Oracle Usage Guide for the Sun StorEdge™ N8600 Filer

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Contents

Preface

This book is intended for system administrators and Oracle database administrators who want to use the Sun StorEdge ™ N8600 Filer to store Oracle8 database files.

You should know how to use the operating system of the machine(s) on which you are working and, if you are a database administrator, should know how to use Oracle8. Although you may use any operating system for the Oracle administrative host, configuration instructions in this document use UNIX® to provide examples. The N8600 filer ships with the Solaris™ 8 operating environment.

How This Book Is Organized

Chapter 1 provides an overview of the filer with Oracle8.

Chapter 2 explains initial setup considerations and best practices.

Chapter 3 covers configuring the filer and Oracle.

Chapter 4 provides a conclusion and bibliography.

Using UNIX Commands

This document may not contain information on basic UNIX commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ Operating Environment
- Other software documentation that you received with your system

Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your .login file. Use ls -a to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% **su** Password:
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type rm *filename*.

Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

Application	Title	Part Number
Sun Enterprise™ 4500 Server	*Sun Enterprise 6500/5500/4500 Systems Installation Guide*	805-2631-10
Sun StorEdge T3 Disk Tray	*Sun StorEdge T3 Disk Tray Installation, Operations, and Service Manual*	806-1062-10
Sun StorEdge N8000 Administration Tool	*Sun StorEdge N8000 Filer Series Administrator's Guide*	806-6905-10
Sun StorEdge N8600 Filer	*Sun StorEdge N8600 Filer Installation, Configuration, and Service Guide*	806-6889-10

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Overview

About the Filer and the Testing

This book explains how the Sun StorEdge N8600 Filer was tested for compatibility with Oracle8 and how you can use the filer with Oracle. Testers used Oracle 8.0.5 and the Solaris 8 operating environment for the testing.

This chapter covers the following items:

- "Product Overview" on page 2
- "Oracle and the Filer" on page 2
- "Terminology" on page 4

Product Overview

A network attached storage (NAS) device is an appliance that supplies disk storage to users over a network. Moving storage from the user's desktop to the network maximizes data availability and security. The Sun StorEdge N8600 Filer is an NAS that consists of a controller and one or more disk storage systems.

The filer contains features that are designed to minimize down time, including:

■ Mirrored system disks in the controller

■ Hardware redundant array of independent disks (RAID)-5 storage system

■ Redundant power supplies in both the controller and disk storage units

Access to the filer's disk storage is through the following industry standard file access protocols:

■ NFS file system

■ Common Internet File System (CIFS)

The filer includes a web-based administration tool that provides an easy-to-use graphical user interface (GUI).

Oracle and the Filer

As the amount of data you need to store increases rapidly, you need a storage system that can expand with your data. Adding capacity to traditional storage systems means increased management complexity and expense.

The Sun StorEdgeN8600 Filer, on the other hand, meets the special challenges of rapidly expanding databases. The filer is pre-configured to support specific file-serving needs with simplified administration requirements.

