

Oracle® Database

Installation Guide

10g Release 2 (10.2) for Linux x86

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Oracle Database Installation Guide, 10g Release 2 (10.2) for Linux x86

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Contents

Send Us Your Comments	ix
Preface	xi
Audience.....	xi
Documentation Accessibility	xi
Related Documentation.....	xii
Conventions	xii
Command Syntax	xii
Accessing Documentation.....	xiii
Third Party Software Notices	xiii
1 Installation Overview	
Overview of Oracle Database Installation	1-1
Oracle Database Installation Methods	1-2
Interactive Installation Methods	1-2
Automated Installation Methods Using Response Files	1-3
Oracle Database Installation Types	1-3
Database Configuration Options	1-4
Preconfigured Database Types	1-4
Installation Choices that Affect Database Creation.....	1-4
Creating a Database After Installation.....	1-5
Available Installation Options	1-5
Database Storage Options	1-5
File System	1-5
Automatic Storage Management	1-6
Raw Devices.....	1-8
Database Management Options.....	1-8
Management Options for Preconfigured Databases.....	1-9
Management Options for Custom Databases	1-9
Features Provided by Oracle Enterprise Manager Database Control	1-10
Database Backup and Recovery Options.....	1-10
Enabling Automated Backups	1-10
Backup Job Default Settings	1-11
More Information About Automated Backups and Recovery	1-11
E-mail Notification Options.....	1-11

Installation Considerations	1-12
Hardware and Software Certification	1-12
Multiple Oracle Homes	1-12
Installing the Software on a System with an Existing Oracle Installation.....	1-12
Oracle Cluster Synchronization Services.....	1-12
Using Network Attached Storage or NFS File Systems	1-13
Upgrade Issues	1-13
AL24UTFFSS Character Set	1-14
Upgrading an Oracle Database Installed on Red Hat Enterprise Linux 2.1.....	1-14
Deprecated Components in Oracle Database 10g Release 2 (10.2)	1-15

2 Preinstallation Tasks

Logging In to the System as root	2-1
Checking the Hardware Requirements	2-2
Checking the Software Requirements	2-4
Checking the Network Setup	2-7
Configuring Name Resolution	2-7
Installing on DHCP Computers	2-8
Installing on Multihomed Computers	2-8
Installing on Computers with Multiple Aliases	2-8
Installing on Non-Networked Computers	2-8
Creating Required Operating System Groups and Users	2-9
Creating the Oracle Inventory Group	2-10
Creating the OSDBA Group	2-11
Creating an OSOPER Group (Optional)	2-11
Creating the Oracle Software Owner User.....	2-12
Determining Whether an Oracle Software Owner User Exists.....	2-12
Creating an Oracle Software Owner User.....	2-12
Modifying an Oracle Software Owner User	2-13
Verifying that the User nobody Exists	2-13
Configuring Kernel Parameters	2-13
Identifying Required Software Directories	2-16
Oracle Base Directory	2-16
Oracle Inventory Directory	2-17
Oracle Home Directory	2-17
Identifying or Creating an Oracle Base Directory	2-17
Identifying an Existing Oracle Base Directory.....	2-18
Creating an Oracle Base Directory.....	2-19
Choosing a Storage Option for Oracle Database and Recovery Files	2-20
Creating Directories for Oracle Database or Recovery Files	2-20
Guidelines for Placing Oracle Database Files on a File System.....	2-21
Guidelines for Placing Oracle Recovery Files on a File System	2-21
Creating Required Directories.....	2-22
Preparing Disk Groups for an Automatic Storage Management Installation	2-23
General Steps for Configuring Automatic Storage Management.....	2-23
Step 1: Identifying Storage Requirements for Automatic Storage Management.....	2-24
Step 2: Using an Existing Automatic Storage Management Disk Group	2-26

Step 3: Creating DAS or SAN Disk Partitions for Automatic Storage Management	2-28
Step 4: Configuring Disks for Automatic Storage Management.....	2-28
Configuring Disks for Automatic Storage Management Using the Automatic Storage Management Library Driver	2-28
Configuring Disks for Automatic Storage Management Using Raw Devices.....	2-32
Configuring Raw Partitions or Raw Logical Volumes	2-34
Using Raw Logical Volumes	2-34
Identifying the Required Raw Partitions.....	2-35
Creating the Required Raw Partitions on IDE, SCSI, or RAID Devices.....	2-36
Binding the Partitions to Raw Devices.....	2-37
Creating the Oracle Database Configuration Assistant Raw Device Mapping File.....	2-38
Stopping Existing Oracle Processes.....	2-39
Configuring the oracle User's Environment	2-40

3 Installation Tasks

Preinstallation Considerations	3-1
Performing Multiple Oracle Database Installations in Noninteractive Mode	3-1
Reviewing Component-Specific Installation Guidelines	3-1
Accessing the Installation Software	3-2
Downloading Oracle Software from the OTN Web Site	3-2
Downloading the Installation Archive Files	3-3
Extracting the Installation Files.....	3-3
Copying the Software to the Hard Disk	3-4
Mounting Discs	3-4
Copying the Oracle Database Software to a Hard Disk.....	3-5
Installing the Oracle Database Software	3-5
Reviewing Product-Specific Installation Guidelines	3-6
Running Oracle Universal Installer	3-7
Installing Automatic Storage Management	3-9
Step 1: Reviewing Automatic Storage Management Installation Considerations.....	3-9
Step 2: Creating the Automatic Storage Management Instance and Disk Groups.....	3-10
Step 3: Installing Oracle Database to Use with Automatic Storage Management.....	3-12
Step 4: Testing the Automatic Storage Management Installation.....	3-13

4 Postinstallation Tasks

Required Postinstallation Tasks	4-1
Downloading and Installing Patches	4-1
Configuring Oracle Products.....	4-2
Recommended Postinstallation Tasks	4-2
Creating a Backup of the root.sh Script	4-2
Configuring New or Upgraded Databases.....	4-2
Setting Up User Accounts	4-3
Setting the NLS_LANG Environment Variable.....	4-3
Generating the Client Static Library.....	4-3
Required Product-Specific Postinstallation Tasks	4-4
Configuring Oracle Net Services	4-4

Configuring Oracle Label Security	4-5
Installing Natively Compiled Java Libraries for Oracle JVM and Oracle <i>interMedia</i>	4-5
Installing Oracle Text Supplied Knowledge Bases	4-5
Configuring Oracle Messaging Gateway	4-5
Modifying the listener.ora File for External Procedures	4-6
Modifying the tnsnames.ora File for External Procedures	4-7
Setting Up the mgw.ora Initialization File	4-7
Configuring Oracle Precompilers.....	4-7
Configuring Pro*C/C++	4-8
Configuring OCCI.....	4-8
Configuring GCC as the Primary Compiler.....	4-9
Installing Oracle Database 10g Products from the Companion CD.....	4-10

5 Getting Started with Oracle Database

Checking the Installed Oracle Database Contents and Directory Location	5-1
Logging In to Oracle Enterprise Manager Database Control	5-1
Managing Automatic Storage Management	5-2
Starting and Stopping Automatic Storage Management	5-3
Automatic Storage Management Utilities	5-3
Reviewing Accounts and Passwords	5-3
Unlocking and Resetting User Passwords	5-6
Using Database Control to Unlock Accounts and Reset Passwords	5-6
Using SQL*Plus to Unlock Accounts and Reset Passwords	5-6
Identifying Databases	5-7
Locating the Server Parameter File	5-7
Reviewing Tablespaces and Data Files, Redo Log Files, and Control Files	5-8
Identifying Tablespaces and Data Files	5-8
Locating Redo Log Files	5-9
Locating Control Files.....	5-10

6 Removing Oracle Software

Overview	6-1
Identifying All Instances	6-1
Removing an Oracle Database	6-2
Removing an Automatic Storage Management Installation	6-2
Reconfiguring Oracle Cluster Synchronization Services	6-4
Identifying Oracle Database 10g Oracle Homes.....	6-4
Reconfiguring the Oracle CSS Daemon	6-5
Deleting the Oracle CSS Daemon Configuration	6-6
Removing Oracle Software	6-6

A Installing and Configuring Oracle Database Using Response Files

Introduction	A-1
Creating a Database Using Automatic Storage Management as the Storage Option for Database Files	A-2
Installation Overview	A-2

Creating the oraInst.loc File	A-3
Preparing a Response File	A-3
Editing a Response File Template.....	A-3
Recording a Response File	A-4
Running Oracle Universal Installer in Silent or Suppressed Mode	A-6
Running NetCA in Silent Mode	A-6
Running Database Configuration Assistant in Noninteractive or Silent Mode	A-7
Using Database Configuration Assistant in Noninteractive Mode	A-8
Using Database Configuration Assistant in Silent Mode.....	A-8
Running Database Configuration Assistant in Noninteractive or Silent Mode.....	A-8
B Using NAS Devices	
General Configuration Guidelines for NAS Devices	B-1
Choosing Mount Points	B-2
Choosing Mount Points for Oracle Software Files	B-2
Choosing Mount Points for Oracle Database and Recovery Files	B-3
Creating Files on a NAS Device for Use with Automatic Storage Management	B-4
NFS Mount Options	B-5
C Optimal Flexible Architecture	
Overview of the Optimal Flexible Architecture Standard	C-1
Characteristics of an Optimal Flexible Architecture Compliant Installation	C-1
Changes to the Optimal Flexible Architecture for Oracle Database 10g	C-3
Implementing Optimal Flexible Architecture	C-3
File Systems.....	C-3
Number of File Systems	C-4
Naming Conventions	C-4
Naming Mount Points for Very Large Databases (VLDBs).....	C-4
Naming Directories.....	C-4
Oracle Base Directory Naming Convention.....	C-4
Referring to Path Names.....	C-5
Oracle Home Directory Naming Convention.....	C-5
Naming Subdirectories	C-5
Naming Database Files.....	C-6
Separating Segments with Different Requirements.....	C-7
Naming Tablespace.....	C-7
Exploiting the Optimal Flexible Architecture Structure for Oracle Files.....	C-7
Optimal Flexible Architecture File Mapping	C-8
Improving Reliability and Performance	C-9
Disk Mirroring.....	C-9
Disk Striping	C-9
D Managing Oracle Database Port Numbers	
About Managing Ports	D-1
Viewing Port Numbers and Access URLs	D-2
Port Numbers and Protocols of Oracle Components	D-2

Changing the Oracle Enterprise Management Agent Port.....	D-4
Changing the Oracle Enterprise Manager Database Control Ports.....	D-4
Changing the iSQL*Plus Ports	D-5
Changing the Oracle Ultra Search Ports	D-5
Changing the Oracle XDB Ports	D-6

E Globalization Support

About NLS_LANG Environment Variable	E-1
Running Oracle Universal Installer in Different Languages	E-2

F Troubleshooting

Verify Requirements	F-1
X Window Display Errors.....	F-1
What to Do If an Installation Error Occurs	F-2
Reviewing the Log of an Installation Session	F-3
Troubleshooting Configuration Assistants.....	F-3
Configuration Assistant Failure	F-4
Fatal Errors.....	F-4
Silent-Mode Response File Error Handling.....	F-4
Cleaning Up After a Failed Installation.....	F-4

G Frequently Asked Questions About Installation

Installing Oracle Database or Oracle Database Client	G-1
Installing Oracle Database Tools.....	G-3
Installing Oracle Database with Oracle Applications	G-6
Installing Oracle Database Heterogeneous Connectivity Tools (Gateways)	G-8

Index

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If you have problems with the software, please contact your local Oracle Support Services.

Preface

This guide describes how to install and configure Oracle Database 10g release 2 (10.2) on Linux x86.

Audience

This guide is intended for anyone responsible for installing Oracle Database 10g release 2 (10.2) on a single Linux x86 system. If you want to install Oracle Real Application Clusters, refer to *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux* for installation instructions.

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Related Documentation

The platform-specific documentation for Oracle Database 10g products includes the following manuals:

- Oracle Database:
 - *Oracle Database Release Notes for Linux x86*
 - *Oracle Database Client Quick Installation Guide for Linux x86*
 - *Oracle Database Installation Guide for Linux x86*
 - *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux*
 - *Oracle Database Administrator's Reference for UNIX-Based Operating Systems*
- Oracle Database Client:
 - *Oracle Database Client Quick Installation Guide for Linux x86*
 - *Oracle Database Client Installation Guide for Linux x86*
- Oracle Database Companion CD:
 - *Oracle Database Companion CD Installation Guide for Linux x86*
 - *Oracle Database Companion CD Quick Installation Guide for Linux x86*

Refer to *Oracle Database Release Notes for Linux x86* for important information that was not available when this book was released. The release notes for Oracle Database 10g are updated regularly. You can get the most-recent version from Oracle Technology Network at

<http://www.oracle.com/technology/documentation/index.html>

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.
UPPERCASE	Uppercase letters indicate Structured Query Language (SQL) reserved words, initialization parameters, and environment variables.

Command Syntax

UNIX command syntax appears in monospace font. The dollar character (\$), number sign (#), or percent character (%) are UNIX command prompts. Do not enter them as part of the command. The following command syntax conventions are used in this guide:

Convention	Description
backslash \	A backslash is the UNIX command continuation character. It is used in command examples that are too long to fit on a single line. Enter the command as displayed (with a backslash) or enter it on a single line without a backslash: <pre>dd if=/dev/rdsd/c0t1d0s6 of=/dev/rst0 bs=10b \ count=10000</pre>
braces { }	Braces indicate required items: <pre>.DEFINE {macrol}</pre>
brackets []	Brackets indicate optional items: <pre>cvtcrt termname [outfile]</pre>
ellipses ...	Ellipses indicate an arbitrary number of similar items: <pre>CHKVAL fieldname value1 value2 ... valueN</pre>
<i>italics</i>	Italic type indicates a variable. Substitute a value for the variable: <pre>library_name</pre>
vertical line	A vertical line indicates a choice within braces or brackets: <pre>FILE filesize [K M]</pre>

Accessing Documentation

The documentation for Oracle Database 10g release 2 (10.2) includes platform-specific documentation and generic product documentation.

Platform-Specific Documentation

Platform-specific documentation includes information about installing and using Oracle products on particular platforms. The platform-specific documentation for this product is available in both Adobe portable document format (PDF) and HTML format on the product disc. To access the platform-specific documentation on disc:

1. Use a Web browser to open the `welcome.htm` file in the top-level directory of the disc.
2. For DVDs only, select the appropriate product link.
3. Select the **Documentation** tab.

If you prefer paper documentation, then open and print the PDF files.

Product Documentation

Product documentation includes information about configuring, using, or administering Oracle products on any platform. The product documentation for Oracle Database 10g products is available in both HTML and PDF formats in the Oracle Database 10g Release 2 (10.2) Online Documentation Library. This library is on the Oracle Technology Network Web site at

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Installation Overview

This chapter describes the different types of Oracle Database installations that you can perform, and issues that you should consider before installing the software. It includes information about the following topics:

- [Overview of Oracle Database Installation](#)
- [Oracle Database Installation Methods](#)
- [Oracle Database Installation Types](#)
- [Database Configuration Options](#)
- [Available Installation Options](#)
- [Installation Considerations](#)
- [Upgrade Issues](#)
- [Deprecated Components in Oracle Database 10g Release 2 \(10.2\)](#)

Overview of Oracle Database Installation

The Oracle Database installation process consists of the following phases:

1. **Read the release notes:** Read the Oracle Database 10g release 2 (10.2) release notes before you begin the installation. The release notes are available with the platform-specific documentation. The latest version of the release notes is available on Oracle Technology Network at:

<http://www.oracle.com/technology/documentation/index.html>

2. **Planning the installation:** This chapter describes the Oracle products that you can install and issues that you must consider before starting the installation.

You can also refer to [Appendix G](#) which covers frequently asked questions about installing Oracle Database components, such as how to install Oracle Database if a site uses Oracle applications or if you need multiple Oracle Database client connections.

3. **Completing preinstallation tasks:** [Chapter 2](#) describes preinstallation tasks that you must complete before installing the product.
4. **Installing software:** Use the following section to install Oracle Database:
 - [Chapter 3](#) describes how to use Oracle Universal Installer to install Oracle Database and Automatic Storage Management.

- [Appendix A](#) describes advanced installation topics: performing noninteractive (silent) installations, which you may want to use if you need to perform multiple installations of Oracle Database.
 - [Appendix F](#) provides troubleshooting advice in case you encounter problems with the installation.
 - [Chapter 6](#) describes how to remove Oracle Database.
5. **Completing postinstallation tasks:** [Chapter 4](#) describes recommended and required postinstallation tasks.
 6. **Getting started using Oracle Database:** [Chapter 5](#) describes how to check the contents of the installed Oracle Database, how to start various tools, and how to locate various files. You can also read [Appendix B](#) on network attached storage devices, which you can use to store Oracle database files and Oracle software. [Appendix C](#) describes the Optimal Flexible Architecture, which is a set of guidelines that ensure reliable Oracle installations that require little maintenance. [Appendix D](#) explains how to manage Oracle Database port numbers, and [Appendix E](#) describes globalization support information.

