended for cross domain replication.

Recovering the catalog with full catalog replication

With full catalog replication, complete catalog backup is recovered to the DR master server. The media servers that do not exist in the DR environment should be deactivated to avoid unnecessary pooling. Since the device configuration at the DR site is likely to be different to the production site all device records are removed. Further, device discovery is run to update the EMM database.

This approach assumes that NetBackup is installed but not running on the secondary master server and the media servers in the DR domain. Also, the secondary master server and the media servers are configured to communicate with each other.

Before restores can be started, carry out the following procedure to prepare for full catalog restore. You must document this procedure in your DR plan:

1. Ensure that replication between the primary and the secondary sites is stopped.

   The replication is stopped if the primary master server is unavailable or if the replication link is disabled.

2. Mount the replicated volume to the appropriate mount point on the secondary master server.

3. Start the NetBackup Relational Database Manager, NetBackup PBX, and EMM services on the new master server.

   - On UNIX and Linux master servers run the following commands:
     - `/usr/openv/netbackup/bin/nbdbms_start_stop start`
     - `/opt/VRTSpbx/bin/pbx_exchange`
     - `"/usr/openv/netbackup/bin/nbemm -maintenance`
   - On Windows master servers start the following Windows services:
     - NetBackup Relational Database Manager
     - Veritas Private Branch Exchange
     - NetBackup Enterprise Media Manager

   Note: The PBX process may already be running since it is not stopped and started by the NetBackup startup and shutdown commands.

4. Deactivate the media servers that are not part of the DR environment. Run the following command:

   ```
   nbemmcmd -updatehost -machinename <Media Server> -machinestateop
   set_admin_pause -machinetype media -masterserver <Master Server>
   ```

5. If any media servers in the DR domain have the same names as media servers in the production domain, delete all tape devices from the EMM database. Run the following command:

   ```
   nbemmcmd -deletealldevices -allrecords
   ```

   Note: This step resolves possible device configuration conflicts on media servers. Skip this step, if the media servers in the DR domain have different names to those of the media servers in the production domain.

6 Restart NetBackup.

7 Optionally, you can deactivate all backup policies to prevent backups from starting automatically.

- You can deactivate the backup policies manually using the **NetBackup Administration Console**.
- Or run the `bppllist <policy> -set -inactive` CLI.

8 Register the media servers that form part of the DR environment in EMM by starting NetBackup on each media server.

9 Using the **Device Configuration Wizard**, create the new tape drive and library configuration.

10 Using the **NetBackup Adminstration Console**, verify if all the recovery media are set to non-robotic.

11 If some recovery media still need to be set to non-robotic, do the following:

- Select the robotic media, right-click, and select **Move**.
- Change the robot field to **Standalone**.
- Click **OK** to save the changes.

12 Once all the recovery media are set to non-robotic, in the **Inventory all the tape libraries** field ensure that the media are identified in the correct library.

You can now start restore and recovery operations of client data that is backed up at the production datacenter.

Making the DR environment consistent with full catalog replication

In the event of a major incident at the production site, operate from the DR site for some time after the basic recovery is completed. The following additional tasks may be optionally carried out once the DR environment is operational to make the DR environment consistent.

To make the DR environment consistent

1 Modify and enable the catalog backup policy and the other backup policies that are required in the DR domain.

2 Delete the policies that are no longer required.

3 Delete the storage units that are associated with the media servers that do not form part of the DR environment.

About partial catalog replication

In partial catalog replication only the image database, policy, and the client configuration are replicated and the relational database components are not replicated. This allows the media servers and the devices to be preconfigured in the disaster recovery domain. You do not need to rediscover them in the event of a failover to the secondary master server.

As partial catalog replication does not replicate the relational database components of the NetBackup catalog, additional steps are required to be carried out following a failover to the disaster recovery master server before backups can be restored.

Preparing an environment for partial catalog replication

The catalog image metadata, which is required to run restore operations, is stored in the relational database so a a backup of the relational database must be taken at regular intervals and replicated along with the flat file information.

1. Change the configuration on the source (production) master server to ensure that the staging area for the relational database is located on the replicated storage. It can be done as follows:
   - Create a suitable directory on the replicated storage.
   - Use the following command to make this directory the staging area.

