



ZFS STORAGE
APPLIANCE

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Oracle® ZFS Storage Appliance Plug-in for
Symantec NetBackup OpenStorage
Administrator's Guide
v1.0

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Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Typographical Conventions

The following typographical conventions are used throughout this document.

Convention	Meaning/Use
<i>italics</i> <italics>	Specifies a variable whose value is supplied by the user. The second example shows less than and greater than signs which are often used to indicate a variable but are not typed.
monospace	Indicates commands, filenames, directory paths, and executables, and screen code output.
bold monospace	Indicates a command that the user types.

Introduction

Symantec NetBackup provides a complete, flexible data protection solution for a variety of platforms. The Oracle ZFS Storage Appliance Plug-in for Symantec NetBackup OpenStorage extends Symantec NetBackup to allow NetBackup to interface with and use advanced features of the Oracle ZFS Storage Appliance. This guide provides an overview of how to install, deploy, and troubleshoot the plug-in into an Oracle ZFS Storage Appliance environment.

This guide is written for the Symantec NetBackup administrator and assumes the user has thorough knowledge of how to use NetBackup. For more information regarding NetBackup, see the *Symantec NetBackup Administrator's Guide*.

Note: The formerly named Sun ZFS Storage Appliance is now called the Oracle ZFS Storage Appliance, and its legacy Oracle ZFS Storage Software versions and their documentation may still reflect the former name. References to Sun ZFS Storage Appliance, Sun ZFS Storage 7000, and Sun ZFS Backup Appliance all refer to the same family of Oracle ZFS Storage Appliances.

About the Oracle ZFS Storage Appliance Plug-in

The Oracle ZFS Storage Appliance Plug-in for Symantec NetBackup OpenStorage performs as a remote interface to the Oracle ZFS Storage Appliances. This interface allows NetBackup to back up, duplicate, and delete data from the Oracle ZFS Storage Appliance using the appliance's features. The plug-in provides the following primary features:

- Backup image creation – Using NetBackup, creates a backup image containing data stored on NetBackup clients onto an Oracle ZFS Storage Appliance.
- Optimized duplication – Directly duplicates an image from one Oracle ZFS Storage Appliance to another using the appliance's Remote Replication feature instead of copying the data through the host. This results in faster duplication and reduced workload on NetBackup media servers.

When an image that has been duplicated is expired, the plug-in does not physically delete the image from the Oracle ZFS Storage Appliance until the image is expired from both the source and target appliances. This is done because the Remote Replication feature of the Oracle ZFS Storage Appliance requires that the data on both the source and target appliances be synchronized. For details on image expiration, consult the NetBackup documentation listed in the References section at the end of this document.

Software Requirements

The media servers that will use this plug-in must run one of the following operating systems:

- Oracle Solaris 10 / 11 (x86-64 or SPARC)
- RHEL or Oracle Linux 5.x / 6.x (64-bit)
- SUSE Linux 10.x / 11.x (64-bit)
- IBM AIX 6.1 / 7.1 (64-bit PowerPC)
- Microsoft Windows Server 2003 / 2003 R2 / 2008 / 2008R2 (x86-64)

The following libraries must be installed:

- For the Oracle Solaris versions, the C++ standard library (`libCstd`) must be installed.

- For the Linux and AIX versions of the plug-ins, the GNU Standard C++ Library v3 (`libstdc++-v3`) must be installed.

These libraries are usually already installed, but if you have problems loading the plug-in, verify that the correct C++ Library is installed.

The plug-in supports the following versions of NetBackup:

- NetBackup 7.1.x
- NetBackup 7.5.x
- NetBackup 7.6.x
- NetBackup 7.7.x

The Oracle ZFS Storage Appliance must be running Oracle ZFS Storage Appliance Software version 2011.1.5.0 or later.

Installing and Configuring the Components

Before you can use NetBackup with the Oracle ZFS Storage Appliance, you must:

- Install NetBackup on each media server.
- Install the plug-in on each media server.
- Configure the Oracle ZFS Storage Appliance(s) for backup and duplication.

Installing NetBackup on the Media Servers

The Oracle ZFS Storage Appliance Plug-in supports Symantec NetBackup OpenStorage versions 7.1.x, 7.5.x and 7.6.x. Follow the installation instructions provided in Symantec's NetBackup documentation to perform this installation on the media servers.

For supported Microsoft Windows operating systems, the plug-in requires a custom installation. During installation, select 'Custom' on the 'Installation Type' screen, as seen in the following figure.

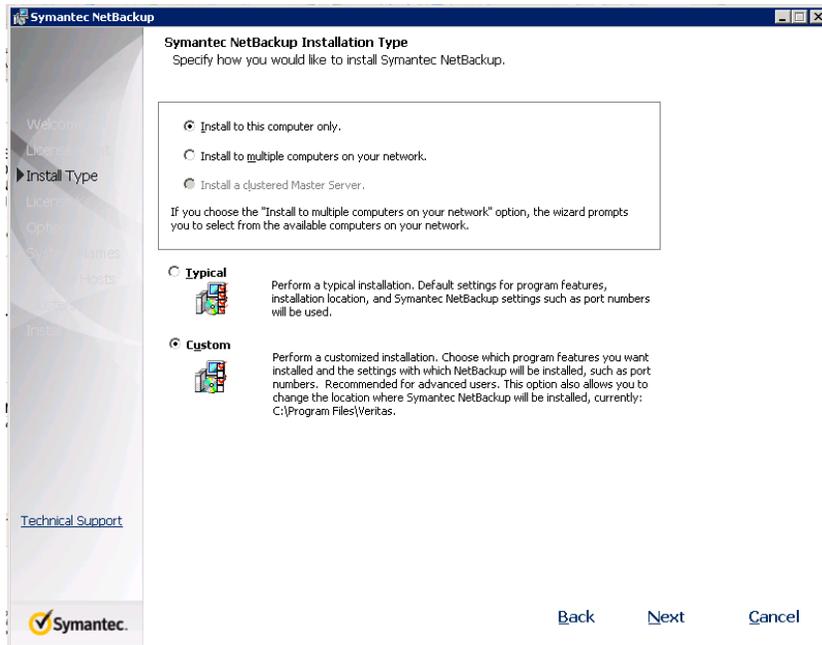


Figure 1. Choosing 'Custom' installation type in the Symantec NetBackup screen for Windows users

IMPORTANT: If NetBackup is already installed on the media server, re-run the installer again, and select 'Modify', as seen in Figure 2. This will allow you to change settings that were set during the original installation. After pressing 'Next', the 'Installation Type' screen (Figure 1) will appear.

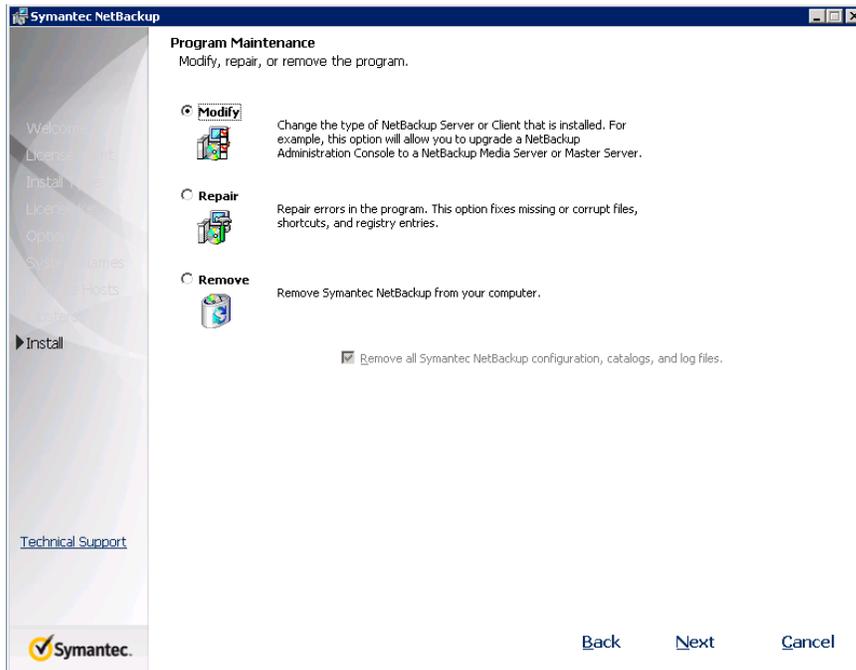


Figure 2. Modifying previously installed NetBackup instance by re-running the installer

After selecting 'Custom' as the installation type, NetBackup will prompt with a series of options. Accept the default options until you get to the 'NetBackup Services' screen, seen in figure 3.

The NetBackup services must be run under an administrator account. Ensure that the 'Use current account settings' and 'Use the built-in system account' check boxes are unchecked and enter the administrator username, password, and domain. For the other options on this screen, leave the default values, as seen in figure 3. Press Next.

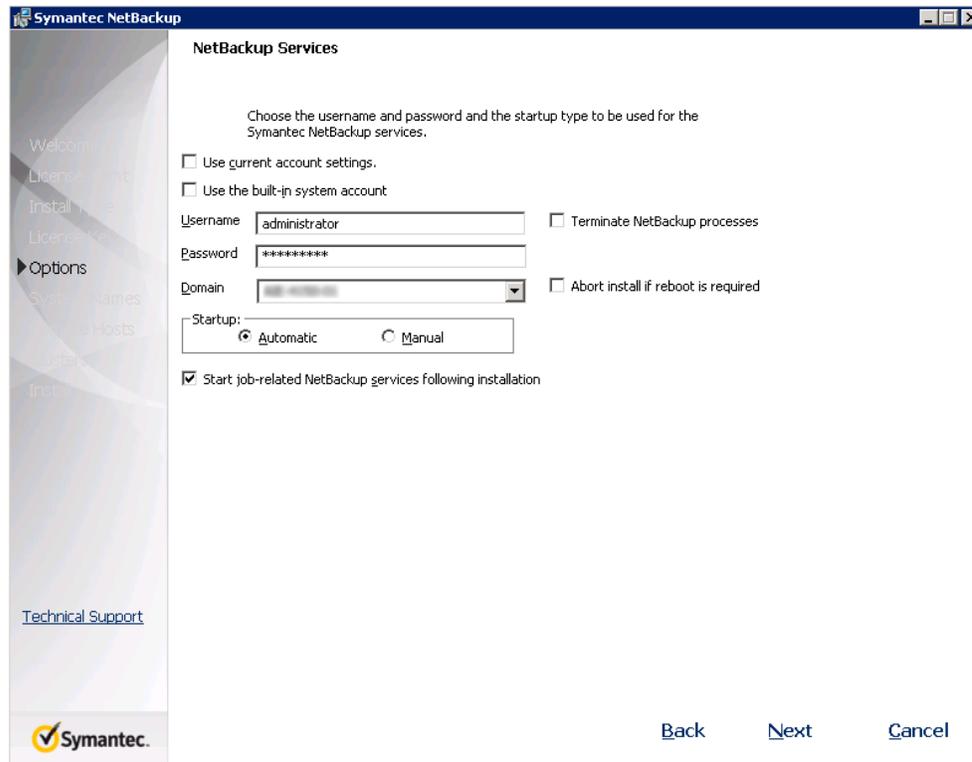


Figure 3. Entering administrator credentials for NetBackup services

Installing the Oracle ZFS Storage Appliance Plug-in for Symantec NetBackup on Media Servers

The plug-in can be downloaded from: <http://www.oracle.com/technetwork/server-storage/sun-unified-storage/downloads/zfssa-plugins-1489830.html>. Download the appropriate package based on the media server operating system that you wish to run it on. The following details show separate instructions for supported Microsoft Windows, Oracle Solaris, IBM AIX, and Linux operating systems. The plug-in must be installed on each media server that is in use.

IMPORTANT: The installation process will stop all NetBackup services. Ensure there are no jobs in progress and close the NetBackup Administration Console before installing the plug-in.

For Windows installation:

Run `install.exe` and follow the onscreen instructions. To un-install, run `install.exe` again and select the option to un-install the plug-in.

For Linux/Oracle Solaris/AIX installation:

Execute the `installOST.sh` script and follow the onscreen instructions. To un-install, execute the `uninstallOST.sh` script.

Configuring the Oracle ZFS Storage Appliance

To set up each appliance for use with NetBackup, enter the Oracle ZFS Storage Appliance Browser User Interface (BUI) as `root`. The Oracle ZFS Storage Appliance(s) will require configuration to accept both backup and optimized duplication operations. Optimized duplication requires configuration of two Oracle ZFS Storage Appliances at minimum to establish source and target appliances.

Configuring the Oracle ZFS Storage Appliance for Backup

Use the following steps for the applicable supported operating system to configure the Oracle ZFS Storage Appliance for backup operations.

For Windows:

1. Log in to the BUI and select the Configuration tab. Among the subtabs that then appear, select the Services tab.
 2. Enable the SMB Data service if it is not already enabled.
 3. Navigate to the Shares -> Projects page. Create a new project. This project will be a dedicated project for NetBackup and will only contain filesystems to be used by NetBackup.
 4. Once the project is created, double click on the project name to edit properties for the project. Navigate to the Protocols tab. Ensure that SMB is enabled. Enter “ost” as the SMB Resource Name. Press ‘Apply’.
 5. Navigate to the ‘Shares’ tab and create any filesystems that you want within this project. Each filesystem that you create in this project will correspond to a volume in NetBackup.
- Once these steps have been completed, you can register the storage appliance in NetBackup and create disk pools using these volumes.

For Oracle Solaris/Linux/AIX:

1. Log in to the BUI and select the Configuration tab. Among the subtabs that then appear, select the Services tab.
2. Enable the NFS data service if it is not already enabled.
3. Navigate to the Shares -> Projects page. Create a new project. This project will be a dedicated project for NetBackup and will only contain filesystems to be used by NetBackup.
4. Once the project is created, double click to open the Properties page for the project. Navigate to the Protocols tab. Ensure that NFS is enabled and the Share mode is set to Read/write. Set any NFS exceptions that you want, but make sure the media servers have full read/write access.
5. Navigate to the Shares tab. Create your filesystems within this project. Each filesystem will correspond to a volume in NetBackup. After creation, note the mountpoint of the filesystems that you created. The mountpoint for each filesystem can be seen on the Shares page for the project. The mountpoint is usually `/export/filesystem`, where the value for `filesystem` will match the name of an individual filesystem.
6. On the media servers, any filesystems that you wish to use as volumes within NetBackup will need to be mounted at `/oraclezfs_ost/server_name/ost_filesytem`, where `server_name` is the fully qualified name of the storage appliance and `filesystem` is the name of the specific filesystem you are mounting.

For example, a storage appliance named `server.example.com`, with a filesystem named `LSU1`, would be mounted at `/oraclezfs_ost/server.example.com/ost_LSU1`.

After the directories are created, use the following commands, depending on your operating system, to mount the filesystems. The provided examples reflect a mountpoint for the filesystem of `/export/LSU1`. Change the mountpoint for your particular setup.

For Linux:

```
# mount -t nfs server_name:/export/filesystem /oraclezfs_ost/  
server_name/ost_filesytem
```

For example:

```
# mount -t nfs server.example.com:/export/LSU1  
/oraclezfs_ost/server.example.com/ost_LSU1
```

For Oracle Solaris:

```
# mount -F nfs server_name:/export/filesystem /oraclezfs_ost/  
server_name/ost_filesystem
```

For example:

```
# mount -F nfs server.example.com:/export/LSU1  
/oraclezfs_ost/server.example.com/ost_LSU1
```

For AIX:

```
# mount server_name:/export/filesystem /oraclezfs_ost/  
server_name/ost_filesystem
```

For example:

```
# mount server.example.com:/export/LSU1  
/oraclezfs_ost/server.example.com/ost_LSU1
```

Once these steps have been completed, you can register the storage appliance in NetBackup and create disk pools using these volumes.

Configuring Dual Oracle ZFS Storage Appliances for Optimized Duplication

Optimized duplication uses the Remote Replication feature of the Oracle ZFS Storage Appliance to directly duplicate an image from one Oracle ZFS Storage Appliance to another instead of copying the data through the host. To use this feature, two storage appliances are designated. The storage appliance where backups are performed is referred to as the source appliance, while the storage appliance where the backup images will be stored is referred to as the target appliance.

When an image that has been duplicated is expired, the plug-in does not physically delete the image from the Oracle ZFS Storage Appliance until the image is expired from both the source and target appliances. This is done because the Remote Replication feature of the Oracle ZFS Storage Appliance requires that the data on both the source and target appliances be synchronized. For details on image expiration, consult the NetBackup documentation listed in the References section at the end of this document.

The following steps will configure the Oracle ZFS Storage Appliances for optimized duplication.

1. On the source appliance, complete all steps as described in the “Configuring the Oracle ZFS Storage Appliance for Backup” section of this guide. The project and filesystems

that are created on the source appliance will be referred to as the source project and source filesystems.

2. Navigate to the Configuration -> Services page on the BUI. Enable the Remote Replication service if it is not already enabled.
3. Click on Remote Replication to enter the Remote Replication configuration page. Add a replication target that corresponds to the target appliance to be used for optimized duplication.
4. Navigate to the source project that contains the OST filesystems. Click on the Replication tab and create a new Action. In the Add Replication Action window, choose the target appliance for the target. Select a pool to replicate to. The update frequency should be set to Continuous.

IMPORTANT: Ensure that the chosen pool on the target appliance has at least the same amount of disk space as the source pool.

Now that both the source and target Oracle ZFS Storage Appliances have been configured for the remote replication, use the following steps according to your operating system to perform the optimized duplication procedure. After these steps have been completed, the source project and its source filesystems will be replicated to the target appliance, creating a target (or replicated) project and a target filesystem for each source filesystem.

For Windows:

1. Log in to the BUI of the target appliance.
2. On the Configuration -> Services page, ensure that the SMB data service is enabled.
3. Navigate to the Shares -> Projects page. Select the pool that contains the replicated share. Click on 'SHOW REPLICA' and select the appropriate target project that corresponds to the source project on the source appliance. The name of the target project will be in the format *source_appliance: source_project*.
4. Once the replicated project is selected, click on the General tab. Ensure that the Export checkbox is checked. Press Apply.
5. Click on the Protocols tab. Ensure that the SMB service is enabled. Enter `osttarget` for the SMB Resource Name. Press Apply.

For Linux/Oracle Solaris/AIX:

1. Log in to the BUI of the target appliance.
2. On the Configuration -> Services page, ensure that the NFS data service is enabled.

3. Navigate to the Shares -> Projects page. Select the pool that contains the replicated share. Click on 'SHOW REPLICA' and select the appropriate target project that corresponds to the source project on the source appliance. The name of the target project is in the format *source_appliance: source_project*.
4. Once the replicated project is selected, click on the General tab. Ensure that the Export checkbox is checked. Press Apply.
5. Click on the Protocols tab. Ensure that NFS is enabled with the share mode set to Read/write. Set any NFS exceptions that you want, but make sure that the media servers have full access.
6. On the Linux/Oracle Solaris/AIX media servers, the target filesystems must be mounted. Click on the Shares tab and note the mountpoint for the target filesystem that you want to duplicate to. Mount the filesystem at */oraclezfs_ost/server_name/osttarget_filesystem*, where *server_name* is the fully qualified name of the target storage appliance and *filesystem* is the name of the target filesystem.

For example, if the target storage appliance is named *target.example.com* and the target filesystem is named *LSU1* with a mountpoint of */export/LSU1*, the example filesystem is mounted at */oraclezfs_ost/target.example.com/osttarget_LSU1*.

After the directories are created, use the following commands, depending on your operating system, to mount the filesystems. The examples reflect that the mountpoint for the filesystem is */export/LSU1*.

For Linux:

```
# mount -t nfs server_name:/export/filesystem/  
oraclezfs_ost/server_name/osttarget_filesystem
```

For example:

```
# mount -t nfs target.example.com:/export/LSU1  
/oraclezfs_ost/target.example.com/osttarget_LSU1
```

For Oracle Solaris:

```
# mount -F nfs server_name:/export/filesystem/  
oraclezfs_ost/server_name/osttarget_filesystem
```

For example:

```
# mount -F nfs target.example.com:/export/LSU1/  
oraclezfs_ost/target.example.com/osttarget_LSU1
```

For AIX:

```
# mount server_name:/export/filesystem/  
oraclezfs_ost/server_name/osttarget_filesystem
```

For example:

```
# mount target.example.com:/export/LSU1/  
oraclezfs_ost/target.example.com/osttarget_LSU1
```

Using Symantec NetBackup in Conjunction with the Plug-in

Once the previous configuration steps have been completed, you can register the Oracle ZFS Storage Appliances and create disk pools and storage units in the NetBackup interface. The first task detailed in the following steps, registering the Oracle ZFS Storage Appliance, presents the appliance for recognition by NetBackup.

Registering a Storage Server with NetBackup (NBU)

In the NetBackup interface, use the available NetBackup wizard to register the Oracle ZFS Storage Appliances with the NetBackup software.

NOTE: Screen shots may look slightly different, depending on the NetBackup version and operating system being used. The following screen shots are from NetBackup 7.5 on Windows Server 2008 R2.

1. From the NetBackup Administration Console application, click on 'Media and Device Management' in the left-side windowpane. This will bring up various configuration wizards in the main windowpane. Start the 'Configure Disk Storage Servers' configuration wizard, as selected in the following figure.

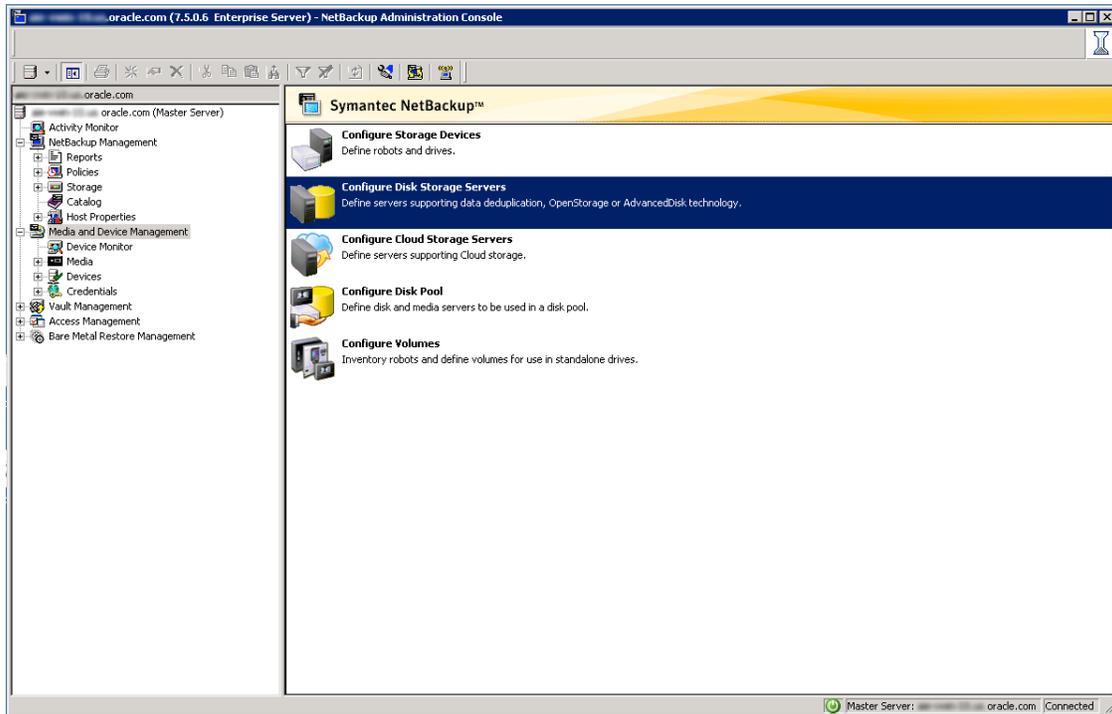


Figure 4. Starting the 'Configure Disk Storage Servers' wizard in Symantec NetBackup

2. Click Next after viewing the wizard's welcome screen. The wizard will next display an Add Storage Server screen where you can select from a pull-down menu of disk storage types, as seen in the following figure.

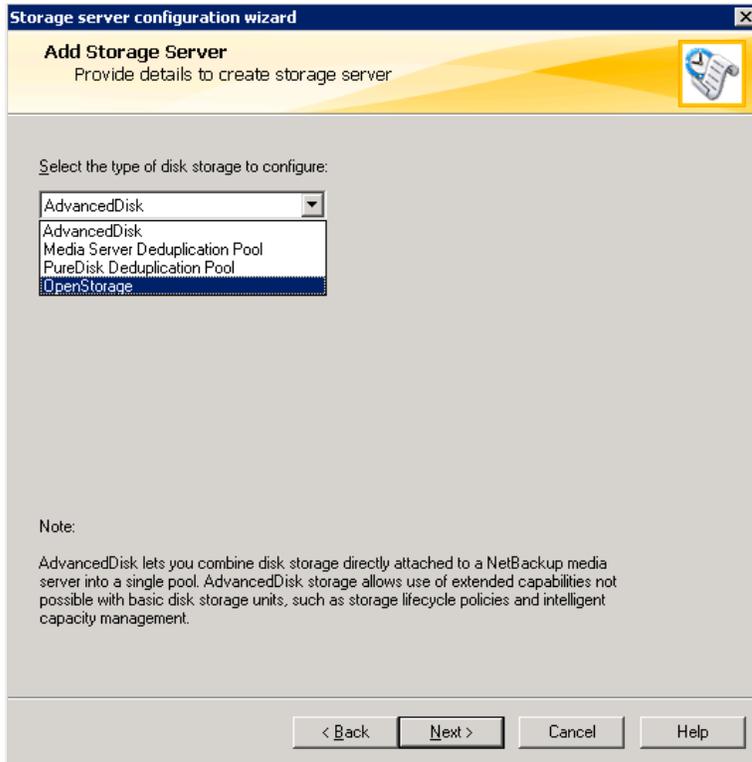


Figure 5. Selecting 'OpenStorage' as the type of disk storage

3. Select 'OpenStorage' as the type of disk storage. Click Next. The wizard then displays a window prompting for details about the storage server, seen in the following figure.

Figure 6. Specifying storage server details for the Oracle ZFS Storage Appliance

4. Enter the storage server details. For the storage server name, you must use the fully qualified domain name (FQDN) of the appliance; otherwise, optimized duplication may fail. If the FQDN has not been used, you should unregister the appliance, delete the appliance from the host cache, and re-register it. Specific instructions for this process are located in the Troubleshooting section of this guide.

Leave the 'Use Symantec's OpenStorage plug-in' box un-checked.

For storage server type, enter 'oracle-zfssa'.

Select the appropriate media server.

Enter the root credentials for the Oracle ZFS Storage Appliance. Press Next. The wizard will display the entered configuration details for review before committing them.

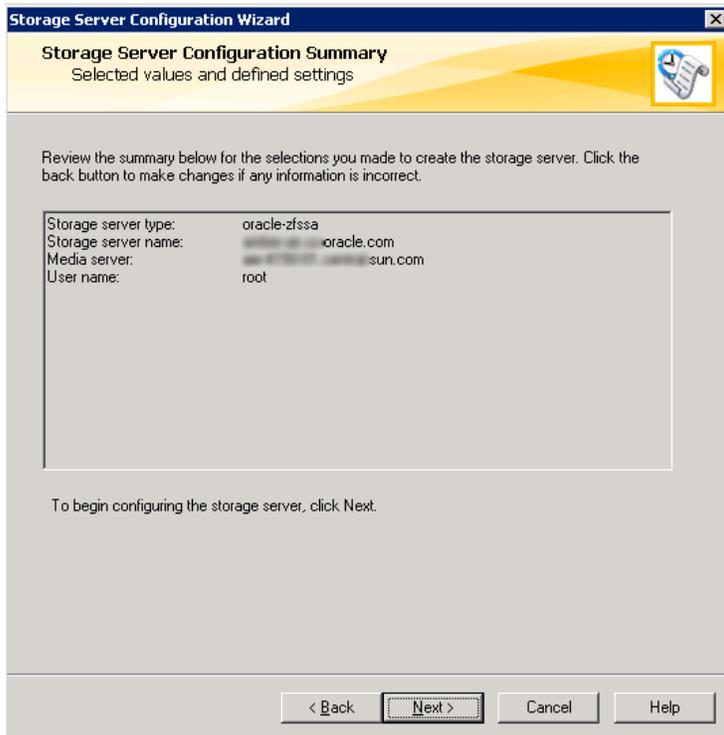


Figure 7. Verifying storage server information in the Configuration Summary window in NetBackup

5. Verify that the information entered is correct and press Next to confirm the configuration.

- As the storage server is added or 'created' for recognition in NetBackup, the wizard displays the associated tasks' progress as seen in the following figure. Wait until the storage server is added and click Next when complete.

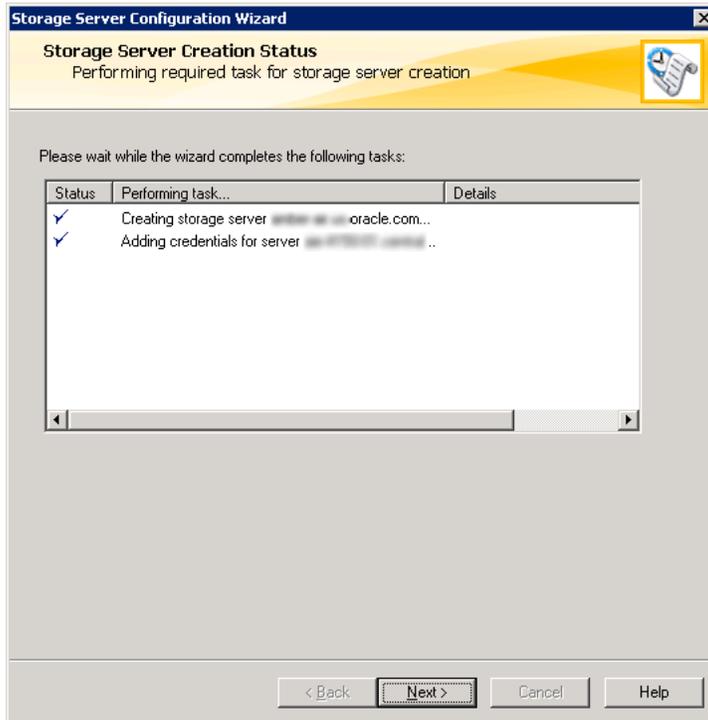


Figure 8. Receiving status information for the storage server creation process in NetBackup's wizard

- At this point the storage server has been successfully added to NetBackup. Press Close to exit the wizard, or press Next to enter the Disk Pool Configuration wizard.

If you wish to use the optimized duplication feature, you must run the Storage Server Creation wizard again and add the target appliance.

Creating Disk Pools and Storage Units

- Start the Disk Pool Configuration Wizard. The wizard displays an identifying welcome screen, seen in the following figure. Press Next to proceed with the configuration wizard.

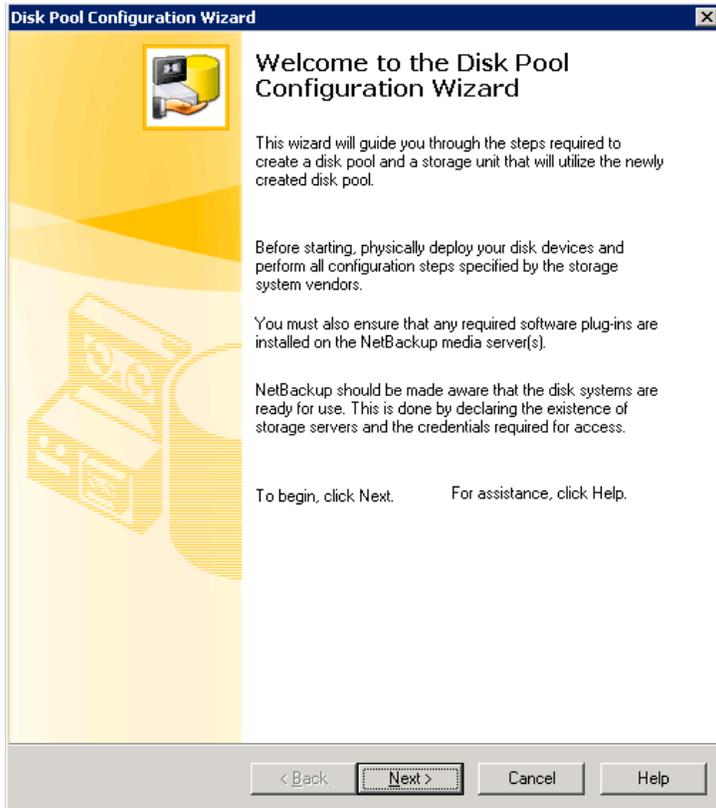


Figure 9. NetBackup's Disk Pool Configuration Wizard welcome screen

2. In the next window, for Disk Pool creation, select 'OpenStorage (oracle-zfssa)' as the Disk Pool type. Press Next to continue.

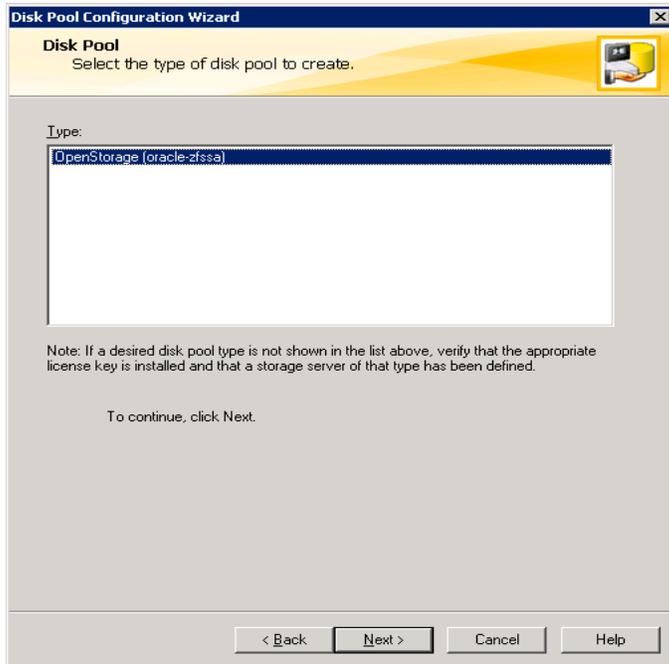


Figure 10. Choosing a disk pool type in the Disk Pool Configuration Wizard

3. Select the storage server on which you wish to create a disk pool. Press Next.

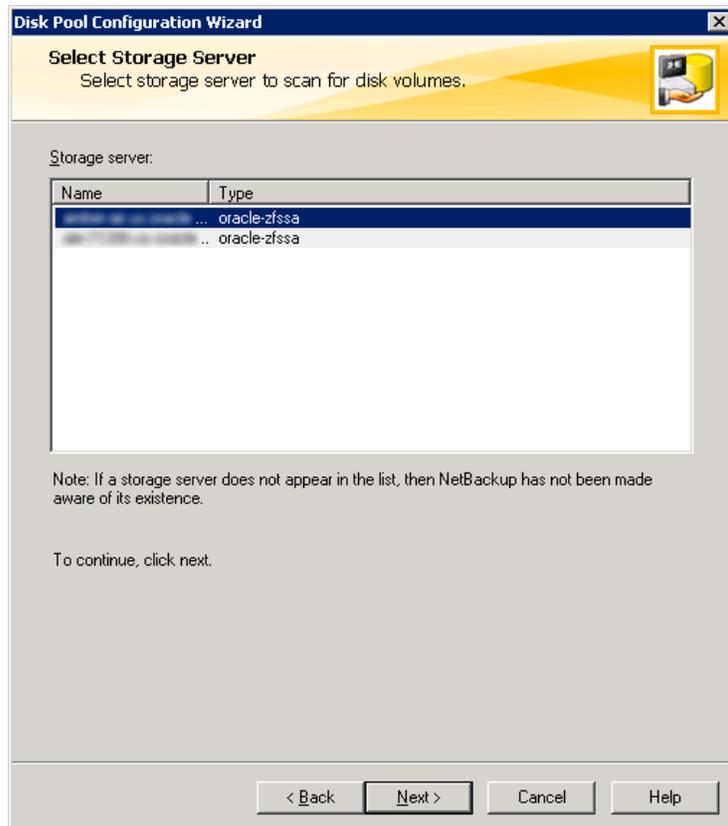


Figure 11. Selecting the storage server that you wish to create a disk pool on

4. Select the volume that you want to create a disk pool from. These volumes correspond to the filesystems that you created on the appliance in the “Configuring the Oracle ZFS Storage Appliance for Backup” section. Volumes that correspond to source filesystems and that can be used for backups have an ‘ost’ prefix. Volumes that correspond to target filesystems and to which duplicates can be sent have an ‘osttarget’ prefix. Only one volume may be selected for a disk pool. If a source filesystem is chosen for the disk pool, the disk pool will be known as a source disk pool. If a target filesystem is chosen for the disk pool, the disk pool will be known as a target disk pool.

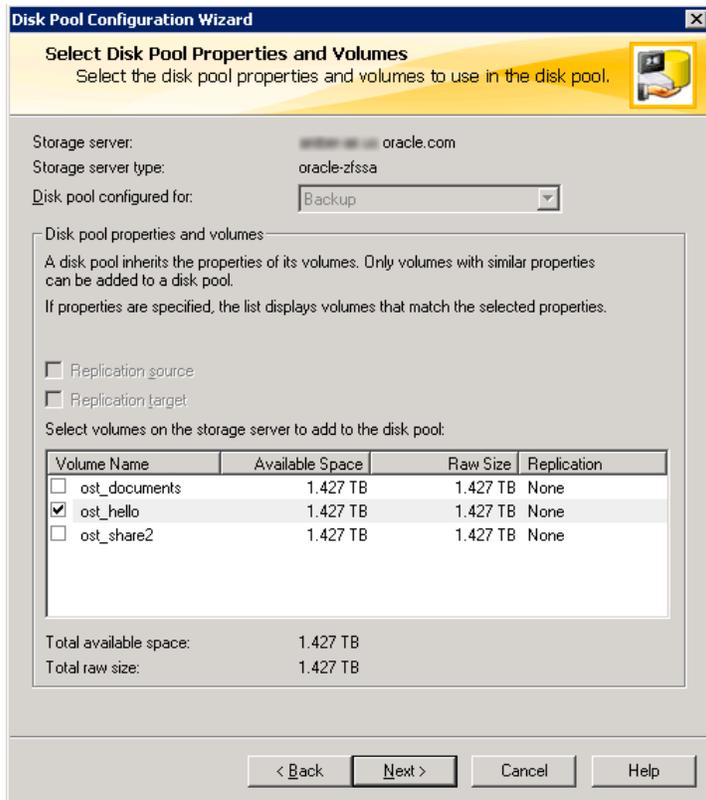
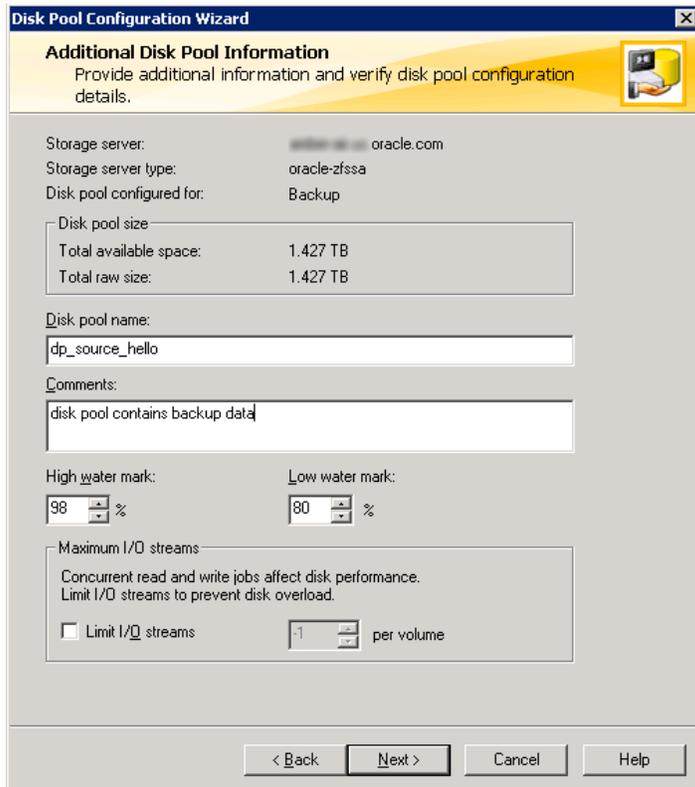


Figure 12. Choosing the volume for the disk pool. Only one volume can be selected.

5. Enter a disk pool name. It is recommended that the disk pool name contain an indication of whether the disk pool is a source or target disk pool. Enter any comments if you wish, and select the defaults for the other options.



The screenshot shows the 'Disk Pool Configuration Wizard' window. The title bar reads 'Disk Pool Configuration Wizard'. The main heading is 'Additional Disk Pool Information' with a sub-heading 'Provide additional information and verify disk pool configuration details.' Below this, the configuration details are as follows:

Storage server:	oracle.com
Storage server type:	oracle-zfssa
Disk pool configured for:	Backup

Disk pool size:

Total available space:	1.427 TB
Total raw size:	1.427 TB

Disk pool name:
dp_source_hello

Comments:
disk pool contains backup data

High water mark: 98 % **Low water mark:** 80 %

Maximum I/O streams:

Concurrent read and write jobs affect disk performance.
Limit I/O streams to prevent disk overload.

Limit I/O streams: -1 per volume

At the bottom, there are four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

Figure 13. Setting the disk pool properties

- Verify the disk pool configuration and click Next if all the information is accurate.

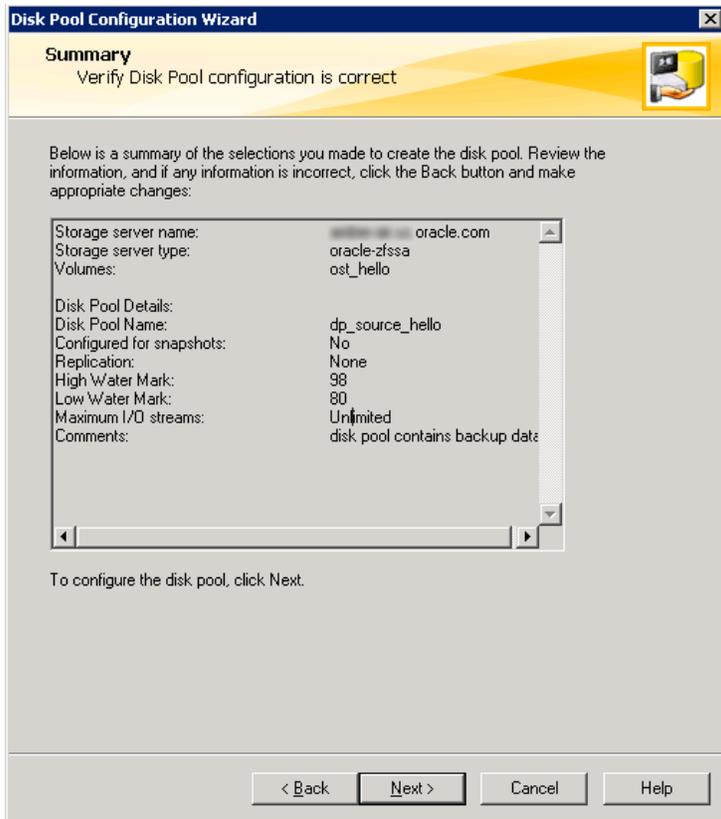


Figure 14. Verifying the disk pool details in the Configuration Summary window

7. After successful completion of the disk pool creation, you have the choice to create a storage unit. Ensure that the 'Create a Storage Unit' box is selected, and click Next to create a storage unit for this disk pool.

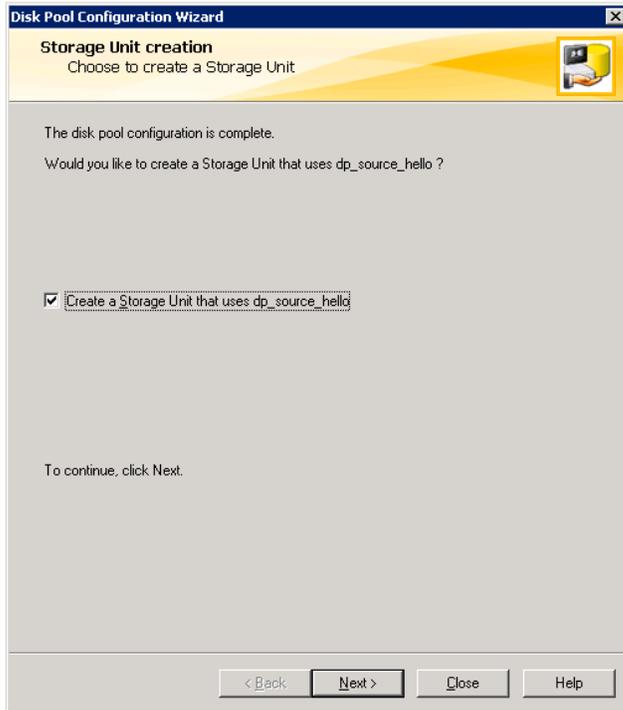


Figure 15. Creating a storage unit that uses the disk pool

8. Enter a storage unit name. It is recommended that the name contain an indication of whether it is using a source disk pool or target disk pool. Keep the default values for 'Maximum concurrent jobs' and 'Maximum fragment size'. Click Next to create the storage unit.

Figure 16. Setting the storage unit properties

9. Once the storage unit is created, the wizard will display a successful completion screen. Click Finish to exit.

If you wish to use the optimized duplication feature, you must register the target appliance and create a new disk pool and storage unit with the target volume. The target volume is located on the target appliance and will have the same name as the source volume, but with an “osttarget” prefix instead of “ost”. Repeat the previous steps for your target appliance.

Creating a Backup Policy

A backup policy is needed to back up data from clients. A backup policy allows you to define backup schedules and settings for backing up one or more clients.

1. On the NetBackup Administration Console GUI, expand the 'NetBackup Management' node in the navigation tree on the left hand side.

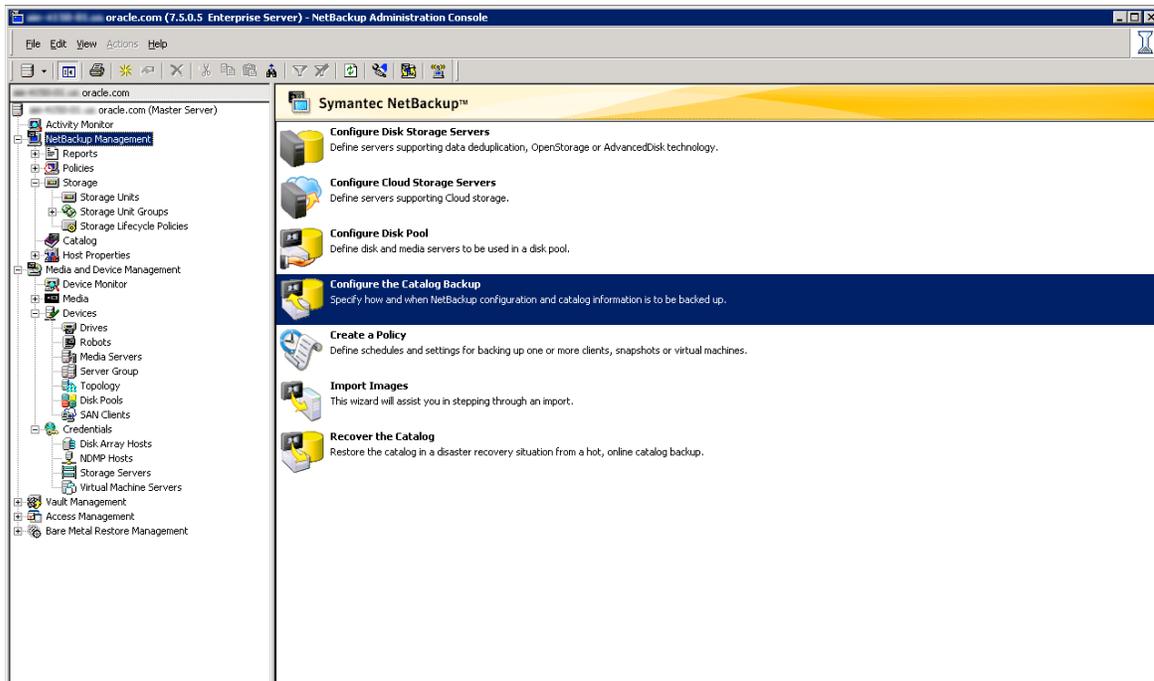


Figure 17. Expanding the 'NetBackup Management' node in the NetBackup navigation tree

2. Right click the 'Policies' node under 'NetBackup Management' and select 'New Policy'.

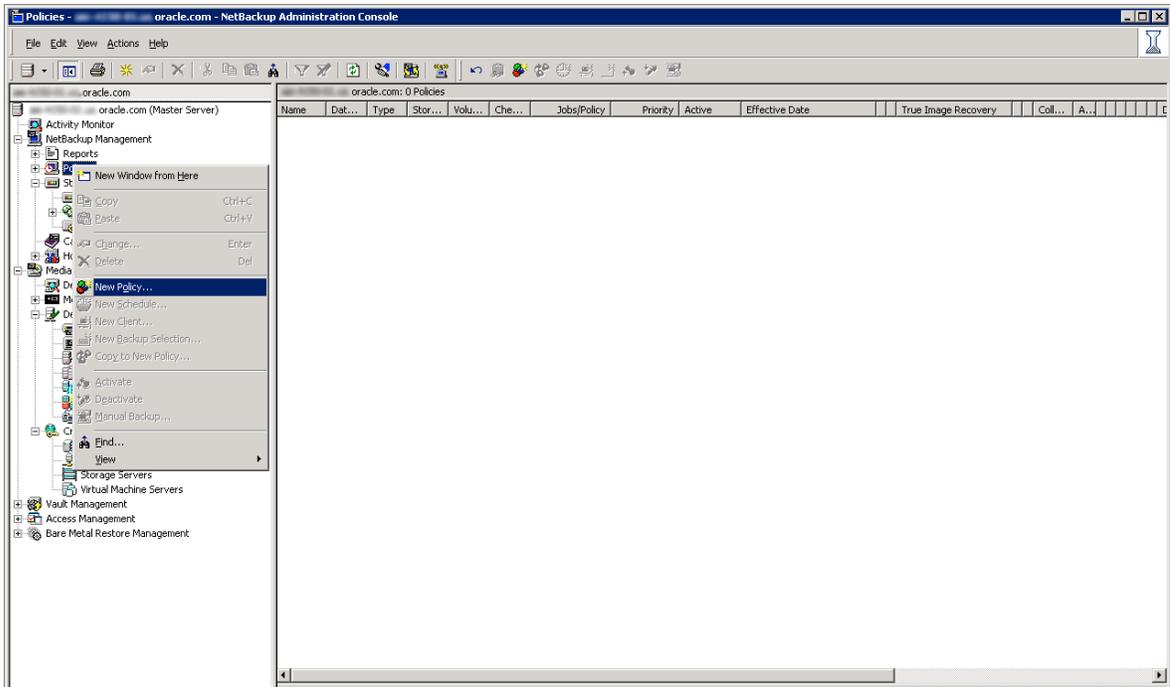


Figure 18. Creating a new policy

3. Enter a name for the new policy in the resulting pop-up window and click OK.

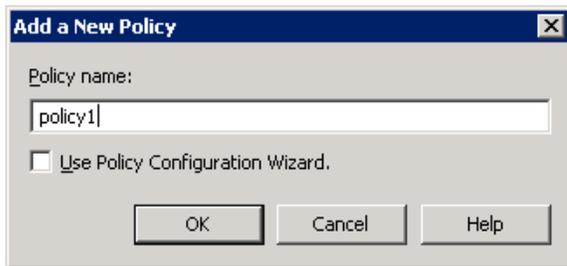


Figure 19. Entering a name for the new backup policy

- The 'Add New Policy' window showing your new policy name should appear, as shown in the next figure. Select the 'Attributes' tab. For 'Policy storage', select a source storage unit. For 'Policy volume pool', select 'NetBackup'. Note that backing up a policy to a target storage unit will cause the backup to fail.

The rest of the available options are not used for the Oracle ZFS Storage Appliance. For descriptions for these other options, see the NetBackup Administrator's Guide for your installed version of NetBackup.

The screenshot shows the 'Add New Policy - policy1' dialog box with the 'Attributes' tab selected. The 'Policy type' is set to 'MS-Windows'. Under 'Destination', 'Data classification' is '<No data classification>'. 'Policy storage' is 'su_source_hello' and 'Policy volume pool' is 'su_source_hello'. There are checkboxes for 'Take checkpoints every' (0 minutes), 'Limit jobs per policy', and 'Media Owner' (Any). The 'Go into effect at' section is set to 8/29/2013 at 11:15:03 AM. Other options include 'Backup Network Drives', 'Cross mount points', 'Compression', 'Encryption', and 'Collect disaster recovery information for'. The 'Snapshot Client' section has checkboxes for 'Perform block level incremental backups', 'Perform snapshot backups', 'Retain snapshot for Instant Recovery or SLP management', 'Hyper-V server', and 'Perform off-host backup'. The 'Microsoft Exchange Attributes' section includes 'Exchange 2010 DAG or Exchange 2007 replication (LCR or CCR)', 'Database backup source', and 'Preferred server list...'. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

Figure 20. Setting attributes for the new backup policy

5. Select the 'Schedules' tab on the 'Add New Policy' window. Click 'New' to add a schedule.
6. Create a new schedule with your preferred settings. Click 'OK' when completed.

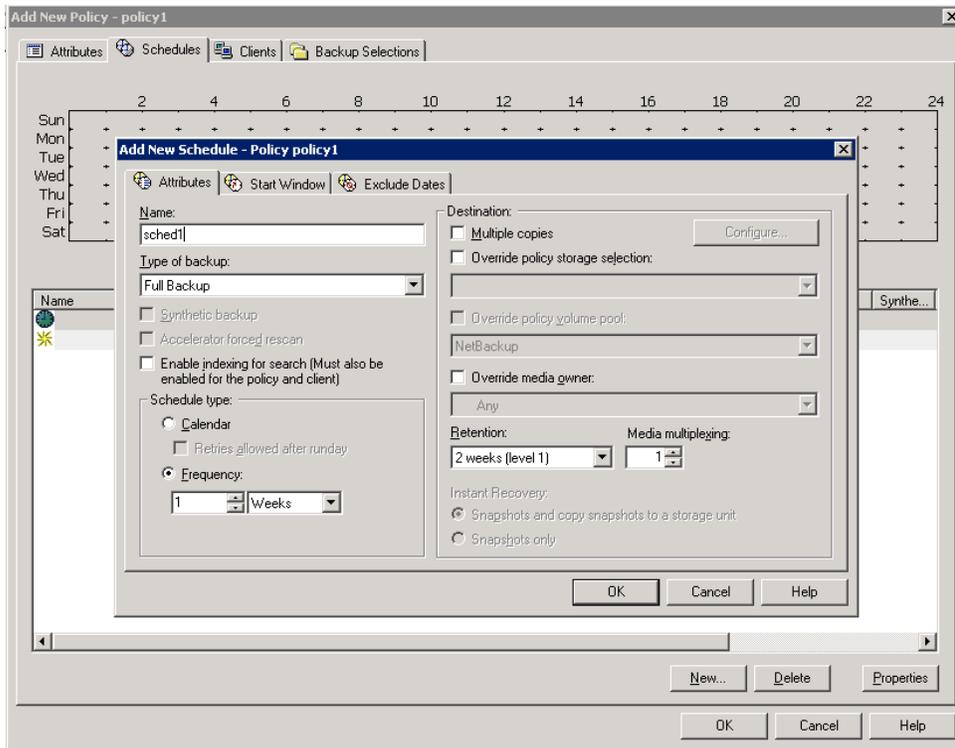


Figure 21. Creating a new schedule for the backup policy

7. Select the 'Clients' tab on the 'Add New Policy' window. Click 'New' and add a client.

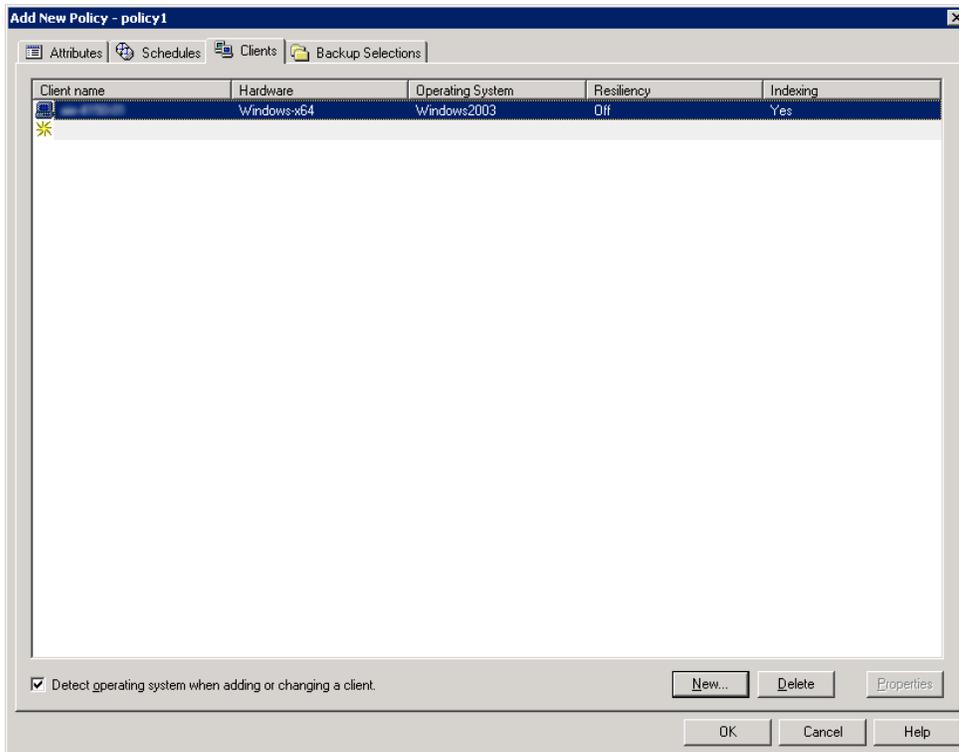


Figure 22. Adding a client to the backup policy

8. Select the Backup Selections tab on the 'Add New Policy' window. Select "New" to add a directory on the client that will be backed up by this policy. Press OK to finish.

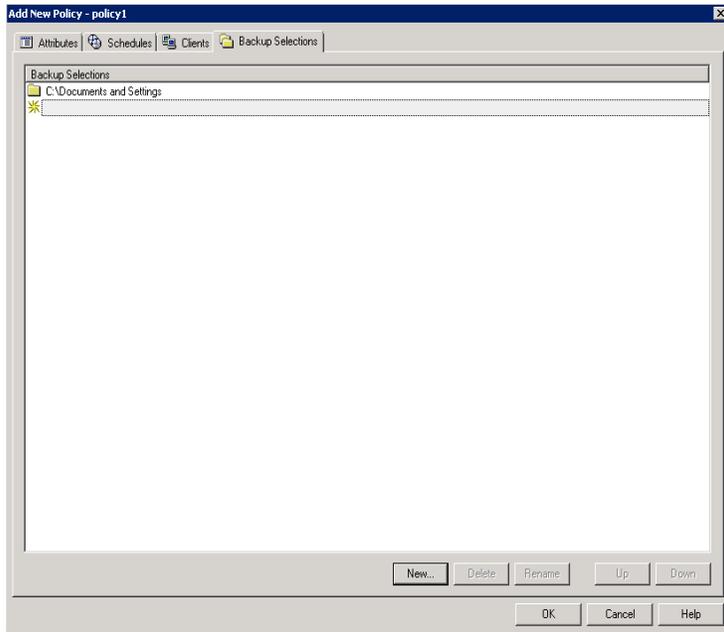


Figure 23. Choosing a directory as a backup selection for the new policy

Manually Starting a Backup Operation

NetBackup will automatically start a backup operation based on schedules that you created within the policy. To start a backup operation manually, follow these steps:

1. Expand the 'NetBackup Management' node on the navigation tree on the left side of the NetBackup Administration Console GUI. Select the 'Policies' node.

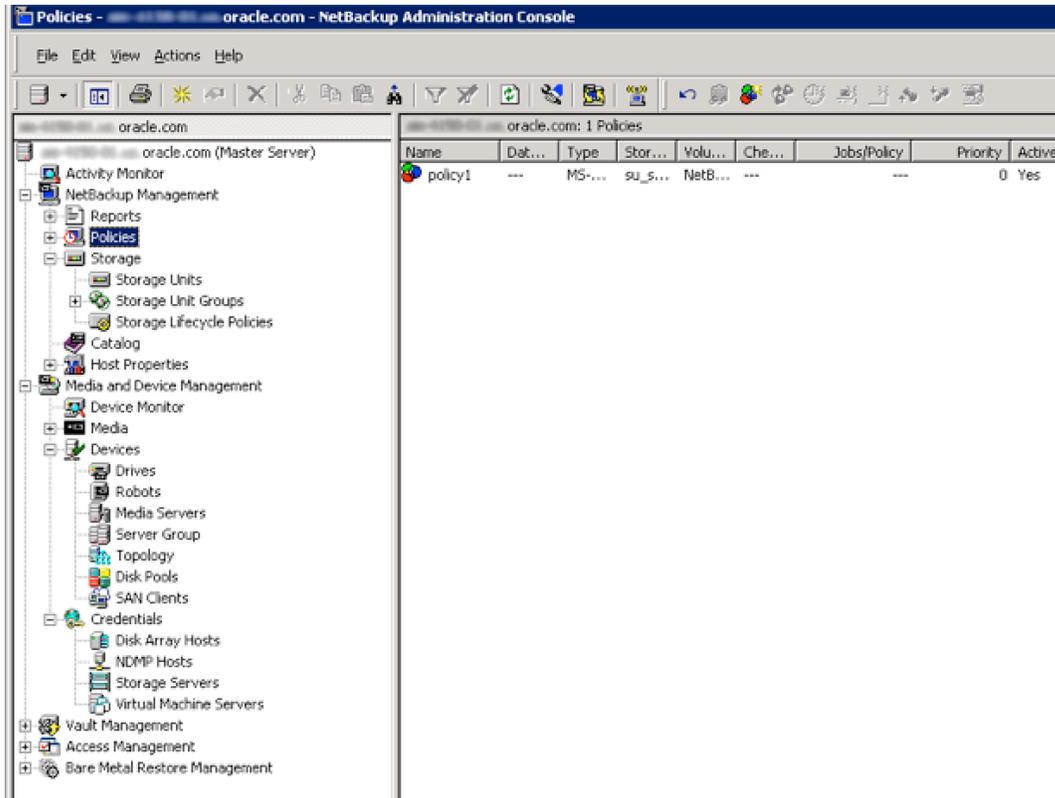


Figure 24. Expanding the 'NetBackup Management' node in the navigation tree

2. Right click on the policy you want to enact and select 'Manual Backup'.

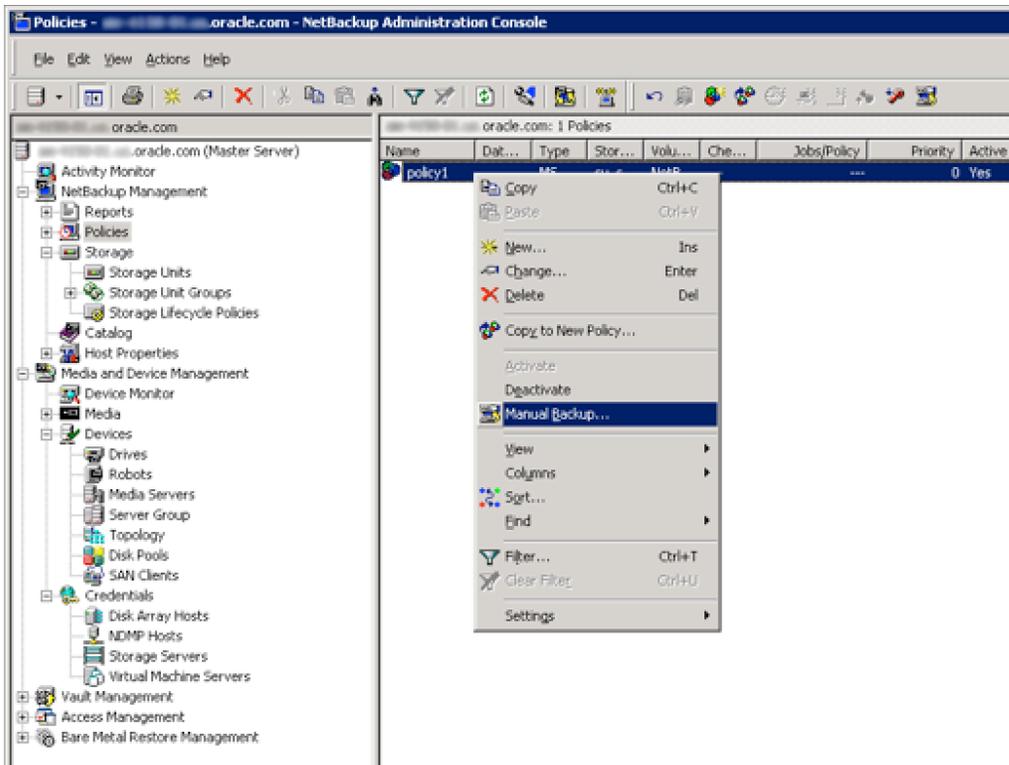


Figure 25. Selecting 'Manual Backup' in the NetBackup Administration Console

3. Select a schedule and client(s) to start the backup. To back up all clients, press OK without selecting any clients.

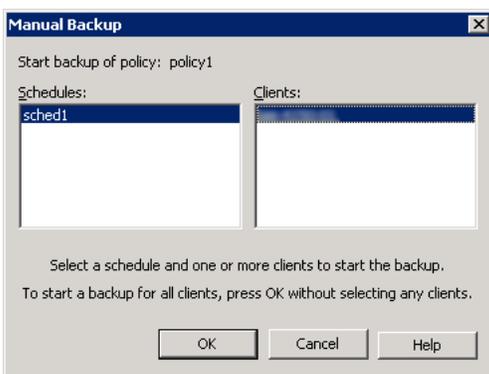


Figure 26. Starting the backup

- To view the status of a backup, click on the 'Activity Monitor' node on the left side navigation tree of the GUI.

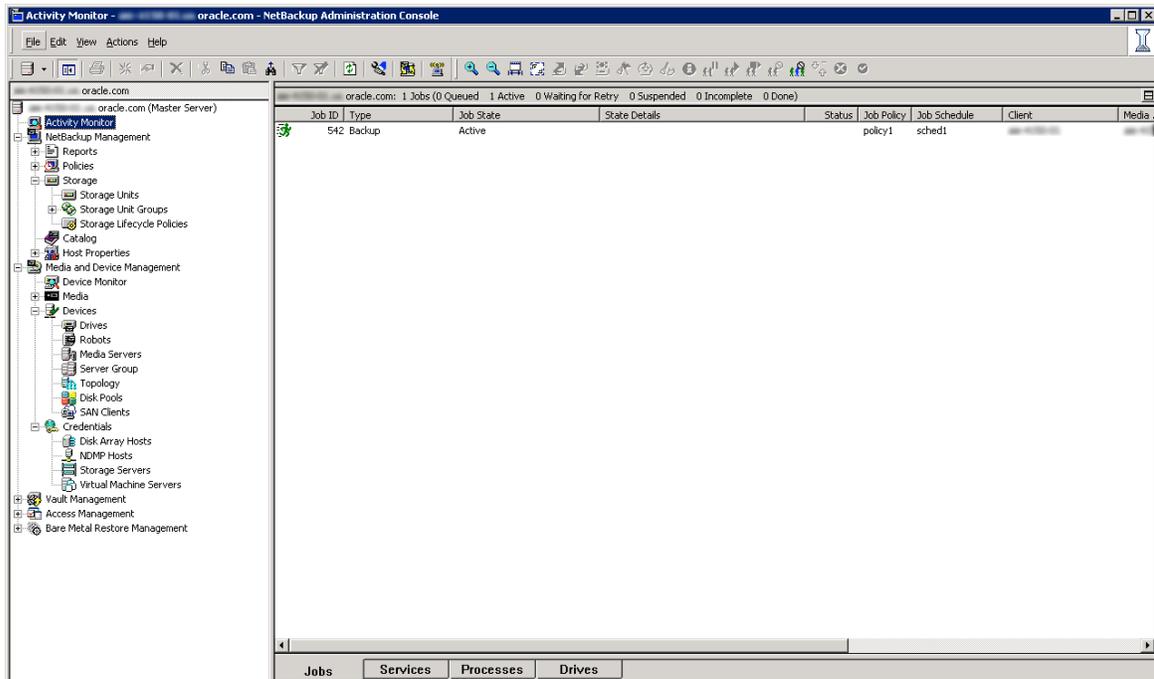


Figure 27. Viewing the progress of the backup in the Activity Monitor

Once the backup is complete, the backup image will show up in the Catalog. To view the Catalog, expand the 'NetBackup Management' node in the navigation tree and select 'Catalog'. Select the appropriate date/time range and click 'Search Now'.

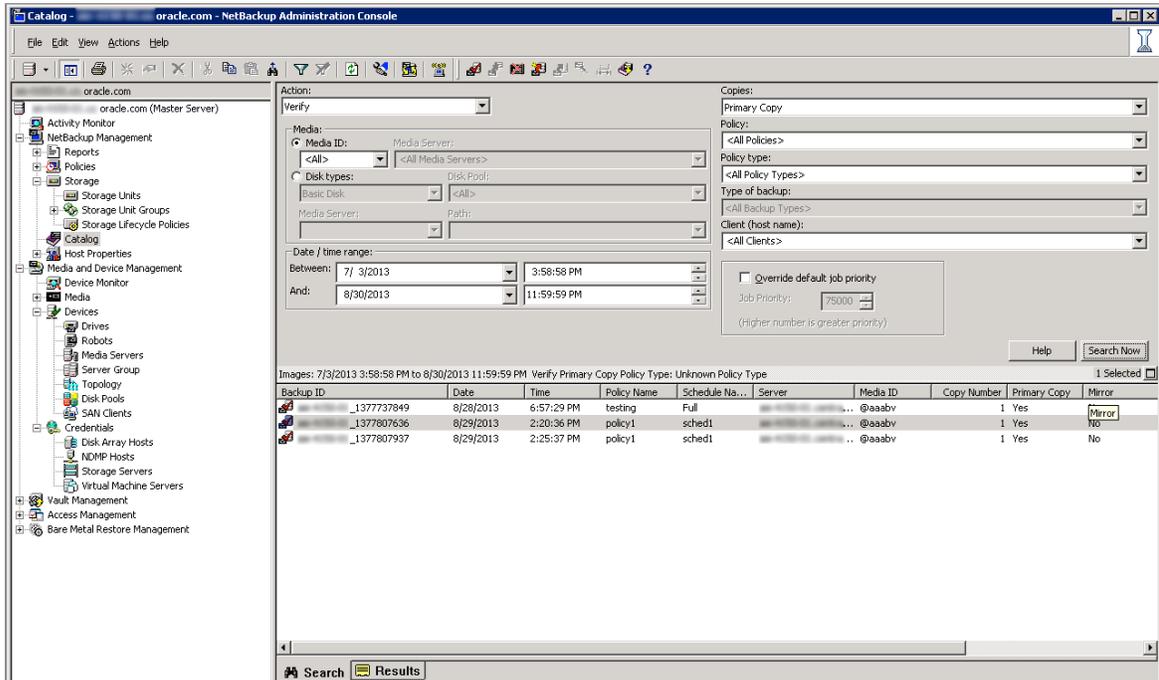


Figure 28. Viewing the backup image in the catalog

Duplicating an Image Using Optimized Duplication

In order to duplicate an image that exists on a source appliance using optimized duplication, the target appliance must be registered in NetBackup and a target disk pool and target storage unit must be created using the target filesystem that corresponds to the source filesystem the image resides on. See the previous instructions in this section for these procedures.

Once you have your target destination configured, you can proceed to the following steps to configure the duplication procedure.

1. Expand the 'NetBackup Management' node on the NetBackup application's left-side navigation tree and select 'Catalog'.

- In the catalog window, select 'Duplicate' for the action. Select the appropriate date/time range and click 'Search Now'.

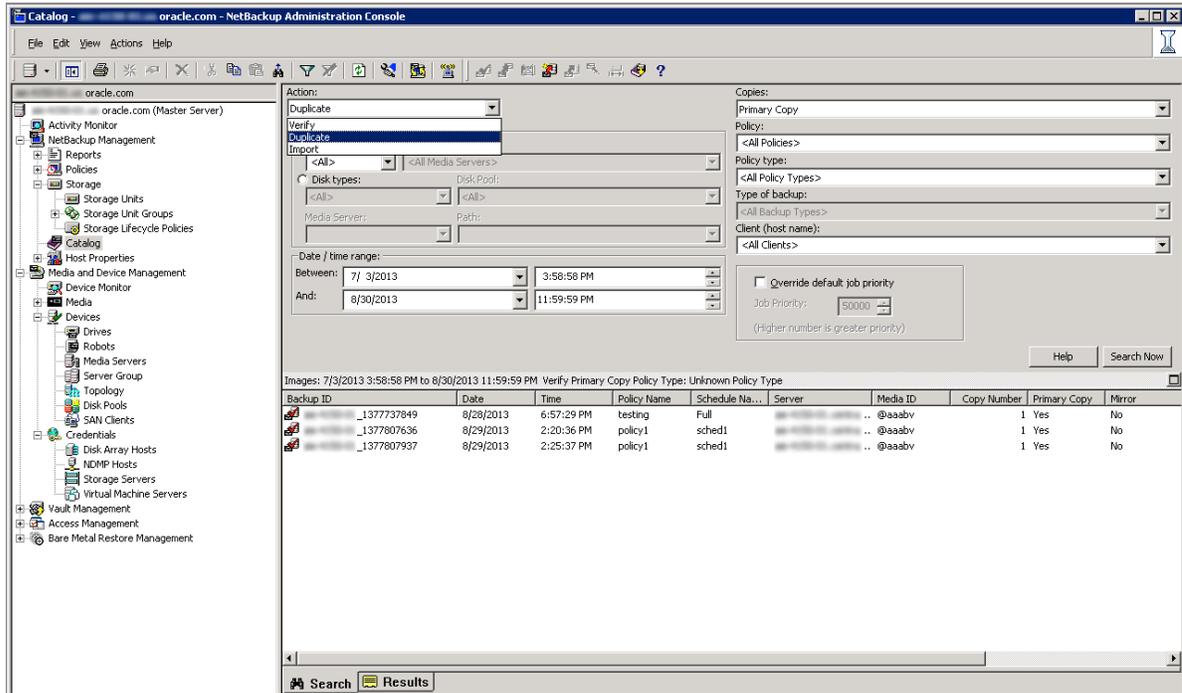


Figure 29. Selecting 'Duplicate' as the action in the Catalog windowpane

3. Right click on the image that you wish to duplicate and select 'Duplicate'.

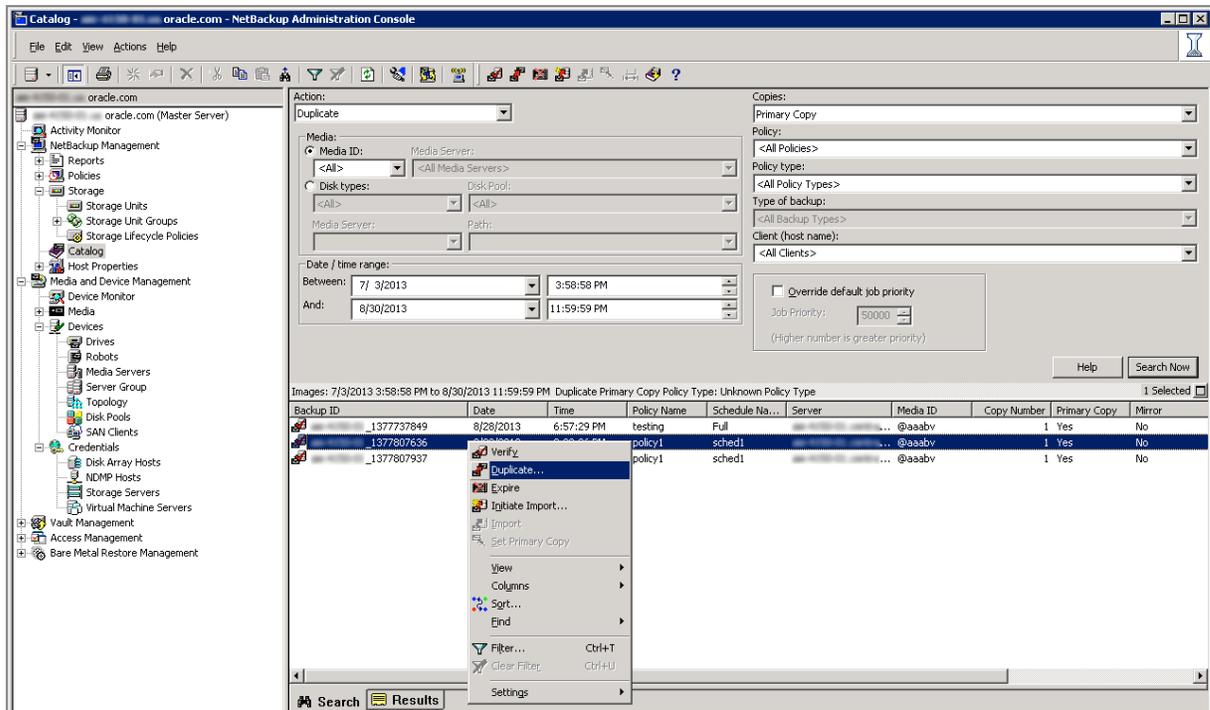


Figure 30. Selecting the image to duplicate

- For the storage unit, select the appropriate storage unit that is the target to the source storage unit that the original image resides on. Selecting any other storage unit will cause the backup to fail. For example, if the original image resides on a storage unit that is linked to a volume called “ost_hello”, the target storage unit needs to be linked to the volume called “osttarget_hello” that is on the target appliance.

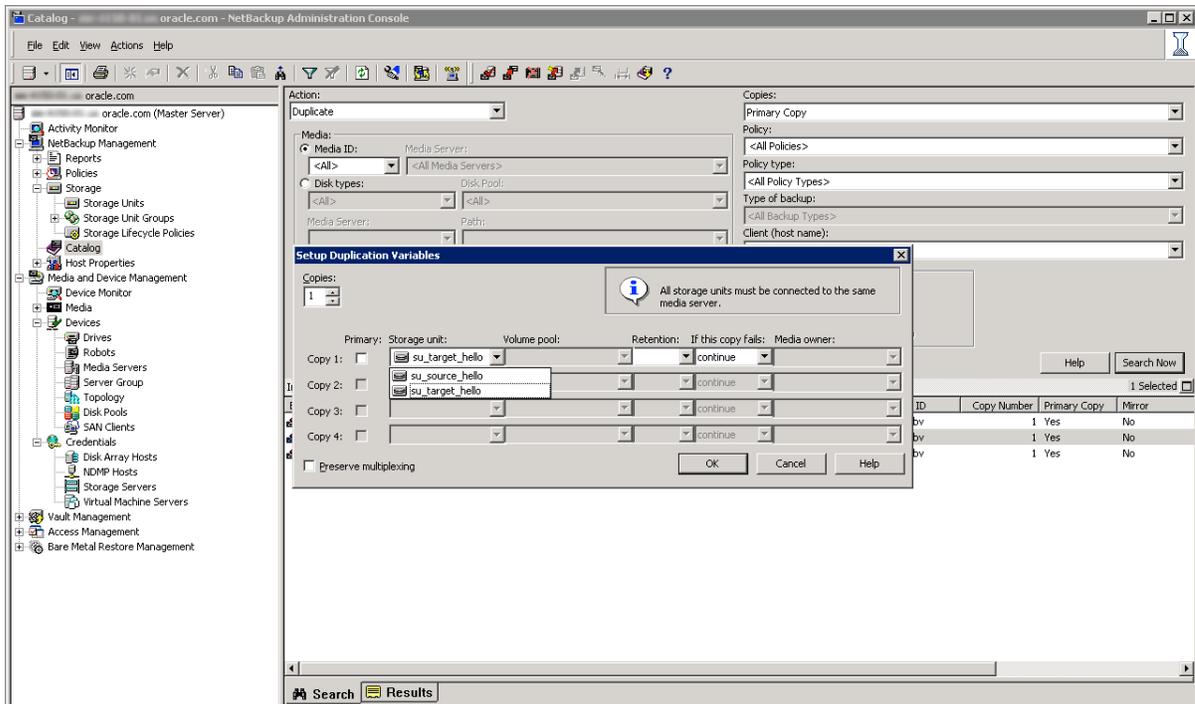


Figure 31. Selecting the target storage unit for the duplication

- Press 'OK'. The duplication is now in progress. Progress can be seen from the Activity Monitor.

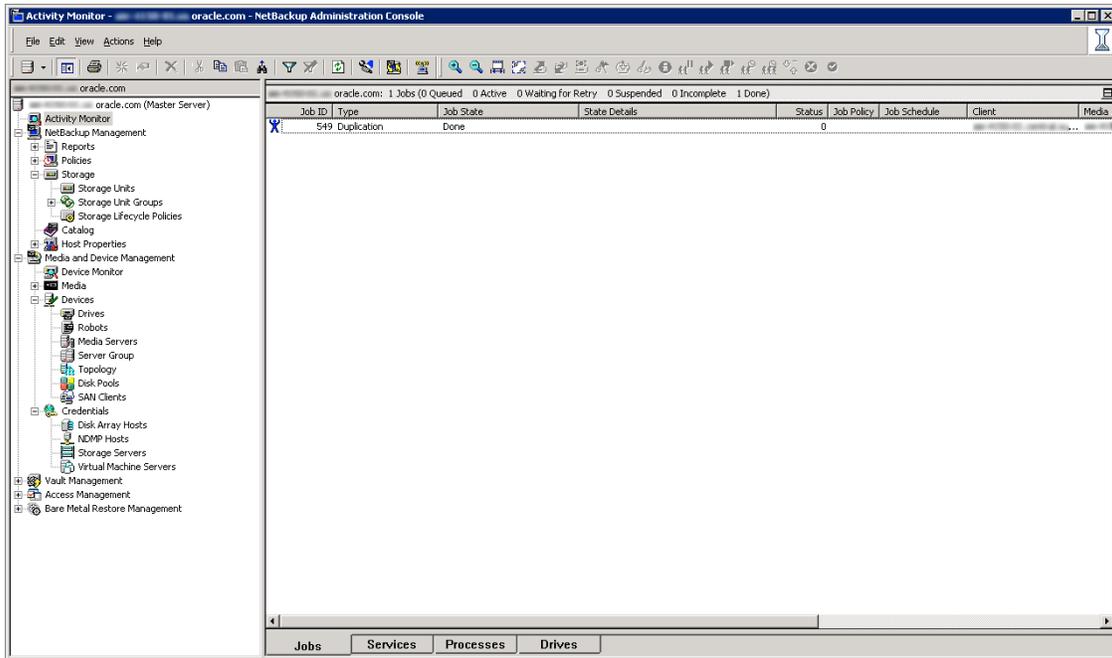


Figure 32. Viewing duplication operation progress in the NetBackup Administration Console's Activity Monitor

Troubleshooting

To aid in troubleshooting, the plug-in generates a log file that contains every OST API call that NetBackup invokes through the plug-in. This log file is located at: `C:\Program Files\Oracle\OST\ost.log` on Windows servers, or at `/oraclezfs_ost/ost.log` on Linux, Oracle Solaris, and AIX servers.

If many NetBackup errors are showing up, it might be beneficial to stop all NetBackup processes and restart them again. Instructions to do this with the various supported operating systems are listed.

For Windows:

1. Close NetBackup.
2. Open a Command Prompt window.
3. Navigate to `C:\Program Files\Veritas\NetBackup\bin>`, assuming NetBackup was installed to the default location. If NetBackup was installed in a custom location, navigate to the directory where the program files were located.
4. Run `bpdown.exe` to stop all processes.
5. Run `bpup.exe` to start all processes.

For Linux/Oracle Solaris/AIX:

1. Close NetBackup.
2. Open a terminal.
3. Navigate to `/usr/opensv/netbackup/bin/goodies`. Note: This is the default install directory. If NetBackup was installed in a custom directory, specify your custom directory.
4. Run `./netbackup stop` to close all NetBackup services.
5. Run `./netbackup start` to start all NetBackup services.

Common Problems and Their Possible Solutions

Here are some common problems and troubleshooting tips to help solve them:

Problem: Cannot load plug-in into NetBackup when using Linux/Oracle Solaris/AIX media servers.

Possible solutions:

- This may happen if the correct C++ libraries are not available on the servers. Open a terminal and navigate to the plug-in directory: `/usr/opensv/lib/ost-plugins/`). Type `ldd libstspioracle-zfssaMT.so`.

This command will tell you if any necessary libraries are missing on your system. Install any missing libraries, and try again.

Problem: Cannot add storage server to NetBackup.

Possible solutions:

- Verify that the plug-in is installed.
- Verify that the correct storage server type – 'oracle-zfssa' – is being used.

Problem: When creating a disk pool in the NetBackup wizard, some volumes do not appear in the selection menu.

Possible solutions:

- Verify that the filesystems have been configured properly as outlined in the “Configuring the Oracle ZFS Storage Appliance” section.
- Stop and start all NetBackup processes. Instructions on how to do this are provided at the beginning of this Troubleshooting section.

Problem: A backup is failing.

Possible solutions:

- Verify that the storage unit that is chosen for the backup is a source storage unit.
- Verify that there is enough free space on the Oracle ZFS Storage Appliance.

Problem: An optimized duplication operation is failing.

Possible solutions:

- Verify that the storage unit that the original image is on and the storage unit that the duplication is being copied to have a source -> target relationship. The source and target storage units cannot be the same.
- When searching the catalog for the image that you wish to duplicate, verify that the 'Action' is set to 'Duplicate'.
- Verify that the storage appliances were registered in NetBackup using the fully qualified domain name (FQDN). If multiple media servers are managing the storage appliance, the server name used to register it should be exactly the same across all media servers. For example, one media server should not use the IP address of the Oracle ZFS Storage Appliance, while another uses the FQDN. They should all use the FQDN. If the incorrect name was used to register the Oracle ZFS Storage Appliance, the following actions must be taken:
 1. Delete the storage server from NetBackup.
 2. Delete the storage server from the host cache. To do this, you must use the NetBackup command-line tools:
 - **On Windows:** From the command prompt, navigate to C:\Program Files\Veritas\NetBackup\bin\admincmd>.

Run `nbemcmd.exe -deletehost -machinetype ndmp -machinename server_name`, where `server_name` is the server name used to register the appliance.
 - **On Linux/Oracle Solaris/AIX:** From a terminal, navigate to `/usr/opensv/netbackup/bin/admincmd`.

Execute `./nbemcmd -deletehost -machinetype ndmp -machinename server_name`, where `server_name` is the server name used to register the appliance.
 3. Re-register the storage appliance in NetBackup using the FQDN.

Problem: Multiple concurrent jobs that are writing to the same storage unit are failing.

Possible Solutions:

- Expand the 'Storage' node on the left side navigation tree in NetBackup. Click on 'Storage Units'. Right click on the problematic storage unit and select 'change'. Change the 'Maximum concurrent jobs' to 1.

Problem: Image cleanup failed.

Possible Solutions:

- Failed image cleanup jobs usually succeed on a retry. NetBackup automatically performs the Image Cleanup operation on a regular basis. To manually force the Image Cleanup operation from the command line:

On Windows:

1. From the Windows command prompt, navigate to C:\ Program Files\Veritas\NetBackup\bin\admincmd>.
2. Run `bpimage -cleanup -allclients`

On Linux/Oracle Solaris/AIX:

1. From a terminal, navigate to `/usr/opensv/netbackup/bin/admincmd`.
2. Execute `./bpimage -cleanup -allclients`

If the image cleanup still does not complete successfully, restart the NetBackup processes and try again.

References and Additional Resources

See the following resources for additional information relating to the products covered in this document.

References to Sun ZFS Storage Appliance, Sun ZFS Storage 7000, and ZFS Storage Appliance all refer to the same family of Oracle ZFS Storage Appliance products. Some cited documentation may still carry these legacy naming conventions.

- Oracle ZFS Storage Appliance Documentation Library
<http://www.oracle.com/technetwork/documentation/oracle-unified-ss-193371.html>

The *Oracle ZFS Storage Appliance Administration Guide* is also available through the Oracle ZFS Storage Appliance help context.
The Help function in Oracle ZFS Storage Appliance can be accessed through the browser user interface.
- Oracle Support Center
<http://www.oracle.com/support>
- Patches and updates downloads from My Oracle Support (MOS) (search under Oracle ZFS Storage Software Patches), or

Oracle ZFS Storage Appliance Plug-ins
<http://www.oracle.com/technetwork/server-storage/sun-unified-storage/downloads/zfssa-plugins-1489830.html>
- Oracle Storage Product Information
<http://www.oracle.com/us/products/storage/overview/index.html>
- Oracle ZFS Storage Appliance Technical White Papers and Solution Briefs
<http://www.oracle.com/technetwork/server-storage/sun-unified-storage/documentation/index.html>
- Symantec NetBackup Documentation, including Product Guides, for current and previous releases
<https://sort.symantec.com/documents>



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Oracle® ZFS Storage Appliance Plug-in for Symantec NetBackup OpenStorage Administrator's Guide
October 2013, Version 1.0;
Minor doc update November 2015
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