Oracle Database Installation Methods

You can choose different installation methods to install Oracle Database, as follows:

- [Interactive Installation Methods](#)
- [Automated Installation Methods Using Response Files](#)

Interactive Installation Methods

When you use the interactive method to install Oracle Database, Oracle Universal Installer displays a series of screens that enable you to specify all of the required information to install the Oracle Database software and optionally create a database.

With Oracle Database 10g release 10.2 on Linux x86, Oracle Universal Installer provides two interactive methods that you can use to install Oracle Database:

- **Basic Installation method:**

Select this installation method if you want to quickly install Oracle Database. This installation method requires minimal user input. It installs the software and optionally creates a general-purpose database using the information that you specify on the screen. It is the default installation method.
- **Advanced Installation method:**

Select this installation method if you want to complete any of the following tasks:

 - Perform a custom software installation, or choose a different database configuration

The Available Product Components installation screen automatically selects the components most customers need in their Oracle Database installation. It also lists several components that are not selected by default, but which you may want to include. To find the listing of available components, select **Advanced**, and then in the Installation Type screen, select **Custom**.

 - Upgrade an existing database
 - Select a database character set or different product languages
 - Create the EXAMPLE tablespace during the installation

- Create a database on a different file system from the software
- Configure Automatic Storage Management or use raw devices for database storage
- Specify different passwords for administrative schemas
- Configure automated backups or Oracle Enterprise Manager notifications

Automated Installation Methods Using Response Files

By creating a response file and specifying this file when you start Oracle Universal Installer, you can automate some or all of the Oracle Database installation. These automated installation methods are useful if you need to perform multiple installations on similarly configured systems or if the system where you want to install the software does not have X Window system software installed.

When you use a response file, you can run Oracle Universal Installer in the following modes, depending on whether you specify all of the required information or not:

- **Silent Mode:** Oracle Universal Installer runs in silent mode if you use a response file that specifies all required information. None of the Oracle Universal Installer screens are displayed.
- **Suppressed Mode:** Oracle Universal Installer runs in suppressed mode if you do not specify all required information in the response file. Oracle Universal Installer displays only the screens that prompt for the information that you did not specify.

See Also: For more information about these modes and about how to complete an installation using response files, refer to [Appendix A](#)

Oracle Database Installation Types

Note: Oracle Client is installed separately. You cannot install Oracle Database Client during an Oracle Database installation.

You can choose one of the following installation types when installing Oracle Database 10g:

Note: For more information about the features available with each Oracle Database edition and for information about licensing, refer to the *Oracle Database Licensing Information* guide.

- **Enterprise Edition:** Installs licensable Oracle Database options and database configuration and management tools in addition to all of the products that are installed during a Standard Edition installation. It also installs products most commonly used for data warehousing and transaction processing.
- **Standard Edition:** Installs an integrated set of management tools, full distribution, replication, Web features, and facilities for building business-critical applications.

Note: If you purchased a Standard Edition license, and you perform a Custom installation, then ensure that you install only the components covered by the Standard Edition license.

- **Custom:** Enables you to select the individual components that you want to install from the list of all available components.

Database Configuration Options

During the installation, you can choose whether you want to create an Oracle database as part of the installation. If you choose to create an Oracle database, then Oracle Universal Installer uses Database Configuration Assistant to create it. You can choose to create one of the preconfigured database types, which are designed for a variety of different applications, modify one of the preconfigured database types, or create a customized database to suit your requirements.

This section describes the following database configuration options:

- [Preconfigured Database Types](#)
- [Installation Choices that Affect Database Creation](#)
- [Creating a Database After Installation](#)

Preconfigured Database Types

Oracle provides the following preconfigured database types that you can create or customize during the installation:

- General Purpose
- Transaction Processing
- Data Warehouse

See Also: The online Help provided by either Oracle Universal Installer or Database Configuration Assistant for a description of these preconfigured database types

Installation Choices that Affect Database Creation

Oracle Universal Installer runs Database Configuration Assistant in one of two modes, depending on the choices that you make during the installation:

- Noninteractive mode

If you choose either the Enterprise Edition or Standard Edition installation type, and then choose to create a preconfigured database type, then Oracle Universal Installer prompts you for the minimum amount of information required to create a database of the type you choose. It then runs Database Configuration Assistant in noninteractive mode to create the database after it installs the software.

- Interactive mode

If you choose the Custom installation type or choose the Advanced database configuration option, then Oracle Universal Installer does not prompt you for database information. Instead, it installs the software and then runs Database Configuration Assistant in interactive mode. Using the screens in Database Configuration Assistant, you can either modify one of the preconfigured database types or create a custom database and specify precisely how you want to configure it.

Note: If you choose this method to create a database, then click **Help** on any of the Database Configuration Assistant screens for a description of the information that you must specify on that screen.

Creating a Database After Installation

If you decide not to create a database during the installation, then you can use Database Configuration Assistant to create one after you have installed the software. For more information about using Database Configuration Assistant to create a database after installation, see the *Oracle Database 2 Day DBA* manual.

Available Installation Options

This release of Oracle Database provides options that you can choose during installation to simplify database administration tasks. These options include:

- [Database Storage Options](#)
- [Database Management Options](#)
- [Database Backup and Recovery Options](#)
- [E-mail Notification Options](#)

The following sections describe these options.

Database Storage Options

If you choose to create a database during the installation, you can specify one of three storage options for database files:

- [File System](#)
- [Automatic Storage Management](#)
- [Raw Devices](#)

File System

If you choose the file system option, then Database Configuration Assistant creates the database files in a directory on a file system mounted on the computer. Oracle recommends that the file system you choose be separate from the file systems used by the operating system or the Oracle software. The file system that you choose can be any of the following:

- A file system on a disk that is physically attached to the system
If you are creating a database on basic disks that are not logical volumes or RAID devices, then Oracle recommends that you follow the Optimal Flexible Architecture (OFA) recommendations described in [Appendix C](#) and distribute the database files over more than one disk.
- A file system on a logical volume manager (LVM) volume or a RAID device
If you are using multiple disks in an LVM or RAID configuration, then Oracle recommends that you use the stripe and mirror everything (SAME) methodology to increase performance and reliability. Using this methodology, you do not need to specify more than one file system mount point for database storage.
- A network file system (NFS) mounted from a certified network attached storage (NAS) device

You can store database files on NAS devices if the NAS device is certified by Oracle.

See Also: The "[Using Network Attached Storage or NFS File Systems](#)" section on page 1-13 for more information about certified NAS and NFS devices

If you choose the Custom installation type or the Advanced database creation option, then you can also choose to use the Oracle-managed files feature with the new database. If you use this feature, then you need to specify only the database object name instead of file names when creating or deleting database files.

See Also: *Oracle Database Administrator's Guide* for more information about Oracle-managed files

Automatic Storage Management

Automatic Storage Management is a high-performance storage management solution for Oracle Database files. It simplifies the management of a dynamic database environment, such as creating and laying out databases and managing disk space.

Automatic Storage Management can be used with single database installations, multiple database installations, and in Oracle Real Application Clusters (RAC) environments. It can be used with databases created in Oracle Database 10g release 1 (10.1). Oracle Database 10g release 2 (10.2) databases can use Automatic Storage Management from Oracle Database 10g release 1 (10.1). If the site has multiple single-instance databases, then you can use Oracle Clusterware to consolidate multiple islands of databases into a single clustered pool of storage managed by Automatic Storage Management. Automatic Storage Management manages the storage of all database files, such as redo logs, control files, data pump export files, and so on. However, it does not manage Oracle Database executable binary files.

At a high level, implementing Automatic Storage Management involves allocating partitioned disks for Oracle Database with preferences for striping and mirroring. Automatic Storage Management manages the disk space for you. This helps avoid the need for traditional disk management tools such as Logical Volume Managers (LVM), file systems, and the numerous commands necessary to manage both. The synchronization between Automatic Storage Management and the database instance is handled by Oracle Cluster Synchronization Services (CSS).

The following are components of an Automatic Storage Management installation:

- Automatic Storage Management disk groups

A disk group is a set of disk devices that Automatic Storage Management manages as a single unit. Each disk device can be an individual physical disk, a multiple disk device such as a RAID storage array or logical volume, or even a partition on a physical disk. However, in most cases, disk groups consist of one or more individual physical disks. To enable Automatic Storage Management to balance I/O and storage efficiently within the disk group, you must ensure that all devices in the disk group have similar, if not identical, storage capacity and performance.

You can set the redundancy and striping attributes of individual file types within a disk group by using ASM disk group templates. When you create a disk group, Automatic Storage Management creates a set of default templates for that disk group. Default template settings depend on the disk group type. For example, the default template for data files for a normal redundancy disk group sets two-way mirroring, while the corresponding default template in a high redundancy disk

group sets three-way mirroring. You can modify these default templates to suit the unique needs of the site. See Oracle Database Administrator's Guide for more information.

Automatic Storage Management spreads data evenly across all the devices in the disk group to optimize performance and utilization. You can add or remove disk devices from a disk group without shutting down the database. When you add or remove disks, Automatic Storage Management rebalances the files across the disk group. You can create multiple disk groups to handle specific tasks, such as backup and recovery operations, in addition to regular file storage activities.

When you add a device to a disk group, you can specify a failure group for that device. Failure groups identify disk devices that have common failure characteristics, for example, devices that are attached to the same controller. If the controller fails, then all devices attached to it become unavailable. By default, each device also belongs to its own failure group. By using the failure groups you specify, Automatic Storage Management can distribute data among the devices in the disk group to minimize the risk of data loss caused by component failures.

- Automatic Storage Management instance

The Automatic Storage Management instance manages Automatic Storage Management disk groups. This instance must be running before you can start a database instance that uses Automatic Storage Management. When you choose Automatic Storage Management as the database storage mechanism, this instance is created and started, if necessary. For a single-instance Oracle Database installation, you only need one Automatic Storage Management instance, regardless of the number of database instances on the system. The Automatic Storage Management instance on any node in a single cluster can handle any combination of disk group types.

To install Automatic Storage Management, you use Oracle Universal Installer. This installation guide provides the following general steps for installing Automatic Storage Management:

1. Determine the disk requirements of the site and, if necessary, create one or more disk partitions for Automatic Storage Management.

["Preparing Disk Groups for an Automatic Storage Management Installation"](#) on page 2-23 provides guidelines on how to determine the disk requirements of the site.

2. Run Oracle Universal Installer to install and create an Automatic Storage Management instance and to create Automatic Storage Management disk groups.

["Step 1: Reviewing Automatic Storage Management Installation Considerations"](#) on page 3-9 provides guidelines on where to install Automatic Storage Management and other installation considerations. ["Step 2: Creating the Automatic Storage Management Instance and Disk Groups"](#) on page 3-10 describes how to create an Automatic Storage Management instance and disk groups.

After you create an Automatic Storage Management instance and its associated disk groups, subsequent databases that you create will be able to use Automatic Storage Management for file storage management. If you have databases that were created before you installed Automatic Storage Management, then you can migrate them to Automatic Storage Management by using the Enterprise Manager Migrate Database Wizard. This wizard is available in Enterprise Manager Grid Control or Database Control. Alternatively, you can use Oracle Database Recovery Manager (RMAN) to perform the migration.

3. Create the databases that you want to use Automatic Storage Management.
"Step 3: Installing Oracle Database to Use with Automatic Storage Management" on page 3-15 describes how to create and a database for Automatic Storage Management.
4. Test the Automatic Storage Management installation.
"Step 3: Installing Oracle Database to Use with Automatic Storage Management" on page 3-12 provides a simple test you can try to check that the Automatic Storage Management installation was successful. "Managing Automatic Storage Management" on page 5-2 explains how to start and access Automatic Storage Management and which Oracle Database tools you can use to manage it.

See Also:

- "Oracle Cluster Synchronization Services" on page 1-12
- *Oracle Database 2 Day DBA* for a general overview, from a non-platform perspective, of Automatic Storage Management
- *Oracle Database New Features* for information about new features in this release of Automatic Storage Management
- *Oracle Database Administrator's Guide* for a more detailed description of Automatic Storage Management
- The Oracle Technology Network Web site, for additional information on Automatic Storage Management, which you can visit at

<http://www.oracle.com/technology/products/database/asm>

Raw Devices

Raw devices are disk partitions or logical volumes that have not been formatted with a file system. When you use raw devices for database file storage, Oracle writes data directly to the partition or volume, bypassing the operating system file system layer. For this reason, you can sometimes achieve performance gains by using raw devices. However, because raw devices can be difficult to create and administer, and because the performance gains over modern file systems are minimal, Oracle recommends that you choose Automatic Storage Management or file system storage in preference to raw devices.

Database Management Options

To simplify database administration, Oracle provides a Web-based management tool called Oracle Enterprise Manager. There are two ways that you can deploy Oracle Enterprise Manager:

- Deploy Oracle Enterprise Manager 10g centrally in the environment

To deploy Oracle Enterprise Manager centrally, you must install at least one Oracle Management Repository and one Oracle Management Service within the environment, then install an Oracle Enterprise Management Agent on every computer that you want to manage. You can then use a single HTML interface to manage and monitor software and hardware targets on all of those systems. Targets can include Oracle databases, application servers, Net listeners, and third-party software. This single interface is called Oracle Enterprise Manager Grid Control (or simply Grid Control).

Note: Oracle Enterprise Manager 10g is available separately in the Oracle Database media pack. For more information about Oracle Enterprise Manager 10g, refer to the *Oracle Enterprise Manager Concepts* manual and the *Oracle Enterprise Manager Grid Control Installation and Basic Configuration* manual.

- Deploy Oracle Enterprise Manager Database Control locally on the database system

Oracle Enterprise Manager Database Control software is installed by default with every Oracle Database installation except Custom. During a Custom installation, you can choose not to install Oracle Enterprise Manager Database Control. However, Oracle recommends that you do install it. This local installation provides a Web-based interface called Oracle Enterprise Manager Database Control. The Database Control is similar in function to the Grid Control, but it can manage only a single database. If you want to administer more than one database on this system, then you must either configure a separate Database Control for each database, or install Oracle Enterprise Manager 10g Grid Control.

This section contains the following topics:

- [Management Options for Preconfigured Databases](#)
- [Management Options for Custom Databases](#)
- [Features Provided by Oracle Enterprise Manager Database Control](#)

Management Options for Preconfigured Databases

When you choose to create a preconfigured database during the installation, you must select the Oracle Enterprise Manager interface that you want to use to manage the database. The following options are available:

- Use Grid Control for central database management

This option is available only if an Oracle Management Agent is installed on the system. When Oracle Universal Installer detects an Oracle Management Agent on the system, you can choose this option and specify the Oracle Management Service that you want to use to manage the database.

If an Oracle Management Agent is not installed, then you must choose to use Database Control to manage the database. However, if you install Oracle Management Agent after you install Oracle Database, then you can then use Grid Control to manage this database.

- Use Database Control for local database management

This option is selected by default if an Oracle Management Agent is not installed on the system. However, even if a Management Agent is installed, then you can still choose to configure Database Control to manage the database.

Management Options for Custom Databases

If you choose the Advanced database configuration option or choose to create a database during a Custom installation, then Oracle Universal Installer runs Database Configuration Assistant in interactive mode. Using a screen in Database Configuration Assistant, you can specify the Oracle Enterprise Manager interface that you want to use to manage the database. Alternatively, you can also choose not to configure the database with Enterprise Manager.

Note: Oracle recommends that you configure the database to use Enterprise Manager during installation. However, if you choose not to configure the database to use Enterprise Manager during the installation, then you can use Database Configuration Assistant after the installation to configure the database to use it.

Features Provided by Oracle Enterprise Manager Database Control

Oracle Enterprise Manager Database Control provides a Web-based user interface that enables you to monitor, administer, and maintain an Oracle database. You can use it to perform all of the database administration tasks. You can also use it to determine information about the database, such as:

- Instance name, database version, Oracle home location, media recovery options, and other instance data
- Current instance availability
- Database alert information
- Session and SQL-related performance information
- Space usage metrics

In addition, it provides you with automatic notification of security alerts and it provides the ability to download and apply patches for the software.

Database Backup and Recovery Options

If you choose to use Oracle Enterprise Manager Database Control during the installation, then you can optionally enable automated database backups that use the Oracle-suggested default backup strategy.

Note: You do not have to enable automated backups during the installation. If you prefer, you can use Oracle Enterprise Manager Database Control or Grid Control to configure automated backups after you install the software and create a database.

This section contains the following topics:

- [Enabling Automated Backups](#)
- [Backup Job Default Settings](#)
- [More Information About Automated Backups and Recovery](#)

Enabling Automated Backups

If you enable automated backups, then Oracle Enterprise Manager schedules a daily backup job that uses Oracle Recovery Manager (RMAN) to back up all of the database files to an on-disk storage area called the flash recovery area. The first time the backup job runs, it creates a full backup of the database. Subsequent backup jobs perform incremental backups, which enable you to recover the database to its state at any point during the preceding 24 hours.

To enable automated backup jobs during installation, you must specify the following information:

- The location of the flash recovery area

You can choose to use either a file system directory or an Automatic Storage Management disk group for the flash recovery area. The default disk quota configured for the flash recovery area is 2 GB. For Automatic Storage Management disk groups, the required disk space depends on the redundancy level of the disk group that you choose. [Chapter 2](#) describes how to choose the location of the flash recovery area and identifies its disk space requirements.