     ```
     nbdb_admin -vxdbms_nb_staging <directory>
     ```
2. Backup the relational database to the staging area several times per day (ideally hourly) by running the following command in a scheduled script.

   ```
   nbdb_backup -online <directory>-truncate_tlog
   ```

Recovering the environment with partial catalog replication

In the event of a loss of the source master server (or during a disaster recover test) follow these steps:

1. Ensure that replication between the primary and the secondary sites is stopped.

   Replication stops if the primary master server is unavailable or if the replication link is disabled.
2. Mount the replicated volume to the appropriate mount point on the secondary master server.
3. Use the command `nbdb_admin -vxdbms_nb_staging <directory>` on the target (disaster recovery) master server to point the staging area for the relational database to the location on the replicated storage.

4. Run the command `cat_export -all -staging` to export the metadata from the replicated relational database backup.
5. Run the command `cat_import -all` to import the exported metadata into the active relational database.
6. Start NetBackup on the secondary master server.
7. If the backup policies are replicated, deactivate all backup policies to prevent backups from starting automatically.
   - You can deactivate the backup policies manually using the **NetBackup Administration Console**.
   - Or run the command `bppllist <policy> -set -inactive .`
8. Ensure that the appropriate FAILOVER_RESTORE_MEDIA_SERVER settings are defined to direct restore operations through the media servers at the secondary site.
9. In order to restore backups from tapes the tapes must be added to the disaster recovery master server's catalog by placing them in a tape library and running an inventory of the library. To prevent the tapes from being accidently overwritten the disaster recovery master server should have a bar code rule that adds the tapes to a volume pool that is not the global scratch pool and is not used by any backup polices. Ideally the tapes should also be physically write locked.
10. For disk based backups, the storage servers and disk pools must be added to the disaster recovery master server by running the disk storage server wizard.

    Once the disk storage is present, run the following command to reconcile the disk media IDs:

    ```
    nbcatsync -backupid <catalog backup ID> -prune_catalog
    ```

    The value `<catalog backup ID>` is the backup ID of the most recent catalog backup and can be found in the catalog backup's disaster recovery file. Once the tapes have been added and the disk media IDs have been reconciled it is possible to start restore operations

Making the disaster recovery environment consistent with partial catalog replication

In the event of a major incident at the production site, operate from the disaster recovery site for some time after the recovery is completed. The following additional tasks may be optionally carried out once the disaster recovery environment is operational to make the disaster recovery environment consistent.

To make the disaster recovery environment consistent with partial catalog replication

1. Modify and enable the catalog backup policy and any other backup policies that are required in the disaster recovery domain.
2. Delete the policies that are no longer required.

Considerations for managing tapes with partial catalog replication

The tapes from the production domain are not assigned in the disaster recovery domain. The tapes must be manually added to the database and placed in a pool where they cannot get accidentally overwritten. This can also be done using a combination of barcode rules and the robot inventory command.

As the tapes are not assigned on the disaster recovery master server they will not be released to the global scratch pool when backups expire and therefore these tapes must be manually recycled.

Caution: Care must be taken to ensure that the tapes are manually moved to the global scratch pool only when they do not have valid backups on them.

The simplest way of checking this is to create two lists by running the commands `bpimagelist -d "01/01/1970 00:00:00" -media -l` and `vmquery -pn <private pool name> -b` and then comparing the lists. Tapes found in the second list but not found in the first list have no valid images on them and can be moved to the scratch pool by running the command `vmchange -p <scratch pool number> -m <media id>`.

Chapter 4

Deploying NetBackup master servers with full catalog replication

This chapter includes the following topics:

About replication considerations

To deploy NetBackup with catalog replication, you must consider the following factors for planning the actual deployment.

Table 4-1 Replication considerations

Considerations	Description
Master server considerations	Veritas does not recommend operating a master server as a combined master and media server. If the storage devices available at the different sites are not compatible, it can lead to problems with storage unit definitions and backup failures. Catalog replication is not a substitute for catalog backup and the catalog must be backed up on a regular basis.

