



Keeping the World's Business-Critical Information Available

Legato[®] Single Server Version

Administrator's Guide

Release 6.1

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Preface

This *Legato® Single Server Version Administrator's Guide, Release 6.1* contains information on how to configure and use the Legato Single Server Version release 6.1 software in conjunction with the latest Oracle Server software for Oracle data storage management.



Important: In this guide, "Windows" refers to *both* the Windows 2000 and Windows NT operating systems, unless specified otherwise.

Legato Single Server Version *must* be installed on a supported UNIX or Windows operating system running Oracle9i Server software to use the information presented in this guide. If the software is not yet installed, refer to the *Legato Single Server Version Installation Guide, Release 6.1* for installation instructions.

Audience

The information in this guide is intended for system administrators and Oracle database administrators (DBAs) who are responsible for maintaining Oracle Server backup and recovery systems. Operators who monitor the daily Oracle database backups may also find this manual useful.

Effective use of this guide requires a working knowledge of Oracle concepts and terminology, especially those related to Oracle database backup and recovery.

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Convention	Indicates	Example
boldface	Names of line commands, daemons, options, programs, or scripts	The nsradmin command starts the command line version of the administration program.
<i>italic in text</i>	Pathnames, filenames, computer names, new terms defined in the Glossary or within the chapter, or emphasized words	Displayed messages are also written to <i>/nsr/logs/daemon.log</i> .
<i>italic in command line</i>	A variable that must be provided in the command line	nwadmin -s <i>server-name</i>
fixed-width	Examples and information displayed on the screen	media waiting: recover waiting for 8mm 5GB tape volume name
fixed-width, boldface	Commands and options that must be typed exactly as shown	nsr_shutdown -a

Convention	Indicates	Example
Menu_Name> Command	A path or an order to follow for making selections in the GUI	Volume>Change Mode>Appendable
Important:	Information that must be read and followed to ensure successful backup and recovery of data	 <hr/> Important: Use the <code>no_verify</code> option with extreme caution. <hr/>

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Legato Service or Resource	Technical Bulletins	Binary Patches	Company & Product Information	Training Programs
<i>www.legato.com</i>	Yes	Yes	Yes	Yes
<i>ftp.legato.com</i> (log in as <i>anonymous</i>)	Yes	Yes		
Legato Sales (650) 210-7000 (option 1) <i>sales@legato.com</i>			Yes	
Legato Education Services (650) 842-9357 <i>training@legato.com</i>				Yes

Technical Support

The Support section of the Legato web site provides contact information, software patches, technical documentation, and information about available support programs.

- Customers with an active support agreement have access to TechDialog, Legato’s integrated product knowledge base. Help with Legato software issues is also available through Legato Technical Support.
- Customers without an active support agreement can contact Support Sales and Renewal to purchase annual Software Update Subscriptions, or Legato Technical Support services for per-update/per-incident support.

Licensing and Registration

To license and register Legato products, go to the Legato licensing web site. To change contact information, transfer licenses, or ask questions about licensing, contact Legato using one of the following methods.

Licensing and Registration	Contact
Legato licensing web site	http://license.legato.com
Telephone number	(650) 812 6000 (option 3, option 2) ^a +31 23 554 8881 ^b
Fax number	(650) 745-1477 ^a +31 23 554 8808 ^b
E-mail	licensing@legato.com ^a licensingemea@legato.com ^b

a. Contact information for Americas, Asia, and Pacific.

b. Contact information for Europe, Middle East, and Africa.

Customer Feedback

Legato welcomes comments and suggestions about software features, the installation procedure, and documentation. Please send any suggestions and comments to feedback@legato.com. Legato confirms receipt of all e-mail correspondence. Although Legato cannot respond personally to every request, all comments and suggestions are considered during product design.

Help improve Legato documentation and be eligible to win a prize by completing a brief survey. Visit the Legato web site at www.legato.com, navigate to the documentation page, and click on the link to the survey.

Chapter 1: Introduction

This chapter provides an overview of the Legato Single Server Version product. It describes the main features and functionality of Legato Single Server Version and how Legato Single Server Version works in conjunction with the other components of an integrated Oracle backup and recovery system.

Note: For important information on registering Legato Single Server Version, see ["Splash Screen and Registration Information"](#) on page 23.

This chapter includes the following main sections:

- ["What is Legato Single Server Version?"](#) on page 19
- ["Overview of Legato Single Server Version Features"](#) on page 20
- ["Overview of Oracle Backup and Recovery System"](#) on page 32
- ["Other Information Sources"](#) on page 36

What is Legato Single Server Version?

Legato Single Server Version is a comprehensive Oracle data storage management system. Legato Single Server Version augments the Oracle backup and recovery subsystem in Oracle9i on UNIX or Windows, by means of its media management functionality.

Legato Single Server Version provides Oracle data storage management services to the Oracle Server. Use Legato Single Server Version to configure and manage the Oracle backup devices and the storage volumes in those devices. Legato Single Server Version interacts with the backup/restore utility on the Oracle Server during Oracle backup and restore operations. That utility is Recovery Manager (RMAN) in Oracle9i.

An Oracle backup or restore is initiated by running the RMAN utility on the Oracle Server. During the backup, Legato Single Server Version receives the Oracle data from the Oracle utility and stores that data on the backup volumes. During the restore operation, Legato Single Server Version retrieves the required data from the backup volumes and passes it to the Oracle utility. Legato Single Server Version also maintains information records about the Oracle backups in its online index files and uses this information to track the backed up data.

Overview of Legato Single Server Version Features

As part of an overall Oracle backup and recovery system, Legato Single Server Version provides:

- Complete storage device and volume management services
- Convenient tracking of Oracle backup data on storage volumes
- Management of Oracle backup data throughout a complete data life cycle
- Complete disaster recovery protection for Oracle databases

The Legato Single Server Version software must be installed on the same computer as the Oracle Server. The Oracle backup devices must also be connected to the Oracle Server computer. For more information on Legato Single Server Version installation, refer to the *Legato Single Server Version Installation Guide*.

The Oracle backup devices and volumes must be configured in Legato Single Server Version. The Legato Single Server Version software maintains information about the Oracle backups in its online index files.

The Legato Single Server Version Administrator program is a graphical user interface (GUI) that can be used to configure and administer Legato Single Server Version and its resources. Use the Administrator program to:

- Connect to Legato Single Server Version
- Configure Legato Single Server Version
- Manage the storage devices and volumes
- Monitor the status of Oracle backup and restore operations

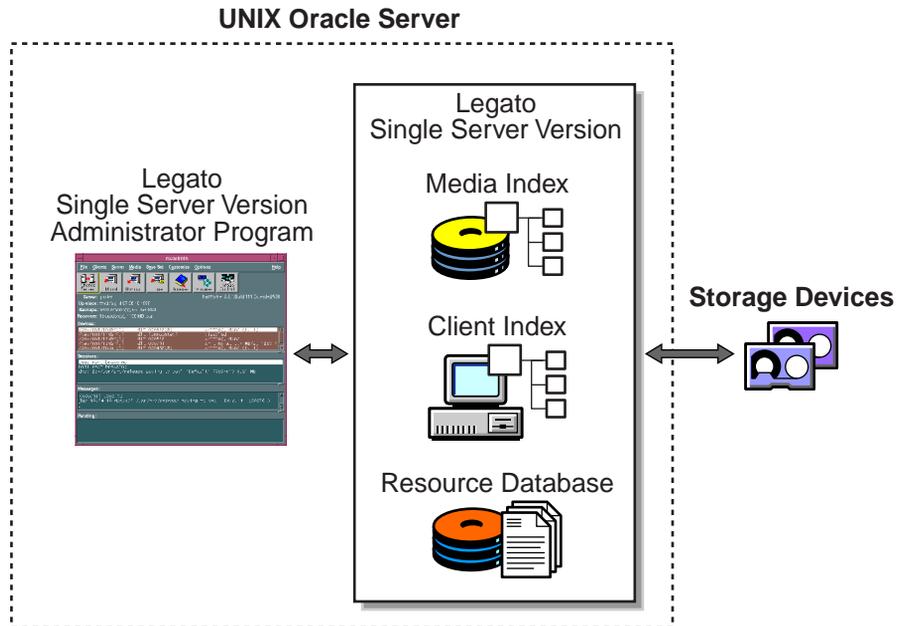
The Administrator program is installed during the Legato Single Server Version installation on the Oracle Server computer. The Administrator program can also be installed and run on a separate Windows platform, which does not require Oracle Server software.

Note: Configuration and management tasks performed in the Legato Single Server Version Administrator program can also be performed using either the character-based Legato Single Server Version interface (**nsradmin** program) or Legato Single Server Version commands at the operating system command line. For more information on these other options, see the following sections:

- "Character-Based Interface (nsradmin)" on page 69
- "Command Line Interface" on page 69

Figure 1 on page 21 illustrates the general organization of Legato Single Server Version and its main components.

Figure 1. Legato Single Server Version Components



In Figure 1 on page 21, Legato Single Server Version (including the Administrator program) is installed on the same UNIX system as the Oracle Server. Legato Single Server Version uses the two online indexes—the *client index* and *media index*—to store information about the Oracle backups. It uses this information to manage the life cycle of the Oracle backup data and enables users to browse this index information.



Important: Legato Single Server Version has a subset of the features in the Legato NetWorker® and Legato NetWorker Module for Oracle products from Legato Systems, Inc.

Information on how to upgrade from Legato Single Server Version to the combination of Legato NetWorker and Legato NetWorker Module for Oracle is available at the Legato web site at www.legato.com/LSSV.

For more information on upgrading from Legato Single Server Version, contact a Legato representative.

Legato Single Server Version stores the backup data passed from the Oracle RMAN utility onto volumes mounted in the Oracle backup devices. During Oracle data recovery, Legato Single Server Version retrieves the backed up Oracle data from the appropriate storage volumes and passes it to the Oracle utility.

To start an Oracle backup or restore, run one of these programs:

- Command line interface of the RMAN utility
- Oracle Enterprise Manager (OEM) Backup Management Tools

The RMAN utility creates the Oracle backup data objects and passes them to Legato Single Server Version.

As an optional component of the Oracle backup and recovery system, OEM Backup Management Tools provide a graphical user interface to the RMAN utility. OEM Backup Management Tools direct RMAN to perform the backup or restore.

Legato Single Server Version supports the backup of Oracle tablespaces, datafiles, control files, and archived redo logs. It supports the backup of *only Oracle data on the Oracle Server computer*—not the backup of other filesystem data on that computer or the backup of data on any other computer on the same network.

Note: For more information on how to back up non-Oracle filesystem data in addition to Oracle data on the Oracle Server, contact a Legato representative.

Splash Screen and Registration Information

After the initial installation, Legato Single Server Version is *not* registered, by default. For more information on registering Legato Single Server Version, see "[Registering Legato Single Server Version](#)" on page 24.

On Windows, if Legato Single Server Version is not registered, a splash screen appears whenever a Legato Single Server Version connection is established or closed in the Administrator program. For more information on how to establish or close such a connection, see "[Legato Single Server Version Connectivity](#)" on page 53.

Note: On Windows, if a Legato Single Server Version connection is established and not closed before the Administrator program is exited, the splash screen appears at exit time and the next time the Administrator program is started.

The Legato Single Server Version splash screen on Windows appears as shown in [Figure 2 on page 23](#).

Figure 2. Legato Single Server Version Splash Screen on Windows



The splash screen describes how to obtain information on the fully functional Legato NetWorker and NetWorker Module for Oracle products. It also includes a registration message, explaining how to register Legato Single Server Version.

If Legato Single Server Version is not registered, a similar registration message appears every two hours in the following locations, as long as the Legato Single Server Version daemons or services are running:

- In the Message area of the Administrator program:
 - On UNIX, in the Message area in the Server window. See [Figure 12 on page 57](#).
 - On Windows, in the Messages area in the Monitor tab. See [Figure 13 on page 61](#).

Note: This registration message in the Message area is also written to the */nsr/logs/daemon.log* file on UNIX and the *C:\Program Files\nsr\logs\daemon.log* file (by default) on Windows.

- In an e-mail message sent to the root user on UNIX.

Registering Legato Single Server Version

Legato Single Server Version can be registered for free by entering a registration code in the Legato Single Server Version Administrator program. When Legato Single Server Version is registered:

- The appearance of the Legato Single Server Version splash screen (on Windows) and registration messages stops immediately.
- A registration completion message is displayed.
- Legato product update notices are provided by Legato Systems, Inc.

Note: Registering Legato Single Server Version does *not* enable any additional product features or functionality.

To register Legato Single Server Version, perform the following:

1. Obtain a registration code as follows:
 - a. Go to the Legato web site at www.legato.com/LSSV.
 - b. Click on the Register LSSV link.
 - c. Complete the registration form.
 - d. Click Submit.

Note: The registration form includes a required Host ID field, in which you must enter the host identifier (ID) of the Legato Single Server Version

host computer. A host ID is a hexadecimal value consisting of eight characters that might be preceded by *0x*. For example, a host ID might appear as either *zzzzzzzz* or *0xzzzzzzzz*, where *zzzzzzzz* is the eight-character string.

For information on how to determine the host ID number of the Legato Single Server Version host computer, see the appropriate section:

- ["How to Determine the Host ID on UNIX" on page 25](#)
 - ["How to Determine the Host ID on Windows" on page 26](#)
2. Enter the registration code in the Administrator program by using the instructions in the appropriate section:
 - ["How to Register Legato Single Server Version on UNIX" on page 28](#)
 - ["How to Register Legato Single Server Version on Windows" on page 29](#)

How to Determine the Host ID on UNIX

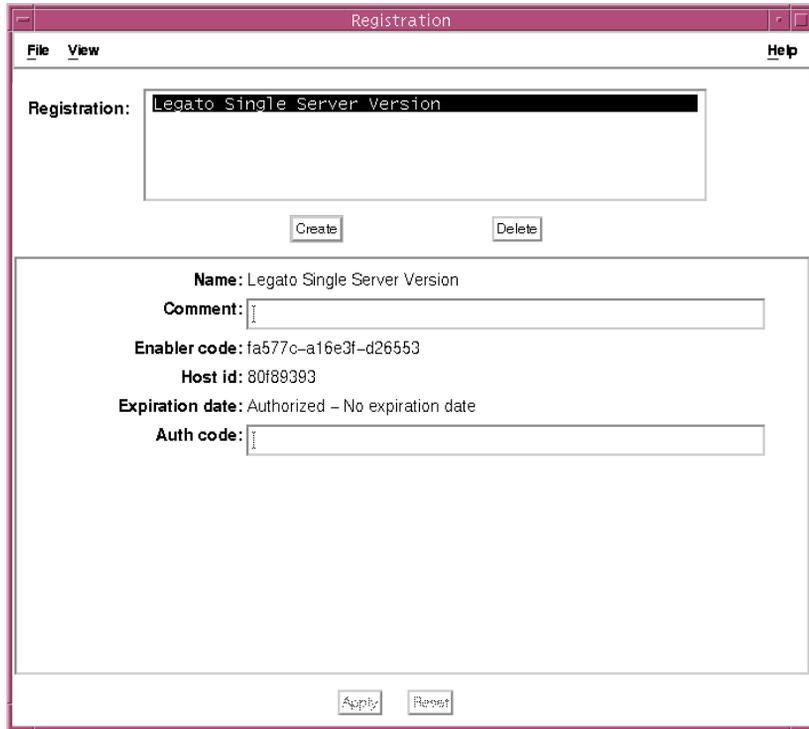
To determine the host ID number of the Legato Single Server Version computer by using the Administrator program on UNIX, perform the following:

1. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
2. From the Server menu, select Registration.
3. In the Registration window, the required host ID number appears in the Host id field. For example, in [Figure 3 on page 26](#), the host ID number is 80f89393.

Note: If you do *not* run the Administrator program as a Legato Single Server Version Administrator, an Administrator field appears at the bottom of the Registration window (not shown in [Figure 3](#)).

The host ID number is required in the Host ID field of the Legato Single Server Version registration form on the Legato web site (www.legato.com/LSSV).

Figure 3. Registration Window on UNIX



How to Determine the Host ID on Windows

To determine the host ID number of the Legato Single Server Version computer by using the Administrator program on Windows, perform the following:

1. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
2. In the Configure tab in the Server window, click the Registration icon.
3. In the Registration window, double-click Legato Single Server Version. See [Figure 4 on page 27](#).
4. In the Edit Registration window, the required host ID number appears in the Host id field. For example, in [Figure 5 on page 27](#), the host ID number is e9379a0a.

The host ID number is required in the Host ID field of the Legato Single Server Version registration form on the Legato web site (www.legato.com/LSSV).

Figure 4. Registration Window on Windows

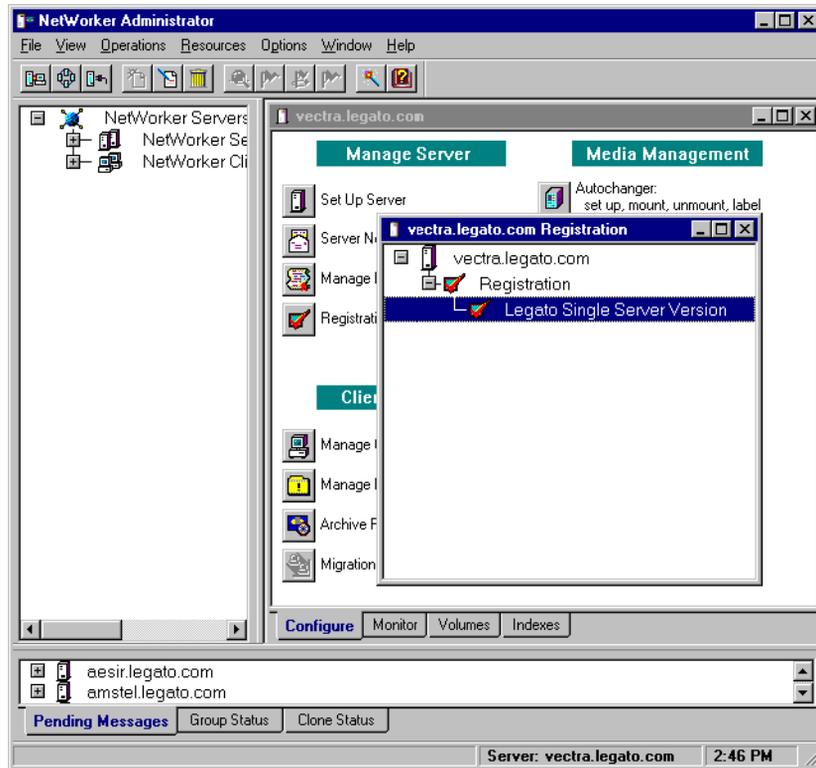
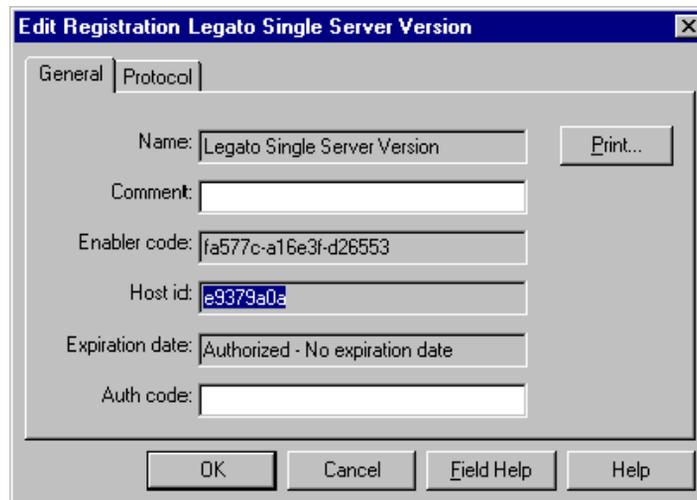


Figure 5. Host ID Field in Edit Registration Window



How to Register Legato Single Server Version on UNIX

The section describes how to register Legato Single Server Version by entering the registration code in the Administrator program on UNIX.

Note: The Administrator program must be run as a Legato Single Server Version Administrator. For more information, see "[Administrator Privileges](#)" on page 52.

To enter the registration code for Legato Single Server Version on UNIX, perform the following:

1. Run the Administrator program, as described in "[The Administrator Program](#)" on page 51.
2. From the Server menu, select Server Setup to open the Server window.
3. In the Server window, perform the following:
 - a. In the View menu, select Details.
 - b. Scroll down to the LSSV reg code field, as shown in [Figure 6 on page 29](#).
 - c. In the LSSV reg code field, enter the registration code.
 - d. Click Apply.

Figure 6. LSSV Reg Code Field on UNIX

How to Register Legato Single Server Version on Windows

The section describes how to register Legato Single Server Version by entering the registration code in the Administrator program on Windows.

Note: The Administrator program must be run as a Legato Single Server Version Administrator. For more information, see ["Administrator Privileges" on page 52](#).

To enter the registration code for Legato Single Server Version on Windows, perform the following:

1. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
2. From the Options menu, select Customize.
3. In the Window Configurations tab in the Customize window, select Display Hidden Attributes and click OK. See [Figure 7 on page 30](#).

4. In the Configure tab in the Server window, click the Set Up Server icon.
5. In the Miscellaneous tab in the Set Up Server window, enter the registration code in the LSSV reg code field and click OK. See [Figure 8 on page 31](#).

Figure 7. Customize Window on Windows

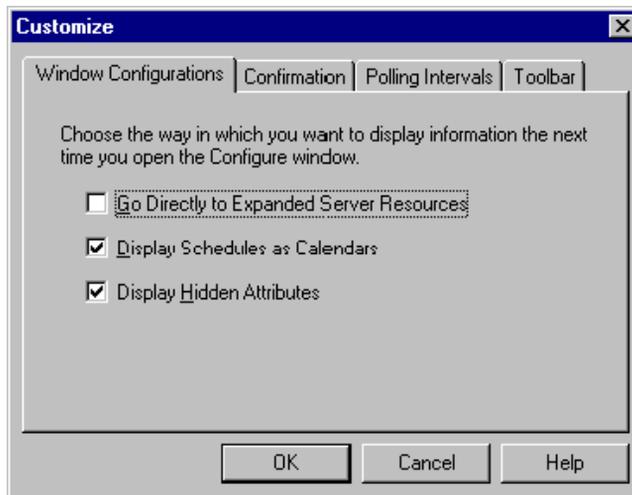
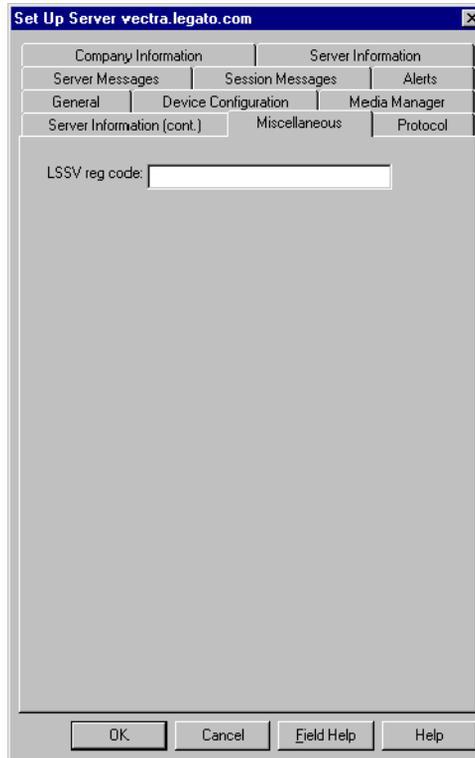


Figure 8. LSSV Reg Code Field on Windows



1

Legato Single Server Version Feature Summary

In summary, the Legato Single Server Version software:

- Supports specific UNIX and Windows operating system releases.
- Supports specific Oracle9i Server releases.

Note: For more information on the specific operating system and Oracle Server releases supported, refer to the *Legato Single Server Version Release Supplement*.

- Can be configured and administered through the Legato Single Server Version Administrator program.
- Configures and manages the storage devices and volumes used for Oracle backups.
- Supports the backup and restore of Oracle tablespaces, datafiles, control files, and archived redo logs.

- Supports the backup and restore of *only Oracle data on the Oracle Server*—*not* other filesystem data on that computer or data on another computer on the network.
- Stores the Oracle data objects created by the RMAN utility on volumes in the backup devices, during an Oracle backup.
- Retrieves the appropriate Oracle data objects from the appropriate storage volumes, during an Oracle data recovery.
- Monitors the progress of Oracle backup and restore operations.
- Enables browsing of online index information for Oracle backups.
- Supports up to four concurrent storage devices (tape only).
- Supports up to four Oracle data streams being backed up simultaneously to the available storage devices.



Important: Legato Single Server Version does *not* support several features of the Legato NetWorker and Legato NetWorker Module for Oracle products, such as archiving, cloning, scheduled backups, using autochangers (jukeboxes) or silos, and volume pools other than the Default pool.

Overview of Oracle Backup and Recovery System

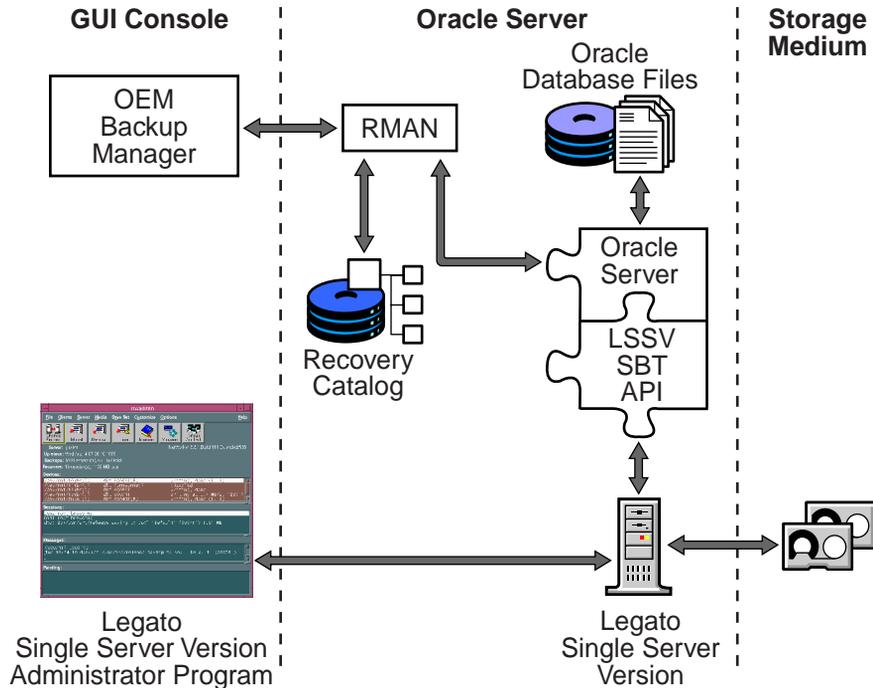
Legato Single Server Version works with the components of the standard Oracle backup and recovery subsystem to produce a comprehensive Oracle data storage management system. To implement an effective Oracle backup and recovery strategy, it is important to understand how Legato Single Server Version and the Oracle components work together.

The Oracle backup and recovery system with the media management layer comprises the following major components:

- Oracle9i Server
- Recovery Manager (RMAN)
- Recovery Catalog (optional)
- OEM Backup Management Tools (optional)
- Legato Single Server Version

[Figure 9 on page 33](#) illustrates the architecture of the overall Oracle backup and recovery system and shows the functional relationship between Legato Single Server Version (or LSSV in the figure), RMAN, and the Oracle Server.

Figure 9. Oracle Backup and Recovery System



Oracle RMAN Utility

RMAN is the main Oracle utility for backing up, restoring, and recovering Oracle datafiles, control files, and archived redo log files. It stores information about its operations in the control file of the backed-up database (the *target database*) and, optionally, in the Recovery Catalog on the Oracle Server.

RMAN provides the following features:

- Online and offline Oracle database backups
- High performance through parallel backups and restores
- An intelligent interface to Oracle databases
- Well-defined backup strategies
- Checking for corrupt blocks during backups and restores
- Block-level incremental backups and restores

For more information on RMAN, refer to the Oracle Recovery Manager documentation.

Oracle Recovery Catalog

The Recovery Catalog is a collection of Oracle database tables containing structural information about Oracle database backups and restores. The Recovery Catalog includes information about the following types of objects:

- Backup sets and backup pieces
- Image copies
- Proxy copies
- Archived redo logs
- Target database schema
- Stored scripts (user-created sequences of RMAN commands)

The Recovery Catalog is maintained by RMAN. RMAN uses the information in the Recovery Catalog or database control file to determine how to perform requested backup and restore operations.

Although a Recovery Catalog is not mandatory, Oracle *recommends* using a Recovery Catalog, especially if there are 20 or more datafiles. If a Recovery Catalog is *not* used, the following functions are *not* supported:

- Point-in-time recovery
- Stored scripts
- Restore and recovery when the control file is lost or damaged

The Recovery Catalog should be stored in the Recovery Catalog database, a dedicated database about 20 MB in size. If the catalog database fails, it must be recovered before the target database can be recovered. Inability to access the Recovery Catalog database implies an inability to recover the target database. Oracle recommends that the Recovery Catalog be kept on a separate computer from the target database.

For more information on the Recovery Catalog, refer to the Oracle Recovery Manager documentation.

How Legato Single Server Version Backs Up Oracle Data

To provide Oracle data storage management services, Legato Single Server Version implements the Oracle System Backup to Tape (SBT) application programming interface (API). During backup and restore operations, Oracle Server processes interact with Legato Single Server Version through the Legato Single Server Version implementation of the SBT API.

Legato Single Server Version includes a media management library (MML) that is integrated with the Oracle Server during the Legato Single Server Version installation on the Oracle Server host. The Legato Single Server Version installation links the media management software routines of the library with the Oracle kernel software. This enables the Oracle Server processes to call the Legato Single Server Version SBT API functions to back up and restore Oracle data to and from the media controlled by Legato Single Server Version.

Perform an Oracle backup by issuing the appropriate RMAN commands through one of the following:

- RMAN command line interface
- OEM Backup Management Tools, including an optional GUI to RMAN

OEM Backup Management Tools generate the RMAN commands required to run the Oracle backup.

RMAN establishes connections with the target database. Each connection starts an Oracle Server process that performs the backup. During the backup, Oracle Server processes read the datafile, control file, or archived redo log being backed up and write it to Legato Single Server Version, through the SBT API. Legato Single Server Version, in turn, stores the Oracle data on the appropriate backup tape device.

At the end of the Oracle backup, Legato Single Server Version updates the online client and media indexes with information about the backup media used and the Oracle data it contains. Legato Single Server Version automatically backs up the client and media indexes once every day as part of the regular Legato Single Server Version *bootstrap* backup.

How Legato Single Server Version Restores Oracle Data

Perform an Oracle restore by issuing the appropriate RMAN commands through one of the following:

- RMAN command line interface
- OEM Backup Management Tools, including an optional GUI to RMAN

OEM Backup Management Tools generate the RMAN commands required to run the Oracle restore.

RMAN starts Oracle Server processes on the target database. These Oracle Server processes perform the restore by calling the Legato Single Server Version SBT API functions. The SBT API translates the object names requested by RMAN into a format that Legato Single Server Version understands.

Legato Single Server Version verifies that the backup pieces exist in the online client index. Legato Single Server Version also searches the online media index for the media containing the requested data objects. It reads the appropriate backup volumes and passes the data to the Oracle Server processes through the SBT API. The Oracle processes write the Oracle data to the disk.

Once the required files are restored from the backup volumes, an Oracle DBA can complete the standard Oracle database recovery.

Other Information Sources

To take best advantage of the information in this *Legato Single Server Version Administrator's Guide*, use it in conjunction with the information available in the following documentation.

UNIX Online Help



Important: Several features documented in the UNIX Online Help are *not* supported by Legato Single Server Version, such as archiving, cloning, scheduled backups, using autochangers (jukeboxes) or silos, and volume pools other than the Default pool.

The UNIX version of the Legato Single Server Version Administrator program includes Online Help. This Online Help contains specific information about the Administrator program, including context-sensitive help in each window that describes the purpose of the window and the information to enter in each field in the window. Other help topics describe Legato Single Server Version features and provide step-by-step instructions for carrying out Legato Single Server Version functions using the Administrator program.

To access the Online Help, select the Help menu displayed in the Administrator program. There are four choices:

- *On Window* provides context-sensitive help on the current window.
- *On Topic* provides a list of help topics from which to choose.
- *On Help* provides information on how to use the Online Help system itself.
- *On Version* provides information on which Legato Single Server Version release is installed on the system.

The UNIX version of the Administrator program also provides Help buttons in most of the dialog boxes. Clicking the Help button in a dialog box displays the help topic associated with that Legato Single Server Version feature.

UNIX Man Pages



Important: Several features documented in the man pages are *not* supported by Legato Single Server Version, such as archiving, cloning, scheduled backups, using autochangers (jukeboxes) or silos, and volume pools other than the Default pool. Since the man pages are the same as for the Legato NetWorker product, they might include NetWorker references. For any NetWorker reference, substitute Legato Single Server Version.

The man pages provided with Legato Single Server Version on UNIX are a reference for the syntax and function of the Legato Single Server Version commands that can be issued from the command line.

To view a Legato Single Server Version man page:

1. Verify that the MANPATH environment variable includes the pathname of the directory where the Legato Single Server Version man pages are installed, `/usr/share/man` by default.
2. At the shell prompt, enter the **man** command and the name of the Legato Single Server Version command. For example, to view the man page for the **nsrmm** command, enter the following **man** command:

```
man nsrmm
```

To print a copy of the entire collection of Legato Single Server Version man pages, enter the **troff** command at the shell prompt with the following options:

```
troff -t -man 'nsr_man -l' | lpr -t -P printer-name
```

The command for a particular computer might vary (for example, the print command might be **lp** instead of **lpr**), depending on the versions of the operating system and PostScript software installed.