- An operating system user name and password for the backup job

Oracle Enterprise Manager uses the operating system credentials that you specify when running the backup job. The user name that you specify must belong to the UNIX group that identifies database administrators (the OSDBA group, typically `dba`). The Oracle software owner user (typically `oracle`) that you use to install the software is a suitable choice for this user. [Chapter 2](#) describes the requirements for the OSDBA group and Oracle software owner user and describes how to create them.

Backup Job Default Settings

If you enable automated backups after choosing one of the preconfigured databases during the installation, then automated backup is configured with the following default settings:

- The backup job is scheduled to run nightly at 2 a.m.
- The disk quota for the flash recovery area is 2 GB.

If you enable automated backups by using Database Configuration Assistant, either during or after the installation, then you can specify a different start time for the backup job and a different disk quota for the flash recovery area.

More Information About Automated Backups and Recovery

For information about using Oracle Enterprise Manager Database Control to configure or customize automated backups or to recover a backed up database, refer to the *Oracle Database 2 Day DBA* manual.

For more detailed information about defining a backup strategy and backing up and recovering Oracle databases, refer to the *Oracle Database Backup and Recovery Basics* manual or *Oracle Database Backup and Recovery Advanced User's Guide*.

E-mail Notification Options

If you choose to use the Oracle Enterprise Manager Database Control during the installation, then you can configure Enterprise Manager to send e-mail when specific events occur. These events can include occurrences such as disk space reaching a critical limit (a threshold), or a database shutting down unexpectedly.

If you choose to enable e-mail notifications, then you must specify the following information:

- The host name of a Simple Mail Transfer Protocol (SMTP) server
- The e-mail address that should receive the alerts

The e-mail address that you specify could belong to an individual or it could be a shared e-mail account or a distribution list.

You can use Enterprise Manager Database Control to set up, change, or customize e-mail notifications after you have created the database.

Installation Considerations

This section contains information that you should consider before deciding how to install this product. It contains the following sections:

- [Hardware and Software Certification](#)
- [Multiple Oracle Homes](#)
- [Oracle Cluster Synchronization Services](#)
- [Using Network Attached Storage or NFS File Systems](#)

Hardware and Software Certification

The platform-specific hardware and software requirements included in this installation guide were current at the time this guide was published. However, because new platforms and operating system software versions might be certified after this guide is published, review the certification matrix on the *OracleMetaLink* Web site for the most up-to-date list of certified hardware platforms and operating system versions. The *OracleMetaLink* Web site is available at the following URL:

<http://metalink.oracle.com>

If you do not have a current Oracle Support Services contract, then you can access the same information at the following Web site:

<http://www.oracle.com/technology/support/metalink/content.html>

Multiple Oracle Homes

This product supports multiple Oracle homes. This means that you can install this release or previous releases of the software more than once on the same system, in different Oracle home directories.

Installing the Software on a System with an Existing Oracle Installation

You must install this product into a new Oracle home directory. You cannot install products from one release of Oracle Database into an Oracle home directory of a different release. For example, you cannot install release 10.2 software into an existing Oracle9i Oracle home directory. If you attempt to install this release into an Oracle home directory that contains software from an earlier Oracle release, then the installation fails.

You can install this release more than once on the same system if each installation is installed in a separate Oracle home directory.

Oracle Cluster Synchronization Services

The first time you install Oracle Database 10g on a system, the installation configures and starts a single-node version of the Oracle Cluster Synchronization Services (CSS) daemon. The CSS daemon is required to enable synchronization between an Automatic Storage Management instance and the database instances that rely on it for database file storage. By default, Oracle Universal Installer does not configure Oracle Cluster Synchronization Services. Oracle Universal Installer configures these services only if you choose Automatic Storage Management as a storage or recovery option. Because it must be running before any Automatic Storage Management instance or database instance starts, it is configured to start automatically when the system boots.

For Oracle Real Application Clusters installations, the CSS daemon is installed with Oracle Clusterware in a separate Oracle home directory (also called the Clusterware home directory). For single-node installations, the CSS daemon is installed in and runs from the same Oracle home as Oracle Database.

If you have installed Oracle Cluster Synchronization Services from the same Oracle home as Oracle Database, then use caution when removing Oracle Database 10g software from the system. Before you remove an Oracle home directory that contains Oracle Database 10g, you must either delete the CSS daemon configuration, or if necessary, reconfigure the CSS daemon to run from another Oracle home directory.

See Also: The "[Reconfiguring Oracle Cluster Synchronization Services](#)" section on page 6-4 for more information about deleting or reconfiguring the Oracle CSS daemon

Note: If you plan to have more than one Oracle Database 10g installation on a single system and you want to use Automatic Storage Management for database file storage, then Oracle recommends that you run the CSS daemon and the Automatic Storage Management instance from the same Oracle home directory and use different Oracle home directories for the database instances.

Using Network Attached Storage or NFS File Systems

Oracle Database 10g must be able to verify that writes to a disk are completed successfully. NFS file systems, including file systems on NAS devices, may not be able to guarantee that writes to a disk are completed successfully, and this may lead to possible data file corruption. Oracle recommends that you do not store files on NFS mounted file systems unless the storage vendor and storage device are listed in the Oracle Storage Compatibility Program list. This list is available from the following Web site:

<http://www.oracle.com/technology/deploy/availability/htdocs/oscp.html>

If a storage device is supported, then you can use it to store Oracle software files, Oracle database files, or both.

See Also: [Appendix B](#) for guidelines about using NFS and NAS devices for Oracle software or database files

Upgrade Issues

For information about upgrading a previous release of Oracle Database to Oracle Database 10g release 2 (10.2), refer to *Oracle Database Upgrade Guide*. The following sections provide additional platform-specific upgrade information that you should review before upgrading an existing database:

- [AL24UTFFSS Character Set](#)
- [Upgrading an Oracle Database Installed on Red Hat Enterprise Linux 2.1](#)

AL24UTFSS Character Set

Note: The information in this section does *not* apply to an upgrade of a release 1 (9.0.1) or later release of Oracle Database.

Before you upgrade an existing database that uses the AL24UTFSS character set, you must upgrade the database character set to UTF8. Oracle recommends that you use the Character Set Scanner (CSSCAN) utility for data analysis before attempting to upgrade the existing database character set.

The Character Set Scanner utility checks all character data in the database and tests for the effects of, and problems with, changing the character set encoding. Before running the Character Set Scanner utility, set the shared library path environment variable for the platform to include the \$ORACLE_HOME/lib directory. The shared library path environment path that you need to set is LD_LIBRARY_PATH.

Caution: AL32UTF8 is the Oracle Database character set that is appropriate for XMLType data. It is equivalent to the IANA registered standard UTF-8 encoding, which supports all valid XML characters.

Do not confuse Oracle Database database character set UTF8 (no hyphen) with database character set AL32UTF8 or with character encoding UTF-8. Database character set UTF8 has been superseded by AL32UTF8. Do not use UTF8 for XML data. UTF8 supports only Unicode version 3.1 and earlier; it does not support all valid XML characters. AL32UTF8 has no such limitation.

Using database character set UTF8 for XML data could potentially cause a fatal error or affect security negatively. If a character that is not supported by the database character set appears in an input-document element name, then a replacement character (usually "?") is substituted for it. This will terminate parsing and raise an exception.

Upgrading an Oracle Database Installed on Red Hat Enterprise Linux 2.1

If you have the 8.1.7, 9.0.1, 9.2.0, or 10.1 release of Oracle Database installed on Red Hat Enterprise Linux 2.1, then you must first upgrade the operating system to Red Hat Enterprise Linux 3 (update 4) before you upgrade the database. To do this, perform *any one* of the following procedures:

See Also: *Oracle Database Upgrade Guide*

- Upgrade the operating system. Then, upgrade the database either manually or by using Oracle Database Upgrade Assistant. The detailed information on preserving database environment while upgrading the operating system is available at the following URL:
http://www.oracle.com/technology/tech/linux/pdf/rhel_23_upgrade.pdf
- Copy the database files. This procedure involves the following steps:
 1. Copy the database files from the computer running Red Hat Enterprise Linux 2.1 to the one running Red Hat Enterprise Linux 3.0.

2. Re-create the control files on the computer running Red Hat Enterprise Linux 3.0.
3. Manually upgrade the database.

Note: You cannot use Oracle Database Upgrade Assistant if you follow this method. However, this method lets you easily revert to the earlier database.

- Upgrade the database by using the Export/Import utilities.

Deprecated Components in Oracle Database 10g Release 2 (10.2)

The following Oracle Database 10g release 2 (10.2) components that were part of Oracle Database 10g release 1 (10.1) are not available for installation with Oracle Database 10g release 2 (10.2):

- Legato Single Server Version (LSSV)
Instead, use Oracle Database Recovery Manager (RMAN).
- Distributed Computing Environment (DCE) component of Oracle Advanced Security

Preinstallation Tasks

This chapter describes the tasks that you must complete before you start Oracle Universal Installer. It includes information about the following tasks:

- [Logging In to the System as root](#)
- [Checking the Hardware Requirements](#)
- [Checking the Software Requirements](#)
- [Checking the Network Setup](#)
- [Creating Required Operating System Groups and Users](#)
- [Configuring Kernel Parameters](#)
- [Identifying Required Software Directories](#)
- [Identifying or Creating an Oracle Base Directory](#)
- [Choosing a Storage Option for Oracle Database and Recovery Files](#)
- [Creating Directories for Oracle Database or Recovery Files](#)
- [Preparing Disk Groups for an Automatic Storage Management Installation](#)
- [Configuring Raw Partitions or Raw Logical Volumes](#)
- [Stopping Existing Oracle Processes](#)
- [Configuring the oracle User's Environment](#)

Logging In to the System as root

Before you install the Oracle software, you must complete several tasks as the `root` user. To log in as the `root` user, complete one of the following procedures:

Note: Unless you intend to complete a silent-mode installation, you must install the software from an X Window System workstation, an X terminal, or a PC or other system with X server software installed.

For more information about silent-mode installations, refer to [Appendix A](#).

- If you are installing the software from an X Window System workstation or X terminal, then:
 1. Start a local terminal session, for example, an X terminal (`xterm`).

2. If you are not installing the software on the local system, then enter the following command to enable the remote host to display X applications on the local X server:

```
$ xhost fully_qualified_remote_host_name
```

For example:

```
$ xhost somehost.us.acme.com
```

3. If you are not installing the software on the local system, then use the `ssh`, `rlogin`, or `telnet` command to connect to the system where you want to install the software:

```
$ telnet fully_qualified_remote_host_name
```

4. If you are not logged in as the `root` user, then enter the following command to switch user to `root`:

```
$ su - root
password:
#
```

- If you are installing the software from a PC or other system with X server software installed, then:

Note: If necessary, refer to your X server documentation for more information about completing this procedure. Depending on the X server software that you are using, you may need to complete the tasks in a different order.

1. Start the X server software.
2. Configure the security settings of the X server software to permit remote hosts to display X applications on the local system.
3. Connect to the remote system where you want to install the software and start a terminal session on that system, for example, an X terminal (`xterm`).
4. If you are not logged in as the `root` user on the remote system, then enter the following command to switch user to `root`:

```
$ su - root
password:
#
```

Checking the Hardware Requirements

The system must meet the following minimum hardware requirements:

- At least 1024MB of physical RAM
- The following table gives the relationship between the available RAM and the required swap space.

Available RAM	Swap Space Required
Between 1024 MB and 2048 MB	1.5 times the size of RAM
Between 2049 MB and 8192 MB	Equal to the size of RAM

Available RAM	Swap Space Required
More than 8192 MB	0.75 times the size of RAM

- 400 MB of disk space in the `/tmp` directory
- Between 1.5 GB and 3.5 GB of disk space for the Oracle software, depending on the installation type
- 1.2 GB of disk space for a preconfigured database that uses file system storage (optional)

Note: The disk space requirement for databases that use Automatic Storage Management or raw device storage is described later in this chapter.

Additional disk space, either on a file system or in an Automatic Storage Management disk group, is required for the flash recovery area if you choose to configure automated backups.

To ensure that the system meets these requirements:

1. To determine the physical RAM size, enter the following command:

```
# grep MemTotal /proc/meminfo
```

If the size of the physical RAM installed in the system is less than the required size, then you must install more memory before continuing.

2. To determine the size of the configured swap space, enter the following command:

```
# grep SwapTotal /proc/meminfo
```

If necessary, refer to your operating system documentation for information about how to configure additional swap space.

3. To determine the available RAM and swap space, enter the following command:

```
# free
```

Note: Oracle recommends that you take multiple values for the available RAM and swap space before freezing on a value. This is because the available RAM and swap space keep changing depending on the user interactions with the computer.

4. To determine the amount of disk space available in the `/tmp` directory, enter the following command:

```
# df -k /tmp
```

If there is less than 400 MB of disk space available in the `/tmp` directory, then complete one of the following steps:

- Delete unnecessary files from the `/tmp` directory to meet the disk space requirement.
- Set the `TEMP` and `TMPDIR` environment variables when setting the `oracle` user's environment (described later).

- Extend the file system that contains the /tmp directory. If necessary, contact your system administrator for information about extending file systems.
5. To determine the amount of free disk space on the system, enter the following command:

```
# df -k
```

The following table shows the approximate disk space requirements for software files for each installation type:

Installation Type	Requirement for Software Files (GB)
Enterprise Edition	1.5
Standard Edition	1.5
Custom (maximum)	1.5

6. To determine whether the system architecture can run the software, enter the following command:

```
# grep "model name" /proc/cpuinfo
```

Note: This command displays the processor type. Verify that the processor architecture matches the Oracle software release that you want to install. If you do not see the expected output, then you cannot install the software on this system.

Checking the Software Requirements

Depending on the products that you intend to install, verify that the following software is installed on the system. The procedure following the table describes how to verify whether these requirements are addressed.

Note: Oracle Universal Installer performs checks on your system to verify that it meets the listed requirements. To ensure that these checks pass, verify the requirements before you start Oracle Universal Installer.

Item	Requirement
Operating system	One of the following operating system versions: <ul style="list-style-type: none"> ■ Red Hat Enterprise Linux 3.0 (Update 3 or later) ■ Red Hat Enterprise Linux 4.0 ■ SUSE Linux Enterprise Server 9.0 ■ Asianux 1.0 ■ Asianux 2.0

Item	Requirement
Kernel version	<p>The system must be running the following kernel version (or a later version):</p> <p>Red Hat Enterprise Linux 3.0 and Asianux 1.0: 2.4.21-27.EL</p> <p>Note: This is the default kernel version.</p> <p>Red Hat Enterprise Linux 4.0 and Asianux 2.0: 2.6.9-5.0.5.EL</p> <p>SUSE Linux Enterprise Server 9.0: 2.6.5-7.97</p>
Packages	<p>The following packages (or later versions) must be installed:</p> <p>Red Hat Enterprise Linux 3.0 and 4.0, and Asianux 1.0 and 2.0:</p> <pre>make-3.79.1 gcc-3.2.3-34 glibc-2.3.2-95.20 compat-db-4.0.14-5 compat-gcc-7.3-2.96.128 compat-gcc-c++-7.3-2.96.128 compat-libstdc++-7.3-2.96.128 compat-libstdc++-devel-7.3-2.96.128 openmotif21-2.1.30-8 setarch-1.3-1</pre> <p>SUSE Linux Enterprise Server 9:</p> <pre>gcc-3.3.3-43 gcc-c++-3.3.3-43 glibc-2.3.3-98 libaio-0.3.98-18 libaio-devel-0.3.98-18 make-3.80 openmotif-libs-2.2.2-519.1</pre>
Oracle Messaging Gateway	<p>Oracle Messaging Gateway supports the integration of Oracle Streams Advanced Queuing (AQ) with the following software:</p> <ul style="list-style-type: none"> ■ IBM WebSphere MQ V5.3, client and server, with corrective service diskette 5 (CSD05) or later: <pre>MQSeriesClient MQSeriesServer MQSeriesRuntime</pre> ■ TIBCO Rendezvous 7.2
Oracle Spatial	<p>X Window System development packages:</p> <pre>XFree86 XFree86-devel</pre> <p>Note: This software is required only to build the sample programs.</p>

Item	Requirement
PL/SQL native compilation, Pro*C/C++, Oracle Call Interface, Oracle C++ Call Interface, Oracle XML Developer's Kit (XDK)	The version of GNU C and C++ compilers listed previously for your distribution are supported for use with these products. Notes: Intel C++ Compiler v7.1.0.28 or later is also supported, however it is not required for installation. On Red Hat Enterprise Linux 3, OCCI is supported with both version 2.96-128 and version 3.2 of the GNU C++ compiler, however, version 3.2 is the default compiler version. OCCI is also supported with Intel Compiler v8.0 with gcc 3.2.3 standard template libraries. Intel C++ Compiler v7 does not support OCCI.
Oracle JDBC/OCI Drivers	You can use the following optional JDK version with the Oracle JDBC/OCI drivers; however, it is not required for the installation: <ul style="list-style-type: none"> ■ Sun JDK 1.4.2_08 with the JNDI extension Note: JDK 1.4.2_08 is installed with this release.

To ensure that the system meets these requirements:

1. To determine which distribution and version of Linux is installed, enter the following command:

```
# cat /etc/issue
```

Note: Only the distributions and versions listed in the previous table are supported. Do not install the software on other versions of Linux.