Table 4-1 Replication considerations *(continued)*

Considerations	Description
Networking considerations	In a multi-site single domain configuration, the master server controls the media servers on both the sites. The metadata must pass between the sites. This metadata traffic is sent over a standard I/P link between the sites. The same link can be used as the heartbeat link for the global cluster control. Veritas recommends that a link of at least 10 Mb/sec and ideally 100 Mb/sec must be provided between the sites to handle this traffic. If host-based replication is used, additional I/P bandwidth is required for the replication layer. The additional bandwidth must also be factored in.
DNS considerations	If the master server nodes at the secondary site are on a different subnet from the master server nodes at the primary site, a DNS change is required as part of the failover process. You can initiate the DNS change automatically by using the cluster failover process. You can also initiate the process manually. The backup system does not function correctly until the change is fully propagated, which can affect the recovery time in a site failover. **Note:** To propagate the DNS change automatically by the cluster service group, the DNS resource must come on-line after starting NetBackup.
Primary and secondary master servers considerations	In order to perform a failover when using catalog replication the primary and secondary master servers must use the same topology. The primary and secondary site master server nodes must both be either clustered or non-clustered. **Note:** The clustered master servers do not require the same number of nodes at each site. For additional details refer http://www.veritas.com/docs/000090837.

Chapter 5

Using NetBackup to perform backups and restores in a cluster

This chapter includes the following topics:

About backups and restores with NetBackup in a cluster

This topic provides links to instructions on how to perform user-directed backups and restore data in a cluster. Additionally, specific instructions for performing backups and restores can be found in other NetBackup guides. See the NetBackup Backup, Archive, and Restore Getting Started Guide and NetBackup Administrator Guides for information related to NetBackup agents and options.

The backup and restore process is the same whether you are in a cluster or a non-cluster environment. See the NetBackup Troubleshooting Guide for further information on backup and archive processes and on restore processes.

Performing user-directed backups with NetBackup in a cluster

When you perform user-directed backups in a cluster, you can use the node name or the virtual name of the client to perform the backup. If you choose the virtual name, the backup can be restored from any of the cluster nodes. You can also configure automatic backups.

To perform a user-directed backup on a Windows client

1. Open the **Backup, Archive, and Restore** console.
2. On the **File** menu, click **Specify NetBackup Machines**.
3. From the **Source client** list, select (or add) the wanted node or virtual name.

To perform a user-directed backup on a UNIX/Linux client

1. Open the **Backup, Archive, and Restore** console.
2. In the **Login** dialog box, enter the name of the client, either the node or the virtual client name.

   You must log on to the wanted node or virtual client. You cannot specify a client other than the local client in the Java interface.

About restoring data in a cluster

For all file restore operations, use the procedures on how to perform restores in the NetBackup Backup, Archive, and Restore Getting Started Guide. When you restore files to the shared disk drives, restore those files to the virtual server name.

When you restore individual database files, restore those files to the virtual server name that corresponds to the client where the database application is installed.

Note: Since a computer can have multiple virtual names in a cluster environment, files can be backed up in the context of more than one client name. If you carefully plan your backup policies, you can avoid this problem. However, it may be necessary to browse more than one client name to locate a backup image. And you may need to perform more than one restore to restore all of the files that you need.

The Backup, Archive, and Restore console operates in the context of that client's name. You must perform a redirected restore to restore the files on the shared disk that were backed up with the virtual server name. NetBackup allows a redirected restore operation only if the necessary configuration is performed on the NetBackup master server. See the information on how to allow redirected restores in the NetBackup Administrator's Guide, Volume I.

There may be other situations that require the appropriate `altnames` directory entries to be created on the master server. While NetBackup tries to restore files from the client, the operation may fail with this error message:

```
131 client is not validated to use this server
```

If you see this message, you must set up the `altnames` directory to allow the operation to succeed. For example, the required network interface parameter may

be set to a valid network name for the client. But this name may not match the NetBackup **Client name** parameter for that client. This situation often happens for NetBackup clients in a cluster. Alternatively, you can perform a server-directed restore and avoid the need to set up the `altnames` directory.

See "Example: Performing a user-directed restore in a NetBackup cluster" on page 45.