Windows Online Help



Important: Several features documented in the Windows Online Help are *not* supported by Legato Single Server Version, such as archiving, cloning, scheduled backups, using autochangers (jukeboxes) or silos, and volume pools other than the Default pool.

The Legato Single Server Version Administrator program on Windows includes Online Help to provide both context-sensitive and reference information on-screen while the software is running. The Administrator program on Windows has an extensive Online Help component.

Context-Sensitive Help

Access context-sensitive help by clicking the Help button found in most dialog boxes. In some cases, both a Help button and a Field Help button are present, particularly in the Create and Edit dialog boxes for Legato Single Server Version resources. For more information on Field Help, see ["Field Help" on page 39](#).

Reference Help

To browse all of the help topics, or to use the extensive index or keyword search features, click the Help Topics button or select Help Topics from the Help menu. The Help Topics dialog box appears.

This dialog box provides tabs with features to help a user find a specific help topic:

- Contents tab — Displays a table of contents organized into books and topics as follows:
 - Double-click on a book to expand it and display additional books and/or topics it contains.
 - Double-click on a topic to open the Help dialog box in the upper right corner of the screen.
- Index tab — Displays a scrollable index of keywords and terms, much like an index found in a printed book. Double-click the keyword or term that pertains to the subject for which help is required.
- Find tab — Displays a Help Wizard that leads a user through a process to find help topics based on entered keywords.

When a help topic appears, the window can be moved and resized just like any other Windows help topic. The help window also contains buttons that enable a user to print the topic, view the previous topic, or return to the Help Topics dialog box.

Field Help

Field Help is a special type of help that appears when the Field Help button is clicked in certain dialog boxes. Due to the Legato Single Server Version architecture, the items that appear in a dialog box can vary, depending on the configuration of the Legato Single Server Version. To meet the dynamic nature of these dialog box contents, Field Help provides a dynamic help system based on the items on the screen.

"How Do I" Help

The "How Do I" help is specialized Online Help that provides online information for common Legato Single Server Version tasks. This help functions in much the same way as Windows Online Help, has its own Help Topics dialog box, and is selected from the Help menu.

"What Is This" Help

The "What Is This" help briefly describes each feature in the Administrator program. To display this help, right-click on a button, icon, or other graphical feature and select the What Is This option.

Legato Command Reference Guide



Important: The *Legato Command Reference Guide* is the guide for the Legato NetWorker products. Since Legato Single Server Version contains a subset of the features of Legato NetWorker, the guide documents several features that are *not* supported by Legato Single Server Version, such as archiving, cloning, scheduled backups, using autochangers (jukeboxes) or silos, and volume pools other than the Default pool.

The *Legato Command Reference Guide* describes the commands and resources that can be used while running Legato Single Server Version. It comprises a

complete set of online man pages for the syntax and function of the commands and their options that can be issued from the command line.

The *Legato Command Reference Guide* is available in PDF form in the Documentation section of the Legato web site www.legato.com. The PDF version of the guide can be accessed using the Adobe Acrobat Reader, available from the Adobe web site at www.adobe.com. The guide uses the advanced search feature available in the latest releases of Acrobat Reader.

When the *Legato Command Reference Guide* is accessed on the Legato web site, a master page appears, containing a description of the different types of command utilities. The PDF master page also includes information on how to use the advanced search feature of Acrobat Reader to search the guide.

Chapter 2: Preparing to Use Legato Single Server Version

This chapter describes the internal components of Legato Single Server Version and their organization as a set of resources and attributes. It explains how Legato Single Server Version uses these components and how the components must be configured for Oracle backup and restore operations. This chapter also provides information on how to use the Legato Single Server Version Administrator program.

It is assumed that Legato Single Server Version is already installed on the Oracle Server host. For information on how to install Legato Single Server Version, refer to the *Legato Single Server Version Installation Guide*, available at the Legato web site www.legato.com/LSSV.

This chapter includes the following main sections:

- ["Legato Single Server Version Architecture" on page 41](#)
- ["Overview of Legato Single Server Version Operations" on page 44](#)
- ["The Administrator Program" on page 51](#)
- ["Character-Based Interface \(nsradm\)" on page 69](#)
- ["Command Line Interface" on page 69](#)
- ["Configuration Roadmap" on page 69](#)

Legato Single Server Version Architecture

Legato Single Server Version has a set of features configured for Oracle data storage management services. The process of installing Legato Single Server Version on the Oracle Server preconfigures the product features to default settings that enable Legato Single Server Version for Oracle data storage operations with a minimum of additional configuration.

Legato Single Server Version can use its programs for Oracle data storage operations only if all the required configurations are in place, and most of the required configurations are already in place immediately after installation. The Legato Single Server Version client/server technology uses a Resource Allocation Protocol (RAP) whereby configurations are maintained as a set of internal *resources*. There are several different types of resources—for example, the Client, Server, Device, and Pool resources.

Legato Single Server Version configuration is a process of creating, modifying, and deleting the required resources, using the Administrator program or available commands. Each resource also has its own components known as *attributes*, to which values are assigned.

For example, the value of the Name attribute of a resource defines the name of that particular resource. When creating a new resource, assign a unique name to that resource by assigning a unique value to its Name attribute.

- On a UNIX system, a resource is represented by a window in the Administrator program. A resource attribute is represented by a field, radio button, or check box in the window.
- On a Windows system, a resource is represented by a dialog box in the Administrator program. A resource attribute is represented by a text box, drop-down list, or similar component in the dialog box.

Before a backup device attached to the Oracle Server can be used, a Device resource must be configured for it. An important step in Legato Single Server Version configuration for Oracle operations is creating the required resource for each attached storage device. By modifying the set of resources maintained by Legato Single Server Version, the product performance and functionality can be modified.

Legato Single Server Version maintains all the information about its configured resources in an online *resource database* file, as shown in [Figure 1 on page 21](#).

[Table 1 on page 43](#) lists the main types of resources that Legato Single Server Version uses for Oracle data storage management.

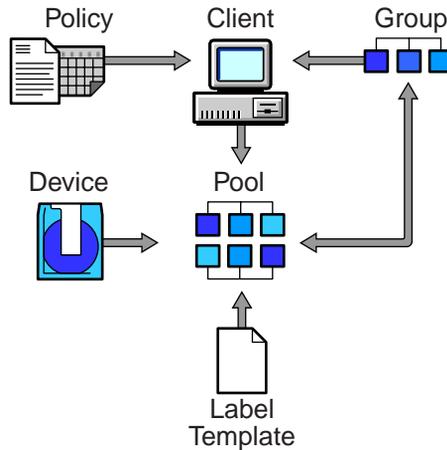
Table 1. Legato Single Server Version Resource Types

Resource Type	Description
Client	Identifies the Oracle Server as the backup client and specifies the policies used for the Oracle backup data management.
Device	Describes a storage device connected to the Oracle Server that can be used for the Oracle backup and restore operations.
Group	Lists the specifications for the automatic bootstrap backup.
Label Template	Provides instructions for creating a label for a storage volume. Each storage volume belongs to a volume pool (represented by a Pool resource), and each pool has a specific label template associated with it.
Policy	Defines a time period for Legato Single Server Version to use for managing the backup data life cycle.
Pool	Names a collection of backup volumes and specifies the criteria that Oracle data must meet to be written to the collection of volumes.
Server	Identifies the Legato Single Server Version characteristics. (Only one Server resource can exist per Legato Single Server Version installation.)

The resource types listed in [Table 1](#) are the only ones that enable Legato Single Server Version functionality for Oracle data storage. Legato Single Server Version does not use or support other types of resources, available with the Legato NetWorker product. For example, Legato Single Server Version does *not* support the Autochanger and Schedule resources.

Some of the resources described in [Table 1](#) exist as attributes of other resources. The interdependent relationships of these resources affect the order in which the resources must be configured. A component resource must be defined before it can be listed as an attribute of another resource.

[Figure 10 on page 44](#) shows the dependencies between the resources. A resource with an outgoing arrow is both an independent resource itself and an attribute of the resource where the arrows end.

Figure 10. Resource Configuration Dependencies

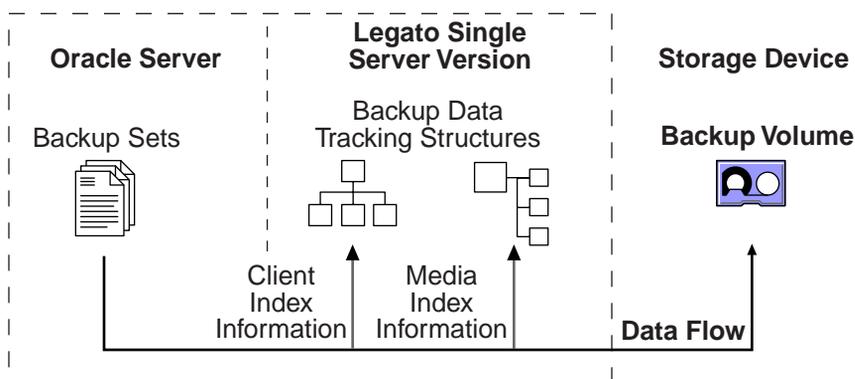
For example, a Policy resource must be defined for a browse or retention policy before that policy can be assigned as an attribute in a Client resource. Also, a label template named *File* cannot be assigned to a Pool resource until the Label Template resource named *File* has been created.

After installation, Legato Single Server Version has a set of preconfigured resources of the types listed in [Table 1 on page 43](#) that are available for immediate use. These preconfigured resources and their default attribute values are described in "[Configuration Roadmap](#)" on page 69. That section also explains the additional resource configurations required before Legato Single Server Version can perform Oracle backups and restores.

Overview of Legato Single Server Version Operations

[Figure 11 on page 45](#) illustrates a simplified model for the Oracle backup operation using Legato Single Server Version. During a backup, Oracle Server processes create the Oracle data backup sets and pass them to Legato Single Server Version. Legato Single Server Version writes the Oracle data to backup volumes in the storage devices and tracks the location and status of the backup data on the volumes.

Figure 11. Data Backup Flow



Legato Single Server Version tracks the location and status of the Oracle backup data, using two special online indexes—the client index and media index. The *client index* contains information on each Oracle data object backed up. The *media index* contains information on the location and content of each backup volume as well as on the life cycle status of the data on each volume.

At the end of an Oracle backup, Legato Single Server Version adds entries for that backup to the client index and media index files.

- To the client index, it adds information on the specific Oracle data that was backed up.
- To the media index, it adds information on the location of the backup volume and the Oracle data written to that volume.

Legato Single Server Version is also preconfigured to perform an automatic bootstrap backup, every day at 3:33 a.m. The bootstrap is a special backup set essential for disaster recovery procedures on the Legato Single Server Version computer. The bootstrap contains the information needed to restore the online indexes and resource configuration files to the state just before the bootstrap was created.

Legato Single Server Version can perform Oracle backup operations only after the required resources are configured and the required storage volumes are labeled and mounted for the backup:

- A Client resource must be configured to identify the Oracle Server as the backup client.

- A Server resource must be configured to:
 - Identify the Legato Single Server Version computer.
 - Specify the parallelism or maximum number of concurrent backup data streams.
 - Specify the users who have the Administrator privileges required to modify the Legato Single Server Version configuration.
- A Device resource must be configured for each device to be used for Oracle backups or restores.
- A storage volume must be labeled and mounted in each device to be used for backup. When labeling a volume, Legato Single Server Version assigns the volume to a volume pool, for which a Pool resource must exist.

For more information on the required Legato Single Server Version configurations, see ["Configuration Roadmap" on page 69](#).

Managing the Data Life Cycle

Two important attributes of the Client resource are the Browse Policy and Retention Policy attributes. Legato Single Server Version uses the browse and retention policies for managing the Oracle backup data life cycle. These policies specify how long the Legato Single Server Version maintains Oracle backup data for recovery.

After installation, Legato Single Server Version contains a preconfigured Client resource for the Oracle Server, including the Browse Policy attribute set to a year and the Retention Policy attribute set to a decade.



Important: Legato recommends that the default values of the Browse Policy and Retention Policy attributes in the Client resource *not* be modified. The browse policy period of a year ensures that the save sets retain a browsable status and the Oracle data can be restored using RMAN for at least a year. Also, with the retention policy of a decade, the backup volumes do not become recyclable for at least ten years.

Browse Policy Considerations

The *browse policy* determines how long the *client index* maintains the information on an Oracle backup. As long as the browse policy period for a particular backup set has not been exceeded, the entry for that backup remains in the client index. And, as long as there is an entry for the backup in the client index (and in the Oracle Recovery Catalog or control file), RMAN can be used to restore the backup set from the backup volume.

After the browse policy period for a backup set has been exceeded, Legato Single Server Version automatically deletes the entry for that backup from the client index. When the entry has been deleted, the backup cannot be restored using RMAN. However, the **scanner** program can be used to recreate the backup's entries in the client index and media index, to enable recovery using RMAN.

Note: The NSR_BROWSE environment variable can be used to specify the browse policy. For more information, see "[Legato Single Server Version Environment Variables](#)" on page 109.

Retention Policy Considerations

The *retention policy* determines the *minimum* period of time that the *media index* maintains the information on Oracle backup data. The media index tracks the Oracle backup sets on the volumes. The retention policy is different from the browse policy in that its expiration does *not* trigger the automatic deletion of entries from the media index.

After the retention policy period for a backup save set has been exceeded, Legato Single Server Version marks the status of that save set as recyclable, but retains its entry in the media index. When *all* the backup sets on a volume are marked recyclable, Legato Single Server Version changes the volume mode to recyclable. The volume is then eligible for automatic relabeling.

Legato Single Server Version deletes a volume from the media index only when either:

- The volume is relabeled, or
- The volume's entries are deleted manually in the Volumes window or tab in the Administrator program.

Note: The NSR_SAVESET_EXPIRATION environment variable can be used to specify the retention policy. For more information, see "[Legato Single Server Version Environment Variables](#)" on page 109.

Additional Client and Media Index Considerations

If a backup save set has passed its browse policy and/or retention policy and has become recyclable, the **scanner** program can be used to rebuild the client index and media index entries for the backup set. When the index entries are rebuilt, the backup save set can be recovered using RMAN.

When Legato Single Server Version relabels a volume, all entries for the volume's backup sets are deleted from the media index. *When a volume is relabeled, the data on the volume can no longer be recovered.* For more information on volume operations, see "[Volume Operations](#)" on page 95.

Note: When Legato Single Server Version relabels a volume for reuse within the *same volume pool*, the volume identification (the name as it appears in the volume label) remains unchanged. However, the information that Legato Single Server Version needs to locate and access the data on the volume is destroyed, and the **scanner** program is no longer an option. At this point, the volume is ready for new data. All existing data is inaccessible and will be overwritten.

All entries for a volume's backup save sets are also deleted from the media index when the volume is deleted *manually*. This type of manual deletion can be performed in the Volumes window or tab in the Administrator program. For more information, see "[Volume Operations](#)" on page 95.

The **scanner** program can still be used to enable data recovery from a manually deleted volume. The **scanner** program can retrieve the information needed to re-create entries in the client index and media index. When the **scanner** program has re-created the index entries, a user with the proper permissions can recover data from the volume using RMAN.

For more information on the **scanner** program, refer to these sources:

- **scanner** entry in the *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on page 39)
- **scanner** man page on UNIX (see "[UNIX Man Pages](#)" on page 37)
- "[Appendix C: scanner Program](#)" on page 189

Tracking the Save Set and Volume Status

In its system of tracking the status of storage volumes and the Oracle backup save sets on them, Legato Single Server Version assigns a "status" value to each backup save set (or "save set") and a "mode" value to each storage volume.

Save Set Status

Table 2 on page 49 shows the possible values that Legato Single Server Version can assign for a save set status.

Table 2. Save Set Status Values

Status Value	Meaning	Description
abort	aborted	The backup for this save set was aborted manually, or a crash occurred during the operation. This save set is considered immediately eligible for recycling.
brows	browsable	The browse policy for this save set has <i>not</i> expired. The files in this save set retain entries in the client index. All the files can be restored using RMAN.
inpro	in progress	This save set is currently being backed up.
recov	recoverable	The browse policy for this save set has expired, but the retention policy has <i>not</i> expired. The files in this save set no longer have entries in the client index but do have entries in the media index. The files can be restored using the scanner program only.
recyc	recyclable	The retention policy for this save set has expired, but the files in this save set still have entries in the media index. The files can be restored using the scanner program only.
scann	scanned-in	The client index entry for this save set was restored using the scanner program. The policies were reset to the values that were applied when the save set was created. For more information, see " Appendix C: scanner Program " on page 189.
susp	suspect	An attempt to restore this save set failed. The restore operation could not read all the blocks of the save set, for example, if there was a bad spot in the tape.

As long as a save set remains in the client index, its status is browsable. After Legato Single Server Version deletes the save set from the client index,

its status changes from browsable to recoverable, and the save set cannot be restored directly using RMAN.

The status of a save set remains recoverable until its retention policy expires. Then, the save set status changes from recoverable to recyclable. When all the save sets on a volume change status to recyclable, the mode of the volume changes to recyclable. For more information on volume modes, see "[Volume Modes](#)" on page 50.

When the status of a save set is either recoverable or recyclable, the save set can be restored from its storage volume using the **scanner** program. The **scanner** program can be used to re-create a save set's entries in the client index and enable file recovery using RMAN.

For more information on how to view the save set status in the Administrator program, see "[How to View Save Set Information](#)" on page 98.

Volume Modes

[Table 3 on page 50](#) shows the possible values that Legato Single Server Version can assign for a volume mode.

Table 3. Volume Mode Values (Part 1 of 2)

Mode Value	Meaning	Description
appen	appendable	The volume contains empty space. Oracle data that meets the criteria for the pool to which the volume belongs can be backed up (appended) to the volume.
man	manual recycle	The volume is exempt from automatic recycling. The mode can only be changed <i>manually</i> in the Volumes window or tab in the Administrator program. For more information, see " How to Change the Mode of a Volume " on page 103.
(R)	read-only	The save sets on the volume are considered read-only. The mode can only be changed <i>manually</i> in the Volumes window or tab in the Administrator program. For more information, see " How to Change the Mode of a Volume " on page 103.

Table 3. Volume Mode Values (Part 2 of 2)

Mode Value	Meaning	Description
recyc	recyclable	The save sets on the volume have exceeded both the browse and retention policy periods. The volume is eligible for automatic recycling. (Legato Single Server Version must relabel the volume before it can overwrite it.)
full	full	The volume is full. There is no more space for data on the volume. The save sets on the volume have <i>not</i> yet exceeded the browse and retention policy periods.

Use the Administrator program to see a list of all the Oracle backup volumes and their modes, as well as the save sets on each volume and their status. For more information on how to view volume modes in the Administrator program, see ["How to View Volume Information" on page 96](#).

For more information on how Legato Single Server Version manages Oracle backup volumes, see ["Chapter 3: Device and Media Management" on page 81](#).

The Administrator Program

Configure and administer Legato Single Server Version using one of the following interfaces:

- Graphical Administrator program (**nwadmin**)
- Character-based administration interface (**nsradmin**)
- Command line interface

The Administrator program provides a graphical interface for connecting to and configuring Legato Single Server Version and its attached tape devices and volumes. The Administrator program can also be used to monitor the status of Oracle backup and restore operations as well as the status of Oracle backup volumes and the backup sets stored on them.



Important: The Administrator program *cannot* be used to administer a Legato NetWorker or other server on the same network. The Administrator program can only be used to configure and administer Legato Single Server Version.

2

During the Legato Single Server Version installation, the Administrator program is automatically installed on the Oracle Server computer. The Administrator program can also be installed and run on a separate Windows computer on the same network as the Oracle Server.

Note: Oracle Server software is *not* required on a separate Windows computer that contains the Administrator program only.

For information on how to use the Administrator program, see the following sections:

- ["Administrator Privileges" on page 52](#)
- ["TCP/IP Network Requirements" on page 53](#)
- ["Legato Single Server Version Connectivity" on page 53](#)
- ["The Administrator Program on UNIX" on page 55](#)
- ["The Administrator Program on Windows" on page 60](#)

Note: Configuration and management tasks performed in the Administrator program can also be performed using either the character-based interface (`nsradmin` program) or Legato Single Server Version commands at the operating system command line. For more information on these alternative options, see the following sections:

- ["Character-Based Interface \(nsradmin\)" on page 69](#)
- ["Command Line Interface" on page 69](#)

Administrator Privileges

Only users listed in the Administrator attribute in the Server resource have permission to make changes to the Legato Single Server Version configuration. Users who do *not* have Administrator privileges can start and use the Administrator program, but are *not* able to make configuration changes. For more information on adding Administrators and Administrator privileges, see ["Server Access Management" on page 71](#).

Note: On Windows, a member of one of the local groups listed in the Administrator list text box must log on locally in order to configure Legato Single Server Version on the local computer.

TCP/IP Network Requirements

The following requirements for TCP/IP network communication must be met before the Administrator program can be used:

- The Legato Single Server Version hostname must be added to the Domain Name System (DNS) file that contains the names and aliases of the servers (hosts) on the network, or to the local *hosts* file located in:
 - */etc* on UNIX
 - *%SystemRoot%\system32\drivers\etc* on Windows

Note: If DNS is used, reverse lookup must be correctly configured.

- If the Legato Single Server Version is a dynamic host configuration protocol (DHCP) client, it must use a reserved address.
- If DHCP is used with dynamic addresses, DHCP must be synchronized with DNS.
- On Windows, use the same name for the Legato Single Server Version TCP/IP hostname and the Windows computer name.

After these requirements are met, the Administrator program can be run according to the information in one of these sections:

- ["The Administrator Program on UNIX" on page 55](#)
- ["The Administrator Program on Windows" on page 60](#)

Legato Single Server Version Connectivity

The Administrator program enables a user to connect to and monitor Legato Single Server Version on a separate computer. For example, the Administrator program can be installed on a Windows computer that is separate from the Legato Single Server Version computer.

- On UNIX, the program automatically connects to a local Legato Single Server Version or the default backup server.
- On Windows, the program displays icons for Legato Single Server Version and the NetWorker servers and clients in the network subnet, and for any remote servers being monitored.

To connect to Legato Single Server Version in order to configure or monitor its activities, use the instructions in ["How to Establish a Server Connection" on page 54](#).

Note: Only a user with Administrator privileges for Legato Single Server Version can perform configuration tasks and issue commands from the Administrator program. A user without Administrator privileges can only monitor the server's activities. For more information on Administrator privileges, see "[Server Access Management](#)" on page 71.

2

How to Establish a Server Connection

To connect to Legato Single Server Version:

- On UNIX:
 1. Run the Administrator program, as described in "[The Administrator Program on UNIX](#)" on page 55.
 2. Select Server>Change to open the Change Server window.
 3. In the Server list, select the Legato Single Server Version hostname. If the name is not listed, do one of the following:
 - Click Update Server List to refresh the list.
 - Enter the Legato Single Server Version hostname in the Server field.
 4. Click OK.
- On Windows:
 1. Run the Administrator program, as described in "[The Administrator Program on Windows](#)" on page 60.
 2. Open the Connect To dialog box by doing one of the following:
 - Click the Connect to Server toolbar button.
 - Select Operations>Connect to Server.
 - Right-click a server icon in the Network or Messages window and select Connect to This Server.
 3. Enter the Legato Single Server Version hostname in the Server text box.
 4. Click OK.

The Administrator program displays information for the Legato Single Server Version that is connected.

How to Monitor a Remote Server from Windows

When the Administrator program is started on Windows, the servers and clients being monitored are usually limited to the subnet. However, a Legato Single Server Version outside of the subnet can also be monitored in the Network and Messages windows by using the Remote Servers feature.

To monitor a remote Legato Single Server Version in the Network window:

1. Select Options>Remote Servers to open the Remote Servers dialog box.
2. In the Server Name text box, enter the name of the remote Legato Single Server Version host, then click Add.
3. Click OK.

The Legato Single Server Version hostname is added to the list. Legato Single Server Version will be monitored as long as the name remains listed.

To stop monitoring a remote Legato Single Server Version:

1. Select Options>Remote Servers to open the Remote Servers dialog box.
2. Select the appropriate Server name.
3. Click Remove.

How to Close a Server Connection

To disconnect and close a Legato Single Server Version connection:

- On UNIX, select File>Exit to exit the Administrator program.
- On Windows, close the Server window and click OK when prompted.
The server icon remains in the Network window and appears in the Connect To dialog box until the Administrator program is exited.

The Administrator Program on UNIX

The following sections describe how to use the Administrator program on UNIX to connect to and configure Legato Single Server Version and its resources:

- ["How to Start the Administrator Program" on page 56](#)
- ["Administrator Toolbar" on page 58](#)
- ["How to Display Hidden Attributes" on page 59](#)
- ["Legato Single Server Version Resources" on page 59](#)

How to Start the Administrator Program

To start the Administrator program and connect to Legato Single Server Version, use one of the following methods:

- If the Legato Single Server Version installation directory is in the system PATH environment variable, enter the **nwadmin** command at the command line prompt:

```
# nwadmin -s server-name &
```

where *server-name* is the Legato Single Server Version hostname.

- If the Legato Single Server Version installation directory is *not* in the system PATH environment variable, enter the *complete* pathname of the **nwadmin** command at the command line prompt, for example:

```
# /usr/sbin/nwadmin -s server-name &
```

where *server-name* is the Legato Single Server Version hostname.

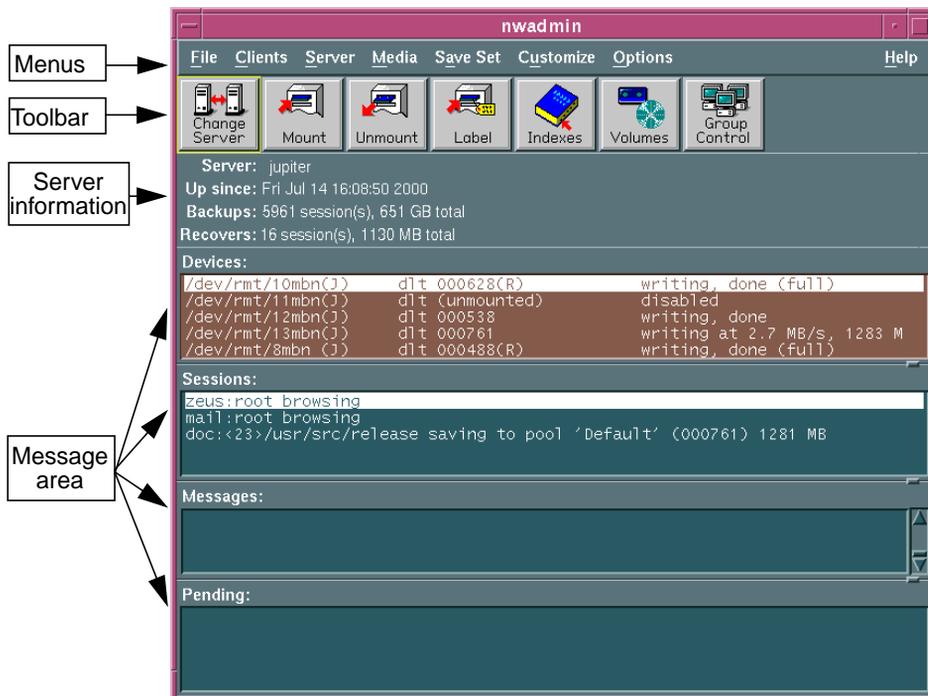
If there are problems starting the Administrator program, consider the following possibilities:

- The Legato Single Server Version software cannot resolve the hostname into a network address.
- A connection is being attempted to a computer not currently running the Legato Single Server Version software.
- The Legato Single Server Version host is unreachable or down.

For more information, see the troubleshooting information in "[Appendix B: Troubleshooting and Error Messages](#)" on page 171.

Most Legato Single Server Version administration tasks can be performed in the Administrator program. The Administrator program contains the program menus, the toolbar, and the windows shown in [Figure 12 on page 57](#).

Figure 12. Administrator Program Interface



2

Server Information

The server information area displays information regarding the Legato Single Server Version that is currently connected.

Message Area

The message area displays the information listed in [Table 4 on page 57](#).

Table 4. Message Area (Part 1 of 2)

Window	Description
Devices window	Displays information about the devices configured for the current server.
Sessions window	Displays progress messages. This information is also written to the <code>/nsr/logs/daemon.log</code> file.

Table 4. Message Area (Part 2 of 2)

Window	Description
Messages window	Displays completion messages. This information is also written to the <code>/nsr/logs/messages</code> file.
Pending window	Displays information on why a backup cannot progress, along with requests to mount tapes and other conditions that require intervention.

The `nsrwatch` command line program also provides this information in a character-based format. For more information on the `nsrwatch` program, refer to the `nsrwatch` man page on UNIX, or the *Legato Command Reference Guide*.

Administrator Toolbar

The Administrator program's toolbar enables a user to perform common tasks by clicking toolbar buttons. [Table 5 on page 58](#) describes the function of each supported toolbar button.

Table 5. Administrator Toolbar Functions (Part 1 of 2)

Button	Name	Function
	Change Server	Opens the Change Server dialog box to connect to a new server.
	Mount	Mounts the device selected in the Devices window.
	Unmount	Unmounts the device selected in the Devices window.
	Label	Labels the device selected in the Devices window.

Table 5. Administrator Toolbar Functions (Part 2 of 2)

Button	Name	Function
	Indexes	Opens the Indexes window, which displays information about the online indexes.
	Volumes	Opens the Volumes window, used to managed volumes.

How to Display Hidden Attributes

By default, the Administrator program leaves some attributes hidden from view in the resource windows. Hidden attributes provide additional functionality and control over resources.

To display hidden attributes, select Details>View in a particular resource window.

Legato Single Server Version Resources

Each resource has a corresponding window or dialog box opened by selecting menu commands. Because resource attributes are created and displayed dynamically in the Administrator program, the same resource window or dialog box might show different attributes depending on the Legato Single Server Version that is currently connected.

For more information on each attribute, select On Window from the Help menu.

For more information on Legato Single Server Version resources, see the following sections:

- ["Legato Single Server Version Architecture" on page 41](#)
- ["Configuration Roadmap" on page 69](#)

The Administrator Program on Windows

The following sections describe how to use the Administrator program on Windows to connect to and configure Legato Single Server Version and its resources:

- ["How to Start the Administrator Program" on page 60](#)
- ["Administrator Program Features" on page 62](#)
- ["Setup Wizard" on page 65](#)
- ["Legato Single Server Version Resources" on page 66](#)

How to Start the Administrator Program

To start the Administrator program and connect to Legato Single Server Version:

1. Use one of these methods to start the program:
 - From the taskbar, select Start>Programs>NetWorker Group>NetWorker Administrator.
 - If the Legato Single Server Version installation directory (*C:\Program Files\nsr\bin*, by default) is in the system path, enter the **nwadmin** command at the command line prompt:
nwadmin -s server-name
where *server-name* is the Legato Single Server Version hostname.
 - If the Legato Single Server Version installation directory is *not* in the system path, enter the *complete* pathname of the **nwadmin** command at the command line prompt, for example:
C:\Program Files\nsr\bin\nwadmin -s server-name
where *server-name* is the Legato Single Server Version hostname.The Administrator program window appears.
2. Click the Connect to Server toolbar button.
3. In the Connect to Server dialog box, enter the name of the Legato Single Server Version host and click OK.

The Server window opens (with the Configure tab active). The Server window displays the name of the Legato Single Server Version host that is currently connected.

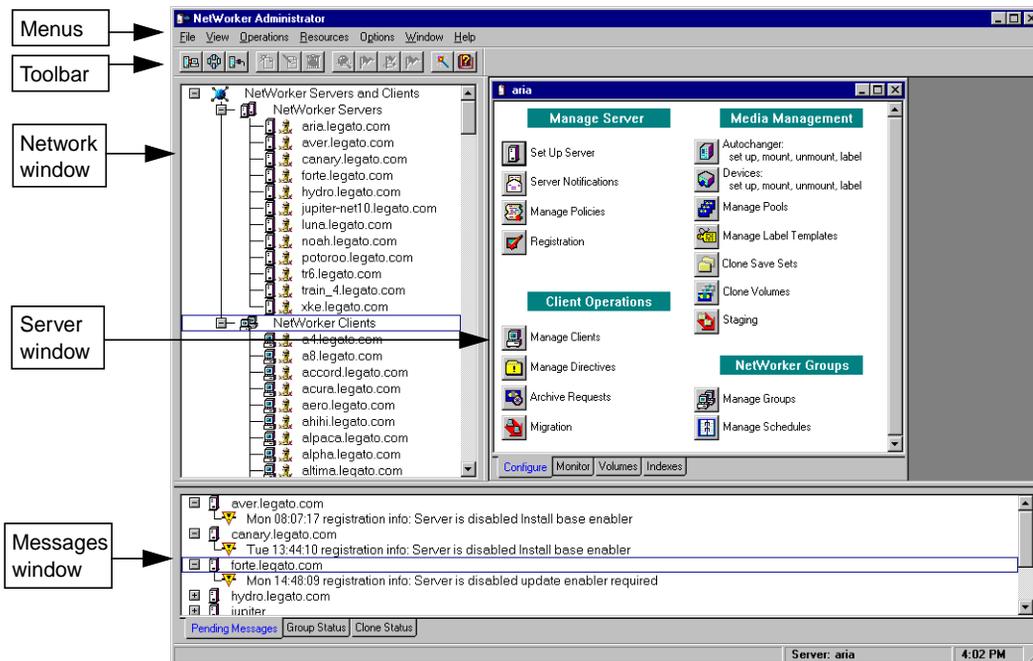
If there are problems starting the Administrator program, consider the following possibilities:

- The hostname cannot be resolved into a network address.
- A connection is being attempted to a computer not currently running the Legato Single Server Version software.
- The Legato Single Server Version host is unreachable or down.