2. To determine whether the required kernel is installed, enter the following command:

```
# uname -r
```

The following is sample output obtained by running this command on a Red Hat Enterprise Linux 3.0 system:

```
2.4.21-15.EL
```

In this example, the output shows the kernel version (2.4.21) and errata level (15.EL) on the system.

If the kernel version does not meet the requirement specified earlier in this section, then contact your operating system vendor for information about obtaining and installing kernel updates.

3. To determine whether the required packages are installed, enter commands similar to the following:

```
# rpm -q package_name
```

If a package is not installed, then install it from your Linux distribution media or download the required package version from your Linux vendor's Web site.

4. If you require a CSD for WebSphere MQ, then refer to the following Web site for download and installation information:

<http://www.ibm.com/software/integration/mqfamily/support/summary/linux.html>

Checking the Network Setup

Typically, the computer on which you want to install Oracle Database is connected to the network, has local storage to contain the Oracle Database installation, has a display monitor, and has a CD-ROM or DVD drive.

This section describes how to install Oracle Database on computers that do not meet the typical scenario. It covers the following cases:

- [Configuring Name Resolution](#)
- [Installing on DHCP Computers](#)
- [Installing on Multihomed Computers](#)
- [Installing on Computers with Multiple Aliases](#)
- [Installing on Non-Networked Computers](#)

Configuring Name Resolution

When you run Oracle Universal Installer, an error may occur if name resolution is not set up. To avoid this error, before you begin installation, you must ensure that host names are resolved only through the `/etc/hosts` file.

To ensure that host names are resolved only through the `/etc/hosts` file:

1. Verify that the `/etc/hosts` file is used for name resolution. You can do this by checking the hosts file entry in the `nsswitch.conf` file as follows:

```
# cat /etc/nsswitch.conf | grep hosts
```

The output of this command should contain an entry for files.

2. Verify that the host name has been set by using the `hostname` command as follows:

```
# hostname
```

The output of this command should be similar to the following:

```
myhost.mycomputer.com
```

3. Verify that the domain name has not been set dynamically by using the `domainname` command as follows:

```
# domainname
```

This command should not return any results.

4. Verify that the hosts file contains the fully qualified host name by using the following command:

```
# cat /etc/hosts | grep `eval hostname`
```

The output of this command should contain an entry for the fully qualified host name and for localhost.

For example:

```
192.168.100.16    myhost.us.mycompany.com    myhost
127.0.0.1        localhost                    localhost.localdomain
```

If the hosts file does not contain the fully qualified host name, then open the file and make the required changes in it.

Installing on DHCP Computers

Dynamic Host Configuration Protocol (DHCP) assigns dynamic IP addresses on a network. Dynamic addressing enables a computer to have a different IP address each time it connects to the network. In some cases, the IP address can change while the computer is still connected. You can have a mixture of static and dynamic IP addressing in a DHCP system.

In a DHCP setup, the software tracks IP addresses, which simplifies network administration. This lets you add a new computer to the network without having to manually assign that computer a unique IP address.

Installing on Multihomed Computers

You can install Oracle Database on a multihomed computer. A multihomed computer is associated with multiple IP addresses. This is typically achieved by having multiple network cards on the computer. Each IP address is associated with a host name. In addition, you can set up aliases for the host name. By default, Oracle Universal Installer uses the `ORACLE_HOSTNAME` environment variable setting to find the host name. If `ORACLE_HOSTNAME` is not set and you are installing on a computer that has multiple network cards, then Oracle Universal Installer determines the host name by using the first entry in the `/etc/hosts` file.

Clients must be able to access the computer either by using this host name or by using aliases for this host name. To verify this, ping the host name from the client computers using the short name (hostname only) and the full name (hostname and domain name). Both tests must be successful.

Setting the `ORACLE_HOSTNAME` Environment Variable

Use the following procedure to set the `ORACLE_HOSTNAME` environment variable.

For example, if the fully qualified host name is `somehost.us.acme.com`, then enter one of the following commands:

Bourne, Bash, or Korn shell:

```
$ ORACLE_HOSTNAME=somehost.us.acme.com
$ export ORACLE_HOSTNAME
```

C shell:

```
% setenv ORACLE_HOSTNAME somehost.us.acme.com
```

Installing on Computers with Multiple Aliases

A computer with multiple aliases is registered with the naming service under a single IP but with multiple aliases. The naming service resolves any of those aliases to the same computer. Before installing Oracle Database on such a computer, set the `ORACLE_HOSTNAME` environment variable to the computer whose host name you want to use.

Installing on Non-Networked Computers

You can install Oracle Database on a non-networked computer. If the computer, such as a laptop, is configured for DHCP and you plan to connect the computer to the network after the Oracle Database installation, then use the `ping` command on the computer on which you want to install the database to check if the computer can connect to itself. Perform this step by first using only the host name and then using the fully qualified name, which should be in the `/etc/hosts` file.

Note: When you run the `ping` command on the computer itself, the `ping` command should return the IP address of the computer.

If the `ping` command fails, then contact your network administrator.

Connecting the Computer to the Network after Installation

If you connect the computer to a network after installation, then the Oracle Database instance on your computer can work with other instances on the network. The computer can use a static IP or DHCP, depending on the network to which you are connected.

Creating Required Operating System Groups and Users

Depending on whether this is the first time Oracle software is being installed on this system and on the products that you are installing, you may need to create several operating system groups and users.

The following operating system groups and user are required if you are installing Oracle Database:

- The OSDBA group (`dba`)

You must create this group the first time you install Oracle Database software on the system. It identifies operating system user accounts that have database administrative privileges (the SYSDBA privilege). The default name for this group is `dba`.

If you want to specify a group name other than the default `dba` group, then you must choose the Custom installation type to install the software or start Oracle Universal Installer as a user that is not a member of this group. In this case, Oracle Universal Installer prompts you to specify the name of this group.

- The OSOPER group (`oper`)

This is an optional group. Create this group if you want a separate group of operating system users to have a limited set of database administrative privileges (the SYSOPER privilege). By default, members of the OSDBA group also have the SYSOPER privilege.

If you want to specify a separate OSOPER group, other than the default `dba` group, then you must choose the Custom installation type to install the software or start Oracle Universal Installer as a user that is not a member of the `dba` group. In this case, Oracle Universal Installer prompts you to specify the name of this group. The usual name chosen for this group is `oper`.

- An unprivileged user

Verify that the unprivileged user `nobody` exists on the system. The `nobody` user must own the external jobs (`extjob`) executable after the installation.

The following operating system group and user are required for all installations:

- The Oracle Inventory group (`oinstall`)

You must create this group the first time you install Oracle software on the system. The usual name chosen for this group is `oinstall`. This group owns the Oracle inventory, which is a catalog of all Oracle software installed on the system.

Note: If Oracle software is already installed on the system, then the existing Oracle Inventory group must be the primary group of the operating system user that you use to install new Oracle software. The following sections describe how to identify an existing Oracle Inventory group.

- The Oracle software owner user (typically, `oracle`)
You must create this user the first time you install Oracle software on the system. This user owns all of the software installed during the installation. This user must have the Oracle Inventory group as its primary group. It must also have the OSDBA and OSOPER groups as secondary groups.

Note: In Oracle documentation, this user is referred to as the `oracle` user.

A single Oracle Inventory group is required for all installations of Oracle software on the system. After the first installation of Oracle software, you must use the same Oracle Inventory group for all subsequent Oracle software installations on that system. However, you can choose to create different Oracle software owner users, OSDBA groups, and OSOPER groups (other than `oracle`, `dba`, and `oper`) for separate installations. By using different groups for different installations, members of these different groups have DBA privileges only on the associated databases rather than on all databases on the system.

See Also: *Oracle Database Administrator's Reference for Linux and Solaris Operating Systems* and *Oracle Database Administrator's Guide* for more information about the OSDBA and OSOPER groups and the SYSDBA and SYSOPER privileges

Note: The following sections describe how to create local users and groups. As an alternative to creating local users and groups, you could create the appropriate users and groups in a directory service, for example, Network Information Services (NIS). For information about using directory services, contact your system administrator or refer to your operating system documentation.

The following sections describe how to create the required operating system users and groups:

- [Creating the Oracle Inventory Group](#)
- [Creating the OSDBA Group](#)
- [Creating an OSOPER Group \(Optional\)](#)
- [Creating the Oracle Software Owner User](#)

Creating the Oracle Inventory Group

You must create the Oracle Inventory group if it does not already exist. The following subsections describe how to determine the Oracle Inventory group name, if it exists, and how to create it if necessary.

Determining Whether the Oracle Inventory Group Exists

When you install Oracle software on the system for the first time, Oracle Universal Installer creates the `oraInst.loc` file. This file identifies the name of the Oracle Inventory group and the path of the Oracle Inventory directory.

To determine whether the Oracle Inventory group exists, enter the following command:

```
# more /etc/oraInst.loc
```

If the output of this command shows the `oinstall` group name, then the group already exists.

If the `oraInst.loc` file exists, then the output from this command is similar to the following:

```
inventory_loc=/u01/app/oracle/oraInventory
inst_group=oinstall
```

The `inst_group` parameter shows the name of the Oracle Inventory group, `oinstall`.

Creating the Oracle Inventory Group

If the `oraInst.loc` file does not exist, then create the Oracle Inventory group by entering the following command:

```
# /usr/sbin/groupadd oinstall
```

Creating the OSDBA Group

You must create an OSDBA group in the following circumstances:

- An OSDBA group does not exist, for example, if this is the first installation of Oracle Database software on the system
- An OSDBA group exists, but you want to give a different group of operating system users database administrative privileges in a new Oracle installation

If the OSDBA group does not exist or if you require a new OSDBA group, then create it as follows. In the following command, use the group name `dba` unless a group with that name already exists.

```
# /usr/sbin/groupadd dba
```

Creating an OSOPER Group (Optional)

Create an OSOPER group only if you want to identify a group of operating system users with a limited set of database administrative privileges (SYSOPER operator privileges). For most installations, it is sufficient to create only the OSDBA group. If you want to use an OSOPER group, then you must create it in the following circumstances:

- If an OSOPER group does not exist, for example, if this is the first installation of Oracle Database software on the system
- If an OSOPER group exists, but you want to give a different group of operating system users database operator privileges in a new Oracle installation

If you require a new OSOPER group, then create it as follows. In the following command, use the group name `oper` unless a group with that name already exists.

```
# /usr/sbin/groupadd oper
```

Creating the Oracle Software Owner User

You must create an Oracle software owner user in the following circumstances:

- If an Oracle software owner user does not exist, for example, if this is the first installation of Oracle software on the system
- If an Oracle software owner user exists, but you want to use a different operating system user, with different group membership, to give database administrative privileges to those groups in a new Oracle Database installation

Determining Whether an Oracle Software Owner User Exists

To determine whether an Oracle software owner user named `oracle` exists, enter the following command:

```
# id oracle
```

If the `oracle` user exists, then the output from this command is similar to the following:

```
uid=440(oracle) gid=200(oinstall) groups=201(dba),202(oper)
```

If the user exists, then determine whether you want to use the existing user or create another `oracle` user. If you want to use the existing user, then ensure that the user's primary group is the Oracle Inventory group and that it is a member of the appropriate OSDBA and OSOPER groups. Refer to one of the following sections for more information:

Note: If necessary, contact your system administrator before using or modifying an existing user.

- If you want to use an existing Oracle software owner user, and the user's primary group is the Oracle Inventory group, then refer to the "[Determining Whether an Oracle Software Owner User Exists](#)" section on page 2-12.
- To modify an existing user, refer to the "[Modifying an Oracle Software Owner User](#)" section on page 2-13.
- To create a user, refer to the following section.

Creating an Oracle Software Owner User

If the Oracle software owner user does not exist or if you require a new Oracle software owner user, then create it as follows. In the following procedure, use the user name `oracle` unless a user with that name already exists.

1. To create the `oracle` user, enter a command similar to the following:

```
# /usr/sbin/useradd -g oinstall -G dba[,oper] oracle
```

In this command:

- The `-g` option specifies the primary group, which must be the Oracle Inventory group, for example `oinstall`

- The `-G` option specifies the secondary groups, which must include the OSDBA group and if required, the OSOPER group. For example, `dba` or `dba,oper`
2. Set the password of the `oracle` user:

```
# passwd oracle
```

Refer to the ["Verifying that the User nobody Exists"](#) section on page 2-13 to continue.

Modifying an Oracle Software Owner User

If the `oracle` user exists, but its primary group is not `oinstall` or it is not a member of the appropriate OSDBA or OSOPER groups, then enter a command similar to the following to modify it. Specify the primary group using the `-g` option and any required secondary group using the `-G` option:

```
# /usr/sbin/usermod -g oinstall -G dba[,oper] oracle
```

Verifying that the User nobody Exists

Before installing the software, perform the following procedure to verify that the `nobody` user exists on the system:

1. To determine whether the user exists, enter the following command:

```
# id nobody
```

If this command displays information about the `nobody` user, then you do not have to create that user.

2. If the `nobody` user does not exist, then enter the following command to create it:

```
# /usr/sbin/useradd nobody
```

Configuring Kernel Parameters

Note: The kernel parameter and shell limit values shown in the following section are recommended values only. For production database systems, Oracle recommends that you tune these values to optimize the performance of the system. Refer to your operating system documentation for more information about tuning kernel parameters.

Verify that the kernel parameters shown in the following table are set to values greater than or equal to the recommended value shown. The procedure following the table describes how to verify and set the values.

Parameter	Value	File
<code>semmsl</code>	250	<code>/proc/sys/kernel/sem</code>
<code>semmns</code>	32000	
<code>semopm</code>	100	
<code>semmni</code>	128	
<code>shmall</code>	2097152	<code>/proc/sys/kernel/shmall</code>

Parameter	Value	File
shmmax	Half the size of physical memory (in bytes)	/proc/sys/kernel/shmmax
shmmni	4096	/proc/sys/kernel/shmmni
file-max	65536	/proc/sys/fs/file-max
ip_local_port_range	Minimum:1024 Maximum: 65000	/proc/sys/net/ipv4/ip_local_port_range
rmem_default	262144	/proc/sys/net/core/rmem_default
rmem_max	262144	/proc/sys/net/core/rmem_max
wmem_default	262144	/proc/sys/net/core/wmem_default
wmem_max	262144	/proc/sys/net/core/wmem_max

Note: If the current value for any parameter is higher than the value listed in this table, then do not change the value of that parameter.

To view the current value specified for these kernel parameters, and to change them if necessary:

1. Enter the commands shown in the following table to view the current values of the kernel parameters:

Note: Make a note of the current values and identify any values that you must change.

Parameter	Command
semmsl, semmns, semopm, and semmni	# /sbin/sysctl -a grep sem This command displays the value of the semaphore parameters in the order listed.
shmall, shmmax, and shmmni	# /sbin/sysctl -a grep shm This command displays the details of the shared memory segment sizes.
file-max	# /sbin/sysctl -a grep file-max This command displays the maximum number of file handles.
ip_local_port_range	# /sbin/sysctl -a grep ip_local_port_range This command displays a range of port numbers.
rmem_default	# /sbin/sysctl -a grep rmem_default
rmem_max	# /sbin/sysctl -a grep rmem_max
wmem_default	# /sbin/sysctl -a grep wmem_default
wmem_max	# /sbin/sysctl -a grep wmem_max

- If the value of any kernel parameter is different from the recommended value, then complete the following procedure:

Using any text editor, create or edit the `/etc/sysctl.conf` file, and add or edit lines similar to the following:

Note: Include lines only for the kernel parameter values that you want to change. For the semaphore parameters (`kernel.sem`), you must specify all four values. However, if any of the current values are larger than the recommended value, then specify the larger value.

```
kernel.shmall = 2097152
kernel.shmmax = 2147483648
kernel.shmni = 4096
kernel.sem = 250 32000 100 128
fs.file-max = 65536
net.ipv4.ip_local_port_range = 1024 65000
rmem_default = 262144
rmem_max = 262144
wmem_default = 262144
wmem_max = 262144
```

By specifying the values in the `/etc/sysctl.conf` file, they persist when you restart the system.

On SUSE systems only, enter the following command to ensure that the system reads the `/etc/sysctl.conf` file when it restarts:

```
# /sbin/chkconfig boot.sysctl on
```

Setting Shell Limits for the oracle User

To improve the performance of the software on Linux systems, you must increase the following shell limits for the `oracle` user:

Shell Limit	Item in <code>limits.conf</code>	Hard Limit
Maximum number of open file descriptors	<code>nofile</code>	65536
Maximum number of processes available to a single user	<code>nproc</code>	16384

To increase the shell limits:

- Add the following lines to the `/etc/security/limits.conf` file:

```
oracle          soft  nproc  2047
oracle          hard  nproc  16384
oracle          soft  nofile 1024
oracle          hard  nofile 65536
```

- Add or edit the following line in the `/etc/pam.d/login` file, if it does not already exist:

```
session required /lib/security/pam_limits.so
```

- Depending on the `oracle` user's default shell, make the following changes to the default shell startup file:

- For the Bourne, Bash, or Korn shell, add the following lines to the `/etc/profile` file (or the `/etc/profile.local` file on SUSE systems):

```
if [ $USER = "oracle" ]; then
    if [ $SHELL = "/bin/ksh" ]; then
        ulimit -p 16384
        ulimit -n 65536
    else
        ulimit -u 16384 -n 65536
    fi
fi
```

- For the C shell (`cs`h or `tc`sh), add the following lines to the `/etc/csh.login` file (or the `/etc/csh.login.local` file on SUSE systems):

```
if ( $USER == "oracle" ) then
    limit maxproc 16384
    limit descriptors 65536
endif
```

Refer to the ["Identifying Required Software Directories"](#) section to continue.