Example: Performing a user-directed restore in a NetBackup cluster

For example, assume the cluster virtual server name is TOE and the cluster node names are TIC and TAC. Files on the shared disk must be backed up by a NetBackup policy that includes TOE in the client list.

To perform a server-directed restore of files on the shared disk, set both the source client and the destination client to TOE. The server-directed restore does not have to know which node is in control of the shared disk at the time of the restore.

To perform a user-directed restore of files in a NetBackup cluster

1. Create the following files on the master server.

   For a UNIX or Linux server:

   ```
   /usr/openv/netbackup/db/altnames/tic
   /usr/openv/netbackup/db/altnames/tac
   ```

   For a Windows server:

   ```
   shared_drive_install_path\NetBackup\db\altnames\tic
   shared_drive_install_path\NetBackup\db\altnames\tac
   ```

2. In both files, add the virtual server name TOE on one line in the file.
3. Determine which node (TIC or TAC) has control of the shared disk.
4. Start the Backup, Archive, and Restore interface on that node and select the virtual server name (TOE) as the source client and the server.
   - On Windows computers, in the **File** menu, click **Specify NetBackup Machines**.
   - On UNIX or Linux computers, in the **Actions** menu, click **NetBackup Machines**.
5. Browse the backed-up files by using the virtual server name (TOE) from the shared disk and restore them as needed.

About supported NetBackup application agents in a cluster

Only certain database agents and NetBackup options are supported in a clustered environment.

For information on how to install and configure database agents and options in a cluster, refer to the administrator's guide for that agent or option.

Backing up database files in a cluster	Database applications are installed on a cluster as virtual servers. To protect the data for these virtual servers, install the appropriate NetBackup database agent on each node of the cluster. With NetBackup for Windows, database agents are installed along with NetBackup server and the NetBackup client.. Also create a backup policy for that database agent. When you configure a policy for the application or database in the cluster, always use the virtual server name of the application or database as the client name in the policy. For complete installation and configuration instructions for a particular database agent, see the NetBackup documentation for that agent.
User backups	User backups that are run on individual nodes of the cluster generally run as a backup of the node, not the NetBackup virtual server. You may find it easier to use scheduled backups rather than user backups to protect the data in the cluster.
NetBackup client in a cluster	You may choose to install only the NetBackup client in a cluster. In this configuration, you can back up the data from the cluster across the network to a separate NetBackup server. In this situation the NetBackup-specific configuration tasks for tape devices, media, and so on, are separate from the setup and maintenance of the cluster itself. However, the NetBackup client itself cannot fail over. To install the NetBackup client on a WSFC, VCS, SunCluster , Service Guard cluster, or HACMP cluster The NetBackup client is installed on a cluster as it is in a non-clustered environment. Refer to the *Veritas NetBackup Installation Guide* for information on how to install the NetBackup client. On Windows systems, you may have problems with name resolution when you try to back up data on the cluster. (This data can be either local data or shared data.) Consider setting the **Required Network Interface** parameter for each client to the fully qualified name of the node where the NetBackup client is installed.

About backing up database files in a cluster

Database applications are installed on a cluster as virtual servers. To protect the data for these virtual servers, install the appropriate NetBackup database agent on each node of the cluster. With NetBackup for Windows, database agents are installed along with NetBackup server and the NetBackup client.. Also create a backup policy for that database agent. When you configure a policy for the application or database in the cluster, always use the virtual server name of the application or database as the client name in the policy. For complete installation and configuration instructions for a particular database agent, see the NetBackup documentation for that agent.

About user backups

User backups that are run on individual nodes of the cluster generally run as a backup of the node, not the NetBackup virtual server. You may find easier to use scheduled backups rather than user backups to protect the data in the cluster.

About NetBackup client in a cluster

You may choose to install only the NetBackup client in a cluster. In this configuration, you can back up the data from the cluster across the network to a separate NetBackup server. In this situation the NetBackup-specific configuration tasks for tape devices, media, and so on, are separate from the setup and maintenance of the cluster itself. However, the NetBackup client itself cannot fail over.

To install the NetBackup client on an WSFC, VCS, SunCluster , Service Guard cluster, or HACMP cluster

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