For more information, see the troubleshooting information in "[Appendix B: Troubleshooting and Error Messages](#)" on page 171.

Most administration tasks can be performed in the Administrator program. The Administrator program contains the program menus, the toolbar, and the windows shown in [Figure 13 on page 61](#).

Figure 13. Administrator Program Interface



Network Window

The Network window displays the Legato Single Server Version and NetWorker clients and servers currently on the network. This window can be changed to display all the computers that are on the network.

Server Window

The Server window displays information regarding the Legato Single Server Version that is currently connected.

- If there is more than one Server connected, multiple Server windows appear.
- If there is no connection to a Server, no Server window appears.

The Server window contains information in the following tabs:

- **Configure** — Contains buttons for creating and configuring the Server, Client, Device, and other resources. Buttons for unsupported features (for example, staging) are dimmed.
- **Monitor** — Displays messages about the backup devices.
- **Volumes** — Displays messages about the volumes, including volume names, sizes, modes, and other information.
- **Indexes** — Displays messages about the client indexes, including index names, sizes, and percentages used.

Messages Window

The Messages window displays messages in the Pending Messages tab about server activity and performance that might require intervention.

Note: Legato Single Server Version does not use the Group Status and Clone Status tabs.

Administrator Program Features

The following sections describe the main features of the Administrator program display and how to customize those features:

- ["Administrator Toolbar" on page 62](#)
- ["How to Display Hidden Attributes" on page 64](#)
- ["How to Change the Server Information Refresh Rate \(Polling Interval\)" on page 64](#)
- ["How to Modify the Toolbar" on page 65](#)
- ["How to Sort Tables by Category" on page 65](#)

Administrator Toolbar

The Administrator program's toolbar enables a user to perform common tasks by clicking toolbar buttons.

Note: Depending on the window that is currently open, certain buttons might be disabled.

[Table 6 on page 63](#) describes the function of each supported toolbar button.

Table 6. Administrator Toolbar Functions

Button	Name	Function
	Show NetWorker Servers and Clients	Displays Legato Single Server Version and NetWorker servers and clients in the Network window.
	Show Entire Network	Displays the entire network in the Network window.
	Connect to Server	Opens the Connect To dialog box to connect to Legato Single Server Version.
	Create Item	Opens the Create dialog box to create a new resource. This button is enabled only when a specific resource window is open and the resource type is selected.
	Edit Item	Opens the Edit dialog box to edit the attributes of a specific resource. This button is enabled only when a specific resource window is open and the resource type is selected.
	Delete Item	Deletes a specific resource. This button is enabled only when a specific resource window is open and the resource type is selected.
	NetWorker Wizard	Starts the Setup Wizard for the active server. The Setup Wizard enables simplified configuration of the server and its clients, storage devices, and media. For more information, see " Setup Wizard " on page 65.
	Help Topics	Click this button to access Online Help and open the Help Contents dialog box.

How to Display Hidden Attributes

By default, the Administrator program leaves some attributes hidden from view in the resource windows. Hidden attributes provide additional functionality and control over resources.

To display hidden attributes in the resource dialog boxes:

1. Select Options>Customize to open the Customize dialog box.
2. In the Window Configurations tab, select Display Hidden Attributes.
3. Click OK.

How to Change the Server Information Refresh Rate (Polling Interval)

The *polling interval* determines how often (in seconds) data is refreshed in certain windows of the Administrator program. Polling can be set for as short as five seconds, and as long as 32,767 seconds (approximately nine hours).

A low polling interval value refreshes the data in the status windows more frequently. However, refreshing the data more often can create more network traffic and server overhead. On slower networks, the interval between refreshes can be increased by increasing the polling interval value.

To change the polling interval:

1. Select Options>Customize to open the Customize dialog box.
2. In the Polling Intervals tab, select the appropriate options and click OK. [Table 7 on page 64](#) describes the Polling Intervals tab attributes and their functions.

Table 7. Polling Interval Options

To determine the polling and refresh rates for:	Select this option:
Resource dialog boxes. A resource window can be manually refreshed by right-clicking any icon in the window and selecting Refresh from the pop-up menu.	Primary Polling
The Volumes and Indexes windows. Polling for these windows places a higher load on the network, so Legato recommends setting a higher secondary polling value than for primary polling. The Volumes and Indexes windows can be manually refreshed by right-clicking anywhere in the window and selecting Refresh from the pop-up menu.	Secondary Polling

How to Modify the Toolbar

To modify the toolbar:

1. Select Options>Customize to open the Customize dialog box.
2. In the Toolbar tab, set the following options:
 - Button Size — Click the appropriate button to set the size of the toolbar buttons as either large or small.
 - Show ToolTips — Select to enable the message boxes that identify the items under the mouse pointer.
3. Click OK.

How to Sort Tables by Category

Many dialog boxes and windows in the Administrator program (such as the Volumes window and the Volume Save Sets dialog box) display information in the form of tables.

To sort a table by any category, click the category heading. Clicking on the heading again re-sorts the table in reverse order.

Setup Wizard

The Administrator program includes a Setup Wizard that leads a user through the steps of setting up and configuring Legato Single Server Version. The Setup Wizard takes advantage of default settings to simplify the setup process and ensure the maximum reliability of the configuration.

By following the Setup Wizard through the setup and configuration of the server, client, and any storage devices, a user can learn how to set up Legato Single Server Version quickly and easily. The Setup Wizard can be used at any time to add or modify servers, clients, and storage devices connected to the Legato Single Server Version computer.

To start the Setup Wizard, use one of these methods:

- Click the Wizard button in the Welcome dialog box when the Administrator program is first started.
- Click the Wizard button on the toolbar.
- Select Wizard from the Help menu.

Each screen of the Setup Wizard describes the actions required for that particular task. There is also Online Help for each screen to provide additional information.

Legato Single Server Version Resources

The following sections describe how to access the Legato Single Server Version resources and how to use toolbar buttons and menus to create, modify, and delete the resources.

- ["Resource Windows" on page 66](#)
- ["How to Open the Edit Dialog Box" on page 67](#)
- ["How to Refresh Information in a Resource Window" on page 67](#)
- ["Resource Dialog Boxes" on page 68](#)
- ["Using the Toolbar to Configure Resources" on page 68](#)
- ["Using the Menu Commands to Configure Resources" on page 69](#)

For more information on Legato Single Server Version resources, see the following sections:

- ["Legato Single Server Version Architecture" on page 41](#)
- ["Configuration Roadmap" on page 69](#)

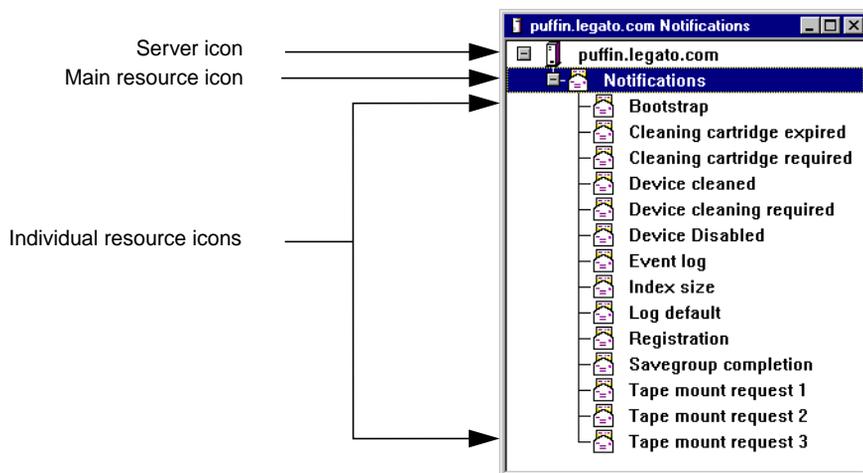
Resource Windows

When a resource icon such as the Server Notifications icon is clicked in the main Administrator window, a resource window appears containing:

- An icon representing Legato Single Server Version
- An icon (known as the main resource icon) representing the resource type
- Individual resource icons under the main resource icon

A resource window appears as shown in [Figure 14 on page 67](#).

The individual resource icons represent all of the individual resources that were either packaged with Legato Single Server Version or were created after Legato Single Server Version was installed on the computer. When a new resource is created, its name and icon appear in the resource window. When a resource is deleted, it no longer appears in the resource window.

Figure 14. Server Notifications Resource Window

As shown in [Figure 14](#), the Server icon appears at the top of the window. A user can right-click this icon and select one of several server tasks that appear.

Below the Server icon is the main resource icon identifying the type of resource (in this case, a Notifications type of resource). To create a new individual resource of this type, right-click the resource icon, select Create, and enter the necessary information in the Create dialog box. The new resource appears in the list of individual resource icons under the main resource icon.

How to Open the Edit Dialog Box

To open the Edit dialog box for a resource, perform one of these steps:

- Double-click the resource icon.
- Right-click the resource icon and select Edit.

How to Refresh Information in a Resource Window

Legato Single Server Version updates and refreshes resource window icons automatically, based on the primary polling interval that is set. When an individual resource is added or deleted, the appropriate resource window reflects the changes the next time polling takes place.

To refresh a resource window manually:

1. Right-click anywhere in the window.
2. Select Refresh.

For instructions on how to set automatic polling, see ["How to Change the Server Information Refresh Rate \(Polling Interval\)"](#) on page 64.

Resource Dialog Boxes

Each resource has a corresponding dialog box that appears any time the Create or Edit menu option is selected for that resource. Because resource attributes are created and displayed dynamically in the Administrator program, the same resource dialog box might show different attributes depending on the Legato Single Server Version that is currently connected.

For more information about each attribute, select Field Help.

Using the Toolbar to Configure Resources

The Administrator program enables a user to create, edit, and delete resources using toolbar buttons with the various resource icons located in the main window. [Table 8 on page 68](#) describes the use of the Create Item, Edit Item, and Delete Item toolbar buttons.

Table 8. Resource Buttons

Button	Condition for Use	Result
 Create Item	When a resource icon is selected (excluding the main autochanger icon).	The Create dialog box for that resource opens. When a resource is created, its icon appears under the resource icon.
 Edit Item	When an individual resource icon in a resource window is selected.	The Edit dialog box for that resource opens.
 Delete Item	When an individual resource icon in a resource window is selected.	The individual resource is deleted from the Administrator program and no longer appears in the resource window.

Using the Menu Commands to Configure Resources

The Create, Edit, and Delete options found in the Resources menu function in much the same way as the toolbar buttons. The conditions for use and their results are equivalent. For more information, see [Table 8 on page 68](#).

Character-Based Interface (nsradmin)

The character-based interface can be used to perform the same configuration and management tasks as in the Administrator program.

Note: The Administrator program provides status information similar to that provided by the **nsrwatch** program for the character-based interface.

To start the character-based interface, enter the **nsradmin** command at the operating system command line prompt:

```
nsradmin
```

For more information on how to use the character-based interface, refer to the **nsradmin** man page on UNIX or the *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on page 39).

Command Line Interface

Any configuration or administration task can be performed by entering Legato Single Server Version commands at the operating system command line. For information on how to use these commands, refer to the following sources:

- UNIX man pages for individual commands
- *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on page 39)

Configuration Roadmap

Before configuring the Legato Single Server Version resources, ensure that Legato Single Server Version is properly installed on the Oracle Server computer. Legato Single Server Version can be installed either during or after the Oracle Server software installation. For more information, refer to the *Legato Single Server Version Installation Guide, Release 6.1*.

After installation, Legato Single Server Version contains a number of *preconfigured* resources, the two main ones being the Server resource and Client resource. "[Legato Single Server Version Architecture](#)" on page 41 describes how Legato Single Server Version uses its system of internal resources and attributes.

The resources must be properly configured before Legato Single Server Version is used for Oracle data storage management. The resources can be viewed and configured using the Administrator program, as described in "[The Administrator Program](#)" on page 51.

To configure the required Legato Single Server Version resources:

1. Configure the Server resource as required. Ensure that the correct parallelism value is specified and the required users have administrative privileges on the system. See "[Configuring the Server Resource](#)" on page 70.
2. Verify that the Client resource is properly configured. See "[Verifying the Client Resource Configuration](#)" on page 75.
3. Configure a Device resource for each storage device (attached to the Oracle Server computer) to be used for Oracle backups and restores. See "[Configuring Storage Devices](#)" on page 81.
4. Configure any required Label Template resources for labeling backup volumes. See "[Storage Managements Operations](#)" on page 90.
Note: For information on how to label and mount backup volumes in the storage devices, see "[Volume Operations](#)" on page 95.
5. Verify that the Default Group resource is properly configured for automatic daily bootstrap backups. See "[Legato Single Server Version Bootstrap Backup](#)" on page 128.

Configuring the Server Resource

After installation, Legato Single Server Version includes a preconfigured Server resource with attribute settings that influence the performance and security of backups. The attributes in the Server resource can be modified for the particular system requirements.

To configure the Server resource:

1. Run the Administrator program, as described in "[The Administrator Program](#)" on page 51.

2. Access the Server resource dialog box:
 - On UNIX, select Server>Setup Server to open the Server dialog box.
 - On Windows, in the Configure tab of the Server window, click the Set Up Server icon to open the Set Up Server dialog box.
3. In the Parallelism attribute, specify the maximum number of backup data streams that Legato Single Server Version allows to arrive concurrently.

Legato Single Server Version supports up to four concurrent data streams. To increase the efficiency of the storage devices, back up multiple data streams at the same time.
4. In the Administrator attribute, specify all the users that should have Administrator privileges for Legato Single Server Version. For the proper format of a user name in the Administrator attribute, see [Table 9 on page 74](#).

For more information on Administrator privileges, see "[Server Access Management](#)" on page 71.
5. To enable the device auto-detection feature *on Windows NT only*, modify the attribute settings in the Device Configuration tab of the Set Server dialog box using the instructions in "[Device Autodetection and Configuration on Windows NT](#)" on page 87.
6. Click Apply or OK.

Server Access Management

Some Legato Single Server Version functions require the operator to have Administrator privileges. Administrators that are authorized to configure the Server must have their addresses included in the Administrator list in the Server resource. For more information, see "[Administrator Privileges](#)" on page 73.

Administrator privileges are required to add, modify, or delete Administrators. Every user or user group listed in the Administrator attribute in the Server resource has permission to modify the Legato Single Server Version configuration and delete entries from the online indexes.

If the following error message is received when Legato Single Server Version configuration changes are attempted, the user name is not included in the Administrator attribute and the user does not have permission to make configuration changes:

```
user user_name needs to be on administrator's list
```

Legato Single Server Version attempts to delete an entry in the online index:

- If the RMAN **delete** command is being used.
- If a *running* Oracle backup is being canceled according to the procedure in ["Canceling a Running Oracle Backup" on page 131](#).

Note: For Legato Single Server Version to delete a backup save set entry in the index, the required Oracle user name must be in the Administrator list; otherwise, the deletion fails. If Legato Single Server Version fails to delete an entry, RMAN might still delete the corresponding entry in the RMAN catalog, leaving the Legato Single Server Version index and RMAN catalog unsynchronized. To resynchronize the index and catalog, issue the appropriate media management command to manually delete the inconsistent save set entries from the Legato Single Server Version index.

To enable Legato Single Server Version to delete an entry from the online index, add the required user name to the Administrator list in the Server resource:

- For an Oracle Server on UNIX:
 - If Net service is used, add the name of the operating system user who starts Net service.
 - If Net service is *not* used, add the name of the operating system user who runs RMAN.
- For an Oracle Server on Windows, add the name of the operating system user who runs the Oracle service (*OracleService<oracle_sid>*).

How to Add an Administrator

Only a current Administrator can add Administrators. To add an Administrator:

1. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
2. Access the Server resource dialog box:
 - On UNIX, select Server>Setup Server to open the Server dialog box.
 - On Windows, in the Configure tab of the Server window, click the Set Up Server icon to open the Set Up Server dialog box.
3. In the Administrator attribute, enter the additional user or group name.

Note: Each Administrator is listed on a separate line in the Administrator attribute.

4. Apply the addition of the new name:
 - On UNIX, click Add and then Apply.
 - On Windows, click OK.

The new name appears in the Administrator attribute.

For details about valid formats for identifying Administrators, see "[Administrator Privileges](#)" on page 73.

How to Delete an Administrator



Important: Do not delete *all* Administrators, especially *root@server-name* on UNIX or *Administrators@server-name* on Windows, because that administrator is required to start Legato Single Server Version daemons and services.

To delete an Administrator:

1. Run the Administrator program, as described in "[The Administrator Program](#)" on page 51.
2. Access the Server resource dialog box:
 - On UNIX, select Server>Setup Server to open the Server dialog box.
 - On Windows, in the Configure tab of the Server window, click the Set Up Server icon to open the Set Up Server dialog box.
3. Select the name to be deleted in the Administrator list box, then click Delete.
4. Click Apply or OK.

Administrator Privileges

Although any user can view resources in the Administrator program, only users specified in the Administrator attribute in the Server resource can add to or change the Legato Single Server Version configuration and delete entries from the online indexes.

After installation, *root@server-name* on UNIX and *Administrators@server-name* on Windows are the only users authorized to change the Legato Single Server Version configuration, by default. The Administrator attribute in the Server

dialog box should include the following entries, depending on the platform where the Administrator program is running:

- Windows: *Administrators@hostname*
- UNIX: *root@hostname*

Note: Legato Single Server Version must be able to convert *hostname* to a resolved TCP/IP address.



Important: If the Administrator list must be restricted so that it does not include *root@server-name* on UNIX or *Administrators@server-name* on Windows, ensure that the Administrator list includes the account that starts the Legato Single Server Version daemons or services. Normally, this is the system account. Using *system@server-name* would allow the proper access to resources and allow the daemons or services to start.

To give administrative privileges to additional users or user groups, add their names to the Administrator attribute in the Server resource. On Windows, Legato Single Server Version recognizes domain names and Microsoft Windows groups, both local and global, for example:

- Administrators group
- Domain Admins group

In a Windows domain, only the *global* group is recognized. To find out the name of the group, run the Windows utility **findgrp.exe**, available with the Windows Resource Kit.

On an individual Windows computer, only the *local* group is recognized, because there is no “global” group.

User names in the Administrator attribute must be in one of the formats listed in [Table 9 on page 74](#).

Table 9. Acceptable Administrator Formats (Part 1 of 2)

Acceptable Formats	Example
<i>local-group@hostname</i>	Administrators@jupiter
<i>global-group@hostname</i>	Domain Admins@jupiter
<i>root@hostname</i>	root@jupiter

Table 9. Acceptable Administrator Formats (Part 2 of 2)

Acceptable Formats	Example
<i>account-name@hostname</i>	anyone@jupiter
<i>wildcard@hostname</i>	*@jupiter
<i>hostname / wildcard</i>	jupiter / *
<i>user@domain-name</i>	me@jupiter.com
<i>user@hostname</i>	me@jupiter
<i>hostname / user</i>	jupiter / me
<i>user@wildcard</i>	me@*
<i>wildcard / user</i>	* / me
<i>user</i>	me



Important: Using a wildcard before the @ sign grants Administrator privileges to any account logged onto that computer. Using a wildcard after the @ sign grants Administrator privileges to any group or account name that precedes the @ sign, regardless of their location.

Using wildcards in the Administrator list might introduce security problems; before using them, verify that enterprise security is not compromised.

Note: If the **nsradmin** interface is used to input these entries, they must be separated by commas.

Verifying the Client Resource Configuration

After installation, Legato Single Server Version contains a preconfigured Client resource with attribute settings that define the Oracle Server as a backup client.



Important: Do *not* modify the attribute settings in the preconfigured Client resource.

The Client resource provides the following type of information:

- How long to maintain backup data entries in the client index for recovery (according to the Browse Policy attribute).
- How long to maintain backup volume entries in the media index for recovery (according to the Retention Policy attribute).
- How to run the automatic daily bootstrap backup.

To view the Client resource configuration:

1. Run the Administrator program, as described in "[The Administrator Program](#)" on page 51.

2. Access the Client resource:

- On UNIX:
 - a. Select Clients>Client Setup to open the Clients window.
 - b. In the Clients list, select the Oracle Server name.

The Clients window appears as shown in [Figure 15 on page 78](#). The window shows the supported Client resource attributes. For more information on the attributes, refer to the Online Help.

- On Windows:
 - a. In the Configure tab in the Server window, click Manage Clients to open the Clients window.
 - b. Right-click the Clients icon with the Oracle Server name, and select Edit to open the Edit Client dialog box.

The Edit Client dialog box appears as shown in [Figure 16 on page 79](#). The General tab shows the supported Client resource attributes. For more information on an attribute, click Field Help.

3. Verify the supported attribute settings:

Note: Legato Single Server Version does *not* support all the resource attributes displayed. The following attributes are the only ones supported.

- Name — This attribute lists the hostname of the Oracle Server.
- Browse Policy — This attribute specifies the length of time (one year, by default) that Legato Single Server Version retains an entry for an Oracle backup in the online client index.

Note: If the NSR_BROWSE environment variable is set as described in ["Legato Single Server Version Environment Variables" on page 109](#), its value *overrides* the Browse Policy attribute setting in the Client resource.

- **Group** — This attribute specifies the backup group used for the automatic daily bootstrap backup. The attribute must be set to Default for the proper bootstrap backup configuration. For more information, see ["Automatic Bootstrap Backup" on page 129](#).
- **Retention Policy** — This attribute specifies the minimum length of time (one decade, by default) that Legato Single Server Version maintains information about Oracle backup data in the online media index.

Note: If the NSR_SAVESET_EXPIRATION environment variable is set as described in ["Legato Single Server Version Environment Variables" on page 109](#), its value *overrides* the Retention Policy attribute setting in the Client resource.

- **Save Set** — This attribute specifies the pathname of the configuration file backed up during the automatic daily bootstrap backup.

For more information on how Legato Single Server Version uses the browse and retention policies to manage Oracle backup data and enable the data to be restored, see ["Overview of Legato Single Server Version Operations" on page 44](#).

Figure 15. Clients Window on UNIX

2

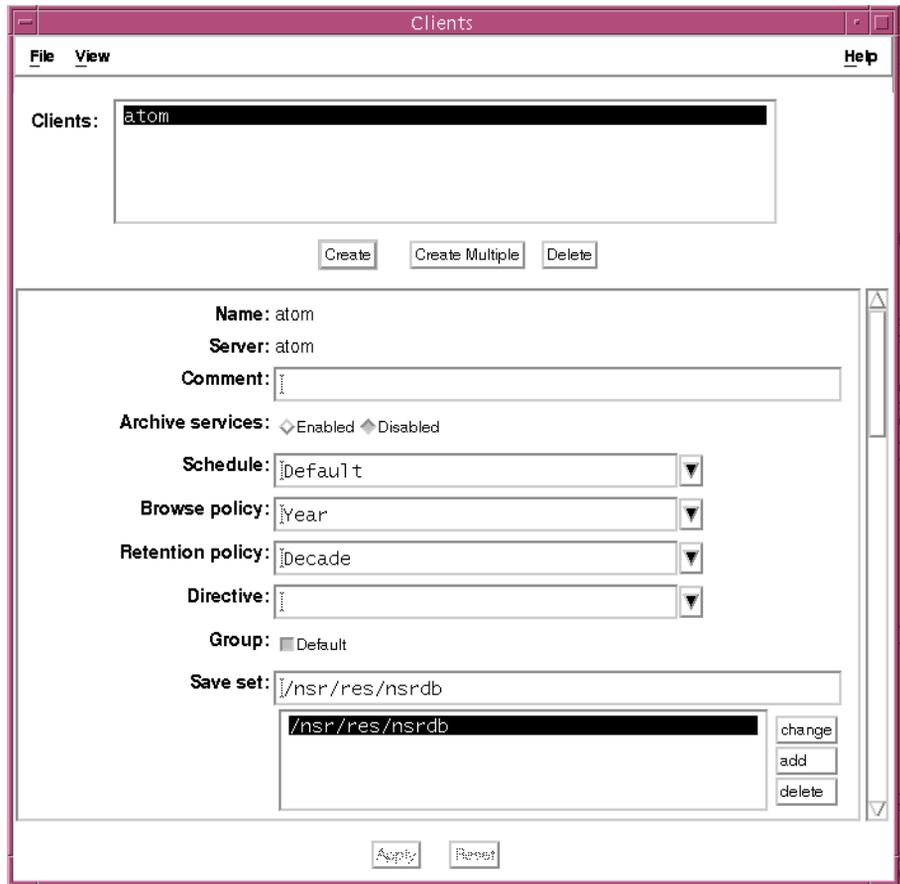
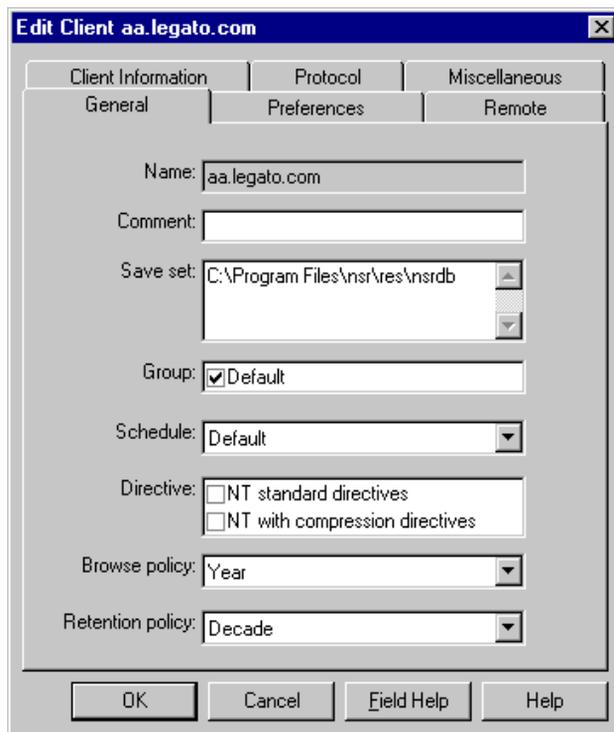


Figure 16. Edit Client Dialog Box on Windows

Configuring Other Resources

Before Legato Single Server Version can be used for backups and restores, a Device resource must be created for each backup device. A backup volume must also be labeled and mounted in each device.

For more information on configuration and management tasks involving the backup devices and volumes, see "[Chapter 3: Device and Media Management](#)" on page 81.

Chapter 3: Device and Media Management

This chapter describes how to configure and manage the storage devices and volumes for Oracle backup and restore operations. It explains how Legato Single Server Version sorts Oracle data onto volumes grouped into volume pools and how volumes can be labeled and mounted in the storage devices. It also describes how Legato Single Server Version tracks Oracle backup volumes and their data.

This chapter includes the following main sections:

- ["Configuring Storage Devices" on page 81](#)
- ["Storage Managements Operations" on page 90](#)
- ["Volume Operations" on page 95](#)

Configuring Storage Devices

A storage device is a local tape drive that Legato Single Server Version uses to write Oracle data during a backup and to read Oracle data during a restore operation. Legato Single Server Version recognizes an attached storage device only if a Device resource has been configured for it.

Consider the following Legato Single Server Version features when planning the configuration of the storage devices:

- Support for tape devices only
- Support for up to four storage devices attached to the Legato Single Server Version computer
- Support for up to four Oracle data streams backing up simultaneously to the storage devices
- Support for device autodetection *on Windows NT only*
- *No support for autochangers (jukeboxes) or silos*

- No support for high-speed devices
- No support for cloning

Except for autochangers, silos, and high-speed devices, Legato Single Server Version supports all the same devices as the Legato NetWorker release 6.1 product. For more information on the devices Legato NetWorker supports, refer to the *Legato Compatibility Guide for Hardware* at the Legato web site www.legato.com.

Note: Legato Single Server Version supports device autodetection and configuration on Windows NT only. For more information, see "[Device Autodetection and Configuration on Windows NT](#)" on page 87.

Preparing for Device Resource Configuration

3

The Legato Single Server Version installation automatically configures a Device resource for a default tape device. For more information on Legato Single Server Version installation, refer to the *Legato Single Server Version Installation Guide*.

The Legato Single Server Version configuration must include a Device resource for each tape device to be used for Oracle backup and restore operations. Up to four Device resources can be configured. Each tape device to be used must contain a labeled and mounted volume.

The Administrator program enables a user to view, create, modify, or delete Device resources. For more information on the Administrator program, see "[The Administrator Program](#)" on page 51.

Note: To be able to create, modify, or delete a Device resource, run the Administrator program as an Administrator (one of the users listed in the Administrator attribute of the Server resource). To view resources only, run the Administrator program as any system user. For more information on Administrator privileges, see "[Server Access Management](#)" on page 71.

Device Preparation on Windows

On Windows, use the Tape Devices program in the Control Panel to install the device driver for a storage device *before* configuring the Device resource for the device. Only devices currently registered with the Windows Registry are available for use with Legato Single Server Version.

To determine the devices that are available:

1. Open an MS-DOS window.
2. Change to the Legato Single Server Version binary directory (*C:\Program Files\nsr\bin*, by default).
3. Display all the devices currently available by entering the following command at the operating system prompt:

inquire

In the resulting display:

- Devices that have a Registry entry of `\\.\TAPE#` are tape devices.
- Devices that have a Registry entry of `\\.\PHYSICALDRIVE#` are regular disk drives.
- Some physical hard drives can also have a `\\.\PHYSICALDRIVE#` Registry entry but are not compatible with Legato Single Server Version.
- Any devices not listed, or listed without a Registry entry, are unavailable to Legato Single Server Version.

If a tape device does not appear in the Windows Registry, consider one of the following reasons:

- The tape device is not properly installed.
- The device driver is not properly installed.
- The driver might not be compatible with the device. See the device manufacturer for information on the latest supported drivers.

On Windows 2000, disable RSM for each storage device to be used by Legato Single Server Version:

1. On the Windows desktop, right-click My Computer and select Manager.
2. On the Computer Management navigation pane (left side of the dialog box), expand *Storage\Removable Storage\Physical Locations*.
3. For each connected device:
 - a. Right-click the device name and select Properties from the pop-up menu.
 - b. In the General tab of the Properties dialog box, ensure that the Enable Library check box is *cleared*.
4. Click OK to apply any changes and close the Computer Management dialog box.

Device Resource Configuration

View, create, modify, or delete Device resources using the Administrator program. For more information on the Administrator program, see "[The Administrator Program](#)" on page 51.



Important: A *nonrewinding* device name must be specified in a tape device configuration. When backing up to a tape volume, Legato Single Server Version writes a file mark on the volume at the end of each backup and uses the position of that file mark to append data onto the volume during the next backup. If the device rewinds the volume at the end of a backup, the file mark position is lost and the existing data on the volume is overwritten during the next backup.

3

For information on Device resource procedures, see the following sections:

- "[How to View a Device Resource](#)" on page 85
- "[How to Create a Device Resource](#)" on page 85
- "[How to Edit a Device Resource](#)" on page 86
- "[How to Delete a Device Resource](#)" on page 86

Information on the configured storage devices is displayed in the Administrator program:

- On UNIX, in the Devices window in the Message area. See "[Message Area](#)" on page 57.
- On Windows, in the Monitor tab in the Server window. See "[Server Window](#)" on page 62.

To enable the device autodetection feature *on Windows NT only*, see "[Device Autodetection and Configuration on Windows NT](#)" on page 87.

For information on labeling, mounting, and using volumes in the configured storage devices, see "[Storage Managements Operations](#)" on page 90.

How to View a Device Resource

To view an existing Device resource and its attributes using the Administrator program:

- On UNIX:
 1. Select Media>Devices to open the Devices window.
 2. Click the device name in the Devices scrolling list. The resource attributes appear in the lower part of the window.
- On Windows:
 1. In the Configure tab in the Server window, click Devices to open the Devices window.
 2. Right-click the icon of the device and select Edit to open the Edit Device dialog box. The resource attributes appear in the dialog box.

How to Create a Device Resource

To create a Device resource using the Administrator program:

1. Open a window for creating the resource:
 - On UNIX:
 - a. Select Media>Devices to open the Devices window.
 - b. Click the Create button under the Devices scrolling list.
 - On Windows:
 - a. In the Configure tab in the Server window, click Devices to open the Devices window.
 - b. Right-click the main Devices icon and select Create to open the Create Device dialog box.
2. In the Name attribute, enter the device pathname for the tape device.
3. In the Media Type attribute, select the correct type of media from the list.
4. In the Read Only attribute, select:
 - Yes to specify that the device be used *only* for restoring Oracle data.
 - No to specify that the device be used for *both* backups and restores.
5. In the Target Sessions attribute, select the number of sessions that Legato Single Server Version will allocate to the device before using the next device during a backup of multiple backup sets.

For more information on how Legato Single Server Version uses the Target Sessions attribute during backups, see "[Multiplexing during Oracle Backups](#)" on page 127.

6. In the Auto Media Management attribute (in the Operation tab on Windows), select Yes to enable auto media management for the tape device.

For more information on auto media management, see "[Auto Media Management for Tape Devices](#)" on page 93.