Identifying Required Software Directories

You must identify or create the following directories for the Oracle software:

- [Oracle Base Directory](#)
- [Oracle Inventory Directory](#)
- [Oracle Home Directory](#)

Oracle Base Directory

The Oracle base directory is a top-level directory for Oracle software installations. It is analogous to the `C:\Oracle` directory used for Oracle software installations on Microsoft Windows systems. On Linux systems, the Optimal Flexible Architecture (OFA) guidelines recommend that you use a path similar to the following for the Oracle base directory:

```
/mount_point/app/oracle_sw_owner
```

In this example:

- *mount_point* is the mount point directory for the file system that will contain the Oracle software.

The examples in this guide use `/u01` for the mount point directory. However, you could choose another mount point directory, such as `/oracle` or `/opt/oracle`.

- *oracle_sw_owner* is the operating system user name of the Oracle software owner, for example `oracle`.

You can use the same Oracle base directory for more than one installation or you can create separate Oracle base directories for different installations. If different operating system users install Oracle software on the same system, then each user must create a separate Oracle base directory. The following example Oracle base directories could all exist on the same system:

```
/u01/app/oracle
/u01/app/orauser
```

```
/opt/oracle/app/oracle
```

The following sections describe how to identify existing Oracle base directories that may be suitable for your installation and how to create an Oracle base directory if necessary.

Regardless of whether you create an Oracle base directory or decide to use an existing one, you must set the `ORACLE_BASE` environment variable to specify the full path to this directory.

Oracle Inventory Directory

The Oracle Inventory directory (`oraInventory`) stores an inventory of all software installed on the system. It is required by, and shared by, all Oracle software installations on a single system. The first time you install Oracle software on a system, Oracle Universal Installer prompts you to specify the path to this directory. Then Oracle recommends that you choose the following path:

```
oracle_base/oraInventory
```

Oracle Universal Installer creates the directory that you specify and sets the correct owner, group, and permissions for it. You do not need to create it.

Note: All Oracle software installations rely on this directory. Ensure that you back it up regularly.

Do not delete this directory unless you have completely removed all Oracle software from the system.

Oracle Home Directory

The Oracle home directory is the directory where you choose to install the software for a particular Oracle product. You must install different Oracle products, or different releases of the same Oracle product, in separate Oracle home directories. When you run Oracle Universal Installer, it prompts you to specify the path to this directory, as well as a name that identifies it. The directory that you specify must be a subdirectory of the Oracle base directory. Oracle recommends that you specify a path similar to the following for the Oracle home directory:

```
oracle_base/product/10.2.0/db_1
```

Oracle Universal Installer creates the directory path that you specify under the Oracle base directory. It also sets the correct owner, group, and permissions on it. You do not need to create this directory.

Identifying or Creating an Oracle Base Directory

Before starting the installation, you must either identify an existing Oracle base directory or if required, create one. This section contains information about the following:

- [Identifying an Existing Oracle Base Directory](#)
- [Creating an Oracle Base Directory](#)

Note: You can choose to create an Oracle base directory, even if other Oracle base directories exist on the system.

Identifying an Existing Oracle Base Directory

Existing Oracle base directories may not have paths that comply with OFA guidelines. However, if you identify an existing Oracle Inventory directory or existing Oracle home directories, then you can usually identify the Oracle base directories, as follows:

- Identifying an existing Oracle Inventory directory

Enter the following command to view the contents of the `oraInst.loc` file:

```
# more /etc/oraInst.loc
```

If the `oraInst.loc` file exists, then the output from this command is similar to the following:

```
inventory_loc=/u01/app/oracle/oraInventory
inst_group=oinstall
```

The `inventory_loc` parameter identifies the Oracle Inventory directory (`oraInventory`). The parent directory of the `oraInventory` directory is typically an Oracle base directory. In the previous example, `/u01/app/oracle` is an Oracle base directory.

- Identifying existing Oracle home directories

Enter the following command to view the contents of the `oratab` file:

```
# more /etc/oratab
```

If the `oratab` file exists, then it contains lines similar to the following:

```
*/u03/app/oracle/product/10.2.0/db_1:N
*/opt/orauser/infra_904:N
*/oracle/9.2.0:N
```

The directory paths specified on each line identify Oracle home directories. Directory paths that end with the user name of the Oracle software owner that you want to use are valid choices for an Oracle base directory. If you intend to use the `oracle` user to install the software, then you could choose one of the following directories from the previous example:

```
/u03/app/oracle
/oracle
```

Note: If possible, choose a directory path similar to the first (`/u03/app/oracle`). This path complies with the OFA guidelines.

Before deciding to use an existing Oracle base directory for this installation, ensure that it satisfies the following conditions:

- It should not be on the same file system as the operating system.
- It must have sufficient free disk space, as follows:

Requirement	Free Disk Space
The Oracle base directory will contain only software files.	Up to 3 GB
The Oracle base directory will contain both software and database files (not recommended for production databases).	Up to 4 GB

To determine the free disk space on the file system where the Oracle base directory is located, enter the following command:

```
# df -h oracle_base_path
```

To continue:

- If an Oracle base directory exists and you want to use it, then refer to the ["Choosing a Storage Option for Oracle Database and Recovery Files"](#) section on page 2-20.

When you configure the `oracle` user's environment later in this chapter, set the `ORACLE_BASE` environment variable to specify the directory you chose.

- If an Oracle base directory does not exist on the system or if you want to create an Oracle base directory, then refer to the following section.

Creating an Oracle Base Directory

Before you create an Oracle base directory, you must identify an appropriate file system with sufficient free disk space, as follows:

Requirement	Free Disk Space
The Oracle base directory will contain only software files.	Up to 3 GB, depending on the platform
The Oracle base directory will contain both software and database files (not recommended for production databases).	Up to 4 GB, depending on the platform

To identify an appropriate file system:

1. Use the `df -k` command to determine the free disk space on each mounted file system.
2. From the display, identify a file system that has appropriate free space.
The file system that you identify can be a local file system, a cluster file system, or an NFS file system on a certified NAS device.
3. Note the name of the mount point directory for the file system that you identified.

To create the Oracle base directory and specify the correct owner, group, and permissions for it:

1. Enter commands similar to the following to create the recommended subdirectories in the mount point directory that you identified and set the appropriate owner, group, and permissions on them:

```
# mkdir -p /mount_point/app/oracle_sw_owner
# chown -R oracle:oinstall /mount_point/app/oracle_sw_owner
# chmod -R 775 /mount_point/app/oracle_sw_owner
```

For example, if the mount point you identify is `/u01` and `oracle` is the user name of the Oracle software owner, then the recommended Oracle base directory path is as follows:

```
/u01/app/oracle
```

2. When you configure the `oracle` user's environment later in this chapter, set the `ORACLE_BASE` environment variable to specify the Oracle base directory that you have created.

Choosing a Storage Option for Oracle Database and Recovery Files

The following table shows the storage options supported for storing Oracle Database files and Oracle Database recovery files. Oracle Database files include data files, control files, redo log files, the server parameter file, and the password file.

For all installations, you must choose the storage option that you want to use for Oracle Database files. If you want to enable automated backups during the installation, then you must also choose the storage option that you want to use for recovery files (the flash recovery area). You do not have to use the same storage option for each file type.

Important: Database files are supported on file systems, Automatic Storage Management, and raw devices. Recovery files are supported only on file systems and Automatic Storage Management.

Storage Option	File Types Supported	
	Database	Recovery
File system	Yes	Yes
Automatic Storage Management	Yes	Yes
Raw devices	Yes	No

Use the following guidelines when choosing the storage options that you want to use for each file type:

- You can choose any combination of the supported storage options for each file type.
- Oracle recommends that you choose Automatic Storage Management as the storage option for database and recovery files.
- For more information about these storage options, refer to the "[Database Storage Options](#)" section on page 1-5.

For information about how to configure disk storage before you start the installation, refer to one of the following sections depending on your choice:

- To use a file system for database or recovery file storage, refer to the "[Creating Directories for Oracle Database or Recovery Files](#)" section on page 2-20.
- To use Automatic Storage Management for database or recovery file storage, refer to the "[Preparing Disk Groups for an Automatic Storage Management Installation](#)" section on page 2-23.
- To use raw devices for database file storage, refer to the following section: "[Configuring Raw Partitions or Raw Logical Volumes](#)" on page 2-34
- To use raw devices for recovery file storage, refer to the "[Configuring Raw Partitions or Raw Logical Volumes](#)" section on page 2-34.

Creating Directories for Oracle Database or Recovery Files

This section contains the following topics:

- [Guidelines for Placing Oracle Database Files on a File System](#)

- [Guidelines for Placing Oracle Recovery Files on a File System](#)
- [Creating Required Directories](#)

Guidelines for Placing Oracle Database Files on a File System

If you choose to place the Oracle Database files on a file system, then use the following guidelines when deciding where to place them:

- The default path suggested by Oracle Universal Installer for the database file directory is a subdirectory of the Oracle base directory.
- You can choose either a single file system or more than one file system to store the database files:
 - If you want to use a single file system, then choose a file system on a physical device that is dedicated to the database.

For best performance and reliability, choose a RAID device or a logical volume on more than one physical device and implement the stripe-and-mirror-everything (SAME) methodology.

- If you want to use more than one file system, then choose file systems on separate physical devices that are dedicated to the database.

This method enables you to distribute physical I/O and create separate control files on different devices for increased reliability. It also enables you to fully implement the OFA guidelines [Appendix C, "Optimal Flexible Architecture"](#). You must choose either the Advanced database creation option or the Custom installation type during the installation to implement this method.

- If you intend to create a preconfigured database during the installation, then the file system (or file systems) that you choose must have at least 1.2 GB of free disk space.

For production databases, you must estimate the disk space requirement depending on the use that you want to make of the database.

- For optimum performance, the file systems that you choose should be on physical devices that are used only by the database.
- The `oracle` user must have write permissions to create the files in the path that you specify.

Guidelines for Placing Oracle Recovery Files on a File System

Note: You must choose a location for recovery files only if you intend to enable automated backups during the installation.

If you choose to place the Oracle recovery files on a file system, then use the following guidelines when deciding where to place them:

- To prevent disk failure from making both the database files and the recovery files unavailable, place the recovery files in a file system on a different physical disk from the database files.

Note: Alternatively, use an Automatic Storage Management disk group for both data and recovery files.

- The file system that you choose should have at least 2 GB of free disk space. The disk space requirement is the default disk quota configured for the flash recovery area (specified by the `DB_RECOVERY_FILE_DEST_SIZE` initialization parameter).

If you choose the Custom installation type or the Advanced database configuration option, then you can specify a different disk quota value. After you create the database, you can also use Oracle Enterprise Manager Grid Control or Database Control to specify a different value.

See Also: *Oracle Database Backup and Recovery Basics* for more information about sizing the flash recovery area

- The default path suggested by Oracle Universal Installer for the flash recovery area is a subdirectory of the Oracle base directory. This default location is not recommended for production databases.
- The oracle user must have write permissions to create the files in the path that you specify.

Creating Required Directories

Note: You must perform this procedure only if you want to place the Oracle Database or recovery files on a separate file system to the Oracle base directory.

To create directories for the Oracle database, or recovery files on separate file systems to the Oracle base directory:

1. Use the `df -h` command to determine the free disk space on each mounted file system.
2. From the display, identify the file systems that you want to use:

File Type	File System Requirements
Database files	Choose either: <ul style="list-style-type: none"> ■ A single file system with at least 1.2 GB of free disk space ■ Two or more file systems with at least 1.2 GB of free disk space in total
Recovery files	Choose a file system with at least 2.4 GB of free disk space.

If you are using the same file system for more than one type of file, then add the disk space requirements for each type to determine the total disk space requirement.

Note the names of the mount point directories for the file systems that you identified.

3. Enter commands similar to the following to create the recommended subdirectories in each of the mount point directories and set the appropriate owner, group, and permissions on them:
 - Database file directory:

```
# mkdir /mount_point/oradata
# chown oracle:oinstall /mount_point/oradata
# chmod 775 /mount_point/oradata
```
 - Recovery file directory (flash recovery area):

```
# mkdir /mount_point/flash_recovery_area
# chown oracle:oinstall /mount_point/flash_recovery_area
# chmod 775 /mount_point/flash_recovery_area
```
4. If you also want to use Automatic Storage Management or raw devices for storage, then refer to one of the following sections:
 - [Preparing Disk Groups for an Automatic Storage Management Installation](#) on page 2-23
 - [Configuring Raw Partitions or Raw Logical Volumes](#) on page 2-34

Preparing Disk Groups for an Automatic Storage Management Installation

This section describes how to configure disks for use with Automatic Storage Management. Before you configure the disks, you must determine the number of disks and the amount of free disk space that you require. The following sections describe how to identify the requirements and configure the disks on each platform:

- [General Steps for Configuring Automatic Storage Management](#)
- [Step 1: Identifying Storage Requirements for Automatic Storage Management](#)
- [Step 2: Using an Existing Automatic Storage Management Disk Group](#)
- [Step 3: Creating DAS or SAN Disk Partitions for Automatic Storage Management](#)
- [Step 4: Configuring Disks for Automatic Storage Management](#)

Note: Although this section refers to disks, you can also use zero-padded files on a certified NAS storage device in an Automatic Storage Management disk group. Refer to [Appendix B](#) for information about creating and configuring NAS-based files for use in an Automatic Storage Management disk group.

General Steps for Configuring Automatic Storage Management

The following are the general steps to configure Automatic Storage Management:

1. Identify your site's storage requirements.
2. Optionally, use an existing Automatic Storage Management disk group.
3. If you are creating a new Automatic Storage Management disk group, create partitions for DAS or SAN disks.
4. Use one of the following methods to complete the Automatic Storage Management configuration:

- If you plan to install Oracle Database using interactive mode, Oracle Universal Installer prompts you for the Automatic Storage Management disk configuration information during the installation.
- If you plan to install Oracle Database using noninteractive mode, you will need to manually configure the disks before performing the installation.

Step 1: Identifying Storage Requirements for Automatic Storage Management

To identify the storage requirements for using Automatic Storage Management, you must determine the number of devices and the amount of free disk space that you require. To complete this task:

1. Determine whether you want to use Automatic Storage Management for Oracle Database files, recovery files, or both.

Note: You do not have to use the same storage mechanism for data files and recovery files. You can use the file system for one file type and Automatic Storage Management for the other. If you plan to use Automatic Storage Management for both data files and recovery files, then you should create separate Automatic Storage Management disk groups for the data files and the recovery files.

If you plan to enable automated backups during the installation, then you can choose Automatic Storage Management as the storage mechanism for recovery files by specifying an Automatic Storage Management disk group for the flash recovery area. Depending on how you choose to create a database during the installation, you have the following options:

- If you select an installation method that runs Oracle Database Configuration Assistant in interactive mode, by choosing the Advanced database configuration option for example, then you can decide whether you want to use the same Automatic Storage Management disk group for database files and recovery files, or you can choose to use different disk groups for each file type. Ideally, you should create separate Automatic Storage Management disk groups for data files and for recovery files.

The same choice is available to you if you use Oracle Database Configuration Assistant after the installation to create a database.

- If you select an installation type that runs Oracle Database Configuration Assistant in noninteractive mode, then you must use the same Automatic Storage Management disk group for data files and recovery files.
2. Choose the Automatic Storage Management redundancy level that you want to use for each Automatic Storage Management disk group that you create.

The redundancy level that you choose for the Automatic Storage Management disk group determines how Automatic Storage Management mirrors files in the disk group and determines the number of disks and amount of disk space that you require, as follows:

- External redundancy

Automatic Storage Management does not mirror the contents of the disk group. Choose this redundancy level under any one of the following conditions:

- When the disk group contains devices, such as RAID devices, that provide their own data protection
- Your use of the database does not require uninterrupted access to data, for example, in a development environment where you have a suitable backup strategy

- Normal redundancy

In a normal redundancy disk group, Automatic Storage Management uses two-way mirroring by default, to increase performance and reliability. Alternatively, you can use three-way mirroring or no mirroring. A normal redundancy disk group requires a minimum of two failure groups (or two disk devices) if you are using two-way mirroring. The effective disk space in a normal redundancy disk group is half the sum of the disk space in all of its devices.

For most installations, Oracle recommends that you use normal redundancy disk groups.

- High redundancy

The contents of the disk group are three-way mirrored by default. To create a disk group with high redundancy, you must specify at least 3 failure groups (a minimum of 3 devices).

Although high-redundancy disk groups provide a high level of data protection, you must consider the higher cost of additional storage devices before deciding to use this redundancy level.