The major benefit of filers is that they relieve expensive general purpose servers of many of their file management operations. Filers free the CPUs of general purpose servers for other tasks. FIGURE 1-1 illustrates how a filer interacts with Oracle on a network.
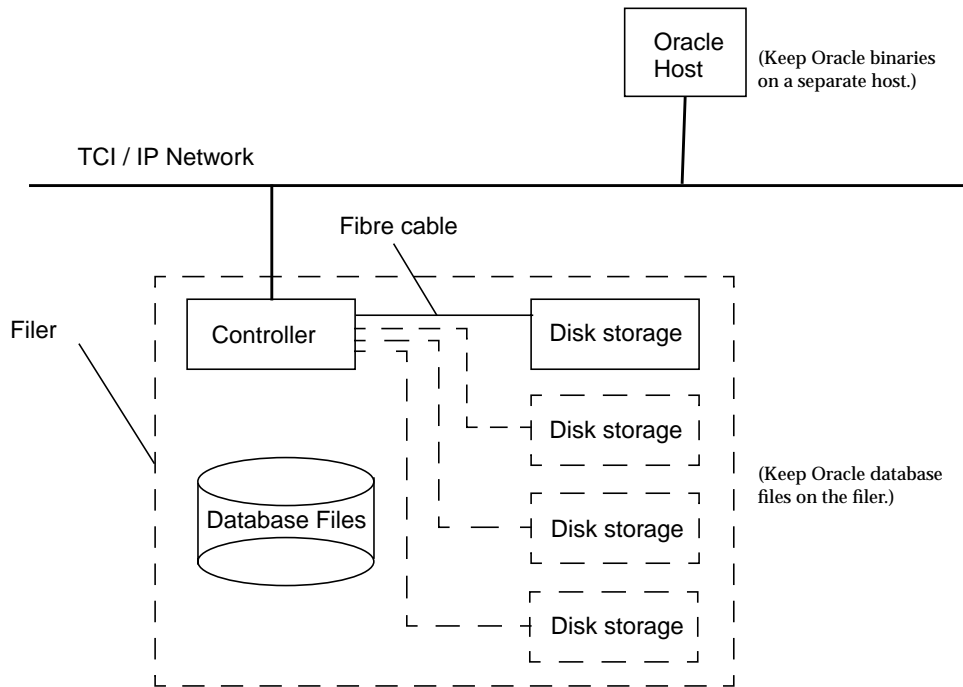
FIGURE 1-1 Typical Sun StorEdge N8600 Filer and Oracle Network Configuration

The filer contains the Oracle database files. The Oracle administrative host stores the Oracle binaries and server application. Although the filer supports the Microsoft Windows and Linux operating systems, testing has verified use with the Solaris operating environment only.

You can expand the filer storage capacity in 1-Tbyte (terrabyte) increments to a maximum of 10 Tbytes by adding disk storage units. Contact your local Sun sales representative for more information.

Terminology

CIFS Common Internet File System. Enhanced version of the SMB file sharing protocol for the Internet that allows Web applications to share data over the Internet and intranets; similar to WebNFS.

Double failures A double failure occurs when the filer is turned off and then on (rebooted) while it is contacting clients and then turned it off and then turned on again. Certification testing verifies data integrity remains when there is a double failure.

File locks File locks ensure data consistency and integrity. A session can not modify files to which data is being written by another session.

Filer / filer server A filer is an NAS device that has been designed solely to serve up files to the network. It consolidates storage, simplifies the management of network data, and provides consistent improved performance and increased data availability while reducing administrative complexity and operating costs. Filers are attached directly to a network to provide file-level access to data.

A file server has a single focus, to serve up data to the network. An application server's focus is to run user applications.

Hard-mount / soft-mount A hard mount enables Oracle to continue contacting the filer until connection is re-established when there is a failure on the filer side and the filer is hard-mounted on the Oracle server. When the filer is soft mounted on the Oracle server, Oracle stops contacting the filer as soon as the filer fails. The default setting is to hard mount.

Latency Latency is an expression of how much time it takes for a packet of data to get from one designated point to another on a network.

Network-attached storage (NAS) Network-attached storage is a concept of shared storage on a network. A NAS device is typically a dedicated, high-performance, high-speed communicating, single-purpose server or device.

NFS A Network File System is a client/server application that allows a computer user to view and optionally store and update files on a remote computer as though they were on the user's own computer. NFS was developed by Sun Microsystems and has been designated a file server standard. Most UNIX clients use NFS for remote file access.

Initial Setup and Special Considerations

This chapter covers system requirements, installation and special considerations you must make when you set up your Sun StorEdge N8600 Filer and Oracle administrative host.

This section covers the following topics:

- "The Filer Setup" on page 6
- "Oracle Administrative Host Setup" on page 7
- "Best Practices for Oracle and the Filer" on page 8

The Filer Setup

This section covers the following topics:

- "Filer System Specifications" on page 6
- "Installing the Filer" on page 6

Filer System Specifications

The filer uses the following minimum system specifications when running with Oracle. The filer runs with any version of Oracle8. In this document, Oracle 8.0.5 is assumed.

TABLE 2-1   Minimum Filer System Specifications

Requirement	Description
System	Sun StorEdge N8600 Filer
Storage	1 Tbyte expandable to 10 Tbyte, depending on database needs
Memory	8 Gbyte
CPU	Two units with 450 MHz each
Operating Environment	Solaris 8 operating environment

Installing the Filer

To install the filer, see the following documentation for details.

- *Sun StorEdge T3 Disk Tray Installation, Operations, and Service Manual*
- *Sun Enterprise 4500 Server Owner's Guide*
- *Sun StorEdge N8000 Filer Series Administrator's Guide*
- *Sun StorEdge N8600 Filer Installation, Configuration, and Service Guide*

Although you must install the Oracle administrative host software on a machine other than the filer, the filer stores the database files. For more information, see the illustration "Typical Sun StorEdge N8600 Filer and Oracle Network Configuration" on page 3.

Oracle Administrative Host Setup

This section covers the following topics:

- "Oracle Host System Requirements" on page 7
- "Installing Oracle" on page 7

Oracle Host System Requirements

You must have an Oracle server machine running a supported operating system and NFS or CIFS client software. For specific requirements, refer to your third-party documentation.

The following specifications were used in Sun's testing of Oracle. For more information, see the *Oracle Storage Compatibility Program Test Suite for the Sun StorEdge™ N8600 Filer.*

TABLE 2-2   Test System Specifications for the Oracle Administrative Host

Specification	Description
System	Sun Ultra SPARC™ II 60
Hard Disk	2 Gbyte
Memory	512 Mbyte
CPU	Two units with 450 MHz
Operating Environment	Solaris 6

Installing Oracle

Although the filer stores the database files, you must install the binary files for the Oracle administrative server on a machine other than the filer. For more information, see the illustration "Typical Sun StorEdge N8600 Filer and Oracle Network Configuration" on page 3. Refer to your Oracle documentation for details on installation.

Best Practices for Oracle and the Filer

As you install and configure the filer to work with an Oracle administrative host, you must make several considerations on how to optimize your system. This section covers several issues a database administrator should consider when using Oracle with the filer. The topics in this section include:

- "Storage Architecture of the Filer" on page 8
- "Database Administration Issues and Solutions" on page 9
- "Network Configurations" on page 11

Storage Architecture of the Filer

The Sun StorEdgeN8600 Filer system ships with one 1 TByte pair and can be expanded in 1 Tbyte increments to a maximum of 10 Tbytes. This is done by adding Sun StorEdge T3 Disk Tray partner groups for a maximum of twenty individual disk trays (ten pairs).

Each array has nine storage disks, which provide 73 Gbyte of storage capacity each. The nine disks are configured "7 + 1 + 1"; seven are intended to store user data, one is a parity disk, and one is a hot spare used to replace a disk in the array that fails. The hot spare enables your database to survive two disk failures and still maintain data integrity. However, if you do not address the two failures, a third failure results in lost data. The filer has an E-mail notification feature to let you know of disk failures.

You can use different arrays for various database operations, according to their input and output requirements. Each array represents one input and output unit for an Oracle database. The arrays have hardware RAID 5 LUNs. Because the arrays use RAID 5, parity and data is striped across the storage disks within an array. As a result, there is almost no input and output contention for data stored on the filer.

If your Oracle database is particularly large, you can use two or more arrays in the filer to store user data while you use other arrays to store indexes and other data that causes high fragmentation. Distributing your data over several arrays enables the filer to read large amounts of data very quickly, and it also resolves input and output contention issues.

Database Administration Issues and Solutions

Database administrators face special issues when they manage very large databases. The filer offers solutions for the following:

- Database protection against various failure scenarios
- Recovery time
- Input/output contention
- Database performance
- Heterogeneous environments
- Scalability and downtime
- Database security
- Volume management

Data Protection Against Failure

A mirrored bootdisk provides data protection by helpint to ensure that the system's storage will not be brought down in the event of a bootdisk failure. There are different ways to recover your database from a valid backup.

Recovery Time

With the Sun StorEdgeN8600 Filer, you can increase storage capabilities with 1 Tbyte pairs, expandable from 1 Tbyte to 10 Tbyte capacity for each filer. The hardware offers RAID 5, which frees the CPU from having to make parity calculations and results in better performance. For example, if a disk fails or a disk needs to be rebuilt, performance impact is minimal.

Input and Output Contention

Distributing data across various shares on the filer's arrays and providing corresponding mount points on the Oracle administrative host resolves input and output contention issues. Database administrators need to maintain different tablespaces to keep data for the duration of their life span. Data files that have long life spans should be kept in tablespaces that are different than tablespaces for data files with short life spans.

The filer offers several choices for spreading the tablespace data files across disk arrays to balance input and output. You can create shares for keeping data according to its usage. For example, you can create some shares for keeping user data and other shares for keeping temporary data or indexes. It is a good practise to keep user data away from temporary data or indexes

Tablespaces that have to grow dramatically need more and bigger data files attached to them. Tablespaces defined for sorting operations and hold temporary data should have data files on disks other then those that have user data. Sorting should be done in a storage device on the local machine.

Database Performance

The major benefit of the filer is that it relieves your more expensive general-purpose servers of many file management operations, which frees up the CPUs of those servers for other tasks. The filer is optimized for file system performance.

Heterogeneous Environments

The Sun StorEdgeN8600 Filer allows file sharing in heterogeneous environments, and comes preconfigured with NFS and CIFS (for Windows NT machines) support.

Scalability and Downtime

The filer gives you the flexibility to scale vertically or horizontally; you can add more storage to a filer or more filers to a network. You can scale your filer system in a short time without impacting data availability.

Database Security

Access to the data on a filer is protected when you set certain configuration options. You can grant hosts, users and groups access to specific database directories. The Sun StorEdge N8000 Administration Tool is also password protected. Only the administrator or superuser can telnet to the filer.

Volume Management

The filer allows you to create and manage multiple volumes, and therefore multiple copies of the database. This enables you to combine the power of a highly scalable, high performance file system with easy-to-use, online disk and storage management and backup and recovery technologies.

Network Configurations

This section explains two possible network topologies for using the filer with an Oracle administrative host. The first, FIGURE 2-1, is an enterprise configuration and the second, FIGURE 2-2, is a workgroup configuration.

Enterprise Configuration

A large company with heavy investments in its network infrastructure can maximize database system performance by using a high-speed private network shared between a filer and an Oracle administrative host. The company can have a second network between the Oracle administrative host and its network clients.
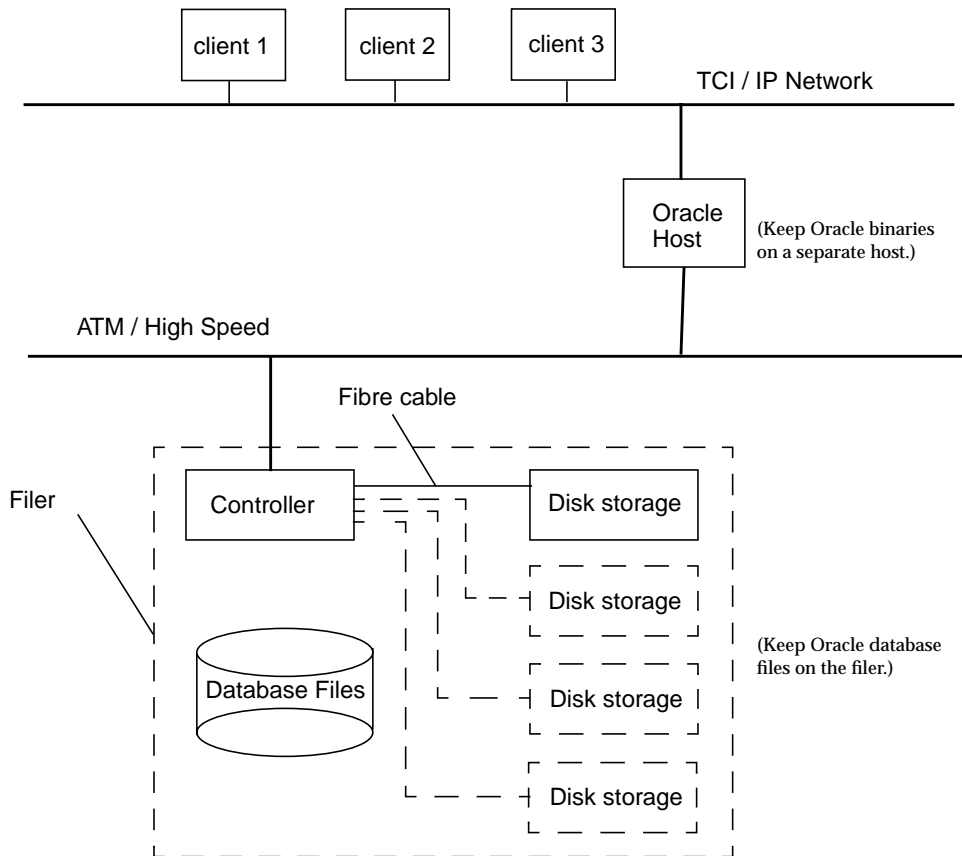
FIGURE 2-1 Enterprise Configuration: Filer and Oracle Network and Client Network

Workgroup Configuration

Companies with smaller networks can place a filer on the same network as the Oracle administrative host and clients. This configuration keeps operations costs low. It is an optimal scenario if the company does not expect a high messaging load between the Oracle administrative host and the filer.
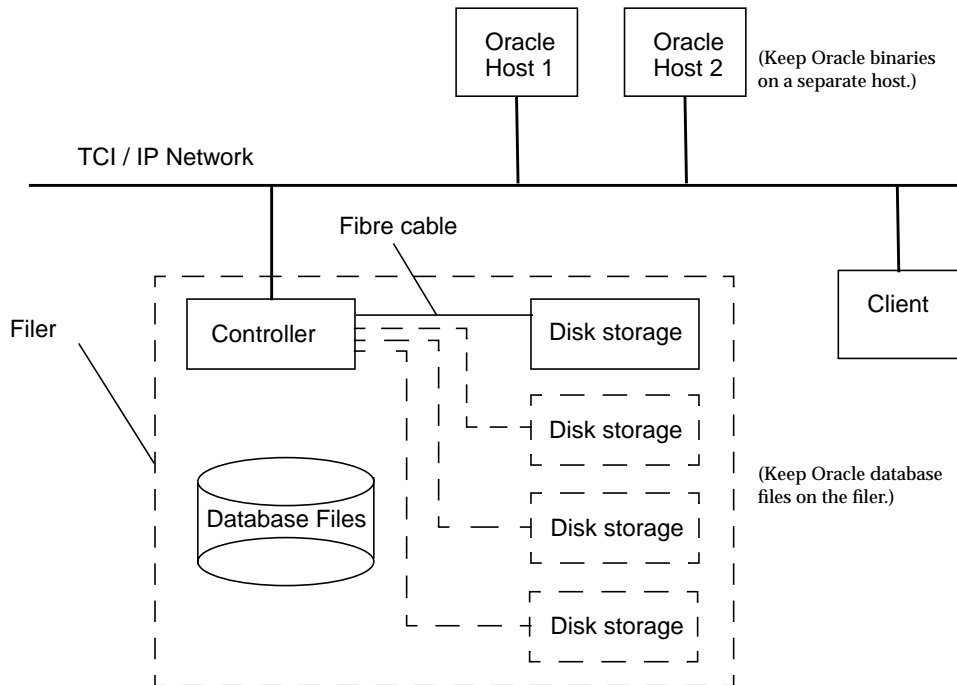
FIGURE 2-2   Workgroup Configuration: One network for filer, Oracle, and client

Storing the database files, system files and control files on the filer reduces downtime if the Oracle administrative host fails. You can make another machine your Oracle administrative host and, by changing the IP address to the new Oracle administrative host machine, regain access to the database files. You can also avoid bottlenecking network traffic by putting the filer and Oracle server on a private network.

Configuring the Sun StorEdge N8600 Filer and Oracle

This chapter covers configuring the Sun StorEdge N8600 filer and Oracle server to communicate in a network environment. In the tests, the filer and Oracle server both ran on the Solaris operating environments and used NFS. All command examples in this chapter are for the Solaris operating environment.

This section covers the following topics:

■ "Network Connectivity Considerations" on page 13

■ "Configuring the Sun StorEdge N8600 Filer and Oracle System" on page 15

■ "Mounting the Shares on the Oracle Administrative Host" on page 16

Network Connectivity Considerations

When you install the filer and Oracle8 software, you establish network connectivity between the filer and the Oracle administrative host. This section covers the following topics:

■ "Determining Port Allocation" on page 14

■ "Verifying Network Connectivity for the Filer" on page 14

■ "Adding the Filer to a Name Service" on page 14

Determining Port Allocation

The Sun StorEdgeN8600 Filer, by default, ships with one 100 Mbit network connection port. Additional and faster network ports of 1 or more Gbit are available for higher bandwidth and throughput.

The Sun StorEdgeN8600 Filer provides a web-based Filer Administration Tool, a graphical user interface (GUI) via which you can configure host names, IP addresses, and subnet masks of additional ports. See the *Sun StorEdge™ N8400 and N8600 Filer Administrator's Guide*for details.

See also the *Sun StorEdge N8600 Filer Installation, Configuration, and Service Guide* and the *Sun StorEdge N8000 Filer Product Family Administrator's Guide* documentation, and contact your sales representative to purchase the ports.

Verifying Network Connectivity for the Filer

After you set up and configure the filer to communicate with network hosts, as referred to in "Installing the Filer" on page 6, verify the connection with the Oracle administrative host.

From the Oracle host, type the `ping` command, where *filer_address* is the IP address for the filer:

```
# ping filer_address
```

If the Oracle host can communicate with the filer, the filer returns a message, such as "*filer_address* is alive." Some systems return a more detailed message, which includes statistics about the communications link.

Adding the Filer to a Name Service

If you are using a name services, such as NIS, NIS+, or LDAP, add the filer to the name service so that other computers on the network can communicate with the filer by name. To add the filer to a name service, follow the procedures for the specific name service or contact a network administrator. If you do not use the filer in a name service environment, you must manually configure the Oracle host to communicate with the filer.

Configuring the Sun StorEdge N8600 Filer and Oracle System

This section covers the following topics:

- "Establishing Network Connectivity for the Oracle Administrative Host" on page 15
- "Creating the User oracle and the Group dba" on page 16

Establishing Network Connectivity for the Oracle Administrative Host

You must set up and configure the Oracle8 host to communicate with network hosts. Refer to your third-party documentation for more information.

▼ To Identify the Filer on the Oracle Host

1. **Go to the** `hosts` **file in the** `/etc` **directory on the Oracle administrative host and open it for editing.**

2. **Specify the IP address and host name of the filer.**

Note – If you configured both the filer and the Oracle server in a name service environment, you do not need to identify the filer on the Oracle server. Continue with creating users and groups.

Creating the User oracle and the Group dba

If you are using a name service, such as NIS, NIS+, or LDAP, you can add the user `oracle` and the group `dba` to the name service so that other computers on the network can share information about the user. Do this by following the steps specific to the name service being used, or contact your network administrator for assistance. The user and group information is typically stored in the `/etc/passwd` and `/etc/group` files.

If you are not in a name service environment, refer to the *Sun StorEdge N8000 Filer Product Family Administrator's Guide* for information about creating a user with the Sun StorEdge N8000 Administration Tool.

Mounting the Shares on the Oracle Administrative Host

To configure the Oracle server to use the filer for database storage, follow the procedures in this section:

- "To Create a Volume" on page 17
- "To Create Shares On the Filer" on page 17
- "To Create a Mount Point" on page 18
- "To Mount the Filer Shares on the Oracle Host" on page 18

Note – You should make hard mount points, rather than soft ones; if the filer fails, the Oracle administrative host continues contacting the filer until a connection is re-established.

▼ To Create a Volume

1. Log in as root and type the following command to create a 5 GByte volume `oracle` in the filer:

```
#/usr/rbin/bin/vol create oracle 5000
```

2. Type the following command to give read/write permissions to all for the volume `oracle`.

```
#share /oracle
```

Now `oracle` can be used as the mount point for the Oracle database. There can be "n" mount points, in order to distribute the database uniformly in the filer.

▼ To Create Shares On the Filer

1. Start the Sun StorEdge N8000 Administration Tool and add a share on the filer to hold a given user database.

For example, you could enter the value `PROD_user` in the Directory Field on the Shares tab of the administration tool.

See the *Sun StorEdge N8600 Filer Installation, Configuration, and Service Guide* and the *Sun StorEdge N8000 Filer Product Family Administrator's Guide* for details on the administration tool.

2. Enter a verbose description of the share in the Description field on the Shares tab of the filer administration tool.

3. Click Assign Ownership and enter the user `oracle` and group `dba` in the appropriate fields on the dialog.

4. Click Global Access to specify the Oracle host.

Then, click Read/Write to assign permissions to the share.

5. Click update.

6. Continue to create shares as needed.

▼ To Create a Mount Point

1. **Login to the Oracle administrative host as a superuser or administrator.**

2. **Create a directory to be used as a mount point for the shares you created in "To Create Shares On the Filer" on page 17.**

   The mount point should be given access to the `oracle` user and the `dba` group. Specify the permissions you want, giving write permissions to `oracle`.

▼ To Mount the Filer Shares on the Oracle Host

1. **Login as a superuser on the Oracle administrative host.**

2. **If you are using a Solaris operating environment, change directory to** `/etc` **and open the** `/vfstab` **file for editing:**

   ```
   # vi vfstab
   ```

   Note – If you are using another operating environment, refer to your third-party system administration documentation for information on NFS or CIFS.

3. **In the** `/vfstab` **file, type appropriate values for the variables:**

   ```
   # filer_hostname:/mount_point / local_mount_point
   ```

4. **Enter the** *local_mount_point* **identifier in the** `/oracle/.login` **file.**

   The other parameters are automatically set during the Oracle installation.

5. **Save the changes to the files on the Oracle host and reboot.**

Conclusions

This chapter covers the following topics:

- "Conclusions" on page 19
- "References" on page 20

Conclusions

The Sun StorEdge N8600 Filer NAS (network attached storage) appliance successfully completed the Oracle Storage Compatibility Program (OSCP) NFS Test Suite.

As a result, Oracle customers can now capitalize on the performance, scalability, and reliability of the filer with the confidence that it is compatible with their Oracle database environments. Membership in the OSCP is evidence of a strong commitment by Sun to deliver best of breed, enterprise-class storage solutions that meet the needs of today's business environments.

References

1. *Network-Attached Storage; a White Paper,* Sun Microsystems, Inc.

2. *Oracle Installation Manual for 8.0.5 - Solaris*, Oracle Corp.

3. *Oracle Network Storage System Compatibility Fault Injection Tests*, Oracle Corp.

4. *OSCP Test Suite For Sun StorEdge N8600 Filer*, Sun Microsystems, Inc.

5. *Product Support Document (PSD) for Sun DNS*, Sun Microsystems, Inc.

6. *RAID Strategies and Related Performance*, by Tom Locklin, Sun Microsystems Systems, `http://pittweb.east/tlocklin/RPS/Disk_Raid_Info/`

7. *Solaris Naming Setup and Configuration Guide*, Sun Microsystems, Inc.

8. *Sun Enterprise 6500/5500/4500 Systems Installation Guide*, Sun Microsystems, Inc.

9. *Sun Solstice DiskSuite 4.2 User's Guide*, Sun Microsystems, Inc.

10. *Sun StorEdge T3 Disk Tray Installation, Operations, and Service Manual,* Sun Microsystems, Inc.

11. *Sun StorEdge N8000 Filer Product Family Administrator's Guide*, Sun Microsystems, Inc.

12. *Sun StorEdge N8000 Filer Series Administrator's Guide*, Sun Microsystems, Inc.

13. *Sun StorEdge N8600 Filer Installation, Configuration, and Service Guide*, Sun Microsystems, Inc.