7. Click Apply or OK.

How to Edit a Device Resource

To edit an existing Device resource using the Administrator program:

1. Open the resource window:
 - On UNIX:
 - a. Select Media>Devices to open the Devices window.
 - b. Click the device name in the Devices scrolling list. The resource attributes appear in the lower part of the window.
 - On Windows:
 - a. In the Configure tab in the Server window, click Devices to open the Devices window.
 - b. Right-click the icon of the device and select Edit to open the Edit Device dialog box. The resource attributes appear in the dialog box.
2. Make the required changes to any of these attributes:
 - Media Type
 - Read Only
 - Target Sessions
 - Auto Media Management

Note: The Enabled attribute must be set to Yes to ensure that the device is enabled for Oracle backup and restore operations.
3. Click Apply or OK.

How to Delete a Device Resource

Note: A Device resource cannot be deleted for a device that contains a mounted volume.

To delete an existing Device resource using the Administrator program:

- On UNIX:
 1. Select Media>Devices to open the Devices window.
 2. Click the device name in the Devices scrolling list.
 3. Click the Delete button under the Devices scrolling list.
 4. Click OK in the dialog box that pops up.
- On Windows:
 1. In the Configure tab in the Server window, click Devices to open the Devices window.
 2. Right-click the icon of the device and select Delete.
 3. Click Yes in the dialog box that pops up.

Device Autodetection and Configuration on Windows NT

On Windows NT *only*, the device autodetection and configuration feature can be enabled. This feature enables Legato Single Server Version to automatically detect and configure attached SCSI (sequential access) tape devices.

Legato Single Server Version starts an autodetection session as a background process that automatically looks for *new* SCSI sequential access tape devices. When autodetection is complete, Legato Single Server Version creates a Device resource for each supported device it detects. The Device resources are listed in the Devices window of the Administrator program. As for other resources, the attributes can be modified or the Device resources deleted altogether.

Device autodetection also looks at devices with *existing* Device resources. If an existing Device resource's description has changed or if a Device resource is listed but the device itself cannot be detected by the autodetection process, Legato Single Server Version displays an error message and the device remains disabled.

Note: Legato Single Server Version supports up to four configured storage devices. If device autodetection is enabled and more than four devices are connected, Legato Single Server Version will use only up to four of the detected and configured devices.

Device autodetection does *not* automatically delete inactive or obsolete Device resources listed in the Devices window. These resources must be deleted manually. See "[How to Delete a Device Resource](#)" on page 86.

Device Autodetection Enabling Options

When Legato Single Server Version is first installed, the device autodetection feature is *disabled*. To enable the device autodetection feature, change the value of the Search New Devices attribute in the Server resource, located in the Set Up Server dialog box.

Select one of these values for the Search New Devices attribute:

- **Now** - Begins device detection immediately. This value reverts to the previous setting (either At Startup or Never) following the autodetection. Reset the Search New Devices attribute to this choice each time an immediate autodetection is to be performed.
- **At Startup** - Automatically looks for new devices each time the computer is rebooted, or if the Legato Single Server Version services are restarted manually.

Note: Ensure that the devices are compatible and the latest device drivers are installed prior to starting Legato Single Server Version. Device and driver incompatibilities can degrade or prevent Legato Single Server Version from properly starting when this feature is enabled.

- **Never** - Disables the device autodetection feature. This is the *default* value of the Search New Devices attribute.

How to Set Device Autodetection

To set autodetection and configuration of devices on Windows NT:

1. Run the Administrator program as one of the users listed in the Administrator attribute of the Server resource. For more information, see ["The Administrator Program" on page 51](#).
2. In the Configure tab in the Server window, click Set Up Server to open the Set Up Server dialog box.
3. In the Device Configuration tab, select the appropriate choice from the Search New Devices drop-down list:
 - **Now** - Begins device detection immediately. (This value automatically reverts to its previous setting of either At Startup or Never following autodetection.)
 - **At Startup** - Automatically looks for new devices each time the Administrator program starts.
 - **Never (default)** - Disables the device autodetection feature.

4. Select Yes from the Enable New Devices list to have Legato Single Server Version automatically enable all devices it detects.

Note: Enable this attribute only if it is certain that all devices detected will serve Legato Single Server Version—otherwise, another computer's devices might be inadvertently misused or reconfigured.

5. Enter the Legato Single Server Version hostname in the Device Host List list box.
6. Click OK to close the Set Up Server dialog box.

If Now is selected for the Search New Devices attribute, Legato Single Server Version immediately starts an autodetection session. Otherwise, Legato Single Server Version must be shut down and restarted for autodetection to occur.

Device Enabling and Configuration Following Autodetection

Some of the devices detected might be owned by other applications. Legato Single Server Version initially disables and only partially configures the Device resources that it creates during autodetection, by default.

Note: Speed up and simplify autodetected device configuration by specifying that Legato Single Server Version automatically enable all new devices. Setting the Enable New Devices attribute in the Set Up Server dialog box to Yes instructs Legato Single Server Version to immediately enable any new Device resources created during the autodetection process. See "[How to Set Device Autodetection](#)" on page 88.

To enable each Device resource manually, open its Edit Device dialog box and select Yes for the Enabled attribute. For details, see "[How to Edit a Device Resource](#)" on page 86.

To assist in identifying each device, the Edit Device dialog box contains the Description attribute describing the device. This is a read-only attribute displaying device information, including the vendor ID, product ID, and logical unit number (LUN).

After a device is enabled, Legato Single Server Version completes all the required configuration for the device. Legato Single Server Version gives default values to other attributes in the Edit Device dialog box. To change any attribute value, open the Edit Device dialog box and make the change. Once the devices are enabled and their configuration is complete, Legato Single Server Version can use the devices for Oracle backup and restore operations.

Storage Managements Operations

The following sections detail the various components and tasks involved in the operations of storage volume and pools.

How Legato Single Server Version Uses Pools and Label Templates

A pool is a collection of storage volumes that Legato Single Server Version groups together according to specific common characteristics. Legato Single Server Version uses volume pools to sort and store Oracle backup data. It uses pools in conjunction with label templates to keep track of what data is on which specific volume.

Every volume belongs to a volume pool. Every volume pool is defined by its Pool resource. The attributes in the Pool resource act as a filter that Legato Single Server Version uses to determine which data to write to the volumes in that pool.

Each pool has a matching label template associated with it. Volumes are labeled according to the rules of these label templates. Label templates provide a method for consistently naming and labeling volumes so there is no need to keep track of how many volumes are used.

A volume label is a unique internal code applied by Legato Single Server Version that initializes and identifies the volume as part of a specific pool. Labeling a volume provides a unique name for tracking and recognizing the media in records stored in the media index. Legato Single Server Version uses the media index to store information about backup volumes and determine which volumes are needed for restoring data. For more information on how Legato Single Server Version uses the media index, see ["Overview of Legato Single Server Version Operations" on page 44](#).

Legato Single Server Version supports only the preconfigured Default label template. For more information on label templates, see ["Appendix D: Using Label Templates" on page 195](#).

When Legato Single Server Version labels a volume, it first verifies that the volume is unlabeled. Then it labels the volume with the name specified in the Volume Name attribute, using one of the following:

- The next sequential label from the label template associated with the pool.
- An override volume name that is entered.



Important: Applying a new label to a volume, or recycling a volume by relabeling it, makes any existing data on the volume unavailable for restore.

If a recyclable volume is relabeled from the same pool, the volume label name and sequence number remain the same, but access to the original data on the volume is destroyed. The volume becomes available for new data.

While Legato Single Server Version contains several preconfigured volume pools after installation, it supports the *Default volume pool only*. For more information, see "[Default Volume Pool](#)" on page 91.

Default Volume Pool

The preconfigured resource for the Default volume pool has the following attributes:

Name: Default
Enabled: Yes
Pool type: Backup
Label template: Default
Store index entries: Yes
Auto media verify: No
Recycle to other pools: No
Recycle from other pools: No

Note: The Default Pool resource *cannot* be modified.

To view the Default Pool resource configuration, run the Administrator program (see "[The Administrator Program](#)" on page 51) and perform the following steps:

- On UNIX:
 1. Select Media>Pools in the main Administrator window to open the Pools window.
 2. In the upper part of the Pools window, highlight Default in the Pools scrolling list. The Default pool attributes are displayed in the lower part of the window.

- On Windows:
 1. In the Configure tab in the Server window, click Manage Pools to open the Pools window.
 2. Right-click the Default icon and select Edit. The Edit Pool dialog box opens with the Default pool attributes displayed.

The preconfigured label template associated with the Default pool is also named Default. The Default Label Template resource has the following attributes:

Name: Default

Fields: hostname, 001-999

Separator: .

Legato Single Server Version automatically uses this Default label template when it labels volumes for the Default pool. For example, if its hostname is *jupiter*, Legato Single Server Version automatically labels the volumes for the Default pool as *jupiter.001*, *jupiter.002*, *jupiter.003*, and so on. This default labeling scheme can be overridden when a backup volume is labeled manually.

For more information on how to label volumes, see ["Volume Operations" on page 95](#).

How Legato Single Server Version Uses Volumes during a Backup

When an Oracle backup occurs, Legato Single Server Version tries to match the characteristics of the save stream to the resource attributes configured for a pool. If the save stream matches the criteria of a pool configuration, Legato Single Server Version directs the save stream to a labeled volume belonging to that pool.

Legato Single Server Version then checks if a correctly labeled volume from the pool is mounted in a configured tape device.

- If only one volume from the pool is mounted and appendable, Legato Single Server Version writes the backup data to that volume.
- If more than one volume from the same pool is mounted, Legato Single Server Version uses the following considerations to select a volume:

- Volume mode

Legato Single Server Version selects a volume using the following hierarchy:

1. A mounted, appendable volume from the appropriate pool.

2. A mounted, recyclable volume from the appropriate pool but not currently in use. (All the save sets on a recyclable volume have the status recyclable.)

Note: A mounted recyclable volume that belongs to a different pool will not be recycled. The choice is a new, unlabeled volume.
 3. An appendable volume that is not currently mounted in the device, but is from the appropriate pool.
 4. A recyclable volume that is not currently mounted in the device, but is from the appropriate pool.
 - Volume label time (the time when the volume was labeled)
Volumes with the oldest label time are selected before volumes that were labeled more recently.
 - Number of sessions currently being written to a device.
- If Legato Single Server Version cannot find a mounted volume from the appropriate pool, it performs one of the following actions:
 - If auto media management is enabled for a device (in the Device resource), Legato Single Server Version can *automatically* label and mount an unlabeled or recyclable volume that is loaded in the device and proceed with the backup.
For more information on auto media management, see "[Auto Media Management for Tape Devices](#)" on page 93.
 - If auto media management is *not* enabled for a device, Legato Single Server Version requests a writable volume by displaying a message similar to the following in the Pending Messages section:
media waiting (or critical): backup to pool 'Default'
waiting for 1 writable backup tape or disk
Legato Single Server Version displays one of three messages suggesting that the user mount a volume, relabel a volume, or label a new volume. It continues to generate messages until the user mounts an appropriate volume; then it proceeds with the backup.

Auto Media Management for Tape Devices

Legato Single Server Version supports auto media management for tape devices. The auto media management feature gives automatic control over a volume loaded in a configured tape device.

If the auto media management feature is enabled in the Device resource for the tape device, Legato Single Server Version automatically:

- Labels the volume
- Mounts the volume
- Overwrites a volume it considers unlabeled
- Reuses a recyclable volume that is loaded in the device

Legato Single Server Version considers a volume *unlabeled* if one of the following conditions apply:

- The volume has no internal label.
- The volume is labeled with information other than a recognizable label.
- The volume is labeled with a proper label, but the density indicated on the internal label differs from the density of the device where the volume is mounted.

Note: Since auto media management can relabel a tape volume with a different density, it is possible to inadvertently overwrite data that still has value. For this reason, be careful if tape volumes are shared between devices with different densities.

If the auto media management feature is *not* enabled for a tape device, Legato Single Server Version ignores an unlabeled tape in the device and does not consider it for backup.

If the auto media management feature is enabled for a tape device, the following processes occur when a volume becomes full during a backup:

1. Legato Single Server Version issues a notification that it is waiting for a writable volume. At the same time, it waits for the full, verified volume to be unmounted.
2. Legato Single Server Version monitors the device, and waits for an operator to insert another volume into the device.
3. After detecting a volume, Legato Single Server Version checks whether the volume is labeled. If the volume is already labeled, it mounts the volume. Legato Single Server Version checks to see whether the newly mounted volume is a candidate to write data to.
 - If so, the write operation continues.
 - If not, it waits for a writable volume to continue the backup.
4. If the volume is recyclable and is a member of the required pool, Legato Single Server Version recycles it the next time a writable volume is needed.

5. If the volume is unlabeled, Legato Single Server Version labels it when the next writable volume is needed for a backup.

If a *non-full* volume is unmounted from a tape drive and auto media management is enabled, Legato Single Server Version waits for 60 minutes before it automatically remounts the volume in the drive. This hour delay is designed to give an operator time to unload the volume after unmounting it.

To enable auto media management for a tape device, modify the Device resource for the tape device, as described in "[How to Edit a Device Resource](#)" on page 86.



Important: Legato Single Server Version considers volumes that were labeled by a different application to be valid relabel candidates if auto media management is enabled. Once Legato Single Server Version relabels a volume, any data on the volume is lost.

Volume Operations

A configured backup device attached to the Oracle Server must have a labeled storage volume mounted in it before Legato Single Server Version can use the device and volume for backup and restore operations. A volume must also be unmounted in the device before it can be replaced with another volume.

Use the Administrator program to view information about volumes and their save sets. In the Administrator program, an administrative user can also use the Volumes window to perform the following volume operations:

- Change a save set status
- Change a volume mode
- Recycle a volume
- Delete a volume from the media index

For information on volume operations, see the following sections:

- "[How to View Volume Information](#)" on page 96
- "[How to View Save Set Information](#)" on page 98
- "[How to Mount a Volume](#)" on page 100
- "[How to Label and Mount a Volume in One Operation](#)" on page 100
- "[How to Label a Volume without Mounting It](#)" on page 102

- "How to Unmount a Volume" on page 102
- "How to Find a Volume Name" on page 103
- "How to Change the Mode of a Volume" on page 103
- "Marking a Volume as Full for Off-Site Storage" on page 105

How to View Volume Information

To view volume information:

- On UNIX:
 1. Run the Administrator program, as described in "The Administrator Program" on page 51.
 2. Select Media>Volumes or click the Volumes button to open the Volumes window.
- On Windows:
 1. Run the Administrator program, as described in "The Administrator Program" on page 51.
 2. Select the Volumes tab in the main Administrator window.
The Volumes tab appears as shown in Figure 17 on page 96.

Figure 17. Volumes Tab

Name	Barcode	Written	Used	Mode	Expiration	Location	Pool
jupiter.000(R)		7637 MB	100%		08/01/01	Tape Drive	mypool
jupiter.001(R)		4560 MB	100%		08/30/01	Tape Drive	mypool
jupiter.002		2677 MB	full	recyc	10/18/01	Tape Drive	mypool
jupiter.003		3191 MB	full	recyc	11/10/01	Tape Drive	mypool
jupiter.004		2543 MB	full	recyc	12/31/01	Tape Drive	mypool
jupiter.005		2471 MB	full	recyc	01/16/02	Tape Drive	mypool
jupiter.006		1952 MB	100%		02/23/02	Tape Drive	mypool
jupiter.007		2536 MB	full	recyc	04/05/02	Tape Drive	mypool
jupiter.008		1824 MB	0%	appen	05/18/02	Tape Drive	mypool
jupiter.009		2001 MB	0%	appen	06/03/02	Tape Drive	mypool
jupiter.010		2541 MB	0%	appen	07/30/02	Tape Drive	mypool

The Volumes window or Volumes tab displays the information for each backup volume, including the volume name, the amount of data written to the volume, the percentage currently used, and other topics.

Check the Volumes window or Volumes tab to view the contents of the media index and as a starting point for changing volume modes, deleting volumes, or setting locations for the collection of volumes.

Table 10 on page 97 describes the volume information displayed in the Volumes window or Volumes tab.

Table 10. Volume Information in the Volumes Window or Volumes Tab

Category	Description
Name	Volume name, which is the same as the name that appears on the volume label. An (R) at the end of the name indicates that the volume is read-only.
Pool	Name of the pool to which the volume belongs.
Written	Exact number of bytes written to the volume.
% Used	Estimated percentage of the volume used, based on the total capacity of the volume according to the Media Type value specified in the Device resource. When %Used is <i>full</i> , there is no more space on the volume and the end-of-tape marker has been reached or an error with the media has occurred. In contrast, when %Used is <i>100%</i> , the Written value equals or exceeds the estimated capacity of the volume. (However, space may still be available because the end-of-tape marker has not been reached.)
Mode	One of the possible volume mode values described in " Volume Modes " on page 50.
Location	Location of the volume (entered by the user as a reminder) that describes a physical location meaningful within the user's environment, such as "2nd shelf, Cabinet 2, Room 42."

Read-Only Mode

Changing the mode of a volume to read-only prevents new data from being written to the volume. A read-only volume is *not* a write-protected volume.

The save sets on a read-only volume are still subject to their browse and retention policies, and the volume is not protected from being overwritten. When all the save sets on the volume change status to recyclable, the mode of

the volume changes to recyclable, and the volume becomes eligible for automatic recycling.

To change a volume mode, see ["How to Change the Mode of a Volume" on page 103](#).

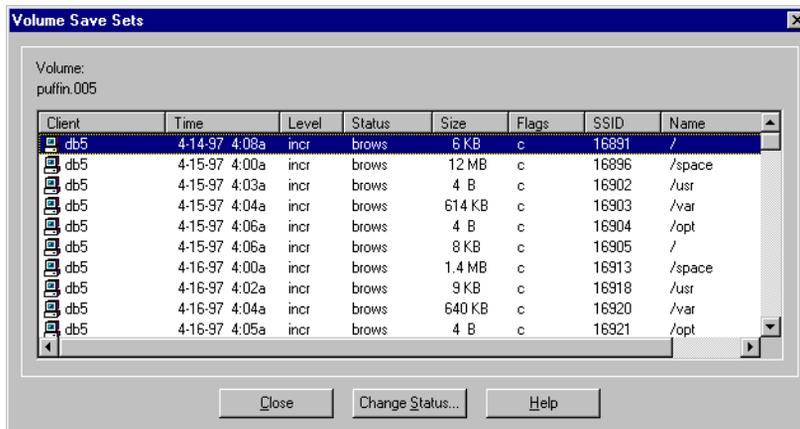
How to View Save Set Information

To view save set information:

- On UNIX:
 1. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
 2. Select Media>Volumes or click the Volumes button to open the Volumes window.
 3. Click a volume name to view save set information for the specific volume.
- On Windows:
 1. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
 2. Select the Volumes tab in the main Administrator window.
 3. Right-click a volume name in the list of volumes.
 4. Select Show Save Sets.

The Volume Save Sets dialog box appears as in [Figure 18 on page 98](#), displaying information about the save sets on the selected volume.

Figure 18. Volume Save Sets Dialog Box



The Volumes window or Volume Save Sets dialog box displays information about all the save sets stored on a volume, including the client name, the save set name, size, and other categories. The status of a save set can be changed from here.

[Table 11 on page 99](#) describes the save set information displayed in the Volumes window or Volume Save Sets dialog box.

Table 11. Save Set Information in the Volumes Window or Volume Save Sets Dialog Box

Category	Description
Client	Name of the Legato Single Server Version computer that created the save set.
Date or Time	Date (and time) when the save set was created.
Level	For Oracle backups, the level is blank.
Status	One of the possible save set status values described in "Save Set Status" on page 49 .
Save Set or Name	Pathname of the filesystem containing the save set.

How to Change a Save Set Status

To change the status of a save set:

1. Open the Volumes window (on UNIX) or Volume Save Sets dialog box (on Windows), using the steps described in ["How to View Save Set Information" on page 98](#).
2. Click the save set name.
3. Select Change Status.
4. Select the appropriate status:
 - Normal: Select this status if the save set is suspect but it can be used for restores.
 - Suspect: Select this status to prevent Legato Single Server Version from using the save set for restores.
5. Click Apply or OK.

How to Mount a Volume

To mount a labeled volume:

1. Insert the volume in the storage device, or ensure that the volume is already present.
2. Run the Administrator program, as described in "[The Administrator Program](#)" on page 51.
3. Mount the volume:
 - On UNIX:
 - a. In the Devices section of the main Administrator window, select the appropriate device.
 - b. Select Media>Mount or click the Mount button.
 - On Windows:
 - a. In the Configure tab, click Devices to open the Devices window.
 - b. Right-click the icon for the device in which to mount the volume, and select Operations.
 - c. Click Mount.

After a volume is labeled and mounted, the name of the volume appears beside the device pathname in the Devices list in the Administrator program.

To perform an unattended backup using a tape device, a labeled volume must be mounted in the device before being left unattended.



Important: On UNIX, use a *nonrewinding* tape device only. If a rewinding device is used, the read/write tape head is repositioned at the start of a volume in the device, and the existing data on the volume is overwritten. A nonrewinding device pathname must follow the Berkeley Storage Device (BSD) semantic rules, for example, `/dev/rmt/0mbn`. The *b* in the pathname satisfies the BSD semantics requirement.

How to Label and Mount a Volume in One Operation

If there is more than one storage device connected, the device to be used for labeling must be first selected from the Devices list in the Administrator program.

Notes:

- Since the volume label is internal and machine-readable, it is a good idea to put an adhesive label on each volume that matches the internal volume label.
- Relabeling a volume makes it impossible for Legato Single Server Version to recover data from that volume.

To label and mount a volume in one operation:

1. Insert a volume in the storage device, or ensure that a volume is already present.
2. Run the Administrator program, as described in "[The Administrator Program](#)" on page 51.
3. Open the Label window or dialog box:
 - On UNIX:
 - a. In the Devices section of the main Administrator window, select the appropriate device.
 - b. Select Media>Label or click the Label button to open the Label window.
 - On Windows:
 - a. In the Configure tab, click Devices to open the Devices window.
 - b. Right-click the appropriate device icon, and select Operations.
 - c. Click Label to open the Label dialog box.
4. In the Pool attribute, select Default.

This action generates a name in the Volume Label attribute. The following rules apply:

- If the volume is unlabeled, Legato Single Server Version assigns the next sequential label from the label template associated with the pool.
- If a recyclable volume from the same pool is relabeled, the volume label name and sequence number remain the same. However, access to the original data on the volume is destroyed, and the volume becomes available for new data.
- If a pool is not selected for the volume to be labeled, Legato Single Server Version automatically applies the label template associated with the Default pool.
- To create an individual label name not associated with a template, edit the Volume Label and enter a unique label name.

5. Select the Manual Recycle attribute to manually recycle the volume.

If the Manual Recycle attribute is enabled when a volume is labeled, the volume cannot automatically be marked as recyclable according to the retention policy. When a volume is marked *manual recycle*, Legato Single Server Version disregards the assigned browse and retention policies. Only an Administrator can mark the volume recyclable.

6. Select the Mount After Labeling attribute.
7. Click OK.

Legato Single Server Version automatically labels the volume and mounts it in the device. After the volume is labeled and mounted, it is ready to receive data.

How to Label a Volume without Mounting It

To label a volume without mounting it, follow the same procedures as for labeling and mounting in one operation, described in "[How to Label and Mount a Volume in One Operation](#)" on page 100, *except* deselect the Mount After Labeling attribute in the Label window or dialog box.

How to Unmount a Volume

To unmount a volume:

1. Run the Administrator program, as described in "[The Administrator Program](#)" on page 51.
2. Unmount the volume:
 - On UNIX:
 - a. In the Devices section of the main Administrator window, select the appropriate device.
 - b. Select Media>Unmount or click the Unmount button.
 - On Windows:
 - a. In the Configure tab, click Devices to open the Devices window.
 - b. Right-click the appropriate device icon, and select Operations.
 - c. Click Unmount.

Once the volume is unmounted from the device, the Devices section in the Administrator window displays that information.

How to Find a Volume Name

If the adhesive label on a volume is missing or illegible, use one of these methods to determine the volume name:

- Mount the volume in a storage device. The volume name appears next to the device name in Administrator program (in the Devices pane of the Monitor tab on Windows).

For more information, see ["How to Mount a Volume" on page 100](#).

- Mount the volume in a storage device and enter the **nsrmm** command (as root user on UNIX) at the operating system command line to determine the volume name:

```
nsrmm -pv -f device-name
```

Note: On UNIX systems, when the **nsrmm** command includes the **-f device-name** option and the device name contains backslashes, a backslash (escape) character must be used with each backslash. For example, enter the device name `rd=sn1:\\.\Tape0` as `rd=sn1:\\.\Tape0`.

- Load the volume in a storage device and perform the appropriate steps:
 - On UNIX:
 - a. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
 - b. Select Media>Label. In the Label window, the name of the volume appears in the Volume Name attribute.
 - c. Click Cancel to close the window without relabeling the volume.
 - On Windows:
 - a. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
 - b. Right-click the device's icon in the Device window and select Operations.
 - c. Click Label. In the Label dialog box, the name of the volume appears in the Volume Label text box.
 - d. Click Cancel to close the dialog box without relabeling the volume.

How to Change the Mode of a Volume

The mode of a volume determines whether Legato Single Server Version can write to it during a backup. For more information on volume modes, see ["Volume Modes" on page 50](#).

A volume is automatically recyclable if all the save sets on the volume are recyclable. Recyclable save sets have passed the time period designated by the retention policy.

If the data on a full or appendable volume is *not* needed, the mode of the volume can be changed manually to recyclable. Legato Single Server Version then overwrites the data on the volume the next time it needs a volume for a backup.

To change the mode of a volume, see the appropriate section:

- ["How to Change the Mode of a Volume on UNIX" on page 104](#)
- ["How to Change the Mode of a Volume on Windows" on page 104](#)

3

How to Change the Mode of a Volume on UNIX

To change the mode of a volume on UNIX:

1. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
2. In the Devices section of the main Administrator window, select the appropriate device.
3. Select Media>Volumes or click the Volumes button to open the Volumes window.
4. Select the volume whose mode is to be changed.
5. Select Volume>Change Mode and one of the following values:
 - Appendable
 - Read Only
 - RecyclableFor a listing of the volume modes, see ["Volume Modes" on page 50](#).
6. Select a Mode button and click OK.

The changed volume mode appears in the Volumes window.

How to Change the Mode of a Volume on Windows

To change the mode of a volume on Windows:

1. Run the Administrator program, as described in ["The Administrator Program" on page 51](#).
2. Select the Volumes tab.

3. Right-click the volume whose mode is to be changed.
4. Select Change Mode to open the Change Mode dialog box.
5. Select a Mode button and click OK.

The changed volume mode appears in the Volumes list box.

Marking a Volume as Full for Off-Site Storage

When removing a volume from a device to store off-site, mark the volume as full so that Legato Single Server Version will not continue to ask for the volume.

To mark a volume as full, enter the following **nsrmm** command (as the root user on UNIX), where *valid* is the volume identifier of the volume:

```
nsrmm -V valid -o full
```

The **mminfo** command can be used to determine the volume identifier.

For more information on the **nsrmm** and **mminfo** commands, see the corresponding man pages on UNIX or the *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on page 39).

Chapter 4: Backup and Restore Operations

This chapter describes how to set up and run Oracle backups and restores. Legato Single Server Version enables a user to run Oracle backups and restores using either the Oracle RMAN command line interface or the OEM Backup Management Tools.

An important consideration with the Oracle backups is maintaining regular bootstrap backups to ensure adequate preparation for disaster recovery.

This chapter includes the following main sections:

- ["Roadmap for Oracle Backups and Restores" on page 108](#)
- ["Legato Single Server Version Environment Variables" on page 109](#)
- ["RMAN Commands" on page 114](#)
- ["Creating RMAN Scripts" on page 123](#)
- ["Performing Oracle Backups or Restores" on page 126](#)
- ["Using the OEM Backup Management Tools" on page 127](#)
- ["Multiplexing during Oracle Backups" on page 127](#)
- ["Completing the Oracle Data Recovery" on page 128](#)
- ["Legato Single Server Version Bootstrap Backup" on page 128](#)
- ["Canceling a Running Oracle Backup" on page 131](#)
- ["Canceling a Nonresponding Oracle Backup" on page 132](#)
- ["Monitoring Oracle Backups and Restores" on page 133](#)

Roadmap for Oracle Backups and Restores

Before running Oracle backups, ensure that the Legato Single Server Version configurations have been completed according to the "[Configuration Roadmap](#)" on page 69. The Server, Client, and Device resources must be configured, and the required backup volumes labeled and mounted.

Note: Legato Single Server Version can be used to restore only Oracle data that has been backed up according to the instructions in this chapter.

To perform an Oracle data backup or restore, use either the RMAN command line interface or OEM Backup Management Tools:

- To use the RMAN command line interface:
 1. Review the Legato Single Server Version environment variables that can be set in the RMAN script for the backup or restore. See "[Legato Single Server Version Environment Variables](#)" on page 109.
 2. Review the RMAN commands that are dependent on the Legato Single Server Version media management implementation. See "[RMAN Commands](#)" on page 114.
 3. Create the RMAN backup or restore script for the Oracle backup or restore, as required. See "[Creating RMAN Scripts](#)" on page 123.
 4. Run the Oracle backup or restore using the RMAN command line interface. See "[Performing Oracle Backups or Restores](#)" on page 126.
- To use the OEM Backup Management Tools, see "[Using the OEM Backup Management Tools](#)" on page 127.



Important: The bootstrap is a special backup set essential for disaster recovery procedures. The bootstrap is *not* automatically backed up at the end of an Oracle backup. However, Legato Single Server Version is preconfigured to perform an automatic daily bootstrap backup. After running a number of Oracle backups, a *manual* bootstrap backup should be performed using the instructions in "[Legato Single Server Version Bootstrap Backup](#)" on page 128.

For important additional considerations for Oracle backups, see "[Multiplexing during Oracle Backups](#)" on page 127.

For information on how to keep track of the status of Oracle backups and restores, see "[Monitoring Oracle Backups and Restores](#)" on page 133.

Note: Oracle database backups must be performed using RMAN scripts, as described in this chapter. In addition, other important Oracle files (for example, *init<oracle_sid>.ora*) should be backed up using appropriate backup methods. For more information, refer to the Oracle backup and recovery documentation.

Legato Single Server Version Environment Variables

Legato Single Server Version environment variables described in [Table 12 on page 111](#) are environment variables that can be set in the RMAN command or script for an Oracle backup or restore using Legato Single Server Version.

To ensure that the required environment variables are set during an Oracle backup or restore, set them in one of three ways:

- Using the **parms** option in *either* the **allocate channel** command *or* the **configure** command. See "[The parms Option in the allocate channel Command](#)" on page 121.

Note: *Each* environment variable set using the **parms** option in the **allocate channel** command must be included in the **parms** option for *each* allocated channel.

- Using the **rman send** command on the operating system command line.
- Using the **send** command in the RMAN session or script.

For more information on the RMAN **send** command, see "[The send Command](#)" on page 116.

Do *not* mix these three ways of setting the environment variables in the same RMAN session.

On Windows, when an environment variable is set using the **parms** option in *either* the **allocate channel** command (as in the RMAN script on [page 124](#)) *or* the **configure channel** command used for automatic channel allocation, the

value of that variable remains in effect for all subsequent allocated channels and for all subsequent RMAN sessions until either:

- The Oracle database is shut down; or
- The variable is unset for the channel using the **parms** option, as in the following example:

```
run {
    allocate channel t1 type 'SBT_TAPE'
    parms 'ENV=(NSR_COMPRESSION=)';
    :
    :
    release channel t1;
}
```

Note: This problem on Windows does *not* occur if the environment variables are set using the **send** command in all RMAN sessions.

Using a UNIX **setenv** command or Windows **set** command on the operating system command line to set the NSR_* variables has *no effect*.

Environment Variable Definitions

[Table 12 on page 111](#) describes all the Legato Single Server Version environment variables to set in the RMAN session. For each variable, the table includes a description of the variable, the default value, and the valid values for the variable.

Table 12. Legato Single Server Version Environment Variables in the RMAN Command or Script (Part 1 of 3)

Variable	Description	Default and Valid Values
NSR_BROWSE	<p><i>Mandatory</i> if setting a nondefault browse policy for an Oracle backup.</p> <p>Date when the entry for the backup is to be deleted from the client index.</p>	<ul style="list-style-type: none"> • Most appropriate policy for the client, as selected by Legato Single Server Version (default) • Valid date in nsr_getdate(3) format
NSR_CHECKSUM	<p><i>Optional</i>. Specifies whether or not Legato Single Server Version performs checksumming on the backup data.</p>	<ul style="list-style-type: none"> • FALSE (default) = Legato Single Server Version performs <i>no</i> checksumming • TRUE = Legato Single Server Version performs checksumming
NSR_CLIENT	<p><i>Recommended</i> for all restores.</p> <p>Client resource to use for a backup or restore session.</p> <p>Might be needed for disaster recovery.</p>	<ul style="list-style-type: none"> • Physical host on which the session runs (default) • Valid name of a Client resource
NSR_COMPRESSION	<p><i>Optional</i>. Specifies whether or not Legato Single Server Version performs compression on the backup data.</p>	<ul style="list-style-type: none"> • FALSE (default) = Legato Single Server Version performs <i>no</i> compression • TRUE = Legato Single Server Version performs compression

Table 12. Legato Single Server Version Environment Variables in the RMAN Command or Script (Part 2 of 3)

Variable	Description	Default and Valid Values
NSR_DEBUG_FILE	<p><i>Optional.</i> Only used for debugging of Legato Single Server Version SBT API.</p> <p>Enables debugging by specifying the complete pathname of a file to receive debugging information.</p>	<ul style="list-style-type: none"> • Undefined (default) • Valid pathname of the debug file <p>Note: If undefined, no debugging information is generated. If a file with the specified pathname <i>cannot</i> be created, debugging information is either directed to default location or not generated.</p>
NSR_ENCRYPTION	<p><i>Optional.</i> Specifies whether or not Legato Single Server Version performs encryption on the backup data.</p>	<ul style="list-style-type: none"> • FALSE (default) = Legato Single Server Version performs <i>no</i> encryption • TRUE = Legato Single Server Version performs encryption

Table 12. Legato Single Server Version Environment Variables in the RMAN Command or Script (Part 3 of 3)

Variable	Description	Default and Valid Values
NSR_NWPATH ^a	<p><i>Mandatory</i> when deleting a backup from Legato Single Server Version if both:</p> <ul style="list-style-type: none"> • nsrmm binary is in a nondefault location; and • <i>/nsr/res/nwora.res</i> file is not created or does not contain the correct location of Legato Single Server Version binaries. <p>Complete pathname of the directory containing the nsrmm binary.</p>	<ul style="list-style-type: none"> • Platform-specific default location of Legato Single Server Version binaries (default) • Valid pathname of nsrmm binary directory, for example, <i>/usr/local/bin</i>
NSR_SAVESET_EXPIRATION	<p><i>Mandatory</i> if setting a nondefault retention policy for an Oracle backup.</p> <p>Date when the save set becomes recyclable.</p>	<ul style="list-style-type: none"> • Most appropriate policy for the client, as selected by Legato Single Server Version (default) • Valid date in nsr_getdate(3) format

a. As an alternative to setting the NSR_NWPATH variable in the RMAN script, create the */nsr/res/nwora.res* file and add a line containing `NSR_NWPATH=nsrmm_dirpath` to the file, where *nsrmm_dirpath* is the complete pathname of the directory containing the **nsrmm** program.

For example:

```
NSR_NWPATH=/opt/networker/bin
```

This is the only variable entry allowed in the *nwora.res* file. Other environment variables *cannot* be set in the file.

RMAN Commands

This section describes RMAN commands that are dependent on the Legato Single Server Version media management implementation. Review the following information before using any of the RMAN commands.

- ["The delete expired backup Command" on page 114](#)
- ["The change...crosscheck and crosscheck Commands" on page 115](#)
- ["The pool Option of the backup Command" on page 115](#)
- ["Proxy Copy" on page 115](#)
- ["The send Command" on page 116](#)
- ["The set duplex Command" on page 122](#)
- ["The trace Option of the backup Command" on page 123](#)

For more information on these RMAN commands, refer to the appropriate Oracle Server documentation.

For more information on how to use the main new Oracle9i RMAN features with Legato Single Server Version, see ["Appendix A: Oracle9i Support in Legato Single Server Version" on page 163](#).

4

The delete expired backup Command

To be able to use the **delete expired backup** command with Legato Single Server Version, a user must be listed as an Administrator in the Server resource, as described in ["Server Access Management" on page 71](#).

If the user name is not listed in the Server resource, or there is an authorization problem when the **delete expired backup** runs, Legato Single Server Version *fails* to delete the required entries in the client index and media index.

Note: If the Legato Single Server Version binaries are located in a nondefault directory on the Oracle Server host and the `/nsr/res/nwora.res` file was *not* created during the Legato Single Server Version installation, the NSR_NWPATH environment variable might need to be set in the `/nsr/res/nwora.res` file or in the RMAN script. For more information, see ["Legato Single Server Version Environment Variables" on page 109](#).

In Oracle9i, the **change...delete** command is deprecated and has been replaced by the **delete...** command (including the **delete expired backup** option).

The change...crosscheck and crosscheck Commands

For all Legato Single Server Version client index entries that are *not* browsable, running the **change...crosscheck** or **crosscheck** command in Oracle9i causes the status of the corresponding backup pieces to change to *expired* in the RMAN catalog.

Note: In the RMAN catalog, an expired status for a backup piece indicates that the Legato Single Server Version browse policy specified for that backup piece is expired.

The pool Option of the backup Command



Important: Legato Single Server Version does *not* support the **pool** option of the RMAN **backup** command, with the exception of **pool=0**.

If any nonzero value is specified for the **pool** option of the RMAN **backup** command, the RMAN session will terminate and Legato Single Server Version will return the following error message:

```
sbtbackup: Oracle pool is not supported
```

For more information on this error message, see "[Legato Single Server Version Error Messages](#)" on page 184.

4

Proxy Copy



Important: Legato Single Server Version does *not* support proxy copy.

The **proxy only** option of the RMAN **backup** command will cause the Oracle backup to fail. To perform a regular backup, do *not* specify the **proxy only** option.

As mentioned in the Oracle backup and recovery documentation, the **proxy** option of the RMAN **backup** command will default to a regular backup.

The send Command

The Legato Single Server Version implementation of the **send** command enables a user to set the environment variables described in ["Legato Single Server Version Environment Variables" on page 109](#).

The **send** command is supported in Oracle9i. Legato recommends use of the **send** command *instead of* the **parms** option in the **allocate channel** or **configure channel** command for setting the environment variable values.

The following sections describe the **send** command syntax and precedence rules and how to use the **send** command to set the environment variables.

- ["Syntax Rules" on page 116](#)
- ["Two Ways to Run the send Command" on page 119](#)
- ["The parms Option in the allocate channel Command" on page 121](#)
- ["Precedence Rules" on page 122](#)

Syntax Rules

The **send** command must have the following format:

```
send [ device_type 'device_specifier' | channel channel_id ]
      'NSR_ENV=(var_name1=value1 [ , var_name2=value2, ... ] )'
```

These sections describe the syntax rules for the two main parts of the **send** command:

- ["send Command String" on page 116](#)
- ["send Command Options" on page 117](#)

send Command String

The command string in the **send** command is the string inside the quotes, 'NSR_ENV=(var_name1=value1...)'

Follow these syntax rules for the **send** command string:

- The maximum length of the command string is restricted by Oracle to 512 bytes, including the terminating NULL.
- The NSR_ENV keyword and the variable names must be *all uppercase*.

- Between the `NSR_ENV` keyword and left parenthesis, an equal sign and spaces are *optional*. For example, these commands are all correct:


```
send 'NSR_ENV = (NSR_CLIENT=client1)'
```

```
send 'NSR_ENV=(NSR_CLIENT=client1)'
```

```
send 'NSR_ENV (NSR_CLIENT=client1)'
```

```
send 'NSR_ENV(NSR_CLIENT=client1)'
```
- The parentheses in the command string are *mandatory*.
- Inside the parentheses, there must be one or more Legato Single Server Version environment variable names and the corresponding variable values.
- Inside the parentheses, spaces are *not* allowed around the equal signs. A space *before* an equal sign becomes part of the variable name. A space *after* an equal sign becomes part of the variable's value.
- Commas separating the *var_name=value* entries are *mandatory*.
- Comments are *not* allowed inside the quotes. In the following example, `"# NSR_CLIENT"` is considered the first variable's name:

```
run {
    allocate channel t1 type 'SBT_TAPE';
    send 'NSR_ENV=(
# NSR_CLIENT=oracle,
NSR_COMPRESSION=TRUE)';
    :
```

- A **send** command in an RMAN script can span multiple lines. For example:

```
send 'NSR_ENV=(
NSR_CLIENT=oracle,
NSR_COMPRESSION=TRUE)';
```

send Command Options

Use the **send** command with *only one* of the following options:

- **send** with no option—only the quoted command string—sets the environment variables for *all* allocated channels.
- **send device_type 'SBT_TAPE'** sets the environment variables for all channels of the backup tape device.

Note: The **send** command has *no effect* with **device type disk**.

- **send channel** sets the environment variables for the specified channels only.

In the following sample script, the environment variables are set for channel *t1* only, not for channel *t2*:

```
run {
    allocate channel t1 type 'SBT_TAPE';
    allocate channel t2 type 'SBT_TAPE';
    send channel t1 'NSR_ENV=(NSR_CLIENT=client1,
NSR_COMPRESSION=TRUE)';
    :
}
```



Important: Use the **device_type** or **channel** option in the **send** command in an RMAN script only. *Neither* option can be used in the **send** command on the operating system command line. For more information, see "[The send Command on the Operating System Command Line](#)" on page 119.

Specify the correct option values in the **send** command:

- *device_specifier* is the device type as specified in an **allocate channel** command in the RMAN script. For a backup tape device, use SBT_TAPE.
- *channel_id* is the channel identifier as specified in an **allocate channel** command in the RMAN script. In the previous sample script, the identifier is *t1*.
- *var_name1* is the first environment variable name. In the previous sample script, the first variable name is NSR_CLIENT.
- *value1* is the value assigned to the first environment variable. In the previous sample script, the first value is *client1*.
- *var_name2* is the second environment variable name. In the previous sample script, the second variable name is NSR_COMPRESSION.
- *value2* is the value assigned to the second environment variable. In the previous sample script, the second value is *TRUE*.

Two Ways to Run the send Command

There are two different ways to run the **send** command:

- As an option of the **rman** invocation on the operating system command line, as described in ["The send Command on the Operating System Command Line" on page 119](#).
- In the **run** job of the RMAN script, as described in ["The send Command in the RMAN Script" on page 120](#).

The send Command on the Operating System Command Line

To use the **send** command as an option of the **rman** invocation on the operating system command line, enter the command in the following format:

```
% rman send "'NSR_ENV=(var_name1=value1[, var_name2=value2, ...])'"
```

- If more than one **send** option appears in the **rman** command, *only the last send* command is executed.
- Follow all the **send** command syntax rules listed in ["send Command String" on page 116](#)—*except* for the last rule, which applies *only* to a **send** command in an RMAN script.
- Do *not* use either the **device_type** or **channel** option (see ["send Command Options" on page 117](#)).
- Use two sets of quotes around the command string, each set consisting of a single and double quote. The single quote can be either before or after the double quote, but the second set of quotes must be opposite to the first set. For example, this command is also correct:

```
% rman send '"NSR_ENV=(var_name1=value1[, var_name2=value2, ...])"'
```

Two sets of quotes are required to prevent some operating system shells (for example, **ksh**) from treating spaces inside the quotes as meta (special) characters and attempting to tokenize the string.

- The variable values in the quoted string are applied to *all* channels allocated during the RMAN session. These values are applied *before* any variable values specified in **send** commands within the RMAN script itself. For more information, see ["Precedence Rules" on page 122](#).

In the following example, the NSR_CLIENT environment variable value (*mars.legato.com*) is applied to all three channels (*t1, t2, t3*) allocated in the RMAN script:

```
% rman send "'NSR_ENV=(NSR_CLIENT=mars.legato.com)'"
(RMAN script:)
run {
    allocate channel t1 type 'SBT_TAPE';
    allocate channel t2 type 'SBT_TAPE';
    allocate channel t3 type 'SBT_TAPE';
    :
}
```

The send Command in the RMAN Script

To run the **send** command in the **run** job of the RMAN script, enter the command in the following format, at the required point within the **run** command brackets:

```
send [ device_type 'device_specifier' | channel channel_id ]
      'NSR_ENV=(var_name1=value1 [ , var_name2=value2, ... ])'
```

- Follow all the **send** command syntax rules listed in ["send Command String" on page 116](#).
- Use either the **device_type** or **channel** option with the **send** command in an RMAN script, as described in ["send Command Options" on page 117](#).
- Specify the correct option values in the **send** command, as described in ["send Command Options" on page 117](#).
- RMAN commands are run *in the order that they appear* in the backup or restore script. For an environment variable value to be in effect during a backup or restore, put the **send** command (setting the value) *before* the **backup** or **restore** command in the script, but after the **allocate channel** commands for those channels to which the variable value applies.
- If no channel is allocated when the **send** command runs, an RMAN error is produced.

The following sample RMAN script performs a backup of the entire Oracle database.

```
run {
    allocate channel t1 type 'SBT_TAPE';
    allocate channel t2 type 'SBT_TAPE';

    send 'NSR_ENV=(NSR_DEBUG_FILE=
C:\Program Files\nsr\applogs\backup.log)';

    backup full filesperset 4
    format '/FULL_%d_%u/'
    (database);

    release channel t1;
    release channel t2;
}
```

This script is the same as the sample script on [page 124](#), *except* the environment variable is set using a single **send** command instead of the **parms** option in each **allocate channel** command. The single **send** command sets the environment variable for *each* channel.

Note: To prevent backup performance problems, use forward slashes in the **format** option in either the RMAN **backup** command or **configure** command to generate backup piece names that resemble UNIX directory names. For more information on this issue, refer to the *Legato Single Server Version Release Supplement*.

The parms Option in the allocate channel Command

If environment variables are set using *both* the **send** command and the **parms** option in the **allocate channel** command (*not recommended*), the variables are set in the order of the "Precedence Rules" on [page 122](#).

On Windows, when a Legato Single Server Version environment variable is set using the **parms** option, the value of that variable remains in effect for all subsequent allocated channels and for all subsequent RMAN scripts until certain conditions exist. For more information, see "[Legato Single Server Version Environment Variables](#)" on [page 109](#).

Precedence Rules

Environment variables are set for channels allocated during the RMAN session in the following order:

1. In the **parms** option of the **allocate channel** command in the RMAN script or in the **configure channel** command.
2. In the **rman send** command on the operating system command line.
3. In the **send** command in the **run** job of the RMAN script.

To prevent confusion and simplify the task of setting environment variables in a specific order, do *not* mix these three ways of setting environment variables in the same RMAN session.

In the following example, the `NSR_CLIENT` variable is set in this order:

1. To *client2* in the **parms** option.
2. To *client1* in **rman send**.
3. To *client3* in **send channel**.

```
% rman send "'NSR_ENV=(NSR_CLIENT=client1)'"
```

(RMAN script):

```
run {
    allocate channel t1 type 'SBT_TAPE'
    parms 'ENV=(NSR_CLIENT=client2)';
    send channel t1 'NSR_ENV=(NSR_CLIENT=client3)';
    :
}
```

The set duplex Command



Important: Legato Single Server Version does *not* support the **set duplex** command. However, Legato NetWorker Module for Oracle (used in conjunction with Legato NetWorker) does support the **set duplex** command.

The trace Option of the backup Command

The **trace** option of the RMAN **backup** command can be set to the value 0, 1, or 2. The default value of **trace** is 0.

The output of **trace** is written to the Oracle *sbtio.log* file. The output is also written to the */nsr/applogs/nmo.messages* file on UNIX and to the *%SystemDrive%\Program Files\nsr\applogs\nmo.messages* file on Windows.

[Table 13 on page 123](#) outlines the conditions traced when the **trace** option is set to each of the three valid values.

Table 13. Trace Option Values and Conditions Traced

Trace Value	Conditions Traced
0 (default)	<ul style="list-style-type: none"> • All error conditions
1	<ul style="list-style-type: none"> • All error conditions • Entry and exit for each SBT function (the Legato implementation of the Oracle SBT interface)
2	<ul style="list-style-type: none"> • All error conditions • Entry and exit for each SBT function (the Legato implementation of the Oracle SBT interface) • Values of all function parameters • First 32 bytes of each read/write buffer

Creating RMAN Scripts

Create an appropriate RMAN script to perform the desired type of Oracle backup or restore on the Oracle Server host.

RMAN scripts can be stored as flat ASCII files. Alternatively, if a Recovery Catalog is used, scripts can be stored in the Recovery Catalog database. For more information on storing RMAN scripts in the Recovery Catalog database, refer to the appropriate Oracle backup and recovery documentation.

The following sample RMAN backup script performs a backup of the entire database and writes RMAN-specific debugging information to the `C:\Program Files\nsr\applogs\backup.log` file.

```
run {
    allocate channel t1 type 'SBT_TAPE'
    parms 'ENV=(NSR_DEBUG_FILE=
C:\Program Files\nsr\applogs\backup.log)';
    allocate channel t2 type 'SBT_TAPE'
    parms 'ENV=(NSR_DEBUG_FILE=
C:\Program Files\nsr\applogs\backup.log)';

    backup full filesperset 4
    format '/FULL_%d_%u/'
    (database);

    release channel t1;
    release channel t2;
}
```

Note: To prevent backup performance problems, use forward slashes in the **format** option in either the RMAN **backup** command or **configure** command to generate backup piece names that resemble UNIX directory names. For more information on this issue, refer to the *Legato Single Server Version Release Supplement*.

Using automatic channel allocation and persistent settings, the **backup** command can be run as a stand-alone command. See "[Automatic Channel Allocation](#)" on page 163.

Set the **type** option in the RMAN **allocate channel** command to **SBT_TAPE**. This value specifies a Legato Single Server Version media management device.

If a device is allocated using the **allocate channel t1 type disk** command (with Oracle correctly configured and Legato Single Server Version uninstalled), backups to disk files using Oracle's backup implementation are supported. Obviously, in this case, the **parms** option has no effect.

The following sample RMAN restore script performs a restore of a tablespace and writes RMAN-specific debugging information to the specified log files.

```
run {
    allocate channel t1 type 'SBT_TAPE'
    parms 'ENV=(NSR_DEBUG_FILE=
C:\Program Files\nsr\applogs\restore_ch1.log)';
```

```

allocate channel t2 type 'SBT_TAPE'
parms 'ENV=(NSR_DEBUG_FILE=
C:\Program Files\nsr\applogs\restore_ch2.log)';
sql 'alter tablespace users offline immediate';
restore (tablespace users);
sql 'alter tablespace users online';
release channel t1;
release channel t2;
}

```

To ensure that the required Legato Single Server Version environment variables are set during an Oracle backup or restore, the variables can be set:

- Using the **parms** option in *either* the **allocate channel** command *or* the **configure** command.
- Using the RMAN **send** command.

Note: The environment variables cannot be set using another command, such as **setenv** or **set**, on the operating system command line.

For complete information on setting the environment variables in the RMAN script, including specific issues to consider, see "[Legato Single Server Version Environment Variables](#)" on page 109.

In the RMAN backup script on [page 124](#), the **format** string **FULL_%d_%u** specifies the name of each backup piece. This name can be anything, *provided that each backup piece has a unique name in Legato Single Server Version*. Use substitution variables, such as **%d** and **%u**, to guarantee unique names.

- **%d** specifies the name of the database.
- **%u** specifies an eight-character name consisting of compressed representations of the backup set number and time the backup set was created.

A **format** string such as **FULL** or **FULL_%d** will *not* generate unique names. Similarly, the **format** string **FULL_%u** will *not* generate unique names for two databases being backed up to Legato Single Server Version.



Important: If a backup piece name is *not* unique, the Oracle backup fails.

For more information, refer to the following sources:

- For information on how to write RMAN scripts, refer to the appropriate Oracle backup and recovery documentation.
- For information on how to use the OEM Backup Wizard to generate RMAN scripts, refer to the Oracle Enterprise Manager documentation.
- For important Legato-specific information on RMAN commands, see ["RMAN Commands" on page 114](#).

Performing Oracle Backups or Restores

Before starting an Oracle backup or restore, ensure that the required configurations and scripts are in place.

- The Oracle system must be properly configured. The Oracle Server should have the Net service configured. If a Recovery Catalog is to be used, the Recovery Catalog must be set up and the target database registered.
- Legato Single Server Version must have the required Server, Client, Device, and Pool resources configured, as described in ["Configuration Roadmap" on page 69](#).
- The required volume must be labeled (and mounted as required) in a configured backup device, or—if auto media management is enabled for a tape device—the tape must be loaded in the tape device for Legato Single Server Version to use automatically.
- If using an RMAN backup or restore script, the script must be created, as described in ["Creating RMAN Scripts" on page 123](#).

Start an Oracle backup or restore using the RMAN command line interface on the Oracle Server host.

For example, if the RMAN backup script on [page 124](#) is stored in the file `/disk1/scripts/full_backup.txt` on a UNIX Oracle Server and the Net service has been configured to connect to the databases `payroll` and `rcvcatdb`, the Oracle backup can be started using the following command:

```
% rman target internal/oracle@payroll rcvcat
rman/rman@rcvcatdb cmdfile
\ '/disk1/scripts/full_backup.txt\'
```

As another example, if the RMAN restore script on [page 124](#) is stored in the file `/disk1/scripts/restore.txt` and the Net service has been configured to connect to

the databases *payroll* and *rcvcatdb*, the Oracle restore can be started using the following command:

```
% rman target internal/oracle@payroll rcvcat
rman/rman@rcvcatdb cmdfile \'/disk1/scripts/restore.txt\'
```

On Windows, the command to run the RMAN script is **rman** for Oracle9i. For more information on the **rman** command line options, refer to the appropriate Oracle backup and recovery documentation.

Using the OEM Backup Management Tools

The OEM Backup Management Tools can be used instead of the RMAN command line interface to start an Oracle backup or restore. The OEM Backup Management Tools include a graphical user interface to RMAN for generating the required RMAN commands and performing backup and restore operations.



Important: After the completion of an Oracle backup or restore, the OEM job queue history displays the status of the job as "failed", even if the backup or restore completed successfully. This is due to a known problem with OEM. View the job output to confirm that the backup or restore completed successfully.

For more information on using OEM Backup Management Tools, refer to the Oracle Enterprise Manager documentation included with the product kit.

Multiplexing during Oracle Backups

To prevent Legato Single Server Version from multiplexing multiple RMAN backup sets to one tape drive, only allocate as many RMAN channels as there are physical tape drives available to Legato Single Server Version.

Allocating more channels than physical tape drives will typically result in multiplexed RMAN backup sets to one drive, which might significantly add to the time required to restore from those backups. To clarify, the multiplexing performed by Legato Single Server Version (when allocating more channels than physical devices) would be in addition to the multiplexing automatically performed by RMAN.

The Target Sessions attribute of a Device resource is described in "[How to Create a Device Resource](#)" on page 85. The Target Sessions value is *not a hard limit* on the number of sessions that will run concurrently on the device. It defines the number of sessions that Legato Single Server Version allocates to a device before using the next device. The Target Sessions attribute value defaults to 1 for devices created during the initial Legato Single Server Version installation as well as for devices created afterwards.

If more concurrent backup sets are created than the number of available devices, Legato Single Server Version multiplexes those backup sets onto the available devices, up to the maximum number of sessions specified in the parallelism value of the Server resource.

Note: The "client parallelism" attribute does *not* apply to Legato Single Server Version sessions initiated by RMAN.

Completing the Oracle Data Recovery

4

After a Legato Single Server Version backup of Oracle data is restored using the RMAN utility, the data recovery must be completed, if required.

To recover the Oracle data, use the appropriate Oracle commands to apply the archived redo logs and online redo logs. There are two ways to run the Oracle recovery commands:

- Include the Oracle commands in the RMAN restore script.
- Run the commands after the RMAN restore script has completed successfully.

For more information on Oracle data recovery procedures, refer to the appropriate Oracle backup and recovery documentation.

Legato Single Server Version Bootstrap Backup

Legato Single Server Version is preconfigured to perform a special automatic backup--the *bootstrap* backup--every day at 3:33 a.m. The bootstrap save set contains the information needed to restore the media index and resource configuration files to the point just before the bootstrap was created.

The bootstrap is a special backup save set essential for disaster recovery procedures on the Legato Single Server Version host. Legato Single Server Version writes the bootstrap file to the backup tape and generates a report about the success of the bootstrap backup. Legato Single Server Version also sends an automatic

notification to the Administrator about the bootstrap backup and displays the same information in the Administrator program. The bootstrap information is sent to a printer on the Legato Single Server Version host.

Note: If Legato Single Server Version is down at the time that the automatic bootstrap backup is scheduled to run, the backup will run when the system comes back up.

The bootstrap backup can also be run *manually*. For example, after running a number of Oracle backups, run a bootstrap backup manually, to ensure an up-to-date bootstrap. An up-to-date bootstrap is essential for a complete disaster recovery on the Legato Single Server Version host.

- For information on how to verify that Legato Single Server Version is properly configured for the automatic bootstrap backup, see ["Automatic Bootstrap Backup" on page 129](#).
- For information on how to run the bootstrap backup manually, see ["Manual Bootstrap Backup" on page 130](#).
- For information on the critical bootstrap information to keep for future disaster recovery procedures, see ["Maintaining Bootstrap Information" on page 131](#).
- For information on how to use the bootstrap during a disaster recovery, see ["Chapter 5: Disaster Recovery" on page 137](#).

Automatic Bootstrap Backup

Verify that the configuration is properly set up for the automatic bootstrap backup. The Client resource and Default Group resource must both be configured correctly.

In the Client resource, verify that the Group attribute is set to Default. For information on how to access the Client resource, see ["Verifying the Client Resource Configuration" on page 75](#).

To verify the Default Group resource configuration for the automatic bootstrap backup:

1. Run the Legato Single Server Version Administrator program, as described in ["The Administrator Program" on page 51](#).
2. Open the Groups resource window:
 - On UNIX, select Customize>Groups to open the Groups window. The Groups window lists the single Group resource named Default.

- On Windows:
 - a. In the Configure tab in the Server window, click Manage Groups to open the Groups window.
The Groups window lists the single Group resource named Default.
 - b. Right-click the Default group icon and select Edit to open the Edit Group dialog box.
The General tab shows the attributes of the Default Group resource.
- 3. Verify that the Start Time attribute is set to 3:33 a.m. This attribute specifies when the bootstrap backup is configured to start.
- 4. Verify that the Autostart attribute is set to Enabled. If Autostart is set to Disabled, the bootstrap backup does *not* run.
- 5. To have the bootstrap information sent to a specific printer, set the Printer attribute to the name of that printer.

Information confirming the completion of the automatic bootstrap backup appears in the Messages area (in the Monitor tab on Windows) of the main Administrator program window.

4

Manual Bootstrap Backup

To run the bootstrap backup *manually*, log in as the root user (UNIX) or administrator (Windows) and enter this **savegrp** command at the operating system command prompt:

```
savegrp -O -l full -P printer_name -c server_name
```

where:

- *printer_name* is the name of the printer where the bootstrap information is printed at the end of the bootstrap backup.
- *server_name* is the Legato Single Server Version hostname.

Note: Ensure that a writable tape device is available *before* starting a manual bootstrap backup. If the **savegrp** command is run for a manual bootstrap backup *without* an available device, the backup will fail. In that case, the writable device must be provided and the **savegrp** command rerun, to restart the manual bootstrap backup.

For more information on the **savegrp** command, refer to **savegrp** in the *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on page 39).

Information confirming the completion of the manual bootstrap backup is displayed in the Messages section (in the Monitor tab on Windows) in the Administrator program.

Maintaining Bootstrap Information

At the end of the *automatic* daily bootstrap backup, Legato Single Server Version prints the bootstrap information to the printer specified in the Printer attribute of the Default group resource; or, if that Printer attribute is blank, to the default printer.

At the end of a *manual* bootstrap backup run with the **savegrp** command, as described in ["Manual Bootstrap Backup" on page 130](#), the bootstrap information is sent to the printer specified in the **savegrp** command.

Store the bootstrap printout in a safe location. The printed bootstrap information includes dates, locations, and save set ID numbers for the bootstrap save sets backed up during the past month. With this information, a user can determine which volumes are needed to recover the Legato Single Server Version media index and resource database files during a disaster recovery. For more information, see ["Chapter 5: Disaster Recovery" on page 137](#).

An example of a bootstrap printout is as follows:

```
March 20 03:30 2002 NetWorker bootstrap information Page 1
date    time      level ssid          file record volume
3/19/02 2:29:08 9      114886894956 0      jupiter.005
3/20/02 2:52:25 9      114886898577 0      jupiter.001
```

Canceling a Running Oracle Backup

To keep the Legato Single Server Version index and RMAN catalog synchronized, include the Oracle user name in the Administrator list in the Server resource before canceling an Oracle backup. For more information, see ["Server Access Management" on page 71](#).

Cancel a running Oracle backup (*not* including a backup initiated by OEM) during the RMAN script execution on any platform by pressing the [Ctrl]+[c] keys or the equivalent "attention" key combination on the system.

If this method of canceling an Oracle backup is *not* successful, use the **alter system kill** command to interrupt the running **rman** process. For each allocated channel, perform the following:

1. View the RMAN message log file to determine the Oracle session ID for the channel.

For example, the following sample line from an RMAN message log shows that channel *ch1* has the Oracle session ID *15*:

```
channel ch1: sid=15 devtype=SBT_TAPE
```

2. Run the following **select** command in the Oracle **svrmgr** or **sqlplus** program to determine the serial number, where *session_id* is the Oracle session ID from the RMAN message log in [step 1](#):

```
select serial# from v$session where sid=session_id;
```

3. Run the following **alter system** command in the Oracle **svrmgr** or **sqlplus** program to terminate the channel, where *session_id* is the Oracle session ID from [step 1](#) and *serial#* is the serial number from [step 2](#):

```
alter system kill session 'session_id, serial#';
```

4

Canceling a Nonresponding Oracle Backup

The following procedures for canceling a nonresponding Oracle backup *might* work. If these procedures do *not* work, contact Oracle for assistance.

Note: If the following procedure is used to cancel an Oracle backup, the Legato Single Server Version index and RMAN catalog might become unsynchronized, since Legato Single Server Version does *not* attempt to delete the backup save set entries from its index.

To cancel a nonresponding Oracle backup on UNIX:

1. Include the **set command id to 'xxx'** command in the RMAN backup script used for the Oracle backup. Otherwise, the query in the next step will fail. For a sample script including this command, see ["Creating RMAN Scripts" on page 123](#).
2. Run the following query in the Oracle **svrmgr** or **sqlplus** program to determine the Oracle process ID corresponding to each RMAN channel:

```
select spid, client_info from v$process p, v$session s
where p.addr=s.paddr and client_info like '%id=%';
```

3. Run the following **kill** command to cancel the Oracle backup process, where *pid* is the appropriate Oracle process ID:

```
kill -9 pid
```

To cancel a nonresponding Oracle backup on Windows, stop the **nsrsbctn.exe** process in the Windows Task Manager.

Monitoring Oracle Backups and Restores

The Administrator program can be used to monitor the status of Oracle backup and restore operations. In the Administrator program on Windows, the messages appear in the Monitor tab.

The **nsrwatch** program provides a character-based interface for monitoring Legato Single Server Version activity. For more information, refer to the **nsrwatch** man page on UNIX or the **nsrwatch** entry in the *Legato Command Reference Guide*.

During a restore operation, Legato Single Server Version displays specific types of messages:

- Legato Single Server Version requests the volume that needs to be mounted in the device by displaying a message similar to the following in the Pending Messages section:
media waiting: recover waiting for 8mm 5GB *tape_volume_name*
- If a restore operation requires more than one volume, Legato Single Server Version lists all the volumes in the order they are required. During the restore, Legato Single Server Version requests the volumes, one at a time.

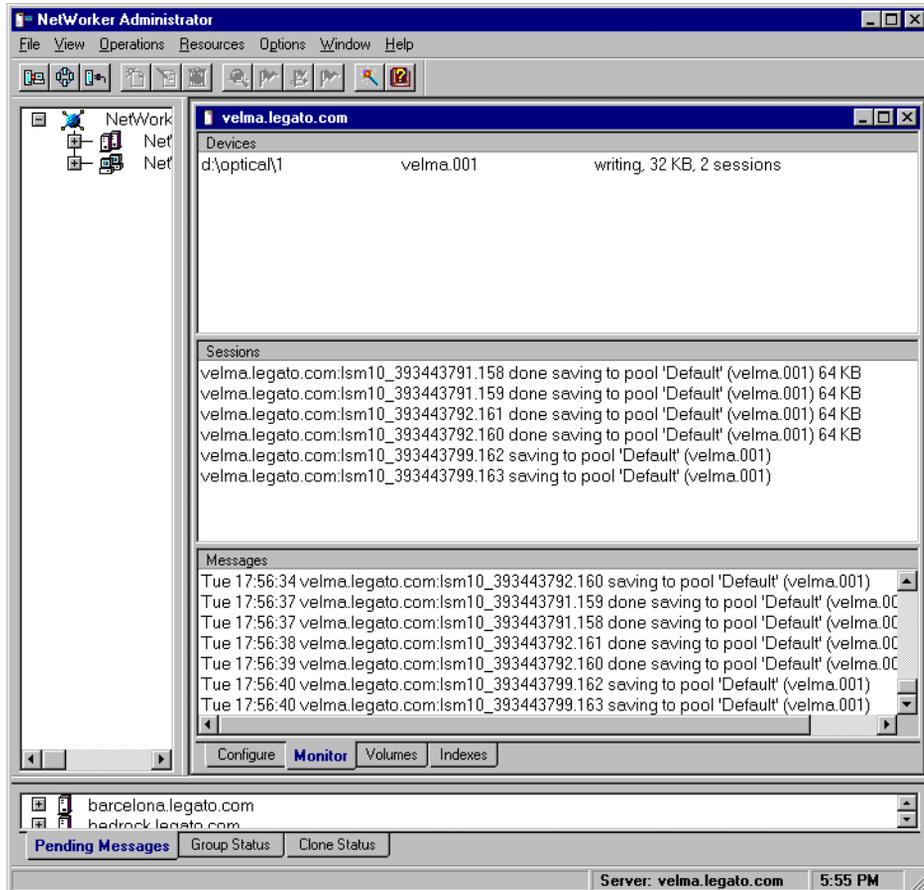
Progress messages appear during a backup or restore, and completion messages advise when the backup or restore is complete. Messages can also be viewed in specific online files.

- For progress messages, watch the Sessions display in the Administrator program. The Sessions display information is also written to the *daemon.log* file:
 - */nsr/logs/daemon.log* on UNIX
 - *%SystemDrive%\Program Files\nsr\logs\daemon.log* on Windows

- For completion messages, watch the Messages display in the Administrator program. The Messages display information is also written to the *messages* file:
 - `/nsr/logs/messages` on UNIX
 - `%SystemDrive%\Program Files\nsr\logs\messages` on Windows
- For information about why a backup cannot progress, view the messages in the Pending display. The Pending display shows requests to mount tapes and other conditions that require operator intervention. For examples of the messages that Legato Single Server Version displays when requesting a volume for Oracle backup or restore, see ["Volume Operations" on page 95](#).
- For information on how to view RMAN error messages and debugging information, see ["RMAN Error Messages" on page 183](#).
- For information on how to view Legato Single Server Version error messages and debugging information, see ["Legato Single Server Version Error Messages" on page 184](#).

[Figure 19 on page 135](#) shows the types of Oracle backup messages displayed in the Sessions and Messages sections of the Monitor tab in the Administrator program on Windows.

Figure 19. Oracle Backup Messages



4

Storage Management Reports

Table 14 on page 136 lists the programs that Legato Single Server Version provides to query the contents of the storage management system. For more detailed descriptions of the most commonly used commands and options, refer to the *Legato Command Reference Guide*.

Table 14. Storage Management Report Programs

Program	Information Reported
mminfo	Contents and mode of the storage volumes and/or the identification numbers and status of the stored save sets.
mmlocate	User-defined location of storage volumes.
nsrinfo	Contents of the client index.
nsrmm	Status of the storage devices known to Legato Single Server Version.

Chapter 5: Disaster Recovery

This chapter provides information on how to recover from different types of system disasters on the Legato Single Server Version host computer. It stresses the importance of preparing for a disaster. Proper preparation for disaster recovery involves regular backups of Oracle data and the implementation of the planning procedures outlined in this chapter.

This chapter includes the following main sections:

- ["Types of Disaster" on page 137](#)
- ["Disaster Preparation" on page 140](#)
- ["Gathering the Key Information" on page 141](#)
- ["Disaster Recovery" on page 142](#)

Types of Disaster

For the purpose of this guide, a *disaster* is any situation in which the day-to-day access to data (for example, working files, software programs, or system files) is disrupted. A disaster can also damage network components such as data, devices, hardware, media, and software.

A disaster can be the result of any one or a combination of the following:

- Computer viruses that can corrupt data
- Hardware and software failures
- Infrastructure interruptions, inconsistencies, or loss of services such as communication or network connections

The degree of loss during a disaster can range from one or more files lost when a disk crashes to an entire computer system. The degree of severity of the disaster determines the procedures that might need to be performed to recover the data on a computer.

In a disaster recovery plan, consider how to recover from the following types of disasters on the Legato Single Server Version host:

- "Damaged Disk Containing Operating System and Legato Single Server Version Software" on page 138
- "Damaged Disk Containing Legato Single Server Version Indexes" on page 139
- "Damaged Disk Containing Oracle Data" on page 139
- "Destroyed Legato Single Server Version Host" on page 140

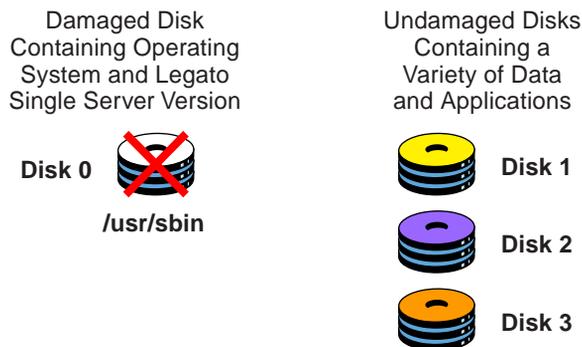
Damaged Disk Containing Operating System and Legato Single Server Version Software

Figure 20 on page 138 illustrates how the operating system and Legato Single Server Version software can be damaged or destroyed. In this example, the computer has several physical disks. A power outage has corrupted the filesystem on Disk 0, and the operating system and Legato Single Server Version software residing on Disk 0 has been lost.

To recover from the disaster:

1. Replace the disk.
2. Reinstall the operating system and Legato Single Server Version software.
3. Use the Legato Single Server Version software to recover the lost server configuration and any data that was lost when the filesystem was corrupted.

Figure 20. Damaged Disk Containing Operating System and Legato Single Server Version Software



Note: If the primary disk containing both the operating system and the Legato Single Server Version binaries has been destroyed, it is important to reinstall the operating system, reinstall the Legato Single Server Version software, and then recover the remainder of the data. Data backed up by Legato Single Server Version cannot be recovered without reinstalling the operating system and Legato Single Server Version software first.

Damaged Disk Containing Legato Single Server Version Indexes

Figure 21 on page 139 shows how the directory containing the Legato Single Server Version online indexes and resource configuration files can be damaged or destroyed. In this example, a disaster has corrupted the disk on the computer that contains the Legato Single Server Version indexes and configuration files. To recover from a disaster of this type, recover the contents of the bootstrap save set and client index.

Figure 21. Damaged Disk Containing Legato Single Server Version Indexes

Damaged Disk Containing
Legato Single Server
Version Indexes and
Configuration Files



`/nsr/res`
`/nsr/index`
`/nsr/mm`

Damaged Disk Containing Oracle Data

Figure 22 on page 140 illustrates how Oracle data can be damaged or destroyed. In this example, a Legato Single Server Version host computer has two disks. The second disk containing the Oracle data has been destroyed by a disk crash. However, the disk containing the operating system and Legato Single Server Version software is still operational. To recover from this situation, use the Oracle RMAN utility in conjunction with Legato Single Server Version.

Figure 22. Damaged Disk Containing Oracle Data

Undamaged Disk
Containing Operating
System and Legato
Single Server Version
Software



/nsr

Damaged Disk
Containing
Oracle Data



Destroyed Legato Single Server Version Host

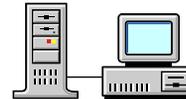
In the example in [Figure 23 on page 140](#), the Legato Single Server Version host computer is destroyed. To recover from this disaster, recover all the data to a new system *by the same name*.

Figure 23. Destroyed Legato Single Server Version Host

Destroyed Legato
Single Server Version



New Legato Single
Server Version using
the Same Name as the
Original Server



Disaster Preparation

It is important to develop a plan for recovering from different types of disasters on the Legato Single Server Version host computer. Back up important data on the computer on a regular basis. Develop and test a plan for recovering data in the event of a disk crash or loss of data. The more time and effort invested in developing and testing a backup strategy and disaster recovery plan, the better the preparation will be in the event of a disaster.

Note: Back up the Oracle data on the computer regularly using the Oracle RMAN utility in conjunction with Legato Single Server Version. Also, back up the *other* (non-Oracle) data on the computer regularly using a suitable backup method.

["Legato Single Server Version Bootstrap Backup" on page 128](#) describes how Legato Single Server Version is preconfigured to perform an automatic daily *bootstrap* backup. The bootstrap is a special backup save set that includes the media index and resource configuration files. A manual bootstrap backup can also be performed using the procedure in ["Manual Bootstrap Backup" on page 130](#).

The bootstrap information printed at the end of each bootstrap backup is essential for recovering the Legato Single Server Version index and resource configuration files. As explained in ["Maintaining Bootstrap Information" on page 131](#), the bootstrap printout should be kept in a safe place, ready for use during a disaster recovery.

Without the bootstrap printout, the save set ID of the most recent bootstrap must be determined. For more information on determining the bootstrap save set ID and using the bootstrap information, see ["Recovering Legato Single Server Version" on page 153](#).

To prepare for disaster recovery, it is important to provide suitable access to the key information about the Legato Single Server Version host computer. Maintain this key information in an onsite location that is the most resistant to disaster. The information should be easily accessible by those assigned to perform disaster recovery. Enact strict guidelines regarding the access, maintenance, and usage of this key information.

Gathering the Key Information

Maintain accurate records for each hardware, software, network, device, and media component related to the Legato Single Server Version host computer.

5

Computer Hardware Information

Maintain the following information about computer hardware and keep this information up-to-date:

- Filesystem configuration
- Fully qualified Domain Names, IP addresses, and hostnames
- For Domain Name Service (DNS) clients, maintain the DNS host's internet address and its hostname
- Hard drive configuration information
- Media device names

- Hardware vendor contact information and contract number
- Configuration information for each piece of hardware, both active and inactive

Computer Software Information

Maintain the following information about computer software and keep this information up-to-date:

- Copies of the original operating system and software media and patches, including the original Legato Single Server Version software media (and where they are located)
- Software enabler and authorization codes
- Software vendor contact information and contract number
- Operating system version and patches installed
- Operating system configuration information
- Emergency media that can be used to restore the computer in the event of a disaster
- Legato Single Server Version bootstrap information
- Kernel configuration and location information
- Device drivers

5

Disaster Recovery

The following sections describe how to perform a disaster recovery on a Legato Single Server Version host computer. The information is designed to provide *general principles* on how to recover critical data and to help in understanding the disaster recovery procedures.

The following list provides a brief overview of the tasks required for a successful disaster recovery on a Legato Single Server Version host computer. These tasks are explained in detail in subsequent sections in this chapter.

1. Reinstall the operating system, if necessary.
2. Reinstall the Legato Single Server Version software, if necessary.
3. Configure the tape device to be used for recovering the Legato Single Server Version bootstrap and load the tape volume containing the latest bootstrap.

4. If the bootstrap save set ID is known, run the **mmrecov** command at the operating system command prompt to recover the bootstrap (media index and resource configuration files).

If the bootstrap save set ID is unknown, run the **scanner -B device-name** command to locate the bootstrap save set ID; then run the **mmrecov** command to recover the bootstrap.

5. Stop the Legato Single Server Version daemons (UNIX) or services (Windows).
6. Copy the contents of the *res.R* directory to the *res* directory.
7. Restart the Legato Single Server Version daemons or services.
8. Run the **nsrck -L7** command to recover the client index.
9. Recover any required Oracle data using Legato Single Server Version.
10. Recover *non-Oracle* data using a suitable recovery method.

Refer to the list of sections in [Table 15 on page 143](#) to determine the specific disaster recovery instructions that apply to the situation.

Note: To recover data *other than Oracle data* on the Legato Single Server Version host computer, use the recovery method that corresponds to the method used to back up that data. Use Legato Single Server Version to recover *only Oracle data* that was backed up by Legato Single Server Version.

Table 15. Sections Containing Disaster Recovery Information

To recover...	See...
Hard drive	<ul style="list-style-type: none"> • "Replacing a Hard Drive" on page 144
Operating system	<ul style="list-style-type: none"> • "Recovering the UNIX Operating System" on page 145 • "Recovering the Windows Operating System" on page 149
Legato Single Server Version	<ul style="list-style-type: none"> • "Recovering Legato Single Server Version" on page 153
Oracle data	<ul style="list-style-type: none"> • "Recovering Oracle Data" on page 161

Replacing a Hard Drive

To replace a hard drive:

- Obtain the hard drive information. See the appropriate section:
 - ["Obtaining the Hard Drive Information on UNIX" on page 144](#)
 - ["Obtaining the Hard Drive Information on Windows" on page 144](#)
- Replace the hard drive. See ["How to Replace a Hard Drive" on page 145](#).

Obtaining the Hard Drive Information on UNIX

The following information is required to replace a hard drive. Obtain the information using the commands appropriate for the operating system.

- Size of the drive
- Filesystem volume information
- Volume label assigned to each disk partition

This information includes details about:

- How the disk is partitioned
- How the disk is loaded
- The size of the disk
- Each logical volume (size and label)
- Each filesystem

Note: Although it will not affect Legato Single Server Version operation, any use of mirroring, RAID/stripping, compression, and volume sets might be noted.

After obtaining this information, replace the hard drive.

Obtaining the Hard Drive Information on Windows

On Windows 2000, go to Start>Programs>Administrative Tools>Computer Management>Storage>Disk Management. On Windows NT, use the Windows NT Disk Administrator.

Obtain the following information about the damaged drive:

- Size of the drive
- Volume size, filesystem type (Windows NT)
- Size, format, and volume label assigned to each disk partition

Note: Although it will not affect Legato Single Server Version operation, any use of mirroring, RAID/stripping, compression, and volume sets might be noted.

After obtaining this information, replace the hard drive.

How to Replace a Hard Drive

If a hard drive fails, refer to the hard drive vendor documentation and the appropriate operating system documentation for instructions on how to replace the hard drive.



Important: Install a new drive that is the same size as, or larger than, the original drive. This ensures that there is enough space to recover all of the failed drive's data.

To begin the recovery process, recover:

- The UNIX operating system, if necessary. See ["Recovering the UNIX Operating System" on page 145](#).
- The Windows operating system, if necessary. See ["Recovering the Windows Operating System" on page 149](#).
- The Legato Single Server Version software, if necessary. See ["Recovering Legato Single Server Version" on page 153](#).
- Oracle data that was backed up by Legato Single Server Version. See ["Recovering Oracle Data" on page 161](#).
- Other filesystem data as necessary, using a suitable recovery method.

Recovering the UNIX Operating System

To recover the UNIX operating system:

- Meet the operating system recovery requirements. See ["UNIX Operating System Recovery Requirements" on page 146](#).
- Recover the operating system. See ["How to Recover the UNIX Operating System" on page 146](#).

UNIX Operating System Recovery Requirements

To recover the UNIX operating system, obtain the following information about the state of the computer immediately prior to the disaster:

- Operating system version and patch level
- TCP/IP properties:
 - Adapter type
 - IP address
 - Default gateway
 - Subnet mask
 - DNS server
- Computer properties:
 - Hostname
 - DNS domain name
 - Superuser password
- Device and SCSI drivers
- Boot files required for booting the kernel. For example:
 - */unix*
 - */boot*
 - */etc/default/boot*
 - */stand/vmunix*

Note: Refer to the appropriate operating system documentation to determine which boot files should *not* be overwritten during a recovery.

Once these requirements have been met, recover the UNIX operating system.

How to Recover the UNIX Operating System

This section describes how to recover the UNIX operating system. This process can be used to recover the operating system back to the original computer or to a different computer.

Recover the operating system by performing either:

- A complete installation and configuration of the operating system.
- OR
- A partial installation and configuration, of only those files that enable the computer to communicate over the network. Then, recover the remaining operating system and configuration files using a suitable recovery method.

Note: Do not recover the operating system from an X session. Rather, recover the operating system in single-user mode from the system console.

To recover the operating system, follow these steps, explained in detail below:

1. Install the operating system.
2. Configure the operating system.
3. Test the operating system and configure the devices.

Step 1: Install the Operating System

To install the operating system:

1. Install the same version and patch level of the UNIX operating system into its original location. Refer to the documentation accompanying the UNIX operating system for details.

To upgrade the operating system, first recover the operating system as it was previous to the disaster, and then perform the upgrade.

2. Re-create all the filesystems that were previously on the computer.

The filesystems must be:

- The same filesystem type.
- At least the same size as before, to hold all of the backed up data.

At a minimum, configure the root volume group and kernel parameters, such as asynchronous I/O. If the resources are available, reconstruct non-root volume group filesystems and logical volumes.

Step 2: Configure the Operating System

To configure the operating system:

1. Configure the network exactly as it was configured before the disaster. Otherwise, the Legato Single Server Version software will view the computer containing Legato Single Server Version as a new computer. If the computer has a host ID different from the one used before the disaster, the Legato Single Server Version software must be reinstalled and configured on the computer. For details, see ["Recovering Legato Single Server Version" on page 153](#).

2. If the operating system is being recovered to a different computer, assign the same hostname (as used for the original Legato Single Server Version host computer before the disaster) for the new computer. If the same hostname is not used, the Legato Single Server Version indexes associated with the original computer cannot be recovered.
3. Configure the date and time as they were configured before, including the time zone.
4. Install any additional UNIX components before recovering the computer's data.
5. Reboot the computer.

Step 3: Test the Operating System and Configure the Devices

To test the operating system and configure the devices:

1. Configure any devices required by Legato Single Server Version.
2. Perform a test to verify that the:
 - Name to Address resolution and TCP/IP are functioning properly. This test can be performed using the **ping** command.
 - Operating system is functioning properly.
 - Tape drive is functioning properly. This test can be performed using the **mt** command.
 - Devices are recognized by the operating system. If the devices are not recognized by the operating system:
 - Load the SCSI driver.
 - Install the device driver software.
 - Modify the device configuration files to enable the computer to communicate with the device during recovery. For details on device configuration, see "[Chapter 3: Device and Media Management](#)" on page 81.

To complete the recovery process, recover:

- The Legato Single Server Version software, if necessary. See "[Recovering Legato Single Server Version](#)" on page 153.
- Oracle data that was backed up by Legato Single Server Version. See "[Recovering Oracle Data](#)" on page 161.
- Other filesystem data as necessary, using a suitable recovery method.

Recovering the Windows Operating System

To recover the Windows operating system:

- Meet the operating system recovery requirements. See ["Windows Operating System Recovery Requirements" on page 149](#).
- Recover the operating system. See ["How to Recover the Windows Operating System" on page 149](#).

Windows Operating System Recovery Requirements

To recover the Windows operating system, obtain the following information about the state of the computer immediately prior to the disaster:

- Operating system version, patches, service packs, and option packs
- Location of the operating system
- TCP/IP properties:
 - Adapter type
 - IP address
 - Default gateway
 - Subnet mask
 - DNS server
- Windows server/workstation properties:
 - Computer name (also called the hostname)
 - Full domain name
 - Administrator name and password
- Date/time properties
- Virtual memory settings
- Protocols installed

Note: For more information about requirements on Windows NT, see ["Dynamic Host Configuration Protocol \(DHCP\) and Windows Internet Naming Service \(WINS\) Databases" on page 160](#).

Once these requirements have been met, recover the Windows operating system.

How to Recover the Windows Operating System

This section describes how to recover the Windows operating system. Use this process to recover the operating system back to the original computer or to a different computer.

Recover the operating system by performing either:

- A complete installation and configuration of the operating system.
OR
- A partial installation and configuration, of only those files that enable the computer to communicate over the network. Then, recover the remaining operating system and configuration files using a suitable recovery method.

To recover the operating system, follow these steps, explained in detail below:

1. Install and configure the operating system.
2. Test the operating system and configure the devices.

Step 1: Install and Configure the Operating System

To install and configure the operating system:

1. Install the same version, service pack, and patch level of the Windows operating system into its original location. Refer to the operating system documentation for details.

To upgrade the operating system, first recover the operating system as it was previous to the disaster, and then perform the upgrade.

2. For Windows NT, install the computer as a workstation or server, not as a BDC (Backup Domain Controller) or PDC (Primary Domain Controller).
3. Install the computer into a workgroup, not into a domain.
4. Configure the TCP/IP properties as they were configured before, with the same hostname (domain name), IP address, default gateway, subnet mask, and DNS server.

For example, in the *hosts* file on Windows 2000

(*%SystemRoot%\system32\drivers\etc\hosts*), the computer name should appear directly after the fully qualified domain name, on the same line, as in the following example:

```
123.56.890.474    kingdome.seattle.washington.com
kingdome
```

Note: If recovering the operating system to a different computer:

- Use the same hostname for the new computer. If the same hostname is not used, the Legato Single Server Version indexes associated with the original computer cannot be recovered.

- Assign the same TCP/IP address for the new computer; otherwise, the computer will be assigned a new host ID by Legato Single Server Version. If this computer does not have the same TCP/IP address as the original computer, Legato Single Server Version must be reinstalled and configured on it. For details, see ["Recovering Legato Single Server Version" on page 153](#).
5. Configure the Windows server/workstation properties as they were configured before the disaster. Use the same computer name, full domain name, administrator name, and password. (The full domain name for a computer named *kingdome*, for example, might be *kingdome.seattle.washington.com*.)

For example, on Windows 2000, perform the following steps:

 - a. On the Desktop, right-click My Computer and select Properties on the context menu. The System Properties dialog box appears. (Another way to reach the System Properties dialog box is to select Start>Settings>Control Panel and click the System icon.)
 - b. In the System Properties dialog box, select the Network Identification tab.
 - c. In the Network Identification dialog box, click the Properties button.
 - d. In the Identification Changes dialog box, click the More button.
 - e. In the DNS Suffix and NetBIOS Computer Name dialog box, ensure that the field labeled "Primary DNS suffix of this computer" contains the domain name. If not, enter the domain name in this field.
 6. Configure the Localization Properties or Date/Time Properties as they were configured before the disaster.
 7. Restart the computer after installing the Windows operating system.
 8. Reset the Virtual Memory Settings as they were configured before by selecting the appropriate options in the Control Panel:
 - Windows 2000: Control Panel>System>Advanced>Performance options>Virtual Memory>Change
 - Windows NT: Control Panel>System>Performance>Change
- Note:** On Windows NT, do not upgrade OEM drivers for network interface cards (NIC) with the OEM Service Pack version of the NIC.
9. If any additional Windows components were installed previously, install them before recovering the computer data.
 10. Restart the computer after the service pack is installed, to apply the new settings.

Step 2: Test the Operating System and Configure the Devices

To test the operating system and configure the devices:

1. Configure any devices required by Legato Single Server Version.
2. On Windows 2000, disable RSM on any stand-alone device connected to the Legato Single Server Version host computer:
 - a. On the Windows desktop, right-click My Computer and select Manager from the pop-up menu.
 - b. For each stand-alone device:
 1. On the Computer Management navigation pane (left side of the dialog box), expand *Storage\Removable Storage\Physical Locations*.
 2. Right-click the device name and select Properties from the pop-up menu.
 3. In the General tab of the Properties dialog box, ensure that the Enable Library check box is *cleared*.
 4. Click OK to apply any changes and close the Computer Management dialog box.
3. Verify that the:
 - Operating system is functioning properly.
 - Network protocols are functioning properly. Test by running **ping**.
 - The Name to Address resolution is correct. Test by running **nslookup** using the fully qualified domain name of Legato Single Server Version.
 - Required devices are recognized by the operating system. If the devices are not recognized by the operating system:
 - Load the SCSI driver.
 - Install the device driver software.

To complete the recovery process, recover:

- The Legato Single Server Version software, if necessary. See ["Recovering Legato Single Server Version" on page 153](#).
- Oracle data that was backed up by Legato Single Server Version. See ["Recovering Oracle Data" on page 161](#).
- Other filesystem data as necessary, using a suitable recovery method.

Once the computer's data is recovered and the computer is rebooted:

- To use Active Desktop, install it.
- On Windows NT:
 - If the computer is a Backup Domain Controller, synchronize it with the Primary Domain Controller.
 - If the computer is a Primary Domain Controller, synchronize it with the domain.

Recovering Legato Single Server Version

To recover Legato Single Server Version:

- Meet the Legato Single Server Version recovery requirements. See "[Legato Single Server Version Recovery Requirements](#)" on page 153.
- Recover Legato Single Server Version. See "[How to Recover Legato Single Server Version](#)" on page 153.

Legato Single Server Version Recovery Requirements

To recover Legato Single Server Version, determine the following:

- Version and patch level of Legato Single Server Version
- Location of the Legato Single Server Version software
- Legato Single Server Version software installation media
- Backup volumes containing the Legato Single Server Version bootstrap (media index and configuration files) and client index
- On UNIX, any links to Legato Single Server Version directories (for example, */nsr* might be linked to */usr/nsr*)

Note: Before recovering Legato Single Server Version on Windows NT, follow the instructions in "[Dynamic Host Configuration Protocol \(DHCP\) and Windows Internet Naming Service \(WINS\) Databases](#)" on page 160 to ensure that the Windows NT DHCP databases and WINS databases are properly restored.

Once these requirements have been met, recover Legato Single Server Version.

How to Recover Legato Single Server Version

This section describes how to recover Legato Single Server Version. Use the following steps to recover Legato Single Server Version back to the original computer or to a different computer.

To recover Legato Single Server Version, follow these steps, explained in detail below:

1. Install Legato Single Server Version.
2. Configure Legato Single Server Version.
3. Locate the bootstrap save set ID.
4. Recover the bootstrap.
5. Rename the resource configuration files.
6. Recover the client index.
7. Verify the Legato Single Server Version recovery.

Step 1: Install Legato Single Server Version

To install Legato Single Server Version:

1. Install the same release of Legato Single Server Version in its original location. For installation instructions, refer to the *Legato Single Server Version Installation Guide*.

Note: By default, the configuration files are located in the `/nsr/res` directory (UNIX) or `C:\Program Files\nsr\res` directory (Windows). Attempt to reuse these configuration files only if the hard drive had not crashed and you are upgrading to or reinstalling Legato Single Server Version.

2. Install any Legato Single Server Version patches that were installed prior to the disaster.
3. (*Perform this step on UNIX only.*) Re-create any links to Legato Single Server Version directories, such as the directories containing the index and configuration files. For example, `/nsr` might be linked to `/usr/nsr`.

Step 2: Configure Legato Single Server Version

To configure Legato Single Server Version:

1. (*Perform this step on Windows only.*) In the Legato Single Server Version Administrator program, check the settings in the Preferences tab of the Client resource. Verify that the computer's aliases are entered correctly. The settings might look something like the following:

```
aliases:kingdome  
kingdome.seattle.washington.com
```

2. Configure the Device resource for each tape device to be used in ["Step 3: Locate the Bootstrap Save Set ID" on page 155](#). For more information on device configuration, see ["Configuring Storage Devices" on page 81](#).
3. *(Perform this step on Windows only.)* The client index path must be the same as when the disaster occurred. If the client index path was relocated to a new location, reset it to the original path using the following procedure:
 - a. Edit the Index Path attribute in the Client resource to the original path.
 - b. Restart the Legato Single Server Version services. This will enable Legato Single Server Version to recognize that the index path has changed. For information on how to restart the Legato Single Server Version services, refer to ["Step 5: Rename the Resource Configuration Files" on page 158](#).
 - c. Run `nsrck -c server-name` from the directory containing the Legato Single Server Version binaries to create an empty file index into which the records can be recovered. By default, the binaries are located in the `C:\Program Files\nsr\bin` directory.

Step 3: Locate the Bootstrap Save Set ID

This section describes how to locate the save set ID for the latest Legato Single Server Version bootstrap. The bootstrap contains the media index and resource configuration files.

Note: If the Legato Single Server Version backup tape volumes are routinely moved to an offsite location for safekeeping, be aware that a file recover operation that generates a mount request will wait until an operator satisfies the mount request. To avoid delays in recovering files, use the `mminfo -mv` command to list the volume containing the file to be recovered and then retrieve the volume from the offsite storage, as required, before starting the recover.

To locate the save set ID of the most recent bootstrap:

1. Insert the most recent backup tape volume used for the automatic daily bootstrap backups or for manual bootstrap backups into the appropriate tape device.
2. At the system console or command prompt, switch to the directory where the Legato Single Server Version binaries are located. For information on the default directory location of the binaries, refer to the *Legato Single Server Version Installation Guide*.

3. Use the **scanner -B** *device-name* command to determine the save set ID of the most recent bootstrap on the volume. For example:

- On Solaris:
scanner -B /dev/rmt/0hbn
- On Windows:
scanner -B \\.\Tape0

The **scanner -B** command displays the latest bootstrap save set information found on the backup volume, for example:

```
scanner: scanning 8mm tape mars.006 on \\.\Tape0
scanner: Bootstrap 1148869870 03/31/01 6:29:58 mars.006,
file 88
```

Note: If the save set ID of the latest bootstrap is *not* located on the most recent tape, run the **scanner -B** command on preceding tapes to locate the save set ID of the latest bootstrap.

4. When the **scanner -B** command output appears, record both the bootstrap save set ID and the volume label.

Step 4: Recover the Bootstrap

This section describes how to recover the Legato Single Server Version bootstrap (media index and configuration files) using the **mmrecov** command.

To recover the bootstrap:

1. Use the **mmrecov** command at the operating system command prompt to recover the bootstrap. For example:

- On UNIX:
mmrecov
- On Windows:
C:\Program Files\nsr\bin> **mmrecov**

The following output appears:

```
mmrecov: Using madrid.spain.com as server
```



Important: The **mmrecov** command overwrites the media index. It does *not* overwrite the resource configuration files, as **mmrecov** recovers them to the *res.R* directory. For more information on the **mmrecov** command, refer to these sources:

- **mmrecov** entry in the *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on page 39)
- **mmrecov** man page on UNIX (see "[UNIX Man Pages](#)" on page 37)

2. If the following message appears, enter the name of the device being used for the recovery (this message only appears if Legato Single Server Version has multiple devices configured and enabled).

```
What is the name of the device you plan on using
[device-name]?
```

3. When the following message appears, enter the save set ID for the latest bootstrap.

```
Enter the latest bootstrap save set ID []: 20076
```

4. When the following message appears, enter the file number to begin the recovery. If unknown, press [Enter].

```
Enter starting file number (if known) [0]: 130
```

5. When the following message appears, enter the first record number to begin the recovery. If unknown, press [Enter].

```
Enter starting record number (if known) [0]: 0
```

6. When the following message appears, insert the volume containing the save set ID into the backup device (if required) and press [Enter]:

```
Please insert the volume on which save set ID 20076 started
into device-name. When you have done this, press <RETURN>:
```

Once the required volume is loaded and [Enter] is pressed, the following message appears:

```
Scanning device-name for save set 20076; this may take a
while...
```

Legato Single Server Version then scans the volume for the save set and recovers it.

Note: The `nwadmin` program can be used (click the Monitor tab on Windows) to monitor the recovery of the bootstrap (media index and configuration files). If the media index is *not* on the same volume as the resource configuration files, Legato Single Server Version will prompt during the recovery if additional volumes are required.

The bootstrap is recovered when the following message appears:

```
If your resource files were lost, they are now recovered
in the 'res.R' directory. Copy or move them to the 'res'
directory, after you have shut down the service. Then
restart the service.
```

```
Otherwise, just restart the service.
```

```
If the on-line index for the server-name was lost, it can be
recovered using the nsrck command.
```

Step 5: Rename the Resource Configuration Files

Because the resource configuration files cannot be reliably overwritten while Legato Single Server Version is running, `mmrecov` recovered the `res` directory as `res.R` by default. In addition, `mmrecov` might have recovered another server's configuration file in this directory. Stopping and restarting the Legato Single Server Version daemons or services is recommended.

To rename the configuration files:

- On UNIX:
 1. Stop the Legato Single Server Version daemons by entering the `nsr_shutdown` command at the UNIX command prompt:

```
# nsr_shutdown
```
 2. Rename the existing `/nsr/res` directory to `/nsr/res.orig`:

```
# mv /nsr/res /nsr/res.orig
```
 3. Rename the recovered `/nsr/res.R` directory to `/nsr/res`:

```
# mv /nsr/res.R /nsr/res
```
 4. Restart the Legato Single Server Version daemons by entering the `nsrexecd` and `nsrd` commands, *in that order*:

```
# nsrexed
# nsrd
```
 5. After verifying that the Legato Single Server Version configurations are correct in the Administrator program, delete the `/nsr/res.orig` directory.

- On Windows:
 1. Stop the Legato Single Server Version services:
 - a. In the Windows Control Panel, select Services.
 - b. Stop the NetWorker Backup and Recover Server service.
 - c. Stop the NetWorker Remote Exec service.
 - d. Click Close.
 2. Rename the existing *nsr\res* directory (in *C:\Program Files* or a relocated directory) to *nsr\res.orig*.
 3. Rename the recovered *nsr\res.R* directory (in *C:\Program Files* or a relocated directory) to *nsr\res*.
 4. Restart the Legato Single Server Version services:
 - a. In the Windows Control Panel, select Services.
 - b. Start the NetWorker Remote Exec service.
 - c. Start the NetWorker Backup and Recover Server service.
 - d. Click Close.
 5. After verifying that the Legato Single Server Version configurations are correct in the Administrator program, delete the *nsr\res.orig* directory.

Step 6: Recover the Client Index

Once the bootstrap consisting of the media index and resource configuration files is recovered, recover the client index.

To recover the client index, enter this **nsrck -L7** command at the operating system command prompt:

```
nsrck -L7 hostname
```

The **nsrck -L7** command recovers the */nsr/index/<hostname>* directory containing the required client index.

Step 7: Verify the Legato Single Server Version Recovery

To verify the Legato Single Server Version recovery:

1. Perform a test Oracle backup or restore to ensure that Legato Single Server Version is fully recovered.
2. Perform a test bootstrap backup manually using the instructions in ["Manual Bootstrap Backup" on page 130](#).

To complete the recovery process, recover:

- Oracle data that was backed up by Legato Single Server Version. See ["Recovering Oracle Data" on page 161](#).
- Other filesystem data as necessary, using a suitable recovery method.

Dynamic Host Configuration Protocol (DHCP) and Windows Internet Naming Service (WINS) Databases

If DHCP or WINS on Windows NT is being used, it is recommended that these databases be regularly dumped and the dumps backed up using a suitable backup method.

Windows NT does not provide a programming interface for backup and restore of the DHCP database or the WINS database, but DHCP and WINS database dumps can be configured using DHCP Manager and WINS Manager. Back up these database dumps as part of the routine filesystem backup operations and then restore the dumps if it ever becomes necessary. After restoring the dumps, import them, again using DHCP Manager or WINS Manager.

To dump, back up, restore, and import the DHCP and WINS databases:

1. To open the DHCP administrative interface, go to Start>Programs>Administrative Tools>DHCP Manager.
2. To run DHCP dumps as necessary, configure the dumps from DHCP Manager. A default dump location is provided, but a different location can be specified. Make a note of the chosen database dump location.
3. To open the WINS administrative interface, go to Start>Programs>Administrative Tools>WINS Manager.
4. To run WINS dumps as necessary, configure the dumps from WINS Manager. A default dump location is provided, but a different location can be specified. Make a note of the chosen database dump location.
5. As part of the routine filesystem backups, specify the backup save sets including the filesystem locations specified for the DHCP and WINS databases dumps. Restore a dump whenever it becomes necessary.
6. To recover a DHCP or WINS database, open DHCP Manager or WINS manager and import the database that was backed up and restored.

Recovering Oracle Data

This section describes how to recover from a crash in which one or more files of an Oracle database were damaged on the Legato Single Server Version host computer.

The first sign of a disk crash is usually an I/O error. Oracle usually documents the I/O error in both the trace file and the alert log.

If only one database file is affected, the database might have encountered a bad spot on the disk. This can be circumvented by reformatting the disk to make a new list of bad blocks. However, this can be time-consuming, so it is prudent to have a spare disk available to swap in during the reformatting.

If several database files are affected, all on the same disk, there might be a disk controller problem or a disk head crash. A bad controller can be replaced, and data on the disk will often be in perfect shape. But after a head crash, that spare disk will need to be used as a replacement.

Keep an extra disk on hand as a "hot spare," in case a disk failure occurs. Format it and verify that it works. If a disk failure does occur, it is much faster to swap in a spare disk than it is to rename database files and update the control file accordingly.

After the Oracle data requiring recovery has been determined, restore the relevant files first.

Restore and recover the Oracle database files by using one of these programs:

- RMAN command line interface
- OEM Backup Management Tools

For complete details on how to restore Oracle database files using Legato Single Server Version, see ["Chapter 4: Backup and Restore Operations" on page 107](#).

To recover an Oracle database using the Oracle RMAN utility, refer to the appropriate Oracle backup and recovery documentation.

Appendix A: Oracle9i Support in Legato Single Server Version

This appendix is designed to help in the use of RMAN features introduced in Oracle9i with Legato Single Server Version. For a complete list and more information on these Oracle9i features, refer to the appropriate Oracle9i backup and recovery documentation.

This appendix includes the following main sections:

- ["Automatic Channel Allocation" on page 163](#)
- ["Control File Autobackup" on page 165](#)
- ["Backup Copies" on page 166](#)
- ["Retention Policies" on page 166](#)
- ["Backup and Restore Optimization" on page 167](#)
- ["Backup of Backup Sets" on page 168](#)
- ["Restartable Backups" on page 169](#)

Automatic Channel Allocation

In Oracle9i, RMAN supports automatic channel allocation. This feature enables a user to configure persistent settings for automatic channels for use in all RMAN sessions.

To configure persistent settings for Oracle backups or restores using Legato Single Server Version, specify the **device type** in the **configure** command using the noncase-sensitive keywords **sbt**, **sbt_tape**, **'sbt'**, and **'sbt_tape'**.

If the **allocate channel** command is not used in an RMAN script to manually allocate at least one channel, RMAN allocates automatic channels in the

RMAN session using the settings that are specified in the following **configure** commands:

```
configure default device type to sbt
configure device type sbt parallelism...
configure channel device type sbt parms...
configure channel n device type sbt parms...
```



Important: Manual and automatic channels are mutually exclusive and cannot be mixed in an RMAN session. The format of an automatic channel name of the device type for Legato Single Server Version backups and restores is `ORA_SBT_n` or `ORA_SBT_TAPE_n`, where *n* is the channel number. Do *not* use this name format for manual channel allocation with Legato Single Server Version; otherwise, RMAN reports an error.

Specify persistent settings for automatic channels for Legato Single Server Version backups and restores using the **configure** commands.

- Specify the default device type using the **configure default device type** command. For example, specify the automatic channel default device type for backups using the following command:

```
configure default device type to 'sbt_tape'
```
- Specify the number of automatic channels using the **parallelism** option. For example, specify two automatic channels for backups using the following command:

```
configure device type 'sbt_tape' parallelism 2
```
- Specify generic automatic channel options using the **configure channel device type...parms...** command. For example, set an automatic channel for Oracle backups and specify backup compression using the following command:

```
configure channel device type 'sbt_tape' parms
'ENV=(NSR_COMPRESSION=TRUE)'
```

Note: Use the **send** command to set the `NSR_*` environment variables for automatic channels only through the operating system command line option of the **rman** invocation. Do *not* use the **send** command in an RMAN script to set the variables for automatic channels. Oracle performs automatic channel allocation when an RMAN command runs that requires the channel allocation, for example, the **backup** command. If the

send command is issued before this type of RMAN command, an RMAN error is generated, stating that no channels were found for the **send** command.

- Specify automatic channel options for a *specific channel number* using the **configure channel *n* device type...parms...** command. For example, specify a Legato Single Server Version debug file only for the second automatic channel (*not* for other automatic channels) using the following command:

```
configure channel 2 device type 'sbt_tape' parms
'ENV=(NSR_DEBUG_FILE=/db/logs/backup.log,
NSR_COMPRESSION=TRUE)'
```

- With automatic channel allocation, the RMAN **backup**, **restore**, or maintenance commands can be run as stand-alone commands without requiring manual channel allocations.

The following sample RMAN backup script specifies two automatic channels for Oracle backups, each channel using a different debug file:

```
configure default device type to sbt;
configure device type sbt parallelism 2;
configure channel 1 device type sbt
parms 'ENV=(NSR_DEBUG_FILE=/db/logs/debug1.log)';
configure channel 2 device type sbt
parms 'ENV=(NSR_DEBUG_FILE=/db/logs/debug2.log)';
```

Control File Autobackup

In Oracle9i, RMAN performs a control file autobackup after each RMAN **backup** command if the control file autobackup has been enabled using the **configure controlfile autobackup on** command. Use this feature to restore the backup entries contained in the control file when the control file is lost and the Recovery Catalog is not available.

Specify persistent settings for the control file autobackups using the **configure controlfile autobackup** command. For example, enable control file

autobackup and specify the persistent setting for the format of the control file autobackup name using the following commands:

```
configure controlfile autobackup on
configure controlfile autobackup format for device type
'sbt_tape' to '/NMO_%f/'
```

If the control file autobackup is set to *on* and the RMAN backup is performed using Legato Single Server Version, the control file autobackup will also be performed using Legato Single Server Version. As a result, one or more channels of device type **sbt_tape** must be allocated for the restore.

Backup Copies

Legato Single Server Version does *not* support the duplexing of backups. As a result, Legato Single Server Version does *not* support the following commands in Oracle9i:

- **configure...backup copies for device type sbt_tape to...**
- **backup...copies**
- **set backup copies**

Note: Legato NetWorker Module for Oracle (used in conjunction with Legato NetWorker) supports the above commands for duplexing backups.

Retention Policies

In Oracle9i, RMAN provides an Oracle retention policy for backups. An Oracle retention policy is based on the recovery window or redundancy; it is *not* based on a defined time period, such as a year. Oracle considers a backup *obsolete* when it is no longer required according to the Oracle retention policy setting. Oracle checks the retention policy of a backup when the **report obsolete...** or **delete obsolete...** command is run.

Legato Single Server Version supports the Oracle retention policy with some restrictions, since Legato Single Server Version has its own browse and retention policies to specify how long data is available for recovery. The Legato Single Server Version browse and retention policies are based on a defined time period. Since the Oracle retention policy is independent from the Legato Single Server Version policies and there is no mechanism to synchronize these policies, the Legato Single Server Version and Oracle policies might conflict with each other.

For example, Legato Single Server Version might expire an Oracle backup that is not yet obsolete in RMAN, depending on the Legato Single Server Version browse and retention policies set by a user. Legato Single Server Version *cannot* guarantee that it will not expire a backup volume until all the RMAN backups on that volume have been deleted from the RMAN catalog.

To avoid conflict problems, disable the Oracle retention policy (and then use only the Legato Single Server Version policy) with the following command:

```
configure retention policy to none
```

If the Recovery Catalog is used, a backup can be exempted from the retention policy with one of the following commands:

```
change backupset...keep until/forever...
```

```
backup...keep until/forever...
```

If the Oracle retention policy is to be used, set the Legato Single Server Version browse and retention policies for backups to be long enough that the backups are kept on the backup volumes *until the Oracle retention policy makes them obsolete*. Specify the Legato Single Server Version policies by using the default settings in the Client resource or by setting the NSR_BROWSE and NSR_SAVESET_EXPIRATION environment variables. For more information on how to set Legato Single Server Version policies for Oracle backups, see ["Verifying the Client Resource Configuration" on page 75](#).



Important: Run the **crosscheck** command on the Oracle backups before running **report obsolete** or **delete obsolete backups** of the **device type sbt_tape**. This ensures that backups expired by Legato Single Server Version are flagged as *expired* in the RMAN catalog. As a result, RMAN can correctly identify which backups are not needed according to the Oracle retention policy.

Backup and Restore Optimization

If backup optimization is enabled using the **configure backup optimization on** command in Oracle9i, RMAN decides which files to skip during a backup, based on several criteria. For more information on these criteria, refer to the appropriate Oracle backup and recovery documentation.

Notes:

- To force a backup that would otherwise be skipped due to backup optimization, use the **force** option in the **backup** command.
- When RMAN skips a backup due to backup optimization, it does not produce an error message. However, RMAN does issue a warning message similar to the following:
skipping archive log file...



Important: When using Oracle backup optimization with Legato Single Server Version backups and restores, run the **crosscheck** command *regularly* to synchronize the Recovery Catalog and Legato Single Server Version indexes. This ensures that backups expired by Legato Single Server Version are also marked as *expired* in the Recovery Catalog and RMAN does not skip a backup when a referenced backup is already expired in Legato Single Server Version.

Restore optimization in Oracle9i causes RMAN not to restore a file if the original file is already in the correct location and contains the expected information.

Note: To force a restore that would otherwise be skipped due to restore optimization, use the **force** option in the **restore** command.

Backup of Backup Sets

In Oracle9i, RMAN supports the backup of backup sets. If Oracle data is backed up using **device type disk**, this Oracle9i feature can be used to back up these backup sets from disk to backup volumes using Legato Single Server Version.

For example, to back up all backup sets from disk to Legato Single Server Version backup volumes in a tape device, use the following command:

```
backup device type sbt backupset all
```

The backup set on disk can also be deleted using the **delete input** option in the **backup device type sbt backupset...** command. For example, to back up the backup sets that were created on disk more than a week ago and then delete the backup sets from disk, use the following command:

```
backup device type sbt backupset completed before  
sysdate-7 delete input
```

Restartable Backups

In Oracle9i, RMAN can back up files that have not been backed up since a specified time. For example, to continue the backup of a database that was canceled two days ago, use the following command:

```
backup device type sbt database not backed up since time  
'sysdate-2'
```

RMAN compares the given time in this command with the completion time of the most recent backup of a datafile to determine if the datafile requires backup. For more information, refer to the appropriate Oracle backup and recovery documentation.

For more information on how to cancel Oracle backups, see the appropriate section:

- ["Canceling a Running Oracle Backup" on page 131](#)
- ["Canceling a Nonresponding Oracle Backup" on page 132](#)

A

Appendix B: Troubleshooting and Error Messages

This appendix describes troubleshooting guidelines to follow if Legato Single Server Version does not function properly. It also describes RMAN error messages and common Legato Single Server Version error messages that might be encountered.

This appendix includes the following main sections:

- ["Troubleshooting Tips" on page 171](#)
- ["Client/Server Communications on UNIX" on page 173](#)
- ["Client/Server Communications on Windows" on page 181](#)
- ["RMAN Error Messages" on page 183](#)
- ["Legato Single Server Version Error Messages" on page 184](#)

Troubleshooting Tips

The following list of troubleshooting tips refers to portions of this *Administrator's Guide* and the *Legato Single Server Version Installation Guide, Release 6.1* that are commonly overlooked. Use the following list to troubleshoot any problems in running Oracle backup and restore operations using Legato Single Server Version.

To set up an Oracle backup and restore system correctly:

1. Configure the Oracle Server and Net service (if used) according to the instructions in the Oracle documentation.

Without Legato Single Server Version installed on the Oracle Server host, it should be possible to perform a backup and restore using the **allocate**

channel t1 type disk command. For more information, see the appropriate Oracle documentation.

2. Verify that the combination of the operating system, Oracle Server, and Legato Single Server Version software is supported.

For more information, refer to the installation requirements in the *Legato Single Server Version Installation Guide, Release 6.1*.

3. Install Legato Single Server Version using the instructions in the *Legato Single Server Version Installation Guide*.

To relink the library file on UNIX, use the commands listed in the *Installation Guide*. Shut down and restart Oracle when required. Use the correct *liblsm.** library file.

To verify the version of the Legato Single Server Version SBT library installed, check the version of the appropriate file:

- On UNIX, use one of these commands, where the *liblsm.** filename ending depends on the particular UNIX system:


```
# what $ORACLE_HOME/lib/liblsm.*
# strings $ORACLE_HOME/lib/liblsm.* | grep "@(#)"
```
- On Windows:
 - a. Find the *orasbt.dll* file.
 - b. Right-click the file icon and select Properties.
 - c. In the Properties window, select the Version tab and view the file version information.

Compare the library file with the *liblsm.** (UNIX) or *orasbt.dll* (Windows) file in the Legato Single Server Version distribution—the two files should be identical. On UNIX, ensure that Oracle is not linked to another *liblsm.**, *libobk.** (BusinessSuite Module for Oracle version of *liblsm.**), or *libnwor.** (NetWorker Module for Oracle version of *liblsm.**) file.

4. Configure the required Legato Single Server Version resources.

For more information, see ["Chapter 2: Preparing to Use Legato Single Server Version" on page 41](#).

5. Perform an Oracle backup using Legato Single Server Version and the proper RMAN script.

Set the required Legato Single Server Version environment variables in the RMAN backup script or in the **rman send** command on the operating system command line. For information on how to set the environment

variables, see ["Legato Single Server Version Environment Variables" on page 109](#). For a simple startup RMAN script, see ["Creating RMAN Scripts" on page 123](#).

For more information on how to troubleshoot problems using Legato Single Server Version, see the following sections:

- ["Client/Server Communications on UNIX" on page 173](#)
- ["Client/Server Communications on Windows" on page 181](#)

If an Oracle backup *fails*, check the debugging file for Legato Single Server Version. For debugging information, set the NSR_DEBUG_FILE environment variable. For more information, see ["Legato Single Server Version Error Messages" on page 184](#).

Client/Server Communications on UNIX

Communications between Legato Single Server Version and the Oracle Server (as a Legato Single Server Version client) are defined by the attributes configured in the Server and Client resources in the Administrator program. These attributes—such as the Parallelism or Administrator attributes—affect the performance and security of backups. To properly configure the Server and Client resource attributes, follow the instructions in ["Configuration Roadmap" on page 69](#).

Many of the problems that might be encountered during Legato Single Server Version setup and configuration are actually problems with network communications. The following sections describe procedures for testing the communications in a network.

How to Troubleshoot IP Errors

If any of the following error conditions occurs, an IP naming problem probably exists:

- RPC errors
- Unknown host messages
- Failure contacting the portmapper
- Connection failures or timeouts
- Program unexpectedly exiting
- Refused connections
- RCMD to active client failures

- Name-to-address translation failures
- Program not registered messages
- Legato Single Server Version services or daemons failing to start
- Legato Single Server Version services or daemons failing to remain active
- Invalid path messages

To troubleshoot IP errors:

1. Document the steps taken and the results, especially error messages, in case Technical Support needs to be contacted. This enables e-mail or fax of the exact steps and error message text directly to Technical Support.
2. Set up a hosts table for each Legato Single Server Version client and server. See ["How to Set Up a Hosts Table" on page 174](#).
3. Disable other name servers to simplify testing. See ["Troubleshooting Hostname Resolution Problems" on page 175](#).
4. Use the **ping** command to establish basic connectivity. See ["How to Use ping to Verify Network Connections" on page 176](#).
5. Use the **rpcinfo** command to verify that sessions can be established and that portmapping is correct. See ["How to Use rpcinfo to Verify That Sessions Can Be Established" on page 177](#).

How to Set Up a Hosts Table

It is recommended that IP problems be troubleshooted using only the hosts table. Troubleshooting using only the hosts table does not mean that the name service, for example, DNS, cannot be used with Legato Single Server Version. Run tests using only the hosts table to determine whether Legato Single Server Version is installed correctly. After it is certain that the software works with the hosts table, enable the named server being used.

To set up a hosts table:

1. On the Legato Single Server Version client, list the client and the server to which it connects, for example:

```
127.0.0.1 localhost loopback
```

```
123.456.789.111 client client.domain.com
```

```
123.456.789.222 server server.domain.com
```

2. On the Legato Single Server Version server, list the Legato Single Server Version server itself and all of its clients, for example:

```
127.0.0.1 localhost loopback
```

```
123.456.789.111 server server.domain.com
```

```
123.456.789.222 client client.domain.com
```

3. Use the guidelines in ["How to Use ping to Verify Network Connections" on page 176](#) to ensure the highest success rate for parsing a hosts table within any operating system.

Recommendations for hosts table configuration:

- Do not use blank lines in the body of the hosts table.
- The end of the hosts table should always contain a blank line.
- The first unremarked entry should always be the loopback line in the exact order and format shown in [step 1](#) and [step 2](#).
- The last character of each unremarked line should be a space, not a carriage return.

On UNIX platforms, the hosts table resides in the `/etc/hosts` directory.

Troubleshooting Hostname Resolution Problems

To simplify the troubleshooting of host name resolution problems, try disabling services like DNS, WINS, and DHCP. If there are hostname resolution problems, first configure the hosts table for the computer, and then test the backups.

Some common problems that can be encountered with DNS, WINS, and DHCP services include:

- The DNS is not configured with a reverse lookup table.
- The clients are configured with the wrong IP addresses for DNS or WINS servers.
- The DHCP services do not properly update the WINS server with new addresses.

DNS does not need to be disabled for the entire network, just for the initial setup of the Legato Single Server Version client and server to be tested. Only disable the ability of a client to obtain IP naming information from a DNS server. Typically, the DNS server itself does not need to be disabled.

To disable the DNS server on most UNIX platforms, rename the file `/etc/resolv.conf` and reboot.

For a Solaris or HP-UX system, instead of renaming *resolv.conf*, the IP name search order can be set up so that the hosts table is searched before DNS.

How to Set the IP Name Search Order

To set the IP name search order:

1. Edit the */etc/nsswitch.conf* file and verify that the */etc/resolv.conf* file exists.
2. Set the host file to be first in the search order, with DNS second and NIS last, for example:

```
hosts: files [NOTFOUND=continue] DNS [NOTFOUND=continue]
nis
```

For an AIX system, edit the */etc/netsvc.conf* file and reboot.

The NSORDER environment variable can also be set. For directions specific to the version of AIX, refer to Info Explorer.

How to Use ping to Verify Network Connections

After creating the hosts table, test it using the **ping** command.

On the Legato Single Server Version client, **ping** the following:

- Client short name (hostname) from the client
- Client long name (hostname plus domain information) from the client
- Client IP address from the client
- Server short name from the client
- Server long name from the client
- Server IP address from the client

The following example shows how to **ping** the client short name and client long name from a Legato Single Server Version client called *mars* in the *jupiter* domain:

```
# ping mars
# ping mars.jupiter.com
```

On the Legato Single Server Version server, **ping** the following:

- Server short name from the server
- Server long name from the server
- Server IP address from the server
- Client short name from the server

- Client long name from the server
- Client IP address from the server

How to Use `rpcinfo` to Verify That Sessions Can Be Established

If `ping` is successful and backup problems still exist, the `rpcinfo` command can also be used for testing. Because Legato Single Server Version relies heavily on mapping of ports, use `rpcinfo` to test the operation of the portmapper. Using `ping` tests the connection up to the network layer in the Open System Interconnection (OSI) model; `rpcinfo` checks for communication up to the session layer.

Use the same tests with `rpcinfo` as with `ping`.

For `rpcinfo` to be used successfully, the machine whose hostname is entered on the command line must have a portmapper running. In most cases, Legato portmappers are compatible with fully functional portmappers from other vendors (third-party portmappers). If a product that provides its own portmapper is used, Legato recommends not loading the third-party portmapper until it is verified that Legato Single Server Version works with the rest of the environment. This process enables portmapper compatibility testing without adding other unknowns.

On Solaris, the `rpcbind` daemon must be running. On AIX and HP-UX, the `portmap` daemon must be running. The `rpcinfo` utility is part of the operating system.

Enter the following `rpcinfo` command to display ports using TCP:

```
# rpcinfo -p hostname
```

Substitute the long name and short name for the variable `hostname`, as for `ping`.

Other `rpcinfo` command options can be viewed by typing `rpcinfo` at the command line. More information on the `rpcinfo` command and its error messages are available in the `rpcinfo` man page. Repeat `rpcinfo` using all the locations and all the iterations listed for `ping` in ["How to Use ping to Verify Network Connections" on page 176](#).

When `rpcinfo` runs successfully, the output is a list of port numbers and names as shown in the following example:

```
rpcinfo for mars
program vers proto  port
100000    2   tcp    111  portmapper
100000    2   udp    111  portmapper
```

390103	2	tcp	760
390109	2	tcp	760
390110	1	tcp	760
390103	2	udp	764
390109	2	udp	764
390110	1	udp	764
390113	1	tcp	7937
390105	5	tcp	821
390107	4	tcp	819
390107	5	tcp	819
390104	105	tcp	822

Replacement for Functional Use of portmapper and rpcbind

The **nsrexecd** process combines the functionality of **portmapper** and **rpcbind**. The parent **nsrexecd** spawns a child **nsrexecd** that handles the **portmapper** functions. As a result, more than one instance of the **nsrexecd** process will be running.

In the following example, the instance of **nsrexecd** running under the process ID (PID) 20415 is the parent and the instance of **nsrexecd** running under the PID 20416 is the child:

```
jupiter# ps -ef | grep nsr
root 20429 204200 11:23:59 ? 0:00 /usr/sbin/nsrmmmd -n 1
root 20415 1 0 11:23:49 ? 0:01 /usr/sbin/nsrexecd -s
jupiter
root 20416 204150 11:23:49 ? 0:01 /usr/sbin/nsrexecd -s
jupiter
root 20428 204200 11:23:57 ? 0:00 /usr/sbin/nsrindexd
root 20420 1 0 11:23:53 ? 0:02 /usr/sbin/nsrd
root 20446 203490 11:27:22 pts/6 0:00 grep nsr
root 20427 204200 11:23:55 ? 0:00 /usr/sbin/nsrmmddb
```

This enables Legato Single Server Version processes to function in a more secure manner that does not utilize ports or protocols that are commonly used by other programs.

How to Verify Firmware for Switches and Routers

If switches or routers from any vendor are used, ensure that the switch or router firmware is dated after August 1995 (wherever they exist on the network) to ensure that RPC (Remote Procedure Call) traffic is handled properly. Most of the switch and router vendors have significantly improved their handling of RPC traffic since August 1995.

Naming Requirements

Legato Single Server Version uses the `/nsr/res/servers` file to determine whether a Legato Single Server Version server is authorized to back up the client data. If the `servers` file does not exist, it can be created in the `/nsr/res` directory using a preferred editor.

The `servers` file must contain both the short name and the long name of the Legato Single Server Version server to be used for backups. For example, the `servers` file would contain the following names for a Legato Single Server Version server named `mars` in the `jupiter.com` domain:

```
mars
mars.jupiter.com
```

In the Alias attribute of the Client resource, list both the short name and the long name, plus any other applicable aliases for the client.

Binding to Server Errors

Legato Single Server Version architecture follows the client/server model, whereby a server provides services to a client through the RPC. These services reside inside of long-lived processes known as daemons.

For a client to find these daemons, register the daemons with a registration service. When the daemons start, they register themselves with the registration service provided by the portmapper.

Legato Single Server Version provides a backup and recovery service. It receives data from the Oracle Server (the client), stores the data on backup media, and retrieves it on demand. If the Legato Single Server Version daemons are not running and a Legato Single Server Version service is requested, the following messages are received:

```
Server not available
RPC error, no remote program registered
```

These messages indicate that the Legato Single Server Version daemons **nsrd**, **nsrexecd**, **nsrindexd**, **nsrmmmd**, and **nsrmmdbd** might not be running.

To restart the daemons, log in as root and enter the following command at the prompt, depending on the system:

Table 16. Legato Single Server Version Startup Command

Operating System	Startup Command
Solaris	<code># /etc/init.d/networker start</code>
HP-UX	<code># /sbin/init.d/networker start</code>
Linux	<code># /etc/rc.d/init.d/networker start</code>
AIX	<code># /etc/rc.nsr</code>
Tru64 UNIX	<code># /sbin/rc3.d/S94NSRstartstop start</code>

Saving Remote Filesystems

The following error messages might be included in the save group completion mail when a backup for a remote client fails:

```
Host hostname cannot request command execution
hostname: Permission denied
```

The first message means that the **nsrexecd** daemon on the client is not configured to enable the server to back up its files. The second message means that the **nsrexecd** daemon is not currently running on the client.

To resolve these problems, ensure that the **nsrexecd** daemon is running on the client, and that the server's hostname is listed in the boot-time file. The boot-time file is automatically generated before the installation script is completed, and takes the responses to the query for the names of all the servers, in order of precedence, that can contact a client for backups. [Table 17 on page 181](#) lists the location for the boot-time file. For more information about the **nsrexecd** daemon, refer to the **nsrexecd** man page.

Table 17. Boot-Time File Locations

Operating System	Boot-Time File
AIX	<i>/etc/rc.nsr</i>
HP-UX	<i>/etc/rc</i>
Solaris	<i>/etc/init.d/networker</i>
Others	<i>/etc/rc2.d/S95networker</i>

Recover Access Rights

Data recover access can be controlled by configuring the Client resource. The Remote Access list displays the user names that have recover access to the save sets. User names can be added or deleted, depending on the level of security the files require.

The following users have permission to recover any files, regardless of the contents of the Remote Access list:

- Root
- Operator
- Member of the operator group

Other users can only recover files for which they have read permission, relative to the file mode and ownership at the time that the file was backed up. Files recovered by a user other than root, operator, or the operator group are owned by that user.

Client/Server Communications on Windows

Communications between Legato Single Server Version and the Oracle Server (as a Legato Single Server Version client) are defined by the attributes configured in the Server and Client resources in the Administrator program. These attributes—such as the Parallelism or Administrator attributes—affect the performance and security of backups. To properly configure the Server and Client resource attributes, follow the instructions in ["Configuration Roadmap" on page 69](#).

Many of the problems that might be encountered during Legato Single Server Version setup and configuration are actually problems with network communications. The following sections address various client/server communication issues for Legato Single Server Version on Windows.

Host Name Determination

Legato Single Server Version on Windows gets its hostname from its TCP/IP setup. Both the server and domain name can be accessed through the Windows control panel. This name is not necessarily the same computer name that is common to other Windows applications.

How to Determine the Hostname

Use these steps to determine the hostname on a Windows computer:

1. From the Windows Start menu, select Settings>Control Panel to open the Control Panel window.
2. Double-click the Network icon to open the Network applet.

The computer's hostname and domain names are displayed in the Identification tab.

Name Resolution

If the network consists of only Windows computers, using WINS or LMHOSTS may be adequate for use of Legato Single Server Version. However, for use of Legato Single Server Version with clients running on other platforms such as UNIX, a local host file or DNS name resolution must be used.

The Legato Single Server Version hostname must be added to either the local *hosts* file (located in %SystemDrive%\winnt\system32\drivers\etc) or the Domain Name Server (DNS) that contains the names of all servers on the network.

Backup Operators Group

The Backup Operators local group provides its members the rights necessary to back up and recover data from a Windows computer. Users requesting backups must be in the Backup Operators or Administrators group of the domain into which they are logged. The Backup Operators group is assigned on a computer-by-computer basis. It is *not* assigned globally by the domain. If

there is trouble performing tasks on one Legato Single Server Version server but not another, check the problematic computer's Backup Operators group to ensure that the required user is properly assigned.

Dynamic Host Configuration Protocol (DHCP) Clients

Legato Single Server Version requires a static (fixed) hostname address. Typically, addresses for Dynamic Host Configuration Protocol (DHCP) clients change because they use dynamic addressing. If the address changes, the registration code for that Legato Single Server Version becomes invalid. If Legato Single Server Version is a DHCP client, a static TCP/IP address must be reserved for it.

Backup and Recover Server Service

In Windows operating systems, the NetWorker Backup and Recover Server service is normally started by the Windows System account. This enables backup and recovery services to run even if no one is logged onto that computer.

RMAN Error Messages

RMAN stores information and RMAN-specific error messages in the log file specified using the **msglog** option. Review the RMAN information in this log file after each backup.

To specify the name of the RMAN log file for an Oracle backup, use the **msglog** option in the **rman** command on the command line:

```
% rman target ... rcvcat ... msglog filename
```

For more information on specific RMAN error messages and recommended courses of action, refer to the appropriate Oracle *Error Messages* guide.

Legato Single Server Version Error Messages

During a backup or restore, Legato Single Server Version records the same error messages in *both* the Oracle *sbtio.log* file and in the following default log file on the Oracle Server host:

- On UNIX:
/nsr/applogs/nmo.messages
- On Windows:
%SystemDrive%\Program Files\nsr\applogs\nmo.messages

To obtain more debugging information for a backup or restore, set the environment variable `NSR_DEBUG_FILE` to the valid pathname of a file to store the information. If the variable is set to an invalid pathname or the specified file does *not* have write permissions, the debugging information is written as follows:

- On UNIX:
 1. In the */nsr/applogs/nmosbt.log* file, or
 2. The information is *not* written.
- On Windows:
 1. In the *%SystemDrive%\Program Files\nsr\applogs\nmosbt.log* file, or
 2. The information is *not* written.

Legato Single Server Version also writes diagnostic information from the Oracle backup to specific log files. For more information on the log files, see ["Chapter 4: Backup and Restore Operations" on page 107](#).

Legato Single Server Version error messages appear in the following format:

function_name: error_message

where:

- *function_name* is the name of the internal function that generates the error message.
- *error_message* is the text of the error message.

The following table of error messages includes several references to Legato Single Server Version environment variables. For more information on how to set the environment variables, see ["Legato Single Server Version Environment Variables" on page 109](#).

[Table 18 on page 185](#) describes the main Legato Single Server Version error messages related to Oracle backups and restores and recommended actions to resolve the associated problems.

Table 18. Legato Single Server Version Error Messages (Part 1 of 4)

Error Message	Description	Resolution
nwora_getssinfo: could not locate the saveset <i>saveset_id</i>	Displayed during recovery, when Legato Single Server Version could not find an entry for the requested backup in the client index.	Check the Legato Single Server Version media index using the backup timestamp (the save set name in the media index is different than the backup piece name in the RMAN catalog for scheduled backups) to find out if the backup entry exists. If it exists, run the scanner program to re-create the client file index that should contain the backup entry. To prevent recurrence of the problem, set the browse policy to the same value as the retention policy in the Client resource.
doinfo: <i>client</i> could not connect to server <i>server</i> to find backup file <i>backup_piece_name</i>	Legato Single Server Version could not connect to the nsrindexd or nsrmmdd daemon.	Check that the Legato Single Server Version daemons are running.
doinfo: <i>client</i> could not find backup file <i>backup_piece_name</i> on server <i>server</i> : permission denied	The software could not obtain authorization to connect to the Legato Single Server Version server.	Add the required user name to the Administrators list in the Server resource.
nwora_index_ssinfo: index connect to <i>server</i> failed for client <i>client</i> : <i>reason</i>	Legato Single Server Version was unable to establish a session with the nsrindexd daemon due to the <i>reason</i> .	Check the <i>Legato Error Message Guide</i> on the Legato web site for the <i>reason</i> and follow the given instructions.
nwora_mmdb_connect: cannot connect to media index server <i>server</i> : <i>reason</i>	Legato Single Server Version was unable to establish a session with the nsrmmdd daemon due to the <i>reason</i> .	Check the <i>Legato Error Message Guide</i> on the Legato web site for the <i>reason</i> and follow the given instructions.

Table 18. Legato Single Server Version Error Messages (Part 2 of 4)

Error Message	Description	Resolution
nwora_open_backup: backup file <i>backup_piece_name</i> already exists: <i>ssid saveset_id</i>	A backup with this name already exists in the client index. As a result, Legato Single Server Version could not complete the backup.	Delete the existing backup in the client index and restart the backup operation.
nwora_open_backup: browse time <i>date</i> not in future	The value of the NSR_BROWSE environment variable is less than or equal to the current date.	Check the value of the NSR_BROWSE environment variable in the RMAN script.
nwora_open_backup: expiration time <i>date</i> not in future	The value of the NSR_SAVESET_EXPIRATION environment variable is less than or equal to the current date.	Check the value of the NSR_SAVESET_EXPIRATION environment variable in the RMAN script.
nwora_open_backup: invalid browse time: <i>date</i>	The NSR_BROWSE environment variable has an invalid <i>date</i> value.	Check the NSR_BROWSE environment variable in the RMAN script. It should have a value in the Legato Single Server Version date format.
nwora_open_backup: invalid expiration time: <i>date</i>	The NSR_SAVESET_EXPIRATION environment variable has an invalid <i>date</i> value.	Check the NSR_SAVESET_EXPIRATION environment variable in the RMAN script. It should have a value in the Legato Single Server Version date format.
nwora_open_backup: unable to start save session with server <i>server: reason</i>	Legato Single Server Version could not establish a save session.	Check the <i>Legato Error Message Guide</i> on the Legato web site for the <i>reason</i> and follow the given instructions.
nwora_open_restore: cannot start recover session with <i>server:</i> <i>reason</i>	Legato Single Server Version could not establish a recover session.	Check the <i>Legato Error Message Guide</i> on the Legato web site for the <i>reason</i> and follow the given instructions.

Table 18. Legato Single Server Version Error Messages (Part 3 of 4)

Error Message	Description	Resolution
nwora_open_restore: restore: permission denied	The host machine is not allowed to restore the specified backup.	Add the user ID and the hostname to the Remote Access attribute in the Client resource when performing a restore from a host different from the one that did the backup.
nwora_remove: Could not determine client name	Legato Single Server Version could not determine the client name.	Set the NSR_CLIENT environment variable in the RMAN script.
nwora_remove: Could not find the nsrmm binary	Legato Single Server Version could not find the nsrmm utility, which is probably in a nondefault location.	Set the NSR_NWPATH environment variable in the <i>/nsr/res/nwora.res</i> file or in the RMAN script. See "Legato Single Server Version Environment Variables" on page 109 . For example, create the <i>/nsr/res/nwora.res</i> (text) file, if required, and add this line to the file: <i>NSR_NWPATH=/opt/networker/bin</i>
nwora_remove: Error removing ssid <i>saveset_id</i> from the media database: <i>reason</i>	Legato Single Server Version was unable to delete the save set from the media index.	Check the <i>Legato Error Message Guide</i> on the Legato web site for the <i>reason</i> and follow the given instructions.
nwora_restore_mmdconn: #: could not prepare restore session: <i>reason</i>	Legato Single Server Version could not connect to the nsrmm daemon. # can be 1 or 2.	Check the <i>Legato Error Message Guide</i> on the Legato web site for the <i>reason</i> and follow the given instructions.
nwora_session_close: could not end session: <i>reason</i>	Legato Single Server Version could not close the session.	Check the <i>Legato Error Message Guide</i> on the Legato web site for the <i>reason</i> and follow the given instructions.

Table 18. Legato Single Server Version Error Messages (Part 4 of 4)

Error Message	Description	Resolution
nwora_session_init: could not determine client name	Legato Single Server Version could not determine the client name.	Set the NSR_CLIENT environment variable in the RMAN script to the Oracle hostname.
nwora_server_init: unable to contact server <i>server: reason</i>	Unable to establish connection with the Legato Single Server Version server.	Check the <i>Legato Error Message Guide</i> on the Legato web site for the <i>reason</i> and follow the given instructions.
sbtbackup: Oracle pool is not supported.	Legato Single Server Version does not support Oracle pools.	Delete the pool option of the backup command in the RMAN script or set the pool option to zero. See " RMAN Commands " on page 114.
sbtcommand: <i>string</i> should be in format: KEY=(xxxxxx)	Invalid syntax of string in the RMAN send command.	For the correct send command syntax, see " RMAN Commands " on page 114.

Appendix C: scanner Program

The **scanner** program can be used to re-create the Legato Single Server Version client index entries for the save sets on a backup tape volume. The **scanner** program can also be used to re-create the Legato Single Server Version media index entries for a volume, if the entries for the volume no longer exist in the media index.

To find the volume that contains a specific file, use the **mminfo** program if the volume is still in the media index or the **scanner** program if the volume is no longer in the media index. The **mminfo** and **scanner** programs provide detailed information on the contents of the volume, including:

- The name of the backup volume
- The name of the save set that contains the required file
- The name of the client to which the file belongs
- The date and time the file was backed up

This appendix includes the following main sections:

- ["Using the scanner Program" on page 189](#)
- ["scanner Program Options" on page 190](#)
- ["Rebuilding Save Set Entries in the Indexes" on page 192](#)
- ["scanner Requests an Entry for Record Size" on page 193](#)
- ["scanner Marks a Volume Read-Only" on page 194](#)

Using the scanner Program

The **scanner** program reads a backup tape to confirm the contents of the tape volume or to rebuild the Legato Single Server Version online indexes. The **scanner** command can be run only by the root user (UNIX) or administrator (Windows).

The **scanner** program reads the volume directly, without accessing information that may be available in the media index. If no entries exist in the media index, make an educated guess as to which volume contains specific data.

After the volume is mounted in the tape drive, run the **scanner** program with any of its available options. The **scanner** options most commonly used are as follows. For more information on these options, see [Table 19 on page 191](#).

- **-m** *device*
- **-i** *device*
- **-S** *save-set-id* **-i** *device*
- **-S** *save-set-id* **-m** *device*
- **-c** *client-name*
- **-N** *save-set-name*

[Table 19 on page 191](#) describes the complete list of **scanner** program options. For detailed information on the **scanner** command syntax and examples of how **scanner** options can be customized to meet the needs of a particular situation, refer to the following sources:

- **scanner** man page on UNIX (see "[UNIX Man Pages](#)" on page 37)
- **scanner** entry in the *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on page 39)

The entries created in the client index receive a status of "scanned-in" to protect them from being automatically deleted the next time the index management service checks the index for entries that have surpassed their browse policy. The entries created in the media index also receive a status of "scanned-in" and the volume mode is listed as "read-only." All index entries created by the **scanner** program must be deleted manually.

scanner Program Options

A tape device name configured in Legato Single Server Version is a mandatory option of the **scanner** program. On UNIX, the tape device name must be a *nonrewinding* device name.

If the **scanner** command is invoked without options (or with the **-v** option only), the volume in the specified device is scanned and a table of contents is generated. The table of contents contains information about each save set found on the volume. By default, one line of information is written to standard output for each save set found on the volume. The information provides the client name, save set name, save time, level, size, files, save set ID, and a flag.

The following example describes the format and options of the **scanner** command:

```
scanner [ -Bimnpqv ] [ -s server ] [ -S save-set-id ]
[ -c client ] [ -N save-set-name ] [ -f file ] [ -r record ]
[ -t type ] [ -b pool ] device [ -x command argument-list ]
```

Table 19 on page 191 describes the complete list of **scanner** program options.

Table 19. scanner Program Options (Part 1 of 2)

Option	Description
-b <i>pool</i>	Specifies the pool to which the tape volume should belong. Legato Single Server Version supports the Default pool only.
-B (without -S)	Quickly scans the tape to the location of the start of the bootstrap save sets. When the entire tape has been scanned, the save set ID and tape file location of the most recent bootstrap save set is printed to standard output.
-c <i>client-name</i>	Only processes save sets that came from the <i>client-name</i> computer. More than one client name can be specified in the same command line. The -c option can also be used in conjunction with the -N option, but only if the -i or -x option is also specified.
-f <i>file</i>	Starts the scan at a specific media file number. For information on how to determine the media file number, refer to the mminfo entry in the <i>Legato Command Reference Guide</i> (see " Legato Command Reference Guide " on page 39).
-i <i>device</i>	Rebuilds both the client index and media index for the volumes that are read. If a single save set is specified with the -S <i>save-set-id</i> option, only the entries from the specified save set are created in the client index.
-m <i>device</i>	Rebuilds only the media index for the volumes that are read.
-n	Runs scanner without rebuilding the client index or media index. This option provides a way to check the tape volume without modifying the client index or media index.
-N <i>save-set-name</i>	Processes only save sets that match the specified name. The value of <i>save-set-name</i> should be a literal string. Multiple names can be specified when this option is used in conjunction with the -c <i>client-name</i> option, but only if the -i or -x option is also specified.
-p	Prints out information about each save set as it is processed.
-q	Only displays error messages or messages of significance.

Table 19. scanner Program Options (Part 2 of 2)

Option	Description
-r <i>record</i>	Starts the scan at a specific media record number, to avoid a scan of potentially unused information. For information on how to determine the media record number, refer to the mminfo entry in the <i>Legato Command Reference Guide</i> (see " Legato Command Reference Guide " on page 39).
-s <i>server-name</i>	Specifies the hostname of the controlling Legato Single Server Version.
-S <i>save-set-id</i>	Extracts the save set specified by <i>save-set-id</i> . When this option is used in conjunction with the -i or -x option, multiple <i>save-set-id</i> values can be specified. The save sets selected are in addition to any selected using the -c and -N options. If the -B option is also specified, the value of <i>save-set-id</i> is assumed to be that of the bootstrap save set; only one <i>save-set-id</i> can be specified in this case.
-x <i>command</i>	Used with an optional list of command arguments, to specify an operating system command to run on each save set scanned. This option can only be specified once per scanner command line, after the device specification.

For examples of **scanner** command usage and a list of common error messages, refer to the following sources:

- **scanner** man page on UNIX (see "[UNIX Man Pages](#)" on page 37)
- **scanner** entry in the *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on page 39)

Rebuilding Save Set Entries in the Indexes

If a file is not browsable (its save set entry is not in the client index), but the save set is still tracked by Legato Single Server Version in the media index, follow these steps to recover the save set's entry back into the client index:

1. Enter the following **mminfo** command:

```
mminfo -a -v volume-name
```

2. From the **mminfo** command output, find the save set ID for the save set believed to contain the required file. *Ensure it is not the bootstrap save set ID.*
3. Having determined the proper save set ID, replace the save set entry in the file index using the following **scanner** command:

```
scanner -i -S save-set-id device-name
```

Note: If the save set spans volume boundaries, use the **scanner** program to read from all the volumes. Otherwise, the client index will not be fully rebuilt, making it impossible to perform a recovery of the files in the save set.

If the save set that contains the particular file is not browsable and the save set is not represented in the media index, the save set's entry must be rebuilt in both the client index and media index.

To rebuild the save set's entry in both the client index and media index:

1. Run the **scanner** program on the backup volume believed to contain the required file (make a guess based on the adhesive label on the volume). Enter the following **scanner** command:

```
scanner device-name
```

2. Use the **scanner** command output to decide whether to reintroduce the contents of this volume into the client index and whether the save set to be rebuilt is on this volume. Locate *all* the volumes that contain this save set ID.
3. Having determined which volumes to reintroduce into the online indexes, enter the following **scanner** command:

```
scanner -i device-name
```

The **scanner** command continues to prompt for a new volume until the command is terminated. To rebuild the indexes completely, scan in *all* the volumes that contain the particular save set ID.

scanner Requests an Entry for Record Size

If the **scanner** program is used with the **-s** option but without an **-i** and **-m** option, the following message is generated:

```
please enter record size for this volume ('q' to quit) [xx]
```

The number in the bracket [xx] is the entry from the last query.

The **scanner** program always rewinds the tape and reads the volume label to determine the block size. If the volume label is corrupted or unreadable, a message is generated, asking for the block size (in kilobytes). Enter the block size as an integer equal to or greater than 32. If an integer is less than 32 is entered, the following message is generated:

```
illegal record size (must be an integer >=32)
```

C

scanner Marks a Volume Read-Only

When the **scanner** program is used to rebuild the index of a backup volume, the **scanner** program marks the volume read-only. This is a safety feature that prevents the last save set on the backup volume from being overwritten. To write to the tape without marking it read-only, use the **nsrmm -o** command:

```
nsrmm -o notreadonly volume-name
```

For more information on the **nsrmm** command, refer to the **nsrmm** entry in the *Legato Command Reference Guide* (see "[Legato Command Reference Guide](#)" on [page 39](#)).

Appendix D: Using Label Templates

This appendix describes how the Legato Single Server Version uses label templates to create unique labels for storage volumes and how it uses the volume labels in conjunction with pools to identify and track backup data on volumes.

This appendix includes the following main sections:

- ["How Legato Single Server Version Uses Label Templates" on page 195](#)
- ["Label Template Resource Attributes" on page 197](#)
- ["Label Template Strategies and Procedures" on page 200](#)

How Legato Single Server Version Uses Label Templates

Legato Single Server Version creates a unique label for each storage volume by applying a label template. Label templates and pool configuration settings are used to sort, store, and track data on storage volumes. During a restore, Legato Single Server Version prompts for the specific volume that contains the required data, identifying the volume by the name given to it when it was labeled.

Legato Single Server Version writes a given set of data to a specific pool of volumes. For Legato Single Server Version to recognize that a particular volume belongs to a particular pool, the volume must have an identifying label that associates it with the pool. The contents of the volume label follow rules defined in a specific label template configured in a Label Templates resource. The label template is associated with a specific pool in the Pools resource. Legato Single Server Version uses the preconfigured Default pool and corresponding Default label template.

The preconfigured Default label template has two fields separated by a period. The first field contains the hostname of the Legato Single Server Version computer and the second field contains a number. To allow for expansion of the volume pool, the number range starts at 001 and ends with 999.

For example:

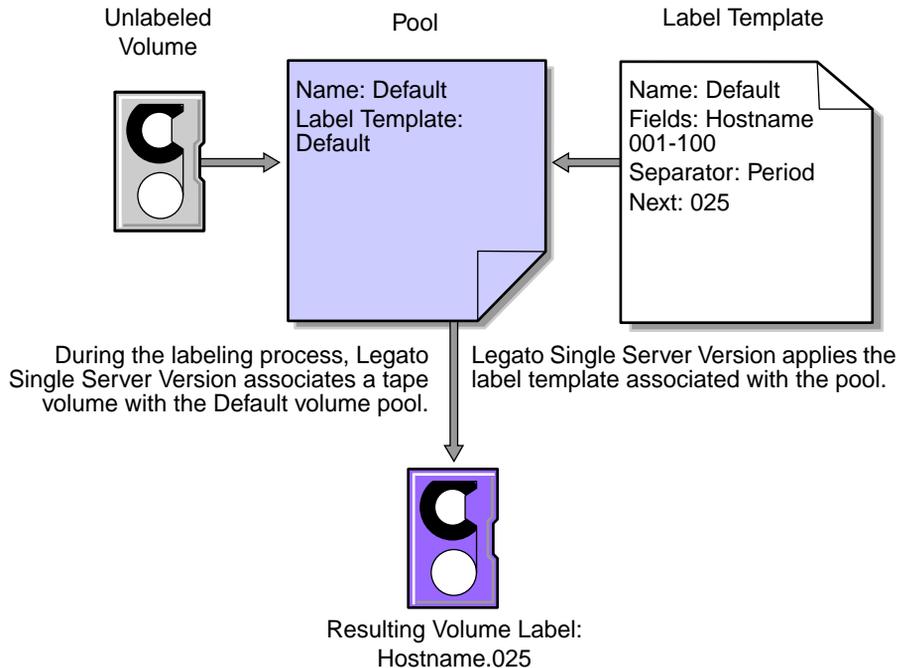
```

mars.001
mars.197
jupiter.054
    
```

Figure 24 on page 196 illustrates how the Default pool configuration uses its associated Default label template to label a volume.

Note: For a label template name to appear as a choice in a Pool resource, the Label Template resource must be configured before the associated Pool resource.

Figure 24. Labeling a Volume Using a Label Template



Label Template Resource Attributes

The attributes for a Label Template resource follow certain guidelines. [Table 20 on page 197](#) describes the key attributes for a Label Template resource.

Table 20. Label Template Resource Attributes (Part 1 of 2)

Attribute	Guidelines
Name	<p>Keep the label template name consistent with the pool name, so that it is easy to see how the data is organized. For example, create a label template called AcctFull for volumes that belong to a pool called Accounting Full.</p> <p>Legato Single Server Version does not allow the following characters in a label template name:</p> <pre data-bbox="301 696 665 725">/ \ * [] () \$! ^ ' ; ' ~ < > & { }</pre> <p>In addition, the following four characters cannot be used, because they are used as separators in label templates:</p> <ul data-bbox="301 861 491 982" style="list-style-type: none"> • colon (:) • dash (-) • period (.) • underscore (_)

D

Table 20. Label Template Resource Attributes (Part 2 of 2)

Attribute	Guidelines
Field	<p>A label template consists of one or more fields. Each field, or component, provides a layer of specificity to the organizational structure. There can be as many components as required, but it is best to keep the template simple with few components. The label cannot exceed 64 characters.</p> <p>Four types of components can be used:</p> <ul style="list-style-type: none"> • Range of numbers (for example, <i>001-999</i>) • Range of lower case letters (for example, <i>aa-zz</i>) • Range of upper case letters (for example, <i>AA-ZZ</i>) • Character string (for example, <i>Accounting</i>) <p>Each range includes a start value, a dash (-), and an end value. The start value and the end value must have the same number of characters. For example, use <i>01-99</i>, not <i>1-99</i>, or <i>aaa-zzz</i>, not <i>aa-zzz</i>. (This rule does not apply to a list of character strings or words; character strings should be separated by a blank space.)</p> <p>The order of entry of each component of the Field attribute is important. Legato Single Server Version applies each component in a left-to-right order, starting with the first one entered. Table 21 on page 199 illustrates how label templates use components to create a number sequence for volume labels.</p>
Separator	<p>Choose the symbol to appear between component entries. The period, dash, colon, or underscore can be used to separate each component of the label template. If a separator is not selected, the label components do not have separators (for example, <i>AA00aa</i>), which makes the labels difficult to read.</p>
Next	<p>Choose the next sequence number to write on the label that Legato Single Server Version places on a volume (according to the template).</p> <ul style="list-style-type: none"> • To force a label to start the label scheme at a particular point, enter the start label value. Legato Single Server Version continues to generate labels from that point on, according to the rules of the template. • To have Legato Single Server Version generate the first label, leave this attribute blank.

Table 21 on page 199 lists examples of number sequences for volume labels.

Table 21. Examples of Number Sequences for Volume Labels

Type of Components	Field	Number Sequence Result	Total Number of Labels
Range of numbers	001-100	001, 002, 003,...100	100
<ul style="list-style-type: none"> • Character string • Range of numbers 	SalesFull 001-100	SalesFull.001,...SalesFull.100	100
<ul style="list-style-type: none"> • Range of lower case letters • Range of numbers 	aa-zz 00-99	aa.00,...aa.99, ab.00,...ab.99, ac.00,...ac.99, : az.00...az.99, ba.00,...ba.99 : zz.00,...zz.99	67,600 (26 ² times 10 ²)

A label template should allow for expansion of the backup tape storage system. For example, it is better to create a template for 100 tapes and not use all of them, than to create a template for only 10 tapes and run out of labels. When Legato Single Server Version reaches the end of the template number sequence, it issues a warning that the maximum tapes allowed for the label template have been reached. Modify the label template to allow for more tapes.



Important: When Legato Single Server Version recycles a volume, the volume label does not change if the volume remains in the same pool. For example, if a volume labeled Dev.006 is recycled, it retains the label Dev.006 and does not receive a new label with the next sequence number. However, the original data on the volume will be overwritten by new data.

Label Template Strategies and Procedures

Legato Single Server Version is packaged with preconfigured label templates that correspond to the preconfigured pools. *Legato Single Server Version supports the Default pool and Default label template only.*

Note: The full featured Legato NetWorker product supports the creation of customized label templates.

A customized label template can include as many components in the Field attribute as necessary to suit an organizational structure. However, it is best to keep the template simple with few components.

For example, in creating a label template for an accounting department, the label template can be customized in several ways, depending on the size of the storage system and device capabilities. [Table 22 on page 200](#) illustrates several ways the components can be used to organize labels.

Table 22. Using Label Template Components

Type of Organizational Structure	Components	Separator	Resulting Volume Labels
Sequential	AcctFull 001-100	period	AcctFull.001 (100 total labels)
Storage oriented (for example, 3 storage racks with 5 shelves each, each shelf holding 100 tapes)	1-3 1-5 001-100	dash	1-1-001 This label is for the first tape in rack 1 on shelf 1. (1,500 total labels)
Two-sided media (for example, optical devices)	AcctFull 000-999 a-b	underscore	AcctFull_000_a (side 1) AcctFull_000_b (side 2) (2,000 total labels)

Labeling Tips

Naming schemes vary from site to site. Volumes might be named with the hostname of Legato Single Server Version followed by a three-digit number, for example:

```
jupiter.001
```

No matter what naming scheme is chosen, keep in mind that the simpler a convention is, the easier it is for operators and administrators to understand.

When volumes are labeled, each volume should have a physical (adhesive) label attached to it. Since Legato Single Server Version keeps track of the backups and which volumes they are on, the volumes can be named with any name that is convenient to use. For example, volumes might be labeled *mars.1*, *mars.2*, *mars.3*, or *Monday.1*, *Tuesday.1*, *Wednesday.1*. Each volume label must be unique.

The adhesive label on the volume should match the name generated by Legato Single Server Version. For example, if a volume is physically labeled *mars.1*, its generated name should also be *mars.1*.

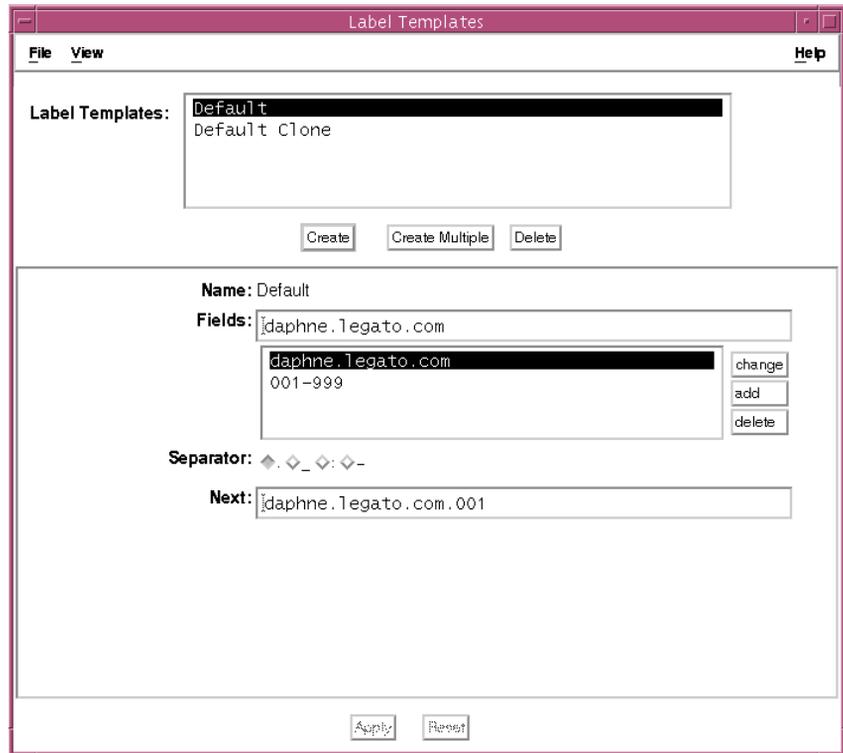
How to Edit a Label Template

The name of a label template cannot be changed. However, to change an individual label name, delete the existing name in the Next text box, and enter a new name.

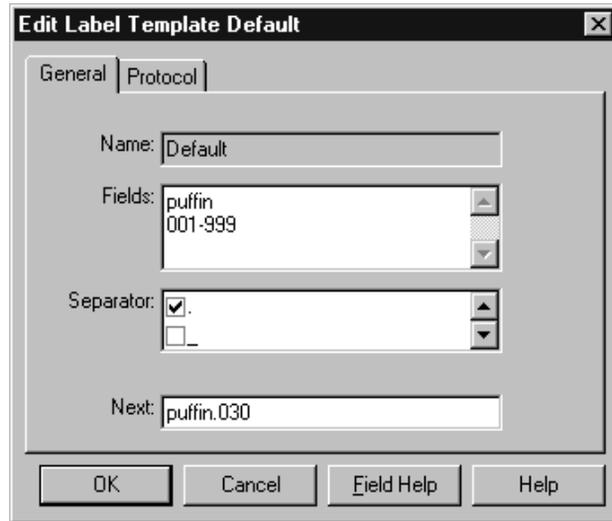
To edit a label template:

1. Run the Administrator program as a user with Administrator privileges. For more information, see ["The Administrator Program" on page 51](#).
2. Open the Label Templates window or Edit Label Template dialog box:
 - On UNIX:
 - a. Select Customize>Label Templates in the main Administrator window to open the Label Templates window, as shown in [Figure 25 on page 202](#).
 - b. Select the label template name in the Label Templates scrolling list.
 - On Windows:
 - a. In the Configure tab in the Server window, click Manage Label Templates to open the Label Templates window.
 - b. Right-click the icon of the label template, and select Edit to open the Edit Label Template dialog box, as shown in [Figure 26 on page 203](#).
3. Edit the required attributes.
4. Click Apply or OK.

Figure 25. Label Templates Window on UNIX



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Figure 26. Edit Label Template Dialog Box on Windows

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Glossary

This glossary contains terms and definitions found in this guide. Most of the terms are specific to Legato Single Server Version.

Administrator	The user with the privileges required to configure and use the Legato Single Server Version. The Administrator hostname must be listed in the Administrator attribute in the Server resource in Legato Single Server Version.
Administrators group	Windows user group whose members have all the rights and abilities of users in other groups, plus the ability to create and manage all the users and groups in the domain. Only members of the Administrators group can modify Windows operating system files, maintain the built-in groups, and grant additional rights to groups.
Administrator program	The program that provides a graphical interface to the Legato Single Server Version software.
API	An abbreviation for application programming interface, a standard set of computer library routines designed to accomplish a particular set of tasks.
Application-Specific Module (ASM)	A program that, when used in a directive, specifies the way a set of files or directories is to be backed up and recovered.

archived redo log	An archived copy of a filled online Oracle redo log. An Oracle database can be optionally configured to archive copies of the online redo logs after they fill. An archived redo log preserves older redo log data for recovery operations while the preallocated online redo log files are reused to store the most current database changes. See redo log .
ASM	See Application-Specific Module (ASM) .
attribute	A feature of a Legato Single Server Version resource. It is a service or information that the resource provides.
auto media management	A feature that enables the storage device controlled by Legato Single Server Version to automatically label, mount, and overwrite a volume it considers unlabeled. Volumes that are eligible for reuse are also automatically recycled.
autochanger	A mechanism that uses a robotic arm to move media among various components located in a device including slots, media drives, media access ports, and transports. Autochangers automate media loading and mounting functions during backups and restores. Legato Single Server Version does <i>not</i> support autochangers.
backup	The writing of saved data to a volume.
Backup Operators group	A Windows group whose members have the capability of logging on to a domain from a workstation or a server, backing it up, and restoring the data. Backup Operators also can shut down servers or workstations.
backup save set	See save set .
backup volume	See volume .
bootstrap	A save set that is essential for Legato Single Server Version disaster recovery procedures, composed of the media index and configuration files.
browse policy	The Legato Single Server Version policy that determines how long entries for backed up files remain in the online client index.

client	The client that accesses Legato Single Server Version to back up or restore files. The only type of client that Legato Single Server Version supports is the Oracle Server.
client index	A database of information maintained by Legato Single Server Version that tracks every file or filesystem backed up. Legato Single Server Version maintains a single client index for the Oracle Server.
command line	The shell prompt, where commands are entered.
daemon	A program that lies dormant waiting for a specified condition to occur.
DBA	An abbreviation for database administrator, the person normally responsible for installing, configuring, and maintaining Oracle database systems.
device	The tape device connected to the Legato Single Server Version host computer that reads from and writes to backup volumes during backups and restores.
expiration date	The date when the volume changes from “read/write” to “read-only.”
expired save set	A save set whose browse time has been reached; therefore, it can no longer be browsed. In addition, the save set has been removed from the client index.
fileserver	A computer with disks that provides services to other computers on the network.
filesystem	<ol style="list-style-type: none">1. A file tree on a specific disk partition or other mount point.2. The entire set of all files.3. A method of storing files.
heterogeneous networks	Networks with systems of different platforms that interact meaningfully across the network.
hint	A choice in the Devices window, representing half-inch magnetic tape.

instance	The combination of Oracle processes that runs each time a database starts up.
interoperability	The ability of software and hardware on multiple computers from multiple vendors to communicate meaningfully.
Legato Single Server Version	A Legato software product designed to provide backup device, media, and storage management services for Oracle9i databases.
Legato Single Server Version Administrator program	See Administrator program .
Legato Single Server Version client	See client .
Legato Single Server Version registration	See registration .
Legato Single Server Version server	See server .
media	Magnetic tape used to back up files.
media index	A database of information that contains indexed entries about the life cycle status and location of all the backup data and volumes managed by Legato Single Server Version.
media management library	See MML .
media manager	The component of Legato Single Server Version that tracks save sets to backup volumes.
MML	An abbreviation for media management library, a library of media management routines provided by Legato Single Server Version and linked with the Oracle kernel software during the Legato Single Server Version installation on the Oracle Server host.

multiplexing	A feature of Legato Single Server Version that enables data from more than one save set to be simultaneously written to the same storage device.
notification	A message generated and sent to the Administrator about important Legato Single Server Version events.
nsrhost	The logical hostname of the Legato Single Server Version computer.
offline backup	A backup of Oracle database objects performed while the corresponding Oracle instance is shut down and unavailable to users.
online backup	A backup of Oracle database objects performed while the corresponding Oracle instance is running and available to users.
online indexes	The databases located on the Legato Single Server Version host that contain all the information pertaining to the Oracle data backups (<i>client index</i>) and backup volumes (<i>media index</i>).
operator	The person who monitors the Legato Single Server Version status, loads volumes into the backup devices, and otherwise executes day-to-day tasks using Legato Single Server Version.
Oracle9i Server	A computer running an Oracle9i release 9.0.x RDBMS. See <i>RDBMS</i> .
parallelism	A feature of Legato Single Server Version that enables the backup or restore of many save sets for the Oracle Server at the same time.
pathname	A set of instructions to the operating system for accessing a file. An <i>absolute pathname</i> specifies how to find a file beginning at the root directory and working down the directory tree. A <i>relative pathname</i> specifies how to find the file starting from the current directory.

policy	A set of constraints that specify how long an entry can remain in a Legato Single Server Version online index. When a policy expires, the save sets associated with that policy are marked recyclable. The Client resource uses two policies: a browse policy and a retention policy. Refer to the nsr_policy entry in the <i>Legato Command Reference Guide</i> .
pool	See <i>volume pool</i> .
preconfigured	Existing selections or configurations for different Legato Single Server Version features.
qic	A choice in the Devices window, representing quarter-inch cartridge tape.
RDBMS	An abbreviation for Relational Database Management System, which refers to the primary architecture of an Oracle database.
recover	An Oracle datafile recovery method that uses Oracle commands to apply archived redo logs and online redo logs to make the database consistent.
Recovery Catalog	A collection of Oracle database tables containing information about Oracle database backups and restores. The Recovery Catalog includes information about backup sets and pieces, image and proxy copies, archived redo logs, stored scripts, and the <i>target database</i> schema. RMAN maintains and uses the information in the Recovery Catalog to determine how to perform requested backup and restore operations.
Recovery Manager	See <i>RMAN</i> .
recyclable save set	A save set whose browse and retention policies have been reached; therefore, the save set has been removed from the media index.
recyclable volume	A volume whose data has passed both its browse and retention policies and is now available for relabeling and use by Legato Single Server Version.

redo log	The online log of an Oracle database, consisting of at least two redo log files (separate from the datafiles) that record all changes made in the database. See also archived redo log .
registration	The process of obtaining a registration code from Legato and applying the code in the Administrator program to disable the regular display of the Legato Single Server Version splash screen (on Windows) and registration messages.
Registry	A database of configuration information central to Windows operations. The database centralizes all Windows settings and provides security and control over system, security, and user account settings.
resource	A component of Legato Single Server Version that describes the server and clients. Devices, clients, and policies are examples of Legato Single Server Version resources. Each resource contains a list of attributes that define the parameters to use for the specific resource.
resource database	A database that contains information about each of the configured Legato Single Server Version resources.
restore	The process whereby Legato Single Server Version retrieves Oracle datafiles from backup volumes and stores the files on disk.
retention policy	The Legato Single Server Version policy that determines how long entries are retained in the media index and thus be recoverable.
RMAN	An abbreviation for Recovery Manager, the Oracle utility (in Oracle8, Oracle8i, or Oracle9i) that acts as an intelligent interface to Oracle databases and works with third-party media management products, such as Legato Single Server Version, to back up and restore Oracle database objects.

root	<ol style="list-style-type: none">1. (UNIX only) The UNIX superuser account (with user name “root” and user ID). By extension, the privileged system-maintenance login on any operating system.2. (Windows NT/Windows 2000 and UNIX) The top node of the system directory structure; the home directory of the root user.
save set	A set of files or a filesystem that Legato Single Server Version backs up onto storage volumes.
save set ID	An internal identification number that Legato Single Server Version assigns to a save set.
save set status	The Legato Single Server Version attribute that indicates whether a given save set is restorable, recoverable, or recyclable. The save set status also indicates whether the save set has been successfully backed up.
save stream	The data and save set information being written to a storage volume during a backup. A save stream originates from a single save set.
scanner	The Legato Single Server Version utility used to read a backup volume when the online indexes are no longer available.
server	The computer running the Legato Single Server Version software, which contains the backup devices, media, and online indexes and provides backup and restore services to the Oracle Server.
shell prompt	A cue for input in a shell window where a command is entered.
SID	An abbreviation for Oracle system identifier, a unique name for an Oracle database instance. This value is typically set in an ORACLE_SID environment variable.
silos	A repository for holding hundreds or thousands of volumes. Legato Single Server Version does <i>not</i> support silos.
ssid	See <i>save set ID</i> .

stand-alone device	A <i>storage device</i> that contains a single drive for backing up data. Stand-alone devices cannot automatically load backup volumes. Legato Single Server Version supports only tape devices.
storage device	The hardware that reads and writes data during backup, restore, and other Legato Single Server Version operations.
system administrator	The person normally responsible for installing, configuring, and maintaining the Legato Single Server Version system.
target database	The Oracle database that has been backed up or that Legato Single Server Version is to back up as a safeguard against data loss.
versions	The date-stamped collection of available backups for any single file.
volume	Magnetic tape used to back up files.
volume ID	The internal identification that Legato Single Server Version assigns to a backup volume.
volume name	The name assigned to a backup volume when it is labeled.
volume pool	A feature that enables backup data to be sorted to selected volumes. A volume pool contains a collection of backup volumes to which specific data has been backed up. Legato Single Server Version supports only the Default pool for backups.

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