3. Determine the total amount of disk space that you require for the database files and recovery files.

Use the following table to determine the minimum number of disks and the minimum disk space requirements for the installation:

Redundancy Level	Minimum Number of Disks	Data Files	Recovery Files	Both File Types
External	1	1.15 GB	2.3 GB	3.45 GB
Normal	2	2.3 GB	4.6 GB	6.9 GB
High	3	3.45 GB	6.9 GB	10.35 GB

If an ASM instance is already running on the system, then you can use an existing disk group to meet these storage requirements. If necessary, you can add disks to an existing disk group during the installation.

The following step describes how to identify existing disk groups and determine the free disk space that they contain.

4. Optionally, identify failure groups for the Automatic Storage Management disk group devices.

Note: You need to perform this step only if you intend to use an installation method that runs Oracle Database Configuration Assistant in interactive mode. For example, if you intend to choose the Custom installation type or the Advanced database configuration option. Other installation types do not enable you to specify failure groups.

If you intend to use a normal or high redundancy disk group, then you can further protect the database against hardware failure by associating a set of disk devices in a custom failure group. By default, each device comprises its failure group. However, if two disk devices in a normal redundancy disk group are attached to the same SCSI controller, then the disk group becomes unavailable if the controller fails. The controller in this example is a single point of failure.

To avoid failures of this type, you can use two SCSI controllers, each with two disks, and define a failure group for the disks attached to each controller. This configuration would enable the disk group to tolerate the failure of one SCSI controller.

Note: If you define custom failure groups, then you must specify a minimum of two failure groups for normal redundancy disk groups and three failure groups for high redundancy disk groups.

5. If you are sure that a suitable disk group does not exist on the system, then install or identify appropriate disk devices to add to a new disk group. Apply the following guidelines when identifying appropriate disk devices:
 - All the devices in an Automatic Storage Management disk group should be the same size and have the same performance characteristics.
 - Do not specify more than one partition on a single physical disk as a disk group device. Automatic Storage Management expects each disk group device to be on a separate physical disk.
 - Although you can specify a logical volume as a device in an Automatic Storage Management disk group, Oracle does not recommend its use. Logical volume managers can hide the physical disk architecture. This would prevent Automatic Storage Management from optimizing I/O across the physical devices.

See Also: ["Step 4: Configuring Disks for Automatic Storage Management"](#) on page 2-28 for information about completing this task

Step 2: Using an Existing Automatic Storage Management Disk Group

Note: This is an optional step.

If you want to store either database or recovery files in an existing Automatic Storage Management disk group, then you have the following choices, depending on the installation method that you select:

- If you select an installation method that runs Oracle Database Configuration Assistant in interactive mode (for example, choosing the Advanced database configuration option), then you can decide whether you want to create a disk group or use an existing one.

The same choice is available to you if you use Oracle Database Configuration Assistant after the installation to create a database.

- If you select an installation method that runs Oracle Database Configuration Assistant in noninteractive mode, then you must choose an existing disk group for the new database; you cannot create a disk group. However, you can add disk

devices to an existing disk group if it has insufficient free space for your requirements.

Note: The ASM instance that manages the existing disk group can be running in a different Oracle home directory.

To determine whether an existing Automatic Storage Management disk group exists, or to determine whether there is sufficient disk space in a disk group, you can use Oracle Enterprise Manager Grid Control or Database Control. Alternatively, you can use the following procedure:

1. View the contents of the `oratab` file to determine whether an ASM instance is configured on the system:

```
# more /etc/oratab
```

If an ASM instance is configured on the system, then the `oratab` file should contain a line similar to the following:

```
+ASM:oracle_home_path:N
```

In this example, `+ASM` is the system identifier (SID) of the ASM instance and `oracle_home_path` is the Oracle home directory where it is installed. By convention, the SID for an ASM instance begins with a plus sign.

2. Open a shell window and temporarily set the `ORACLE_SID` and `ORACLE_HOME` environment variables to specify the appropriate values for the ASM instance that you want to use.

For example, if the Automatic Storage Management SID is named `OraDB10g+ASM` and is located in the `asm` subdirectory of the `ORACLE_BASE` directory, then enter the following commands to create the required settings:

- Bourne, Bash, or Korn shell:

```
$ ORACLE_SID=OraDB10g+ASM
$ export ORACLE_SID
$ ORACLE_HOME=/u01/app/oracle/product/10.1.0/asm
$ export ORACLE_HOME
```

- C shell:

```
% setenv ORACLE_SID OraDB10g+ASM
% setenv ORACLE_HOME /u01/app/oracle/product/10.1.0/asm
```

3. By using SQL*Plus, connect to the ASM instance as the `SYS` user with `SYSDBA` privilege and start the instance if necessary:

```
# $ORACLE_HOME/bin/sqlplus "SYS/SYS_password as SYSDBA"
SQL> STARTUP
```

4. Enter the following command to view the existing disk groups, their redundancy level, and the amount of free disk space in each one:

```
SQL> SELECT NAME,TYPE,TOTAL_MB,FREE_MB FROM V$ASM_DISKGROUP;
```

5. From the output, identify a disk group with the appropriate redundancy level and note the free space that it contains.
6. If necessary, install or identify the additional disk devices required to meet the storage requirements listed in the previous section.

Note: If you are adding devices to an existing disk group, then Oracle recommends that you use devices that have the same size and performance characteristics as the existing devices in that disk group.

Step 3: Creating DAS or SAN Disk Partitions for Automatic Storage Management

In order to use a DAS or SAN disk in Automatic Storage Management, the disk must have a partition table. Oracle recommends creating exactly one partition for each disk containing the entire disk.

Note: You can use any physical disk for Automatic Storage Management, as long as it is partitioned.

Step 4: Configuring Disks for Automatic Storage Management

Oracle provides an Automatic Storage Management library driver that you can use to simplify the configuration and management of the disk devices that you want to use with Automatic Storage Management. A disk that is configured for Automatic Storage Management is known as a candidate disk.

If you intend to use Automatic Storage Management for database storage on Linux, then Oracle recommends that you install the Automatic Storage Management library driver and associated utilities and use them to configure the devices that you want to include in an Automatic Storage Management disk group. If you do not use the Automatic Storage Management library driver, then you must bind each disk device that you want to use to a raw device. The following sections describe how to configure disks using each method:

- [Configuring Disks for Automatic Storage Management Using the Automatic Storage Management Library Driver](#)
- [Configuring Disks for Automatic Storage Management Using Raw Devices](#)

Note: If you choose to configure disks using the Automatic Storage Management library driver, then you must change the default disk discovery string to `ORCL:*`. These disks would be discovered if the diskstring is either set to `ORCL:*` or is left empty ("").

Configuring Disks for Automatic Storage Management Using the Automatic Storage Management Library Driver

To use the Automatic Storage Management library driver to configure Automatic Storage Management devices, complete the following tasks.

Installing and Configuring the Automatic Storage Management Library Driver Software

To install and configure the Automatic Storage Management library driver software:

1. Enter the following command to determine the kernel version and architecture of the system:

```
# uname -rm
```

- If necessary, download the required Automatic Storage Management library driver packages from the Oracle Technology Network Web site:

<http://www.oracle.com/technology/tech/linux/asmlib/index.html>

Note: Automatic Storage Management library driver packages for some kernel versions are available on the Oracle Database installation media in the `db/RPMS/asmlib` directory. However, Oracle recommends that you check the Oracle Technology Network Web site for the most up-to-date packages.

You must install the following packages, where *version* is the version of the Automatic Storage Management library driver, *arch* is the system architecture, and *kernel* is the version of the kernel that you are using:

```
oracleasm-support-version.arch.rpm
oracleasm-kernel-version.arch.rpm
oracleasm-lib-version.arch.rpm
```

- Switch user to the `root` user:

```
$ su -
```

- Enter a command similar to the following to install the packages:

```
# rpm -Uvh oracleasm-support-version.arch.rpm \
    oracleasm-kernel-version.arch.rpm \
    oracleasm-lib-version.arch.rpm
```

For example, if you are using the Red Hat Enterprise Linux AS 3 enterprise kernel on an x86 system, then enter a command similar to the following:

```
# rpm -Uvh oracleasm-support-1.0.0-1.i386.rpm \
    oracleasm-2.4.9-e-enterprise-1.0.0-1.i686.rpm \
    oracleasm-lib-1.0.0-1.i386.rpm
```

- Enter a command similar to the following to determine the UID of the Oracle software owner user that you are using for this installation (typically `oracle`) and the GID of the OSDBA group (typically `dba`):

```
# id oracle
```

- Enter the following command to run the `oracleasm` initialization script with the `configure` option:

```
# /etc/init.d/oracleasm configure
```

- Enter the following information in response to the prompts that the script displays:

Prompt	Suggested Response
Default UID to own the driver interface:	Specify the UID of the Oracle software owner user (<code>oracle</code>).
Default GID to own the driver interface:	Specify the GID of the OSDBA group (<code>dba</code>).
Start Oracle Automatic Storage Management Library driver on start (y/n):	Enter <code>y</code> to start the Oracle Automatic Storage Management library driver when the system starts.

Configuring the Disk Devices to Use the Automatic Storage Management Library Driver

To configure the disk devices that you want to use in an Automatic Storage Management disk group:

1. If you intend to use IDE, SCSI, or RAID devices in the Automatic Storage Management disk group, then:
 - a. If necessary, install or configure the disk devices that you intend to use for the disk group and restart the system.
 - b. To identify the device name for the disks that you want to use, enter the following command:

```
# /sbin/fdisk -l
```

Depending on the type of disk, the device name can vary:

Disk Type	Device Name Format	Description
IDE disk	/dev/hdxn	In this example, <i>x</i> is a letter that identifies the IDE disk and <i>n</i> is the partition number. For example, /dev/hda is the first disk on the first IDE bus.
SCSI disk	/dev/sdxn	In this example, <i>x</i> is a letter that identifies the SCSI disk and <i>n</i> is the partition number. For example, /dev/sda is the first disk on the first SCSI bus.
RAID disk	/dev/rd/cxdypz /dev/ida/cxdypz	Depending on the RAID controller, RAID devices can have different device names. In the examples shown, <i>x</i> is a number that identifies the controller, <i>y</i> is a number that identifies the disk, and <i>z</i> is a number that identifies the partition. For example, /dev/ida/c0d1 is the second logical drive on the first controller.

To include devices in a disk group, you can specify either whole-drive device names or partition device names.

Note: Oracle recommends that you create a single whole-disk partition on each disk that you want to use.

- c. Use either `fdisk` or `parted` to create a single whole-disk partition on the disk devices that you want to use.
2. Enter a command similar to the following to mark a disk as an Automatic Storage Management disk:

```
# /etc/init.d/oracleasm createdisk DISK1 /dev/sdb1
```

In this example, `DISK1` is a name that you want to assign to the disk.

Note: The disk names that you specify can contain uppercase letters, numbers, and the underscore character. They must start with an uppercase letter.

If you are using a multi-pathing disk driver with Automatic Storage Management, then ensure that you specify the correct logical device name for the disk.

Note: To create a database during the installation using the Automatic Storage Management library driver, you must change the default disk discovery string to `ORCL: *`. These disks would be discovered if the `diskstring` is either set to `ORCL: *` or is left empty (`""`).

Administering the Automatic Storage Management Library Driver and Disks

To administer the Automatic Storage Management library driver and disks, use the `oracleasm` initialization script with different options, as follows:

Option	Description
configure	Use the <code>configure</code> option to reconfigure the Automatic Storage Management library driver, if necessary: # /etc/init.d/oracleasm configure
enable disable	Use the <code>disable</code> and <code>enable</code> options to change the behavior of the Automatic Storage Management library driver when the system starts. The <code>enable</code> option causes the Automatic Storage Management library driver to load when the system starts: # /etc/init.d/oracleasm enable
start stop restart	Use the <code>start</code> , <code>stop</code> , and <code>restart</code> options to load or unload the Automatic Storage Management library driver without restarting the system: # /etc/init.d/oracleasm restart
createdisk	Use the <code>createdisk</code> option to mark a disk device for use with the Automatic Storage Management library driver and give it a name: # /etc/init.d/oracleasm createdisk <i>DISKNAME</i> <i>devicename</i>
deletedisk	Use the <code>deletedisk</code> option to unmark a named disk device: # /etc/init.d/oracleasm deletedisk <i>DISKNAME</i> Caution: Do not use this command to unmark disks that are being used by an Automatic Storage Management disk group. You must drop the disk from the Automatic Storage Management disk group before you unmark it.
querydisk	Use the <code>querydisk</code> option to determine whether a disk device or disk name is being used by the Automatic Storage Management library driver: # /etc/init.d/oracleasm querydisk { <i>DISKNAME</i> <i>devicename</i> }

Option	Description
listdisks	Use the <code>listdisks</code> option to list the disk names of marked Automatic Storage Management library driver disks: # /etc/init.d/oracleasm listdisks
scandisks	Use the <code>scandisks</code> option to enable cluster nodes to identify which shared disks have been marked as Automatic Storage Management library driver disks on another node: # /etc/init.d/oracleasm scandisks

Configuring Disks for Automatic Storage Management Using Raw Devices

Note: For improved performance and easier administration, Oracle recommends that you use the Automatic Storage Management library driver rather than raw devices to configure Automatic Storage Management disks.

To configure disks for Automatic Storage Management using raw devices:

1. If you intend to use IDE, SCSI, or RAID devices in the Automatic Storage Management disk group, then:
 - a. If necessary, install or configure the disk devices that you intend to use for the disk group and restart the system.
 - b. To identify the device name for the disks that you want to use, enter the following command:

```
# /sbin/fdisk -l
```

Depending on the type of disk, the device name can vary:

Disk Type	Device Name Format	Description
IDE disk	/dev/hdxn	In this example, <i>x</i> is a letter that identifies the IDE disk and <i>n</i> is the partition number. For example, /dev/hda is the first disk on the first IDE bus.
SCSI disk	/dev/sdxn	In this example, <i>x</i> is a letter that identifies the SCSI disk and <i>n</i> is the partition number. For example, /dev/sda is the first disk on the first SCSI bus.
RAID disk	/dev/rd/cxdypz /dev/ida/cxdypz	Depending on the RAID controller, RAID devices can have different device names. In the examples shown, <i>x</i> is a number that identifies the controller, <i>y</i> is a number that identifies the disk, and <i>z</i> is a number that identifies the partition. For example, /dev/ida/c0d1 is the second logical drive on the first controller.

To include devices in a disk group, you can specify either whole-drive device names or partition device names.

Note: Oracle recommends that you create a single whole-disk partition on each disk that you want to use.

- c. Use either `fdisk` or `parted` to create a single whole-disk partition on the disk devices that you want to use.
2. On Red Hat systems, complete the following steps to bind the disk devices to raw devices:

To determine what raw devices are already bound to other devices, enter the following command:

```
# /usr/bin/raw -qa
```

- a. Raw devices have device names in the form `/dev/raw/rawn`, where `n` is a number that identifies the raw device.

For each device that you want to include in the disk group, identify a raw device name that is unused.

- b. Open the `/etc/sysconfig/rawdevices` file in any text editor and add a line similar to the following for each device that you want to include in a disk group:

```
/dev/raw/raw1 /dev/sdb1
```

Note: If you are using a multi-pathing disk driver with Automatic Storage Management, then ensure that you specify the correct logical device name for the disk.

Specify an unused raw device for each disk device.

- c. For each raw device that you specified in the `rawdevices` file, enter commands similar to the following to set the owner, group, and permissions on the device file:

```
# chown oracle:dba /dev/raw/rawn
# chmod 660 /dev/raw/rawn
```

- d. To bind the disk devices to the raw devices, enter the following command:

```
# /sbin/service rawdevices restart
```

The system automatically binds the devices listed in the `rawdevices` file when it restarts.

3. On SUSE systems, complete the following steps on each node to bind the disk devices to raw devices:

Note: If the nodes are configured differently, then the disk device names may be different on some nodes. In the following procedure, ensure that you specify the correct disk device names on each node.

- a. To determine what raw devices are already bound to other devices, enter the following command on every node:

```
# /usr/sbin/raw -qa
```

Raw devices have device names in the form `/dev/raw/rawn`, where *n* is a number that identifies the raw device.

For each device that you want to include in the disk group, identify a raw device name that is unused on all nodes.

- b. Open the `/etc/raw` file in any text editor and add a line similar to the following for each device that you want to include in a disk group:

```
raw1:sdb1
```

Note: If you are using a multi-pathing disk driver with Automatic Storage Management, then ensure that you specify the correct logical device name for the disk.

Specify an unused raw device for each disk device.

- c. For each raw device that you specified in the `/etc/raw` file, enter commands similar to the following to set the owner, group, and permissions on the device file:

```
# chown oracle:dba /dev/raw/rawn
# chmod 660 /dev/raw/rawn
```

- d. To bind the disk devices to the raw devices, enter the following command:

```
# /etc/init.d/raw start
```

- e. To ensure that the raw devices are bound when the system restarts, enter the following command:

```
# /sbin/chkconfig raw on
```

If you also want to use raw devices for storage, then refer to the "[Configuring Raw Partitions or Raw Logical Volumes](#)" section on page 2-34.

Otherwise, refer to:

- [Stopping Existing Oracle Processes](#) on page 2-39

Configuring Raw Partitions or Raw Logical Volumes

The following subsections describe how to configure raw partitions or raw logical volumes.

- [Using Raw Logical Volumes](#)
- [Identifying the Required Raw Partitions](#)
- [Creating the Required Raw Partitions on IDE, SCSI, or RAID Devices](#)
- [Binding the Partitions to Raw Devices](#)
- [Creating the Oracle Database Configuration Assistant Raw Device Mapping File](#)

Using Raw Logical Volumes

The procedures in the following sections describe how to create raw partitions for Oracle Database file storage. You can use raw partitions for database file storage on all supported Linux distributions.

Alternatively, on Red Hat Enterprise Linux and SUSE Linux Enterprise Server, you can use Logical Volume Manager (LVM) to create logical volumes of the required size and use them instead of raw partitions. Using LVM can provide benefits when used as the method for storing Oracle Database files on raw devices. For example, LVM enables you to overcome the limitations on the number of partitions that you can create on a single physical disk.

Note: The use of logical volumes for raw devices is supported only for single-instance databases.

If you want to use logical volumes instead of raw partitions, then:

See Also: The operating system documentation or the `lvm` man page for more information about completing steps 1 and 2

1. Create a separate volume group for the Oracle Database files.

You can use a name such as `oracle_vg` or `dbname_vg` for the volume group.

2. Create the required number of logical volumes using the sizes listed in [Table 2-1](#) on page 2-35.

Use a naming convention similar to the following when creating the logical volumes:

```
dbname_objectname_raw_size
```

For example, you may name the logical volume for the SYSTEM table space (500 MB) in the sales database as follows:

```
sales_system_raw_500m
```

3. Bind the logical volumes to raw devices as described in the "[Binding the Partitions to Raw Devices](#)" section on page 2-37, using the logical volume device name in place of the partition device name.
4. Create the raw device mapping file as described in the "[Creating the Oracle Database Configuration Assistant Raw Device Mapping File](#)" section on page 2-38.

Identifying the Required Raw Partitions

[Table 2-1](#) lists the number and size of the raw partitions that you must configure for database files.

Table 2-1 Raw Partitions Required for Database Files on Linux

Number	Partition Size (MB)	Purpose
1	500	SYSTEM tablespace
1	500	SYSAUX tablespace
1	500	UNDOTBS1 tablespace
1	250	TEMP tablespace
1	160	EXAMPLE tablespace
1	120	USERS tablespace
3	120	Three online redo log files

Table 2–1 (Cont.) Raw Partitions Required for Database Files on Linux

Number	Partition Size (MB)	Purpose
3	110	First and third control files
1	5	Server parameter file (SPFILE)
1	5	Password file

Note: If you prefer to use manual, instead of automatic, undo management, then create a single RBS tablespace raw device that is at least 500 MB in size, instead of the UNDOTBS1 raw device.

Creating the Required Raw Partitions on IDE, SCSI, or RAID Devices

If you intend to use IDE, SCSI, or RAID devices for the raw devices, then:

1. If necessary, install or configure the disk devices that you intend to use for the raw partitions and restart the system.

Note: Because the number of partitions that you can create on a single device is limited, you may need to create the required raw partitions on more than one device.

2. To identify the device name for the disks that you want to use, enter the following command:

```
# /sbin/fdisk -l
```

Depending on the type of disk, the device name can vary:

Disk Type	Device Name Format	Description
IDE disk	/dev/hdxn	In this example, <i>x</i> is a letter that identifies the IDE disk and <i>n</i> is the partition number. For example, /dev/hda is the first disk on the first IDE bus.
SCSI disk	/dev/sdxn	In this example, <i>x</i> is a letter that identifies the SCSI disk and <i>n</i> is the partition number. For example, /dev/sda is the first disk on the first SCSI bus.
RAID disk	/dev/rd/cxdypz /dev/ida/cxdypz	Depending on the RAID controller, RAID devices can have different device names. In the examples shown, <i>x</i> is a number that identifies the controller, <i>y</i> is a number that identifies the disk, and <i>z</i> is a number that identifies the partition. For example, /dev/ida/c0d1 is the second logical drive on the first controller.

You can create the required raw partitions either on new devices that you added or on previously partitioned devices that have unpartitioned free space. To identify devices that have unpartitioned free space, examine the start and end cylinder numbers of the existing partitions and determine whether the device contains unused cylinders.

3. To create raw partitions on a device, enter a command similar to the following:

```
# /sbin/fdisk devicename
```

Use the following guidelines when creating partitions:

- Use the `p` command to list the partition table of the device.
- Use the `n` command to create a partition.
- After you have created the required partitions on this device, use the `w` command to write the modified partition table to the device.
- Refer to the `fdisk` man page for more information about creating partitions.

Binding the Partitions to Raw Devices

After you have created the required partitions, you must bind the partitions to raw devices. However, you must first determine what raw devices are already bound to other devices. The procedure that you must follow to complete this task varies, depending on the Linux distribution that you are using:

- Red Hat:

1. To determine what raw devices are already bound to other devices, enter the following command:

```
# /usr/bin/raw -qa
```

Raw devices have device names in the form `/dev/raw/rawn`, where `n` is a number that identifies the raw device.

For each device that you want to use, identify a raw device name that is unused.

2. Open the `/etc/sysconfig/rawdevices` file in any text editor and add a line similar to the following for each partition that you created:

```
/dev/raw/raw1 /dev/sdb1
```

Specify an unused raw device for each partition.

3. For each raw device that you specified in the `rawdevices` file, enter commands similar to the following to set the owner, group, and permissions on the device file:

```
# chown oracle:dba /dev/raw/rawn
# chmod 660 /dev/raw/rawn
```

4. To bind the partitions to the raw devices, enter the following command:

```
# /sbin/service rawdevices restart
```

The system automatically binds the devices listed in the `rawdevices` file when it restarts.

- SUSE:

1. To determine what raw devices are already bound to other devices, enter the following command:

```
# /usr/sbin/raw -qa
```

Raw devices have device names in the form `/dev/raw/rawn`, where `n` is a number that identifies the raw device.

For each device that you want to use, identify a raw device name that is unused on all nodes.

2. Open the `/etc/raw` file in any text editor and add a line similar to the following to associate each partition with an unused raw device:

```
raw1:sdb1
```

3. For each raw device that you specified in the `/etc/raw` file, enter commands similar to the following to set the owner, group, and permissions on the device file:

```
# chown oracle:dba /dev/raw/rawn
# chmod 660 /dev/raw/rawn
```

4. To bind the partitions to the raw devices, enter the following command:

```
# /etc/init.d/raw start
```

5. To ensure that the raw devices are bound when the system restarts, enter the following command:

```
# /sbin/chkconfig raw on
```

Creating the Oracle Database Configuration Assistant Raw Device Mapping File

To enable Oracle Database Configuration Assistant to identify the appropriate raw device for each database file, you must create a raw device mapping file, as follows:

1. Set the `ORACLE_BASE` environment variable to specify the Oracle base directory that you identified or created previously:

- Bourne, Bash, or Korn shell:

```
$ ORACLE_BASE=/u01/app/oracle ; export ORACLE_BASE
```

- C shell:

```
% setenv ORACLE_BASE /u01/app/oracle
```

2. Create a database file subdirectory under the Oracle base directory and set the appropriate owner, group, and permissions on it:

```
# mkdir -p $ORACLE_BASE/oradata/dbname
# chown -R oracle:oinstall $ORACLE_BASE/oradata
# chmod -R 775 $ORACLE_BASE/oradata
```

In this example, `dbname` is the name of the database that you chose previously.

3. Change directory to the `$ORACLE_BASE/oradata/dbname` directory.
4. Edit the `dbname_raw.conf` file in any text editor to create a file similar to the following:

```
system=/dev/raw/raw1
sysaux=/dev/raw/raw2
example=/dev/raw/raw3
users=/dev/raw/raw4
temp=/dev/raw/raw5
undotbs1=/dev/raw/raw6
redo1_1=/dev/raw/raw8
redo1_2=/dev/raw/raw9
control1=/dev/raw/raw12
```

```
control2=/dev/raw/raw13
spfile=/dev/raw/raw14
pwdfile=/dev/raw/raw15
```

Use the following guidelines when creating or editing this file:

- Each line in the file must have the following format:

```
database_object_identifier=raw_device_path
```

- The file must specify one automatic undo tablespace data file (`undotbs1`), and at least two redo log files (`redo1_1`, `redo1_2`).
- Specify at least two control files (`control1`, `control2`).
- To use manual instead of automatic undo management, specify a single RBS tablespace data file (`rbs`) instead of the automatic undo management tablespace data files.

5. Save the file, and note the file name that you specified.
6. When you are configuring the `oracle` user's environment later in this chapter, set the `DBCA_RAW_CONFIG` environment variable to specify the full path to this file.

To continue, refer to the "[Stopping Existing Oracle Processes](#)" section.

Stopping Existing Oracle Processes

Caution: If you are installing additional Oracle Database 10g products in an existing Oracle home, then stop *all* processes running in the Oracle home. You must complete this task to enable Oracle Universal Installer to relink certain executables and libraries.

If you choose to create a database during the installation, then most installation types configure and start a default Oracle Net listener using TCP/IP port 1521 and the IPC key value `EXTPROC`. However, if an existing Oracle Net listener process is using the same port or key value, Oracle Universal Installer can only configure the new listener; it cannot start it. To ensure that the new listener process starts during the installation, you must shut down any existing listeners before starting Oracle Universal Installer.

To determine whether an existing listener process is running and to shut it down if necessary:

1. Switch user to `oracle`:

```
# su - oracle
```

2. Enter the following command to determine whether a listener process is running and to identify its name and the Oracle home directory in which it is installed:

```
$ ps -ef | grep tnslnsr
```

This command displays information about the Oracle Net listeners running on the system:

```
... oracle_home1/bin/tnslnsr LISTENER -inherit
```

In this example, `oracle_home1` is the Oracle home directory where the listener is installed and `LISTENER` is the listener name.

Note: If no Oracle Net listeners are running, then refer to the ["Configuring the oracle User's Environment"](#) section on page 2-40 to continue.

3. Set the ORACLE_HOME environment variable to specify the appropriate Oracle home directory for the listener:
 - Bourne, Bash, or Korn shell:

```
$ ORACLE_HOME=oracle_home1
$ export ORACLE_HOME
```
 - C or tcsh shell:

```
% setenv ORACLE_HOME oracle_home1
```
4. Enter the following command to identify the TCP/IP port number and IPC key value that the listener is using:

```
$ $ORACLE_HOME/bin/lsnrctl status listenername
```

Note: If the listener uses the default name LISTENER, then you do not have to specify the listener name in this command.

5. Enter a command similar to the following to stop the listener process:

```
$ $ORACLE_HOME/bin/lsnrctl stop listenername
```
6. Repeat this procedure to stop all listeners running on this system.

Configuring the oracle User's Environment

You run Oracle Universal Installer from the `oracle` account. However, before you start Oracle Universal Installer you must configure the environment of the `oracle` user. To configure the environment, you must:

- Set the default file mode creation mask (`umask`) to 022 in the shell startup file.
- Set the `DISPLAY` environment variable.

Note: Ensure that the `PATH` variable contains `$ORACLE_HOME/bin` before `/usr/X11R6/bin`.

To set the `oracle` user's environment:

1. Start a new terminal session, for example, an X terminal (`xterm`).
2. Enter the following command to ensure that X Window applications can display on this system:

```
$ xhost fully_qualified_remote_host_name
```

For example:

```
$ xhost somehost.us.acme.com
```

3. If you are not already logged in to the system where you want to install the software, then log in to that system as the `oracle` user.
4. If you are not logged in as the `oracle` user, then switch user to `oracle`:

```
$ su - oracle
```
5. To determine the default shell for the `oracle` user, enter the following command:

```
$ echo $SHELL
```
6. Open the `oracle` user's shell startup file in any text editor:

Note: On Red Hat Linux, `.bash_profile` is the user startup file for the Bash shell.

- Bourne shell (`sh`), Bash shell (`bash`), or Korn shell (`ksh`):

```
$ vi .bash_profile
```
 - C shell (`csh` or `tcsh`):

```
% vi .login
```
7. Enter or edit the following line, specifying a value of `022` for the default file mode creation mask:

```
umask 022
```
 8. If the `ORACLE_SID`, `ORACLE_HOME`, or `ORACLE_BASE` environment variable is set in the file, then remove the corresponding lines from the file.
 9. Save the file, and exit from the editor.
 10. To run the shell startup script, enter one of the following commands:
 - Bash shell on Red Hat Enterprise Linux:

```
$ . ~/.bash_profile
```
 - Bourne, Bash, or Korn shell:

```
$ . ~/.profile
```
 - C shell:

```
% source ~/.login
```
 11. If you are not installing the software on the local system, then enter a command similar to the following to direct X applications to display on the local system:
 - Bourne, Bash, or Korn shell:

```
$ DISPLAY=local_host:0.0 ; export DISPLAY
```
 - C shell:

```
% setenv DISPLAY local_host:0.0
```

In this example, `local_host` is the host name or IP address of the system that you want to use to display Oracle Universal Installer (your workstation or PC).

12. If you determined that the `/tmp` directory has less than 400 MB of free disk space, then identify a file system with at least 400 MB of free space and set the `TEMP` and

TMPDIR environment variables to specify a temporary directory on this file system:

- a. Use the `df -k` command to identify a suitable file system with sufficient free space.
- b. If necessary, enter commands similar to the following to create a temporary directory on the file system that you identified, and set the appropriate permissions on the directory:

```
$ su - root
# mkdir /mount_point/tmp
# chmod a+wr /mount_point/tmp
# exit
```

- c. Enter commands similar to the following to set the `TEMP` and `TMPDIR` environment variables:

- * Bourne, Bash, or Korn shell:

```
$ TEMP=/mount_point/tmp
$ TMPDIR=/mount_point/tmp
$ export TEMP TMPDIR
```

- * C shell:

```
% setenv TEMP /mount_point/tmp
% setenv TMPDIR /mount_point/tmp
```

13. Enter commands similar to the following to set the `ORACLE_BASE` and `ORACLE_SID` environment variables:

- Bourne, Bash, or Korn shell:

```
$ ORACLE_BASE=/u01/app/oracle
$ ORACLE_SID=sales
$ export ORACLE_BASE ORACLE_SID
```

- C shell:

```
% setenv ORACLE_BASE /u01/app/oracle
% setenv ORACLE_SID sales
```

In these examples, `/u01/app/oracle` is the Oracle base directory that you created or identified earlier and `sales` is the name that you want to call the database (typically no more than five characters).

14. If you are using raw devices for database storage, then set the `DBCA_RAW_CONFIG` environment variable to specify the full path to the raw device mapping file:

- Bourne, Bash, or Korn shell:

```
$ DBCA_RAW_CONFIG=$ORACLE_BASE/oradata/dbname/dbname_raw.conf
$ export DBCA_RAW_CONFIG
```

- C shell:

```
% setenv DBCA_RAW_CONFIG=$ORACLE_BASE/oradata/dbname/dbname_raw.conf
```

15. Enter the following commands to ensure that the `ORACLE_HOME` and `TNS_ADMIN` environment variables are not set:

- Bourne, Bash, or Korn shell:

```
$ unset ORACLE_HOME
```



```
$ unset TNS_ADMIN
```

- C shell:

```
% unsetenv ORACLE_HOME  
% unsetenv TNS_ADMIN
```

Note: If the ORACLE_HOME environment variable is set, then Oracle Universal Installer uses the value that it specifies as the default path for the Oracle home directory. However, if you set the ORACLE_BASE environment variable, then Oracle recommends that you unset the ORACLE_HOME environment variable and choose the default path suggested by Oracle Universal Installer.

- 16.** To verify that the environment has been set correctly, enter the following commands:

```
$ umask  
$ env | more
```

Verify that the `umask` command displays a value of 22, 022, or 0022 and the environment variables that you set in this section have the correct values.

Installation Tasks

The Oracle Database software is available on disc (DVD) or you can download it from the Oracle Technology Network Web site. In most cases, you use the graphical user interface (GUI) provided by Oracle Universal Installer to install the software. However, you can also use Oracle Universal Installer to complete silent-mode installations, without using the GUI.

See Also: Refer to [Appendix A](#) for information about silent-mode installations

This chapter includes information about the following sections:

- [Preinstallation Considerations](#)
- [Reviewing Component-Specific Installation Guidelines](#)
- [Accessing the Installation Software](#)
- [Installing the Oracle Database Software](#)
- [Installing Automatic Storage Management](#)

Preinstallation Considerations

After reviewing the information in [Chapter 1, "Installation Overview"](#) and completing the tasks listed in [Chapter 2, "Preinstallation Tasks"](#), consider the following issues:

Performing Multiple Oracle Database Installations in Noninteractive Mode

If you need to perform multiple installations of Oracle Database, you may want to use noninteractive mode. In noninteractive mode, at each node, you run Oracle Universal Installer from the command line using a response file. The response file is a text file containing the settings you normally enter in the Oracle Universal Installer GUI dialog boxes.

See Also: [Appendix A](#) for information about silent-mode installations

Reviewing Component-Specific Installation Guidelines

Review the following guidelines before starting Oracle Universal Installer:

- Oracle Universal Installer
 - Do not use Oracle Universal Installer from an earlier Oracle release to install components from this release.

- Installations on a Cluster

If Oracle Clusterware and Oracle Real Application Clusters are already installed on the system, Oracle Universal Installer displays the Specify Hardware Cluster Installation Mode screen. You must select **Local Installation** on this screen, unless you want to install Oracle Real Application Clusters.

See Also: *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux* for information on installing Oracle Real Application Clusters

- Products not installed by default: choose **Advanced Installation** and then the **Custom** installation type. These products are:

- Oracle Connection Manager
- Oracle Label Security

To configure Oracle Label Security to use Oracle Internet Directory, choose the Oracle Internet Directory option when running Database Configuration Assistant. If you are installing Oracle Label Security in an existing Oracle home, then shut down each database in the Oracle home.

- Data Mining Scoring Engine

- Reinstalling Oracle Software

If you reinstall Oracle software into an Oracle home directory where Oracle Database is already installed, you must also reinstall any components, such as Oracle Partitioning, that were installed before you began the reinstallation.

Accessing the Installation Software

The Oracle Database software is available on compact disc (DVD) or you can download it from the Oracle Technology Network Web site. To install the software from the hard disk, you must either download it from Oracle Technology Network and unpack it, or copy it from the discs, if you have them.

You can access and install Oracle Database by using one of the following methods:

Note: If the Oracle Database 10g software is on two discs, you can avoid having to change discs during the installation by running Oracle Universal Installer from the DVD or by copying the contents of the installation discs to a hard disk.

- To copy the software to a hard disk, refer to the following section:
["Copying the Software to the Hard Disk"](#) on page 3-4
- To install the software from a disc or from an existing hard disk location, refer to the ["Installing the Oracle Database Software"](#) section on page 3-5.
- To download the software from Oracle Technology Network, refer to the following section.

Downloading Oracle Software from the OTN Web Site

This section describes how to download the installation archive files and extract them on your hard disk. It contains the following topics:

- [Downloading the Installation Archive Files](#)
- [Extracting the Installation Files](#)

Downloading the Installation Archive Files

To download the installation archive files from Oracle Technology Network:

1. Use any browser to access the software download page from Oracle Technology Network:
<http://www.oracle.com/technology/software/>
2. Navigate to the download page for the product that you want to install.
3. On the download page, identify the required disk space by adding the file sizes for each required file.
The file sizes are listed next to the file names.
4. Select a file system with enough free space to store and expand the archive files.
In most cases, the available disk space must be at least twice the size of all of the archive files.
5. On the file system that you selected in step 4, create a parent directory for each product, for example `Oradb10g`, to hold the installation directories.
6. Download all of the installation archive files to the directory that you created in step 5.
7. Verify that the files you downloaded are the same size as the corresponding files on Oracle Technology Network.

Extracting the Installation Files

To extract the installation archive files, perform the following steps:

1. If necessary, change directory to the directory that contains the downloaded installation archive files.
2. To uncompress each file, enter a command similar to the following:

```
$ gunzip filename.cpio.gz
```

This command creates files with names similar to the following:

```
filename.cpio
```

3. To extract the installation files, enter a command similar to the following:

```
$ cpio -idmv < filename.cpio
```

Note: Refer to the download page for information about the correct options to use with the `cpio` command.

Some browsers uncompress files while downloading them, but leave the `.gz` file extension. If these steps do not work, remove the `.gz` extension from the files and repeat step 3.

For each file, this command creates a subdirectory named `Diskn`, where `n` is either 1 or the disk number identified in the file name.

When you have extracted all of the required installation files, refer to the following section:

["Installing the Oracle Database Software"](#) on page 3-5

Copying the Software to the Hard Disk

Before installing Oracle Database, you might want to copy the software to the hard disk. This enables the installation process to run a bit faster. Before copying the disc content to the hard disk, you must mount the disc. The following sections describe to mount disc and copy its content to the hard disk.

Mounting Discs

On most Linux systems, the disc mounts automatically when you insert it into the disc drive. If the disc does not mount automatically, then follow these steps to mount it:

1. Switch user to `root`:

```
$ su - root
```

2. If necessary, enter a command similar to one of the following to eject the currently mounted disc, then remove it from the drive:

- Red Hat:

```
# eject /mnt/dvd
```

- SUSE:

```
# eject /media/dvd
```

In these examples, `/mnt/dvd` and `/media/dvd` are the mount point directories for the disc drive.

3. Insert the appropriate disc into the disc drive.
4. To verify that the disc mounted automatically, enter one of the following commands depending on the platform:

- Red Hat:

```
# ls /mnt/dvd
```

- SUSE:

```
# ls /media/dvd
```

5. If this command fails to display the contents of the disc, enter a command similar to the following to mount it, depending on your platform:

Note: Before running the following command, ensure that the `/mnt/dvd` and `/media/dvd` directories exist on Red Hat and SUSE Linux, respectively. If not, create the `/mnt/dvd` and `/media/dvd` directories, as required, to mount the DVD.

- Red Hat:

```
# mount -t iso9660 /dev/dvd /mnt/dvd
```

- SUSE:

```
# mount -t iso9660 /dev/dvd /media/dvd
```

In these examples, `/mnt/dvd` and `/media/dvd` are the mount point directories for the disc drive.

6. If Oracle Universal Installer is displaying the Disk Location dialog box, enter the disc mount point directory path, for example:

```
/mnt/dvd
```

To continue, go to one of the following sections:

- If you want to copy software to a hard disk, refer to the ["Copying the Oracle Database Software to a Hard Disk"](#) section on page 3-5.
- If you want to install the software from the discs, refer to the ["Installing the Oracle Database Software"](#) section on page 3-5.

Copying the Oracle Database Software to a Hard Disk

Note: If the system does not have a DVD drive, you can copy the software from the disc to a file system on another system, then either mount that file system using NFS, or use FTP to copy the files to the system where you want to install the software.

To copy the contents of the disc to a hard disk:

1. Create a directory on the hard disk to hold the Oracle software:

```
$ mkdir OraDb10g
```

2. Change directory to the directory you created in step 1:

```
$ cd OraDb10g
```

3. Mount the disc, if it is not already mounted.

Some platforms automatically mount the disc when you insert it into the drive. If the disc does not mount automatically, refer to the ["Mounting Discs"](#) section on page 3-4 for platform-specific information about mounting it.

4. Copy the contents of the mounted disc to the corresponding new subdirectory as follows:

```
$ cp -R /directory_path OraDb10g
```

In this example, `/directory_path` is the disc mount point directory, for example `/mnt/dvd` on Red Hat systems or `/media/dvd` on SUSE systems, or the path of the `db` directory on the DVD. The mount point directory is `/dvd`.

5. If necessary, mount the next disc and repeat step 5.

After you have copied all the required discs, refer to the ["Installing the Oracle Database Software"](#) section on page 3-5.

Installing the Oracle Database Software

The following sections describe how to install the Oracle software:

- [Reviewing Product-Specific Installation Guidelines](#)

- [Running Oracle Universal Installer](#)

See Also:

- ["Installing Automatic Storage Management"](#) on page 3-9 if you want to install Oracle Database and use Automatic Storage Management
- [Appendix A, "Installing and Configuring Oracle Database Using Response Files"](#) if you want to install Oracle Database by using the noninteractive installation method, without the GUI. This method is useful if you need to perform multiple installations of Oracle Database. This appendix covers other advanced installation topics as well.

Reviewing Product-Specific Installation Guidelines

Review the following guidelines before starting Oracle Universal Installer:

- Oracle Universal Installer

Do not use Oracle Universal Installer from an earlier Oracle product release to install components from this release.

- Products requiring a custom installation

To install the following products, you must choose the Custom installation type:

- Oracle Label Security

Note: Before you perform a custom installation, make sure all databases in the Oracle home where you want to install Oracle Label Security are shut down.

If you want to configure OLS to use Oracle Internet Directory, then you must choose the OID option when running the Database Configuration Assistant.

- Oracle Connection Manager
- Data Mining Scoring Engine

- Installations on a cluster

If Oracle Clusterware and Oracle Real Application Clusters (RAC) are already installed on the system, Oracle Universal Installer displays the Specify Hardware Cluster Installation Mode screen. You must select **Local Installation** on this screen, unless you want to install Oracle Real Application Clusters.

If you do want to install Oracle Real Application Clusters, refer to the *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux* instead of using this guide.

- Reinstalling Oracle software

If you re-install Oracle software into an Oracle home directory where Oracle Database is already installed, you must also re-install any components, such as Oracle Partitioning, that were installed before you began the re-installation.

Running Oracle Universal Installer

This section describes the Basic Installation as a default setting. For any type of installation process, start Oracle Universal Installer and install the software, as follows:

1. If you are installing the software from disc, mount the first disc if it is not already mounted.

Some platforms automatically mount the disc when you insert the disc into the drive.

If the disc does not mount automatically, refer to the "[Mounting Discs](#)" section on page 3-4 for platform-specific information about mounting it.

2. To start Oracle Universal Installer, complete one of the following steps depending on the location of the installation files:

Note: Start Oracle Universal Installer from the terminal session where you logged in as the `oracle` user and set the user's environment (described in [Chapter 2](#)).

- If the installation files are on disc, enter commands similar to the following, where `directory_path` is the path of the `db` directory on the DVD:

```
$ cd /tmp
$ /directory_path/runInstaller
```

- If the installation files are on the hard disk, change directory to the `db` directory and enter the following command:

```
$ ./runInstaller
```

If Oracle Universal Installer does not appear, refer to the "[X Window Display Errors](#)" section on page F-1 for information about troubleshooting.

3. Use the following guidelines to complete the installation:
 - Follow the instructions displayed on the Oracle Universal Installer screens. If you need additional information, click **Help**.
 - When Oracle Universal Installer prompts you to run a script with `root` privileges, enter a command similar to the following in a terminal where you are logged in as the `root` user, then click **Continue** or **OK**:

```
# /script_path/script_name
```

The following table lists the various screens displayed and the recommended actions required when you select the Basic Installation option.

Screen	Recommended Action
Select Installation Method	The Basic Installation option is selected by default. Specify the directory path of the Oracle home. Ensure that the UNIX DBA group <code>oinstall</code> is selected. If you want to create a starter database, then specify a name and password for it. Then, click Next .

Screen	Recommended Action
Specify Inventory Directory and Credentials	<p>This screen is displayed only during the first installation of Oracle products on a system.</p> <p>Specify the full path of the Oracle Inventory directory. Ensure that the operating system group selected is <code>oinstall</code>. Then, click Next.</p>
Product-Specific Prerequisite Checks	<p>Verify that all of the prerequisite checks succeed, then click Next.</p> <p>Oracle Universal Installer checks the system to verify that it is configured correctly to run Oracle software. If you have completed all of the preinstallation steps in this guide, all of the checks should pass.</p> <p>If a check fails, then review the cause of the failure listed for that check on the screen. If possible, rectify the problem and rerun the check. Alternatively, if you are satisfied that your system meets the requirements, then you can select the check box for the failed check to manually verify the requirement.</p>
Summary	Review the information displayed on this screen, and then click Install .
Install	This screen displays status information while the product is being installed.
Configuration Assistants	This screen displays status information for the configuration assistants that configure the software and create a database. When the message is displayed at the end of this process, click OK to continue.
Execute Configuration Scripts	When prompted, read the instructions and then run the scripts mentioned on this screen. Click OK to continue.
End of Installation	<p>The configuration assistants configure several Web-based applications, including Oracle Enterprise Manager Database Control. This screen displays the URLs configured for these applications. Make a note of the URLs used. The port numbers used in these URLs are also recorded in the following file:</p> <p><code>oracle_home/install/portlist.ini</code></p> <p>To exit from Oracle Universal Installer, click Exit and then click Yes.</p>

- If you select Advanced Installation, you will be prompted for the SYS, SYSTEM, SYSMAN, and DBSNMP passwords, Oracle recommends that you specify passwords that:
 - Are at least four characters long
 - Are not the same as the user names
 - Have at least one alphabetic, one numeric, and one punctuation mark character
 - Are not simple or obvious words, such as welcome, account, database, or user

Note: You must remember the passwords that you specify.

- If you encounter errors while installing or linking the software, refer to [Appendix F](#) for information about troubleshooting.

4. If you chose an installation type that runs Database Configuration Assistant and Oracle Net Configuration Assistant (NetCA) in interactive mode, you must provide detailed information about configuring the database and network.

If you need assistance when using the Database Configuration Assistant or NetCA in interactive mode, then click **Help** on any screen.

Note: If you chose a default installation, the Database Configuration Assistant and NetCA run in noninteractive mode.

5. When all of the configuration tools have finished, click **Exit**, then click **Yes** to exit from Oracle Universal Installer.

Installing Automatic Storage Management

Follow the procedures in this section to install and configure Automatic Storage Management, and then to install Oracle Database so that it can use Automatic Storage Management. If you do not plan to use Automatic Storage Management, then follow the procedure given in "Installing the Oracle Database Software" on page 3-5 to install Oracle Database.

This section covers the following topics:

- [Step 1: Reviewing Automatic Storage Management Installation Considerations](#)
- [Step 2: Creating the Automatic Storage Management Instance and Disk Groups](#)
- [Step 3: Installing Oracle Database to Use with Automatic Storage Management](#)
- [Step 4: Testing the Automatic Storage Management Installation](#)

Step 1: Reviewing Automatic Storage Management Installation Considerations

Apply these guidelines when you install Automatic Storage Management:

- Before installing Automatic Storage Management, it is recommended that you install the optional add-on Automatic Storage Management support library, ASMLib. ASMLib is an application program interface (API) Oracle that is aimed at simplifying the interface between the operating system and the database, and to exploit the capabilities and strengths of storage arrays provided by different vendors.

ASMLib provides an alternative interface for the Automatic Storage Management-enabled kernel to discover and access block devices. It provides storage and operating system vendors the opportunity to supply extended storage-related features. These features provide benefits such as improved performance and greater data integrity.

See Also: For more information about ASMLib, visit the Automatic Storage Management page on the Oracle Technology Network Web site at

<http://www.oracle.com/technology/products/database/asmlib>

The ASMLib files can be downloaded from

<http://www.oracle.com/technology/tech/linux/asmlib>

- You must complete the steps in "[Preparing Disk Groups for an Automatic Storage Management Installation](#)" on page 2-23 to prepare a disk partition to use for the Automatic Storage Management disk groups.
- Oracle recommends that you install Automatic Storage Management in its own Oracle home, regardless of whether you plan to only have one or multiple database instances. Installing Automatic Storage Management in its own Oracle home helps ensure higher availability and manageability.

With separate Oracle homes, you can upgrade Automatic Storage Management and databases independently, and you can remove database software without impacting the Automatic Storage Management instance. Ensure that the Automatic Storage Management version is the same or later than the Oracle Database version.

If an Automatic Storage Management installation does not already exist and you select the Oracle Universal Installer option to install and configure Automatic Storage Management only, then Oracle Universal Installer installs Automatic Storage Management in its own Oracle home.

- Every Oracle Database instance that use Automatic Storage Management must have an Automatic Storage Management instance on the same computer.
- When you install Automatic Storage Management, Oracle Database Configuration Assistant creates a separate server parameter file (*SPFILE*) and password file for the Automatic Storage Management instance.

Step 2: Creating the Automatic Storage Management Instance and Disk Groups

The following steps explain how to create an Automatic Storage Management instance and a disk group for storing Oracle Database files. You can create multiple disk groups for the Automatic Storage Management instance to manage, if you want. If you plan to use Automatic Storage Management for backup and recovery operations, then Oracle recommends that you create a separate disk group for this purpose.

To install an Automatic Storage Management instance and configure its disk groups:

1. If you are installing the software from disc, mount the first disc if it is not already mounted.

Some platforms automatically mount the disc when you insert the disc into the drive.

If the disc does not mount automatically, refer to the "[Mounting Discs](#)" section on page 3-4 for platform-specific information about mounting it.

2. To start Oracle Universal Installer, complete one of the following steps depending on the location of the installation files:

Note: Start Oracle Universal Installer from the terminal session where you logged in as the `oracle` user and set the user's environment (described in [Chapter 2](#)).

- If the installation files are on disc, enter commands similar to the following, where *directory_path* is the path of the `db` directory on the DVD:

```
$ cd /tmp
$ /directory_path/runInstaller
```

- If the installation files are on the hard disk, change directory to the `db` directory and enter the following command:

```
$ ./runInstaller
```

If Oracle Universal Installer does not appear, refer to the "[X Window Display Errors](#)" section on page F-1 for information about troubleshooting.

3. On the Welcome screen, select **Advanced Installation** and then click **Next**.
4. On the Select Installation Type screen, select either **Enterprise Edition**, **Standard Edition**, or **Custom**, and then click **Next**.
5. On the Specify Home Details screen, enter an Automatic Storage Management-specific name and directory location for the Automatic Storage Management instance.

For example, you could change name to `OraDB10g+ASM` and the directory location to the following:

```
/u01/app/oracle/product/10.2.0/asm
```

6. Click **Next**.
7. On the Product-Specific Prerequisite Checks screen, check that the requirements have been met and then click **Next**.
8. On the Select Configuration Option screen, select **Configure Automatic Storage Management (ASM)** and then specify and confirm the ASM SYS password. Then, click **Next**.
9. On the Configure Automatic Storage Management screen, enter the following settings:

Note: This screen lets you create the disk groups to use with the Automatic Storