



ZFS STORAGE
APPLIANCE

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Using Symantec NetBackup with VSS Snapshot to Perform a Backup of SAN LUNs in the Oracle ZFS Storage Appliance

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Introduction

Oracle ZFS Storage Appliance provides a software plug-in called **Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Service Software** that works with Microsoft Volume Shadow Copy Service to produce consistent shadow copies by coordinating applications (such as business applications, backup and fast recovery solutions) with file system activities in the Oracle ZFS Storage Appliance. This plug-in can be configured to integrate into a Symantec NetBackup client in the Microsoft Windows environment served by Volume Shadow Copy Service.

The Microsoft Volume Shadow Copy Service, known as the VSS infrastructure, provides the ability to create snapshots (point-in-time copies) of volumes. By maintaining snapshot images of data at particular instances in time, users and administrators can quickly recover individual files or whole volumes directly from disk as they appeared at the time the snapshot was taken. This capability is similar to restoring data from tape but much faster. VSS became available with the release of Microsoft Windows Server 2003.

Symantec NetBackup is an enterprise-level heterogeneous backup and recovery suite. It provides a comprehensive data protection solution, including centralized administration and reporting, media management, automated policy-based backups, and restore capability. Symantec NetBackup incorporates support for Microsoft Volume Shadow Copy Service in conjunction with the NetBackup Enterprise Client feature and provides a comprehensive set of data protection technologies for business applications on a Microsoft platform.

Oracle ZFS Storage Appliance supports Microsoft VSS hardware snapshot backups using the Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Service (VSS) Software (introduced with the 2010.Q1 release). The Oracle ZFS Storage Appliance Provider for VSS Software is downloaded and installed on a Windows host that is running the Symantec NetBackup Enterprise Client and enables Symantec NetBackup to create and manage hardware snapshots (with the aid of VSS) in the Oracle ZFS Storage Appliance.

This paper describes how to configure and deploy the Oracle ZFS Storage Appliance for use with Symantec NetBackup 6.x, and 7.x Enterprise Clients using Volume Shadow Copy Service (VSS) hardware snapshots.

For more information about the Oracle ZFS Storage Appliance products, visit the Oracle ZFS Storage Appliance website at <http://www.oracle.com/us/products/servers-storage/storage/unified-storage/index.html>.

NOTE: 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 screen code or documentation may still carry these legacy naming conventions.

Overview

Snapshots have two primary purposes:

- They allow the creation of consistent backups of a volume, ensuring that the contents cannot change while the backup is being made.
- They avoid problems with file locking.

By creating a read-only copy of the volume, backup programs are able to access every file without interfering with other programs writing to those same files. The files on the snapshot volume can then be accessed by a backup program while the application continues to write to the files on the original volume. The process of copying data to the snapshot volume is handled by the file system or by specialized hardware. In the latter case, a VSS hardware provider generates snapshots on the specialized hardware while hiding the details from the operating system and the backup program.

Applications can provide specific support for VSS using VSS writers. VSS writers control how data is set to a consistent state at the beginning of a VSS operation and how consistency is maintained throughout the process.

VSS operates at the block level of the file system. By integrating VSS hardware or software providers, application-level writers, and backup applications, VSS enables backups that are point-in-time and application-level consistent without requiring the backup tool to have knowledge about the internals of each application.

Figure 1 provides an overview of how the Oracle ZFS Storage Appliance and Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Service Software fit into a Symantec NetBackup solution.

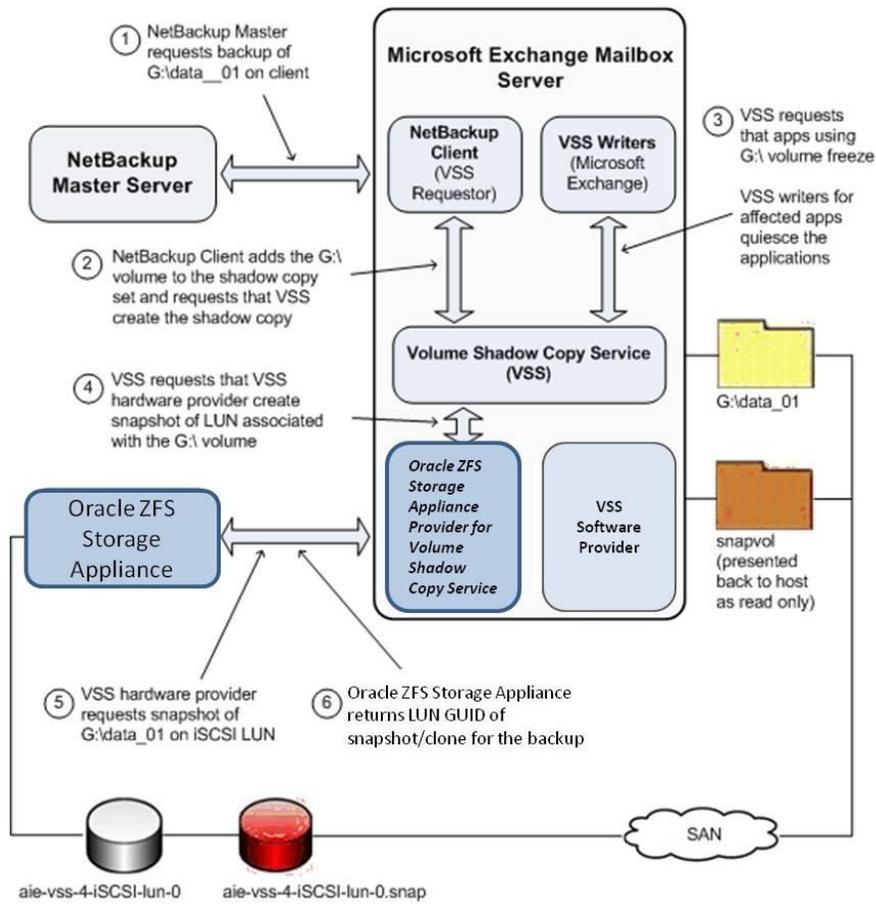


Figure 1. The Oracle ZFS Storage Appliance Provider for VSS Software in a Symantec NetBackup Snapshot Client solution

Oracle ZFS Storage Appliance Configuration

This section describes how to configure the Oracle ZFS Storage Appliance for use in a Microsoft VSS environment. After initially setting up the Oracle ZFS Storage Appliance to work in a Microsoft Windows environment, as well as any applications that will access the storage, a series of configuration steps are detailed to establish initiators and targets recognizable to the VSS and NetBackup components. These configuration steps are performed in the Oracle ZFS Storage Appliance BUI.

Setting Up the Oracle ZFS Storage Appliance

To complete an initial setup of the Oracle ZFS Storage Appliance:

1. Configure the Oracle ZFS Storage Appliance system for use in a Microsoft environment. Configure networking and set up the Active Directory service so that all Microsoft Windows clients have access to the iSCSI or Fibre Channel storage on the Oracle ZFS Storage Appliance. For details, refer to the Oracle ZFS Storage Appliance documentation (see *Appendix B: References*).
2. Configure the storage on the Oracle ZFS Storage Appliance as needed by the applications that will access the storage.

Creating and Configuring an iSCSI Initiator and Initiator Group

To create and configure an iSCSI initiator and initiator group, complete the following steps:

1. Determine the iSCSI Qualified Name (IQN) of the client host by opening the Windows iSCSI initiator utility on the client host and selecting the **Configuration** tab as shown in Figure 2.

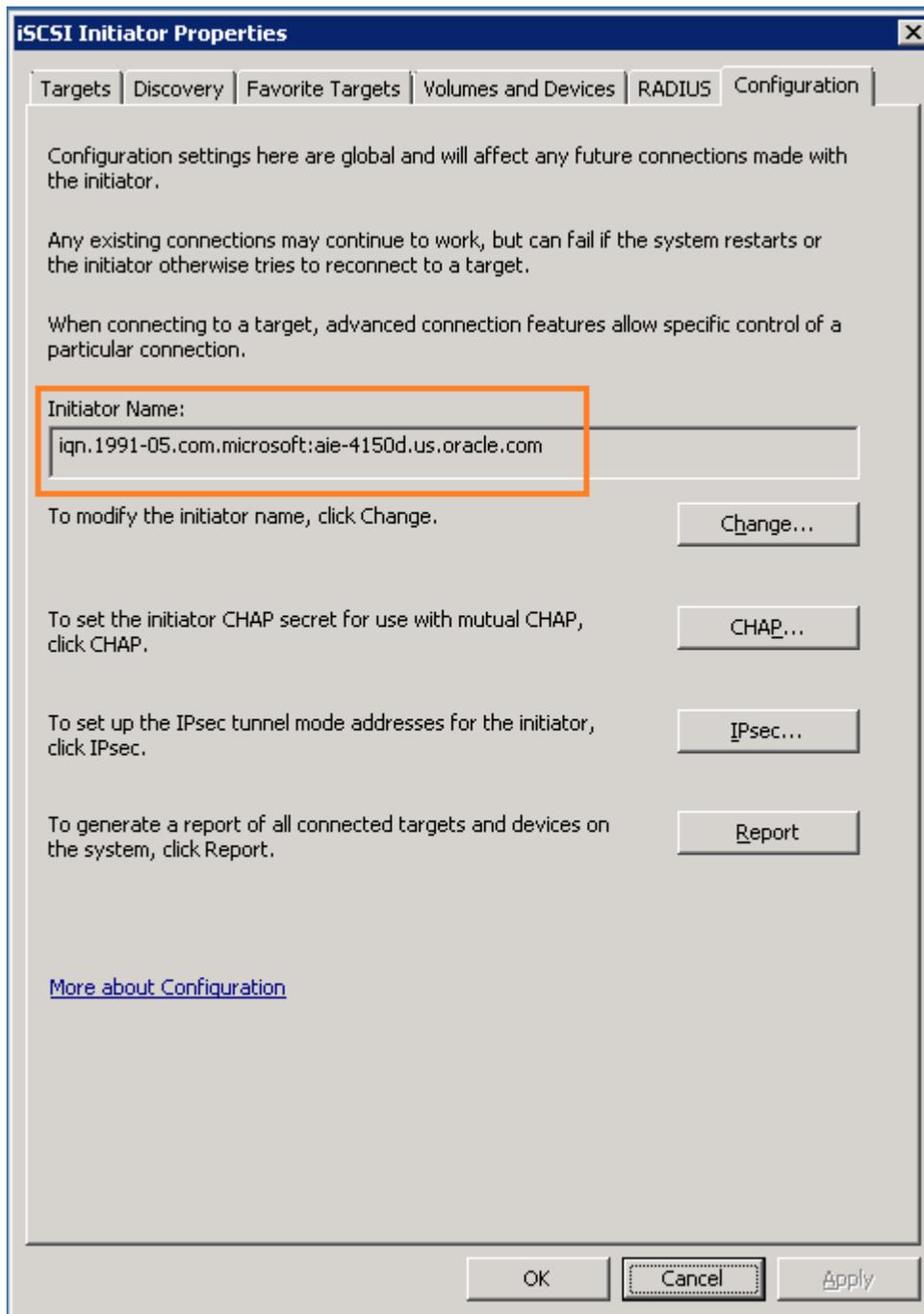


Figure 2. Determining the IQN for the client host

2. In the Oracle ZFS Storage Appliance BUI, select the **Configuration** tab and then the **SAN** tab.
3. To the right of SAN, select the **iSCSI** tab and then select the **Initiators** tab on the left.
4. Click the + icon next to Initiators to add a new iSCSI initiator.

5. In the Identify iSCSI Initiator dialog window, enter the **Initiator IQN** and **Alias** of the client host as shown in Figure 3. Configure CHAP, if CHAP is required.
6. Click **OK**.

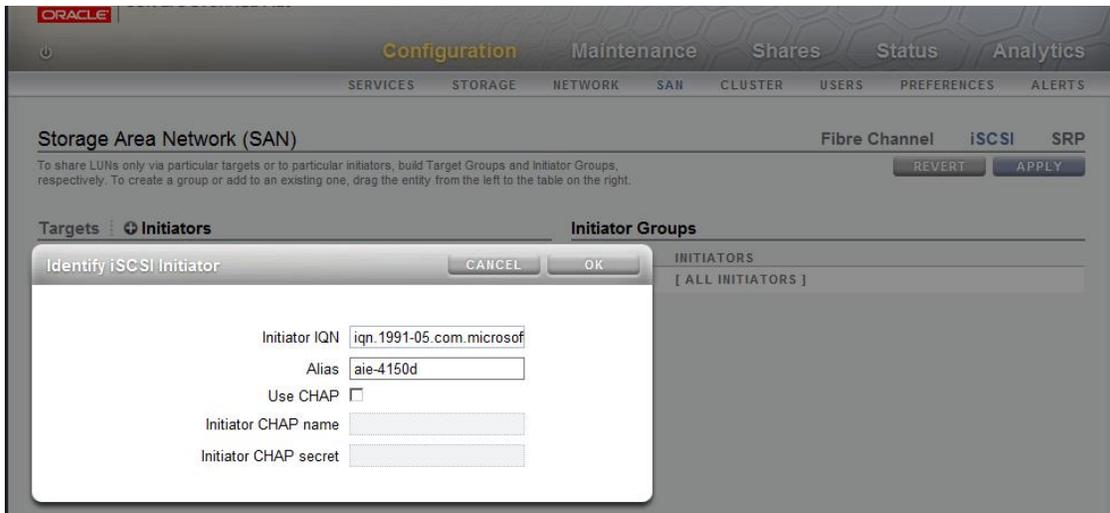


Figure 3. Configuring a new iSCSI initiator

7. Add the new initiator to an initiator group by dragging and dropping it to the bottom of the iSCSI Initiator Groups list to create a new group as shown in Figure 4

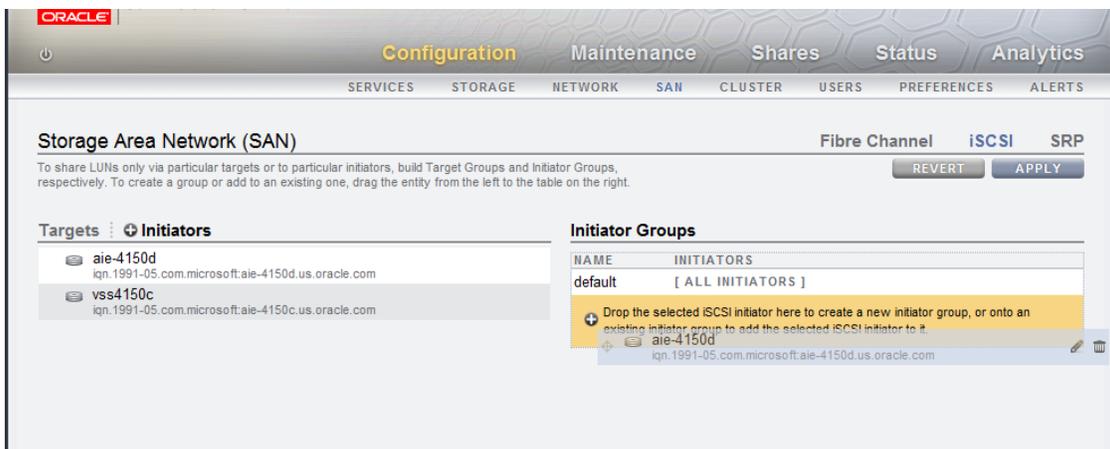


Figure 4. Adding the iSCSI initiator to a new initiator group

8. Click the pencil icon at the right of the new initiator group to display the property dialog window for that initiator group as shown in Figure 5.
9. Enter a **Name** for the initiator group.
10. Use the checkboxes to assign initiators to the group.

More than one initiator may be assigned to this group to allow several hosts to have access to the LUN. Multiple initiators must be assigned to the group to configure the `off-host` backup option in the NetBackup policy.

11. Click **OK** to save the settings.

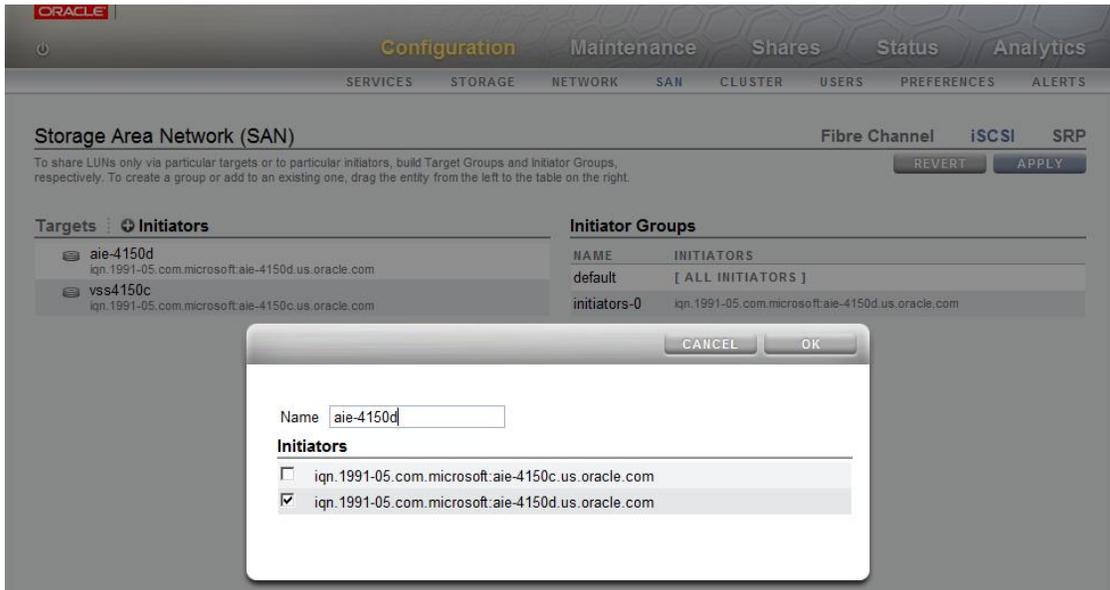


Figure 5. Specifying the group name of the new initiator group and assigning the iSCSI initiator to the group

Creating and Configuring an iSCSI Target and Target Group

To create and configure an iSCSI target and target group, complete the following steps in the Oracle ZFS Storage Appliance BUI:

1. Select the **Configuration** tab and then the **SAN** tab.
2. Select the **iSCSI** tab and the **Targets** tab.
3. Click the **+** icon next to **Targets** to add a new iSCSI target. The New iSCSI Target dialog window is displayed as shown in Figure 6.
4. Select the default **Auto-assign** option for Target IQN if you want the Oracle ZFS Storage Appliance to generate a target IQN, or select the second option to specify the Target IQN.
5. If more than one network interface is available, select the desired interface from the pull-down list of **Network interfaces** to better segregate iSCSI data traffic.
6. Click **OK** to save the settings for the new initiator group.

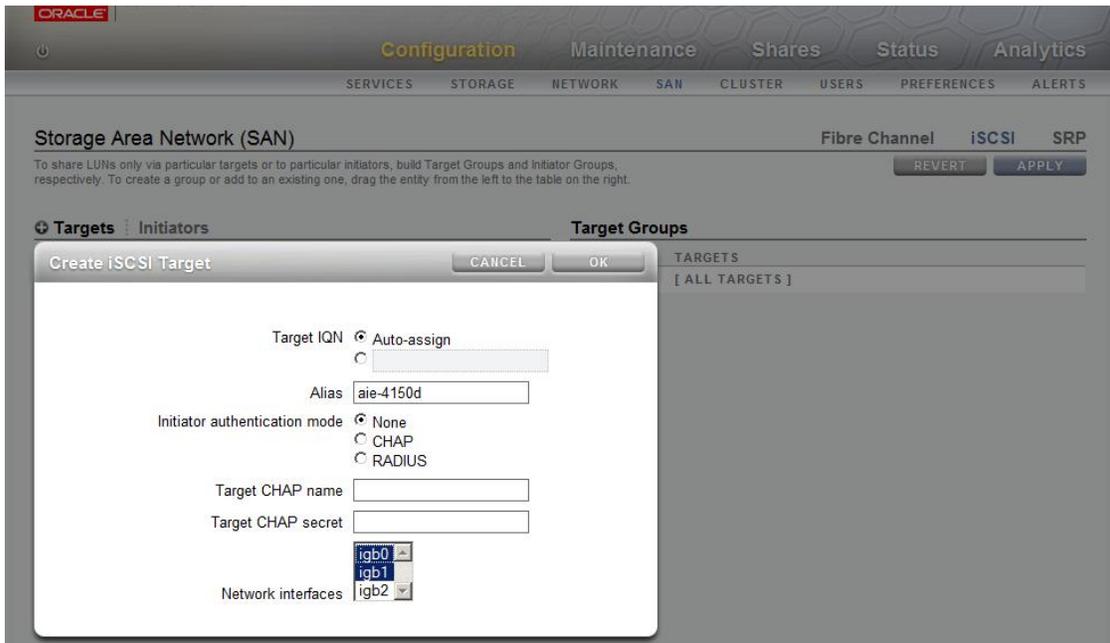


Figure 6. Setting properties for a new iSCSI target

7. Add the new target to a target group by dragging and dropping it to the bottom of the iSCSI Targets Groups list to create a new group as shown in Figure 7.

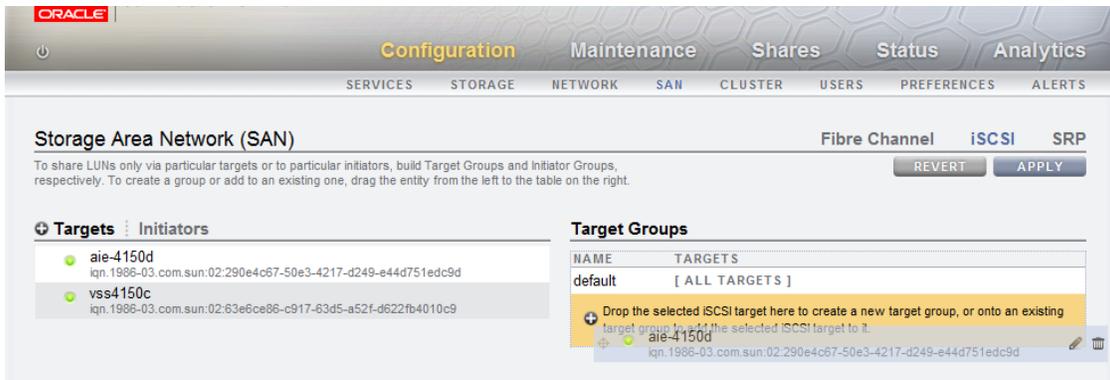


Figure 7. Adding the new iSCSI target to a new target group

8. Click the pencil icon at the right of the new target group to display the property dialog window for the target group as shown in Figure .
9. Enter a **Name** for the target group.
10. Use the checkboxes to assign targets to the group.
11. Click **OK** to save the settings for the new target group.
12. Click **APPLY** in the upper right of the Storage Area Network screen to apply the changes to the new target group.

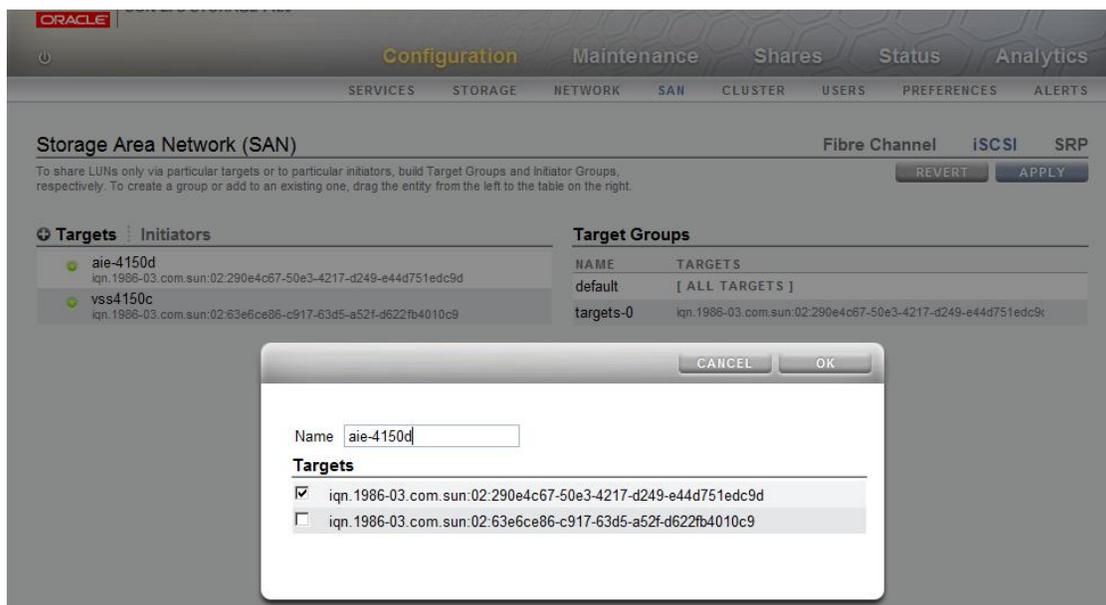


Figure 8. Specifying the name of the new target group and assigning the iSCSI target to the group

Creating a Project and Configuring an iSCSI LUN

Follow the steps in the example to configure an iSCSI LUN on the Oracle ZFS Storage Appliance in its BUI:

1. Select Shares. On the Shares tab, at the left side, click the ► icon to the left of **Projects** to view a list of projects.
2. Click the + icon next to ALL to add a new project.
3. Click the project to select it.
4. To the right of the project list, click **LUNs** and then click the + icon to add a new LUN.
5. In the Create LUN dialog, configure the iSCSI LUN to meet the requirements of the application as shown in Figure9.
6. Select the **Target group** over which this LUN is exported.
7. Select the **Initiator group** corresponding to the initiators that can access the LUN.
8. Specify an **LU Number** for the LUN or select **Auto-assign** to allow the Oracle ZFS Storage Appliance to generate an LU number.
9. Click **APPLY** to save changes.

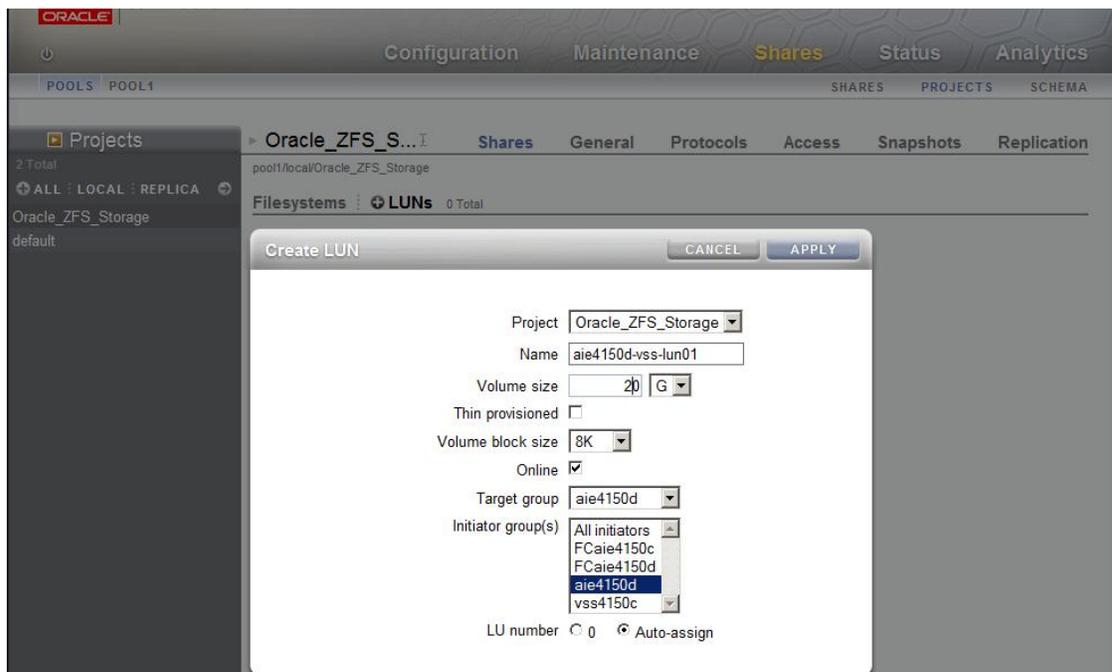


Figure 9. Creating and configuring an iSCSI LUN

Configuring the Microsoft Client iSCSI Initiator

To configure the Microsoft Client iSCSI Initiator, complete the following steps:

1. Start the iSCSI Initiator utility on the Windows client.
2. In the iSCSI Initiator Properties dialog window, select the Discovery tab. See figure 10.
3. In the Target portals section, click **Discover Portal**.
4. Enter the IP address or host name of the target portal of the Oracle ZFS Storage Appliance that will be providing the iSCSI LUN to the host.

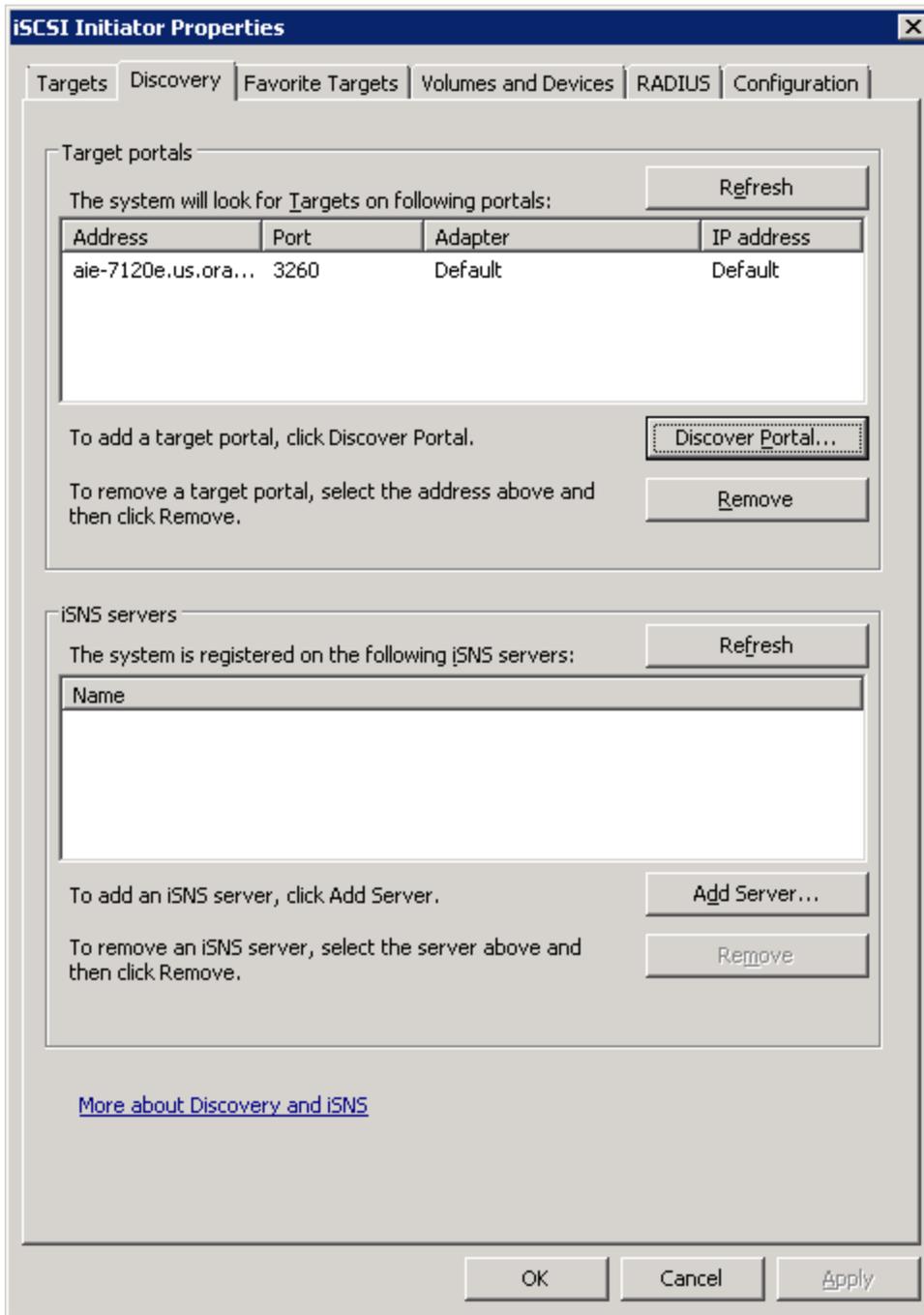


Figure 10. Specifying the target portal for the Oracle ZFS Storage Appliance

5. On the Targets tab, check that the new target is displayed, indicating it is visible to the Windows system as shown in Figure 11.
6. Select **Connect** to make the new iSCSI LUN(s) available to the Windows system.

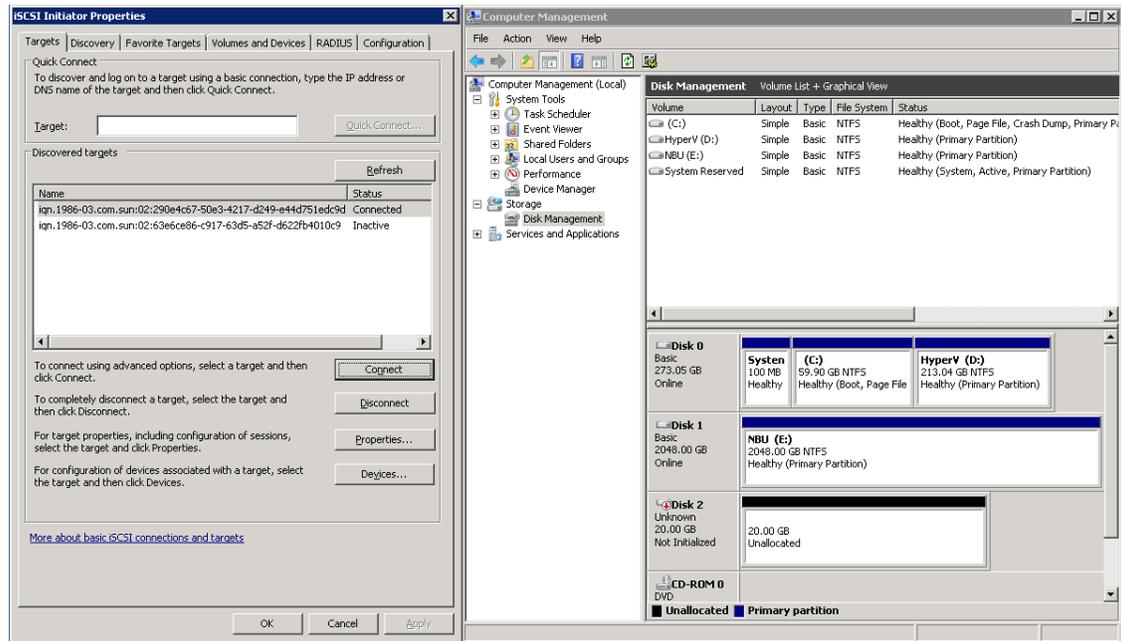


Figure 11. Making an Oracle ZFS Storage Appliance iSCSI LUN available to the Windows system

7. Follow standard Windows administration methods for creating and formatting a file system on the new LUN.

Note: In examples later in this paper, this LUN is shown mounted on the F:\ drive.

Configuring a Fibre Channel LUN

The process for configuring an FC LUN to support VSS hardware snapshot backups is similar to that for an iSCSI LUN. A few key differences are described in the topics “Target Configuration” and “Initiator Configuration” in the Oracle ZFS Storage Appliance documentation (see Appendix B: References) and in the online help for the Oracle ZFS Storage Appliance (which is accessible in its BUI).

Application Configuration

To install and configure an application on the new LUN, complete the procedures in this section that apply to your particular environment.

Configuring Basic Windows NTFS Volumes

To configure a basic Windows NTFS volume, configure the new drive for general-purpose storage or as storage for a shared folder.

Once the volume is configured for use by the Windows system, it is ready for use by the application. The VSS framework is capable of queuing all I/O operations to the file system for up to 10 seconds while a snapshot of the volume is created.

Configuring Microsoft Exchange

A Microsoft Exchange solution typically includes multiple LUNs to accommodate mail stores and transaction logs. The NetBackup Microsoft Exchange agent supports VSS hardware snapshots for protecting the environment at the information-store level, providing a complete and consistent backup solution for the Microsoft Exchange environment.

VSS snapshot methods do not support single mailbox backups or restores. Single mailbox backups and restores require the creation of an administrative service, user, and mailbox on the Exchange server and use of the Messaging Application Programming Interface (MAPI interface) to perform mailbox backups and restores.

For more information on the best practices for configuring the Oracle ZFS Storage Appliance for Microsoft environments, refer to the NAS Storage Documentation, White Papers and Solutions Briefs web page listed in Appendix B: References at the end of this document.

Configuring Microsoft SQL Server

A Microsoft SQL Server solution typically includes multiple LUNs to accommodate database and log files. The NetBackup Microsoft SQL Server agent supports the protection of database instances based on the LUNs where they reside. The NetBackup Database Extension client GUI also allows for more granular restores of individual databases or transaction logs.

For more information on the best practices to use for configuring the Oracle ZFS Storage Appliance for Microsoft SQL Server environments, refer to *Deploying a Microsoft SQL Server 2008 Database on the Sun ZFS Storage Appliance* (see Appendix B: References). Note that for use with VSS, the SQL Server database should be deployed on iSCSI or FC LUNs.

Backup Environment Setup

To support VSS hardware snapshots, a VSS hardware provider specific to the Oracle ZFS Storage Appliance must be provided for use by the NetBackup Snapshot Client. This section describes how to install the Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Service Software available from Oracle.

This section also includes an example procedure showing how to configure the NetBackup client policy on the NetBackup master server to enable VSS hardware snapshots and agents for the Windows client.

Installing the Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Services Software

To install the Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Services Software on a Microsoft Windows Server, complete these steps:

1. Download the Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Service Software from the My Oracle Support site. Go to [Oracle ZFS Storage Appliance Plugin Downloads](#).
2. Open the `readme.html` in the zip file and follow the instructions in Section 5, Installation and Verification. When the installation completes, the Oracle ZFSSA for VSS ConfigUtil icon appears on the desktop, as shown in Figure 2, and in the Windows Start Menu.



Figure 12. Oracle ZFSSA for VSS ConfigUtil icon

3. Double-click the Oracle ZFSSA for VSS ConfigUtil icon to launch the configuration utility for the Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Service Software. The configuration screen appears as shown in Figure 13.

The screenshot shows a Windows-style dialog box titled "Oracle ZFS Storage Appliance Provider For VSCSS". The main area is titled "Oracle ZFS Storage Appliance Server Interface Configuration" and contains three text input fields: "IP Address:", "Username:", and "Password:". To the right of these fields are two buttons: "Apply" and "Clear". Below the input fields is a section titled "Existing Interfaces:" which contains a table with two columns: "Server Address" and "Status". The table is currently empty. At the bottom of the dialog are four buttons: "Configure", "Delete", "OK", and "Cancel".

Server Address	Status
----------------	--------

Figure 13. Configuration screen for the Oracle ZFS Storage VSS hardware provider

4. In the **Address** field, type the IP address of the Oracle ZFS Storage Appliance target where the iSCSI or Fibre Channel LUNs are located.
5. Enter a **Username** and **Password** for a user of the Oracle ZFS Storage Appliance who has appropriate administrative privileges. These are described in *Section 6.2. Configuring a User on the Oracle ZFS Storage Appliance* in the `readme.html` file referenced in step 2.
6. Click the **Apply** button to log in to the Oracle ZFS Storage Appliance. The Status shows "Login succeeded" if this step completes properly, as shown in Figure 14.

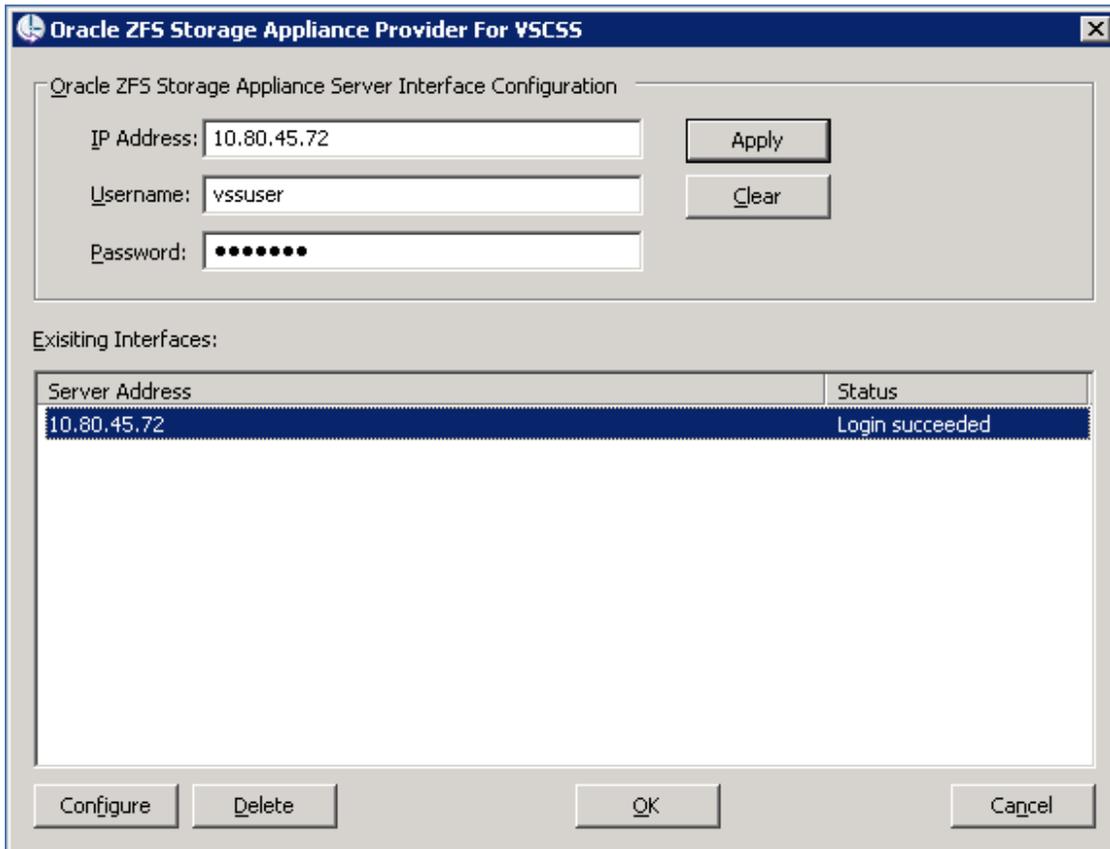


Figure 14. Status screen showing successful login

Note: For an active/active cluster, configure the IP addresses for both heads. If multiple Oracle ZFS Storage Appliance products are providing storage to a single host, the IP address for each Oracle ZFS Storage Appliance must be configured in order to support VSS hardware snapshots.

Installing the NetBackup Client with Operating System Patches

For the latest installation requirements for the NetBackup Client, refer to the NetBackup Enterprise Server Knowledge Base (see Appendix B: References).

Configuring a NetBackup Snapshot Client Policy

This section provides examples of how to configure a NetBackup Snapshot Client with and without agents. For more complete documentation, refer to the Learn tab on the Symantec NetBackup product page (select “Agents & Options”) and to the *Symantec NetBackup Snapshot Client Administrator’s Guide* (see Appendix B: References).

Important: The NetBackup Snapshot Client must be installed and configured on each Windows platform on which volumes are to be protected.

Configuring a Microsoft WindowsNT Client Policy for VSS Hardware Snapshots

To configure a basic NetBackup Snapshot Client policy to protect one or more NTFS volumes on a Windows client, complete these steps in the NetBackup Change Policy dialog window:

1. On the Attributes tab, check **Perform snapshot backups** to enable the Snapshot Client as shown in Figure 15.
2. Set appropriate options under **Snapshot Client**.

In Figure 15, the Snapshot Client option “Retain snapshots for instant recovery” has been selected. If you choose to retain snapshots for instant recovery, a snapshot will remain persistent and be automatically presented back to the client host as a read-only volume. This volume can be assigned a drive letter and its contents accessed for recovery operations.

If you enable the “Perform off-host backup” option, it is recommended that the alternate host be installed on a platform of the same type as the Snapshot Client that is running the same operating system version and version of NetBackup. For more information, refer to the *Symantec NetBackup Snapshot Client Administrator’s Guide* in Appendix B: References.

Figure 15 shows the setup for a backup of a client iSCSI LUN.

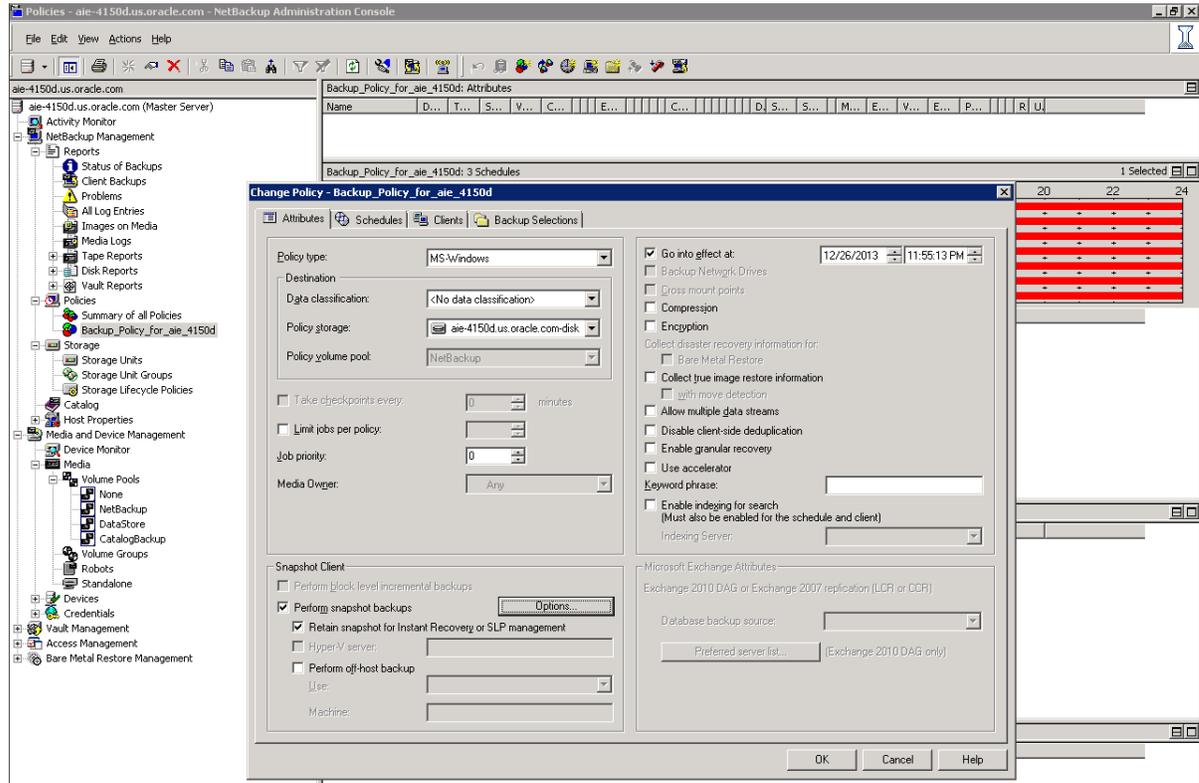


Figure 15. Specifying change policy attributes for an MS-Windows policy type

3. Click **Snapshot Client Options** to display the dialog window shown in Figure 16.
4. Set the Snapshot method to **VSS** and set the value of the configuration parameter Provider Type to **3** (hardware).

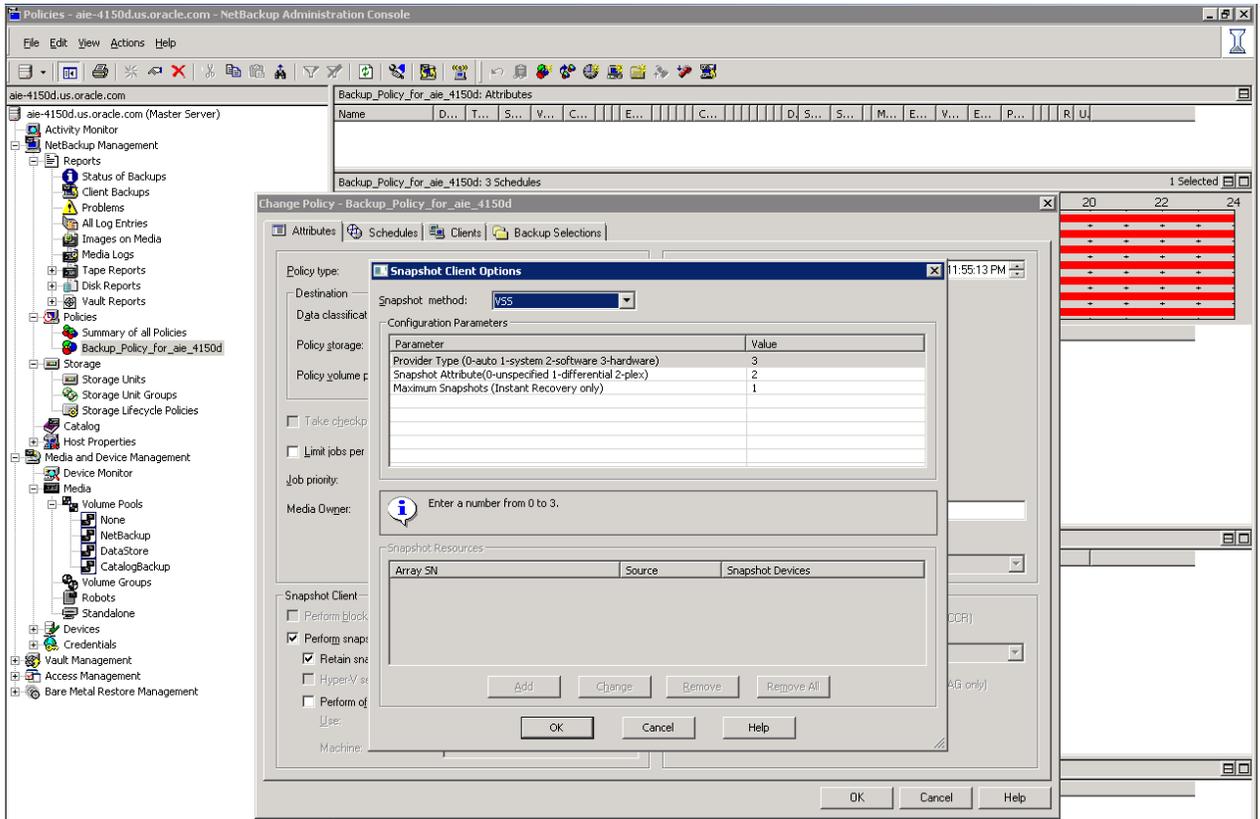


Figure 16. Setting the configuration parameter Provider Type to 3-hardware

- On the Select for Backup tab in the NetBackup for Windows GUI on the client, select the iSCSI LUN mounted on the F:\ drive, as shown in Figure 17, and initiate the backup by selecting Actions > Backup in the menu.

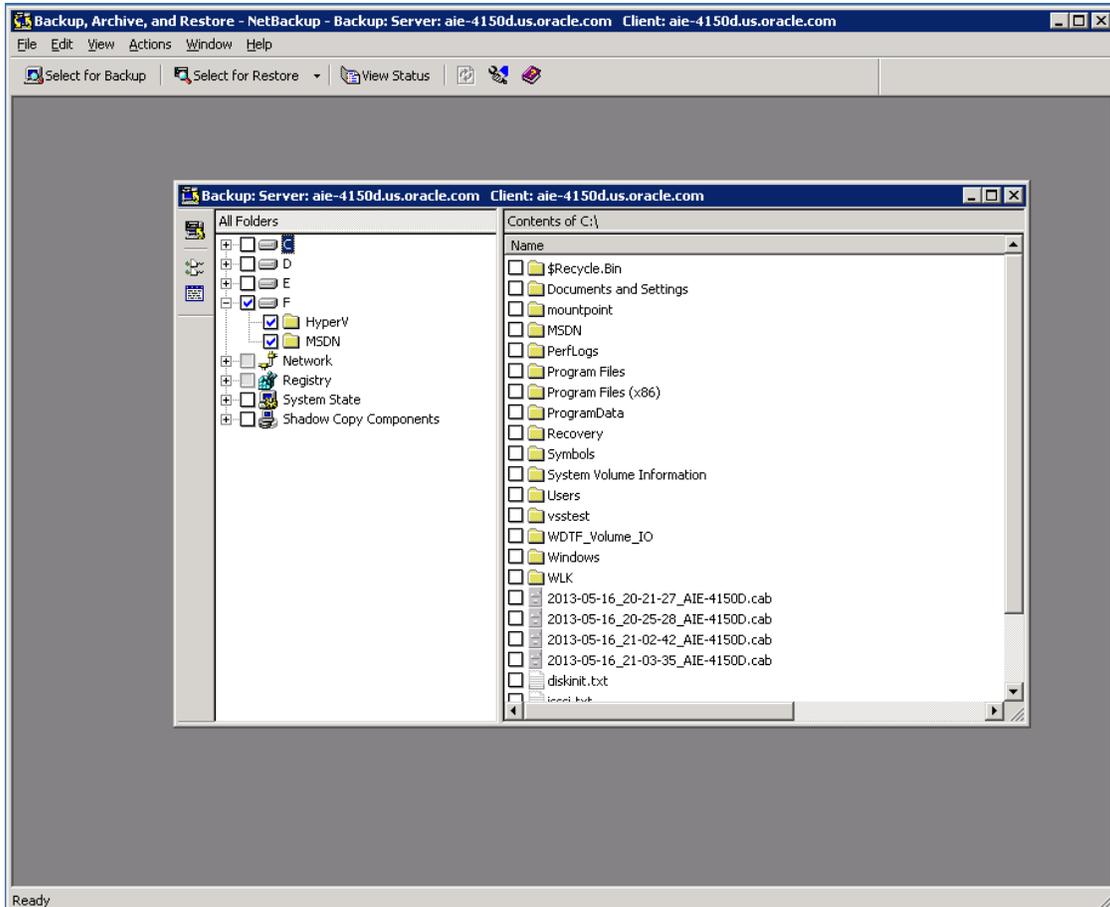


Figure 17. Selecting the iSCSI LUN for backup

- From the Oracle ZFS Storage Appliance BUI, select Shares > Projects and click the LUNs tab to see that a snapshot (clone) of the primary LUN has been created as shown in Figure 18. The snapshot is presented back to the Windows client as a LUN for use by NetBackup to perform backup operations.



Figure 18. Clone of the primary LUN displayed in the Oracle ZFS Storage Appliance

The snapshot is made available to the client or alternate host as a read-only volume ready for the backup operation. Depending on the NetBackup policy settings for this client, the snapshot may be:

Used temporarily for backup purposes and then destroyed when the backup is complete.

Persistent, remaining available to the host (or alternate host) for instant recovery.

Shared for backup by another host running NetBackup Snapshot Client software.

In Figure 19, Disk 2 is the LUN (F: drive) that was backed up. Disk 3 is the read-only snapshot of the LUN that has been made available to the client or to the alternate host.

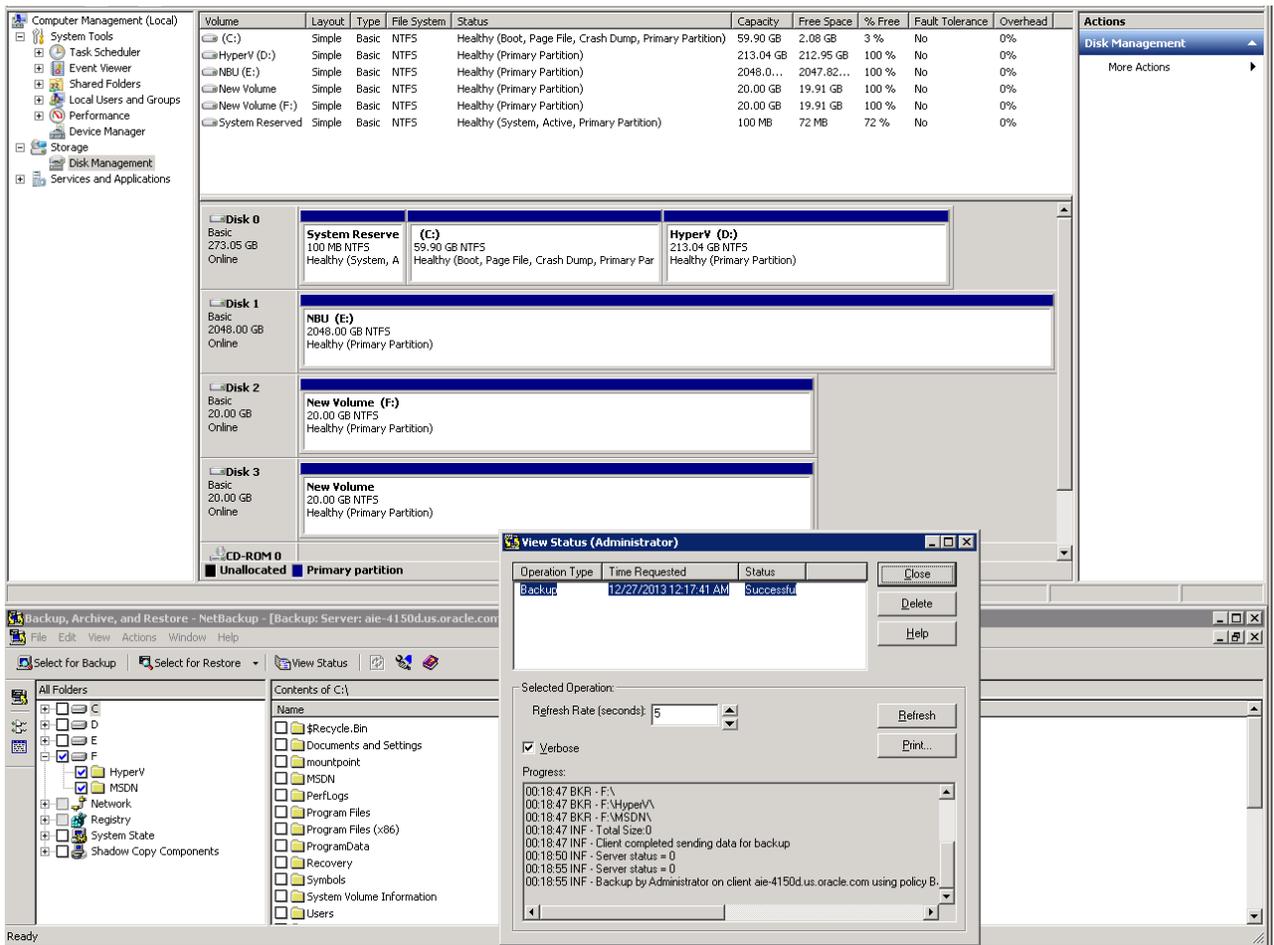


Figure 19. NetBackup for Windows GUI showing the snapshot is available to the SnapShot Client as a read-only volume (Disk 3)

Configuring a Microsoft SQL Server Client Policy for VSS Hardware Snapshots

On the Microsoft SQL Server client, NetBackup client properties are configured to enable connectivity to the database and define which instances are to be protected as shown in this example:

1. Configure the NetBackup client agent for Microsoft SQL Server on the client by selecting Start > All Programs > Symantec NetBackup > NetBackup Agents > NetBackup MS SQL Client.
2. From the File menu, select **Set SQL Server connection properties** as shown in Figure 20.
3. In the dialog window that is displayed, enter the login credentials for the database instance to be protected.

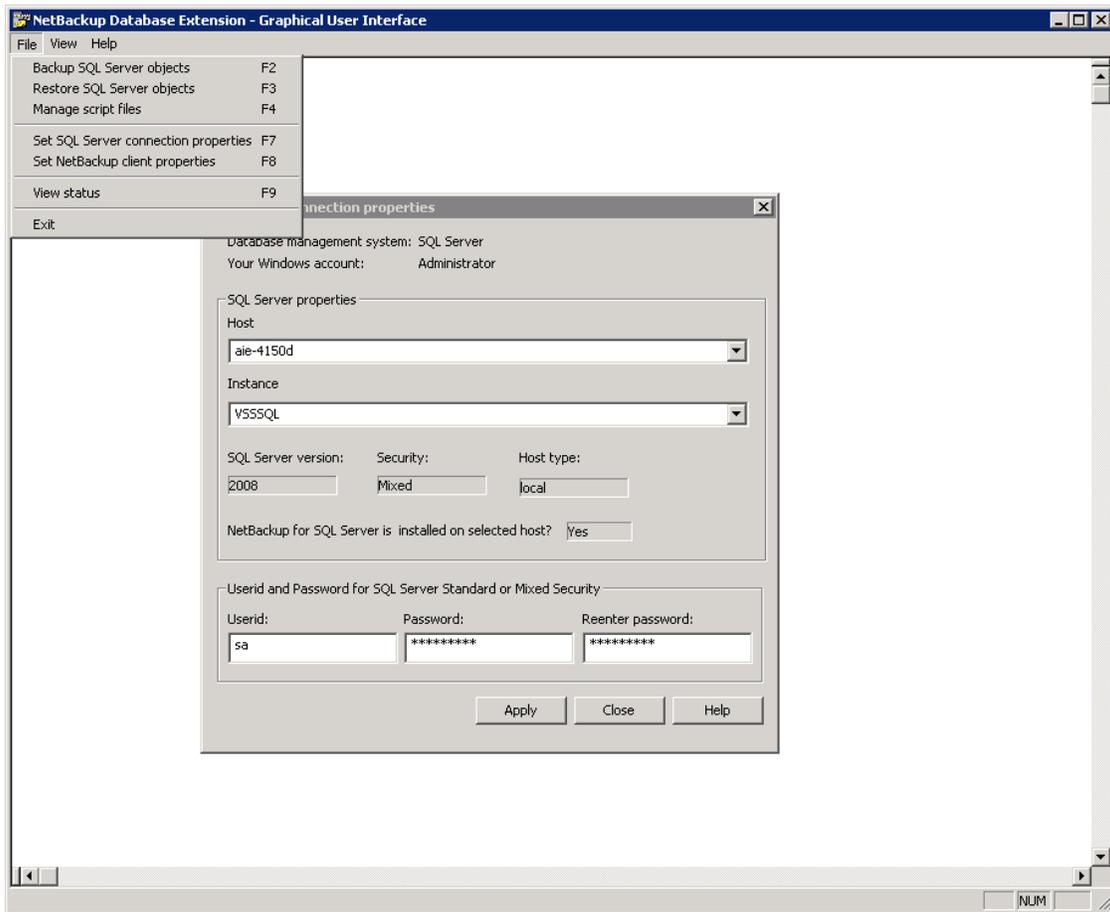


Figure 20. Specifying login credentials for the database instance to be protected

4. On the NetBackup Master server, configure the NetBackup client policy for the Microsoft SQL Server client by going to NetBackup Management > Policies. Then right click on the policy and select **Change**.
5. In the Change Policy dialog that is displayed, set the Policy type to **MS-SQL-Server** as shown in Figure 21.
6. Under Snapshot Client, specify the appropriate options.
7. Click **Snapshot Client Options**. In the dialog that is displayed, set the Snapshot method to **VSS** and set the value of the configuration parameter Provider Type to **3** (hardware).

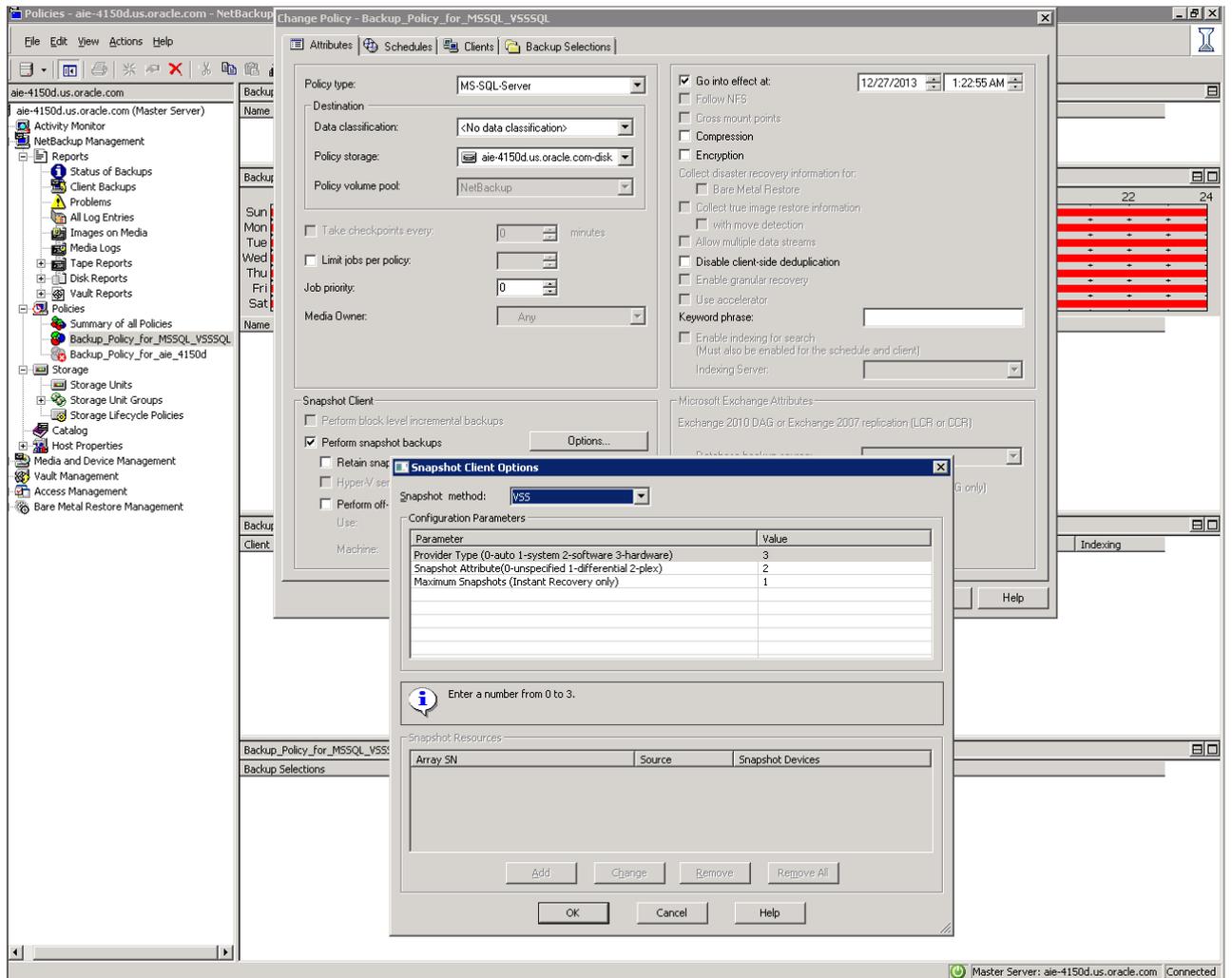


Figure 21. Specifying change policy attributes for a Microsoft SQL Server policy type

8. Select the **Schedules** tab and configure backup schedules for the client.
9. Select the **Backup Selections** tab and select the client paths to the database files and log files as shown in Figure 22.

A gear symbol to the left of a path indicates that an agent script will be run to call the application's VSS writer to ensure proper handling of the application during the snapshot and backup process.

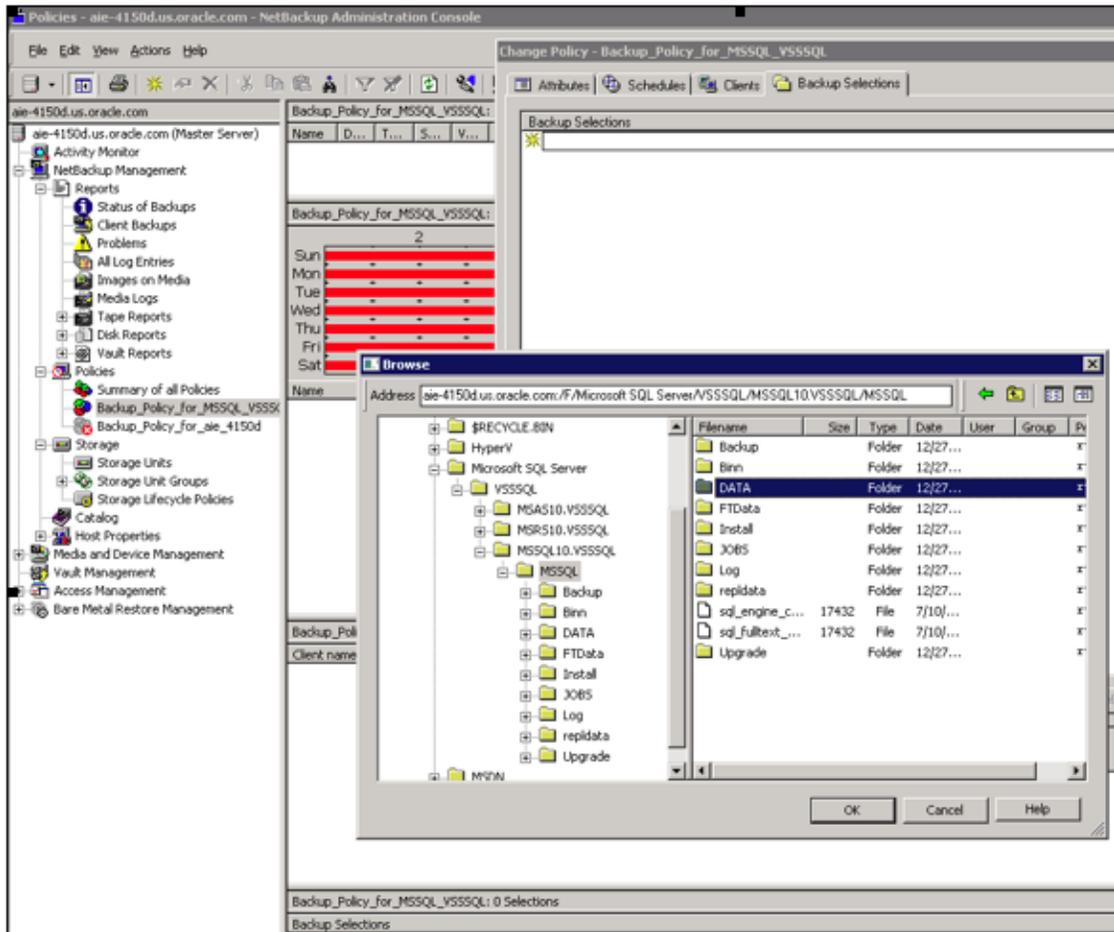


Figure 22. Selecting databases and logs to back up

10. From the NetBackup client agent GUI, execute a backup of the Microsoft SQL server database. In the window displayed at the right in Figure 23, select Actions > Backup from the menu.

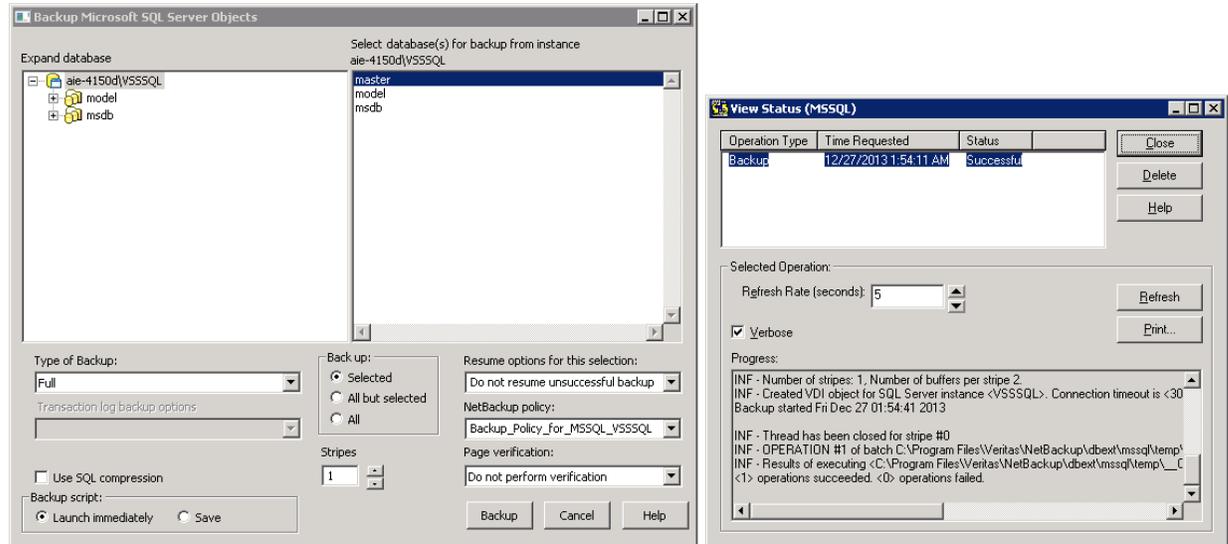


Figure 23. Executing a backup of a SQL Server database

After a successful backup, the snapshot volumes for the database and logs are available to the client system as read-only volumes for instant recovery operations, if needed. These read-only volumes can be made available for sharing to other NetBackup clients as well as to other SQL servers by configuring initiator groups appropriately on the Oracle ZFS Storage Appliance.

To make a read-only snapshot volume available to another NetBackup client:

1. Create an initiator on the Oracle ZFS Storage Appliance that maps to the alternate NetBackup client.
2. Add this initiator to the same initiator group as the primary client.

Now both hosts in the initiator group can see the same LUNs on the Oracle ZFS Storage Appliance.

Configuring a Microsoft Exchange Server Client Policy for VSS Hardware Snapshots

The following steps create a snapshot policy recognized between the NetBackup client and the Microsoft Exchange Server.

1. On the NetBackup master server, configure the NetBackup client policy for the Microsoft Exchange Server client by going to NetBackup Management > Policies.
2. In the Change Policy dialog window that is displayed, set the Policy type to **MS-Exchange-Server**.

3. Click **Snapshot Client Options**. In the dialog window, set the Snapshot method to **VSS** and the value of configuration parameter Provider Type to **3** (hardware) as shown in the following figure.

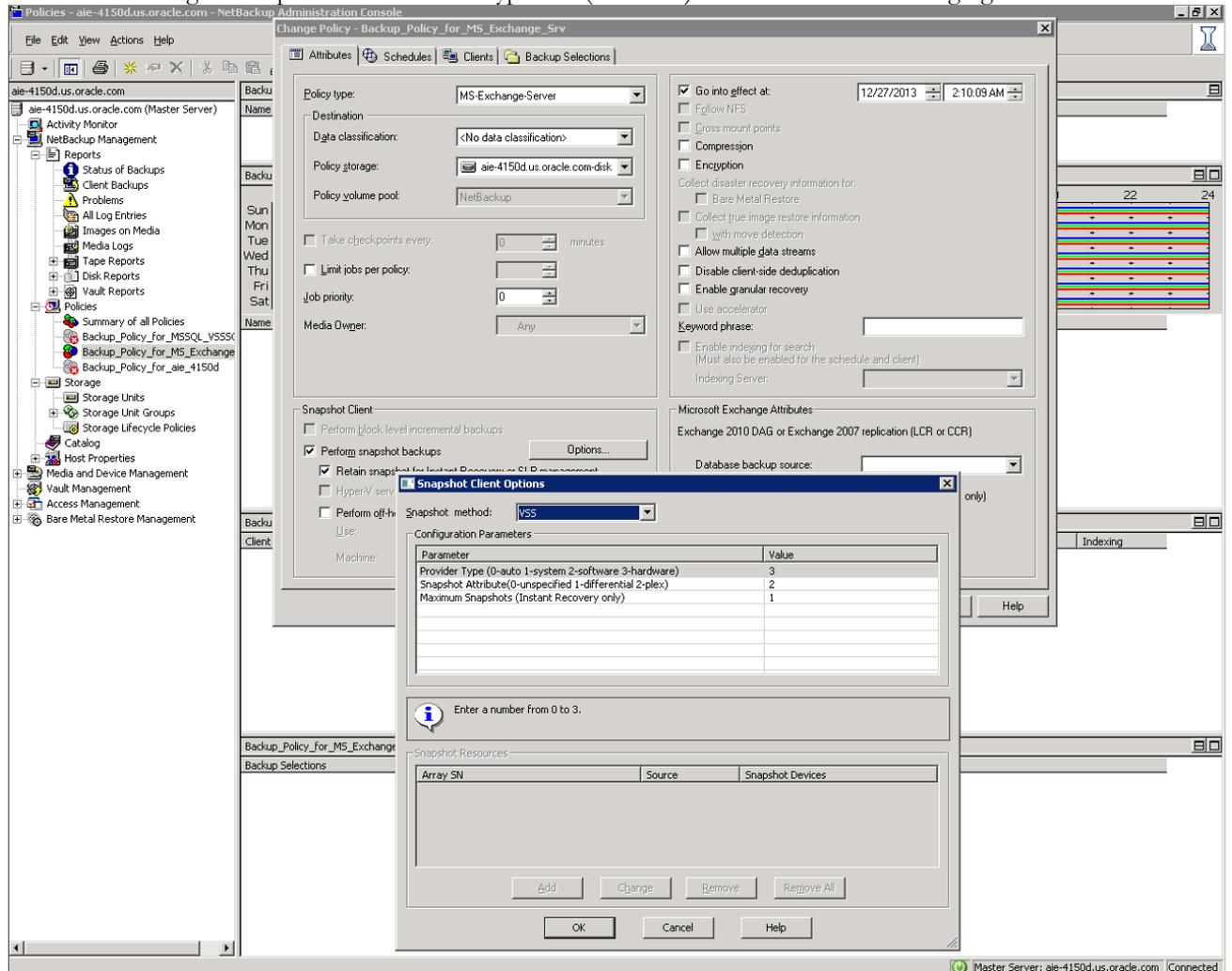


Figure 24. Specifying change policy attributes for a Microsoft Exchange Server policy type

- In the Change Policy window, select the **Schedules** tab and configure client backup schedules.
- Next in the Change Policy window, select the **Backup Selections** tab. Then select the Microsoft Exchange entry and click the pointing finger icon to the right of the entry to display the Select Directive dialog window.
- In the Select Directive dialog, set the Directive Set to **MS_Exchange_Database** and the Directive to **Microsoft Information Store:** as shown in Figure 25.
- Click **OK** to close the Select Directive dialog. This will cause all mail database files on the Exchange client server to be backed up along with corresponding logs.
- Click **OK** on the Backup Selections tab to confirm the settings.

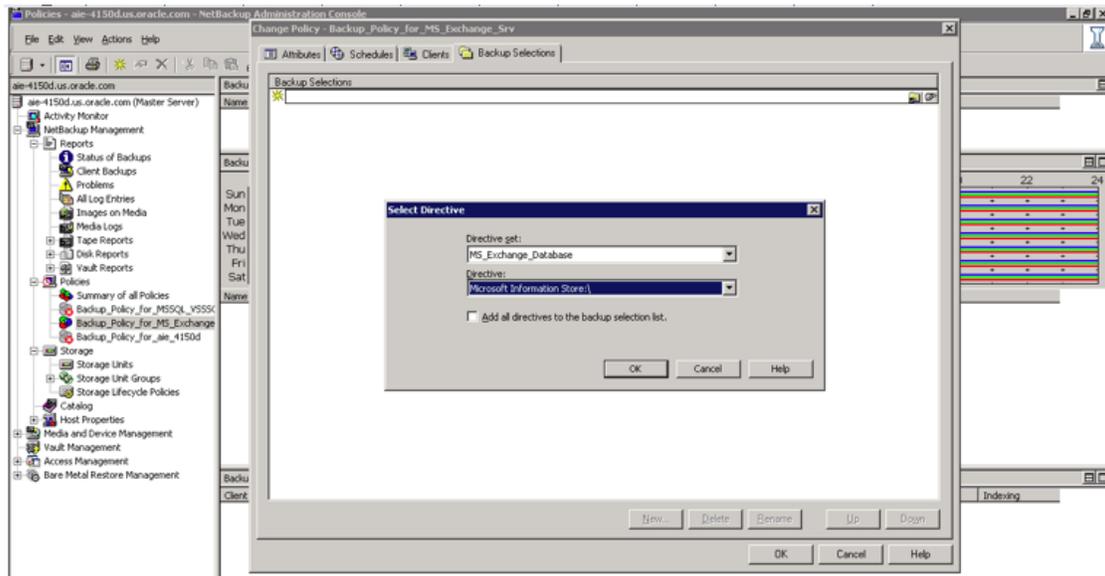


Figure 25. Selecting a directive set for Microsoft Exchange Server

Note: The NetBackup VSS snapshot method does not support single mailbox restores. Single mailbox restores are performed using a MAPI method that is configured as a separate policy for the Exchange server on the NetBackup master. For more information, see the section "Configuring NetBackup for backups and restores of individual mailboxes and public folders" in the *Veritas NetBackup™ for Microsoft Exchange Server Administrator's Guide* (see Appendix B: References).

Conclusion

The Oracle ZFS Storage Appliance Provider for Volume Shadow Copy Service, a VSS hardware provider, enables NetBackup to create and manage hardware snapshots in the Oracle ZFS Storage Appliance. Hardware snapshots provide improved backup performance and minimize recovery time for mission-critical data.

Appendix A: Verifying That a Backup Was Made of a Volume on a Client

To verify that a backup of a volume was successfully made by NetBackup on the Snapshot Client, complete the following steps:

1. On the Snapshot Client, open the Windows Server Manager and select **Storage > Disk Management** in the left-side navigation tree. The snapshot version of the LUN is listed with the same volume name as the LUN but without an assigned drive (see Figure 26).
2. Right-click the entry for the snapshot LUN and select **Properties** from the menu that is displayed.
3. In the Properties screen, select the **Shadow Copies** tab. The volume ID for the LUN is displayed. You can use this volume ID to identify the client backup job in NetBackup server log reports.

Note: This volume is not eligible for shadow copies because Windows does not allow shadow copies to be made of shadow copies.

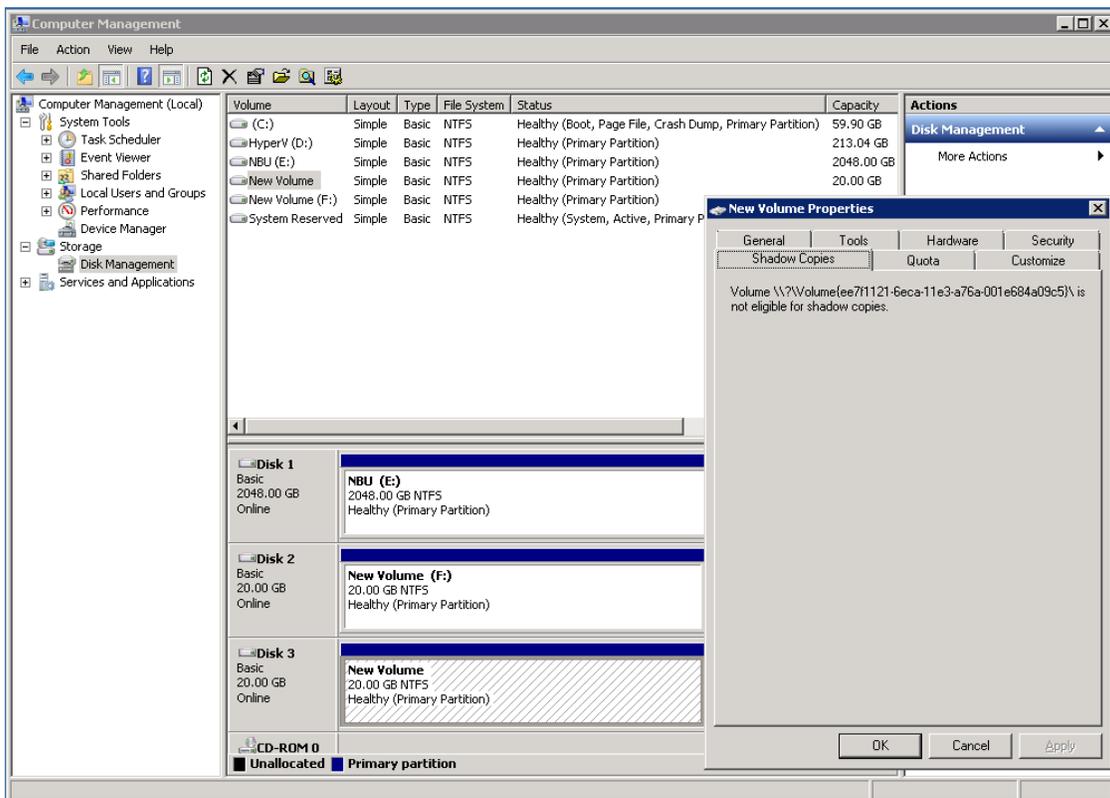


Figure 26. Displaying properties for the snapshot version of the LUN

Another way to obtain the volume ID for the snapshot shadow copy volume is to open the Windows iSCSI initiator utility on the Snapshot Client and select the **Volumes and Devices** tab.

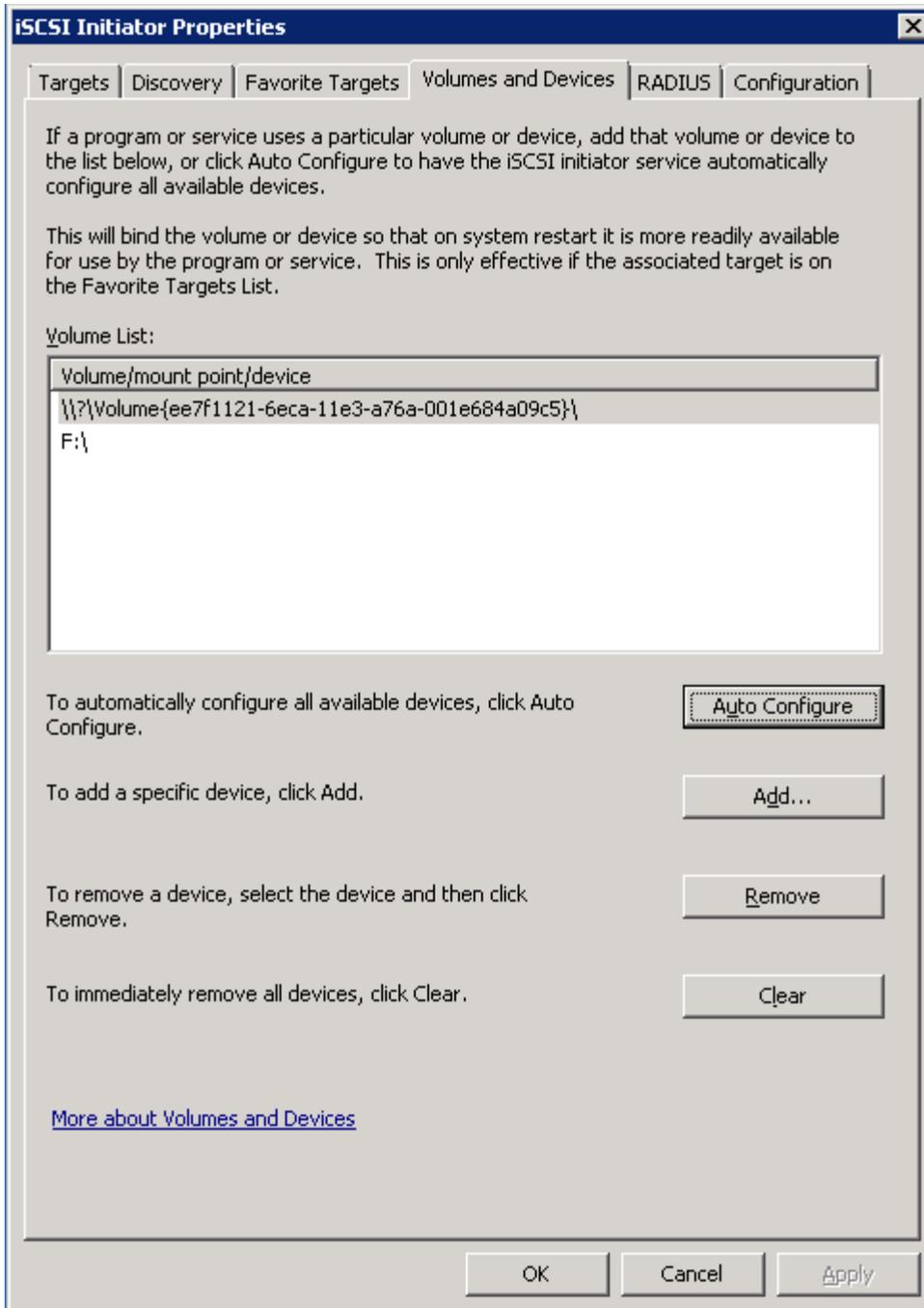


Figure 27. Viewing the snapshot shadow copy volume in the Windows iSCSI initiator utility on the Snapshot Client

To access a NetBackup report on client jobs completed, complete these steps in the NetBackup Administration Console on the NetBackup master server:

1. Select **NetBackup Management > Reports** and select a report to view. In Figure 28, the All Log Entries report is displayed. Other log reports, such as the Client Backups report, can also yield useful information.
2. Locate the job ID corresponding to the snapshot client.
3. Verify that a “BACKUP” was made from the snapshot on the client.

If an off-host backup was configured, you can check the NetBackup server log to validate that alternate hosts processing was completed correctly.

The screenshot shows the NetBackup Administration Console interface. The left sidebar displays a tree view of the console's structure, with 'Reports' expanded and 'All Log Entries' selected. The main window displays the 'Report Settings' for the 'All Log Entries' report, with the date range set to 12/26/2013 to 12/27/2013. Below the settings is a table of log entries for the client 'aie-4150d.us.oracle.com' from 12/26/2013 2:19:33 AM to 12/27/2013 1:41:34 AM.

Time	Media Server	Client	Sev...	Job ID	Type	Description
1:06:00 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:06:00 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:06:00 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:06:03 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	52	Media Device	initial volume E:\; Kbytes total capacity: 2147480572, u...
1:06:03 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	52	Media Device	Removed 52 Kbytes
1:06:03 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	52	Media Device	ending volume E:\; Kbytes total capacity: 2147480572, ...
1:07:00 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	running session_start_notify
1:07:00 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	started backup job (jobid=54) for client aie-4150d.us.o...
1:07:01 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	54	Backup	started backup job for client aie-4150d.us.oracle.com, ...
1:07:11 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	clearing media D6(s)
1:07:30 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	started backup job (jobid=55) for client aie-4150d.us.o...
1:07:30 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	55	Backup	started backup job for client aie-4150d.us.oracle.com, ...
1:07:30 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	55	Backup	client aie-4150d.us.oracle.com handling path START1 pl...
1:07:30 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	55	Backup	client aie-4150d.us.oracle.com handling path BACKUP F...
1:07:36 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	55	Media Device	begin writing backup id aie-4150d.us.oracle.com_13881...
1:07:57 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	55	Backup	successfully wrote backup id aie-4150d.us.oracle.com...
1:07:57 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	55	Backup Status	the requested operation was successfully completed
1:08:02 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	54	Backup Status	the requested operation was successfully completed
1:08:02 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	running session_notify
1:11:27 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:11:29 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	56	Media Device	initial volume E:\; Kbytes total capacity: 2147480572, u...
1:11:29 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	56	Media Device	Removed 24 Kbytes
1:11:29 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	56	Media Device	ending volume E:\; Kbytes total capacity: 2147480572, ...
1:11:47 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:17:12 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	cleaning media D6(s)
1:27:12 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	cleaning media D6(s)
1:36:41 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	running session_start_notify
1:36:41 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	started backup job (jobid=62) for client aie-4150d.us.o...
1:36:42 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	62	Backup	started backup job for client aie-4150d.us.oracle.com, ...
1:36:42 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	62	Backup	client aie-4150d.us.oracle.com handling path /aie-4150...
1:36:48 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	62	Media Device	begin writing backup id aie-4150d.us.oracle.com_13881...
1:36:48 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	62	Backup	successfully wrote backup id aie-4150d.us.oracle.com...
1:36:51 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	62	Backup Status	the requested operation was successfully completed
1:36:51 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	running session_notify
1:37:13 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	cleaning media D6(s)
1:37:14 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:37:57 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	running session_start_notify
1:37:57 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	started backup job (jobid=64) for client aie-4150d.us.o...
1:37:57 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	64	Backup	started backup job for client aie-4150d.us.oracle.com, ...
1:37:57 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	64	Backup	client aie-4150d.us.oracle.com handling path /aie-4150...
1:38:02 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	64	Media Device	begin writing backup id aie-4150d.us.oracle.com_13881...
1:38:03 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	64	Backup	successfully wrote backup id aie-4150d.us.oracle.com...
1:38:07 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	64	Backup Status	the requested operation was successfully completed
1:38:07 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	running session_notify
1:41:32 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:41:32 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:41:32 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	0	General	successfully modified backupid aie-4150d.us.oracle.com...
1:41:34 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	65	Media Device	initial volume E:\; Kbytes total capacity: 2147480572, u...
1:41:34 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	65	Media Device	Removed 598404 Kbytes
1:41:34 AM	aie-4150d.us.o...	aie-4150d.us.o...	Info	65	Media Device	ending volume E:\; Kbytes total capacity: 2147480572, u...

Figure 28. Verifying that a backup was made of the snapshot on the client

Appendix B: References

For more information about installing and troubleshooting the Oracle ZFS Storage Appliance VSS hardware provider, see the `readme.html` file included with the software.

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 Website

<http://www.oracle.com/us/products/servers-storage/storage/nas/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>

"How Volume Shadow Copy Service Works" (Microsoft TechNet article)

[http://technet.microsoft.com/en-us/library/cc785914\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc785914(WS.10).aspx)

Symantec NetBackup product page

<http://www.symantec.com/netbackup>

Symantec NetBackup Server Knowledge Base

<http://www.symantec.com/business/support/index?page=landing&key=15143>

Symantec NetBackup Snapshot Client Administrator's Guide (Symantec product documentation)

<http://www.symantec.com/business/support/index?page=content&id=DOC3661>

Veritas NetBackup for Microsoft Exchange Server Solutions Guide (Symantec white paper)

http://www.symantec.com/connect/sites/default/files/b-whitepaper_netbackup_for_ms_exchange_server_02-2009_20016957.en-us.pdf

Veritas NetBackup™ for Microsoft Exchange Server Administrator's Guide

<http://www.symantec.com/business/support/index?page=content&id=TECH52811>

Oracle ZFS Storage Appliance Downloads

<http://www.oracle.com/technetwork/server-storage/sun-unified-storage/downloads/unified-storage-download-165520.html>

Oracle University

<http://education.oracle.com>

My Oracle Support

<https://support.oracle.com>



Using Symantec NetBackup with VSS Snapshot
to Perform a Backup of SAN LUNs in the Oracle
ZFS Storage Appliance
March 2014, Version 1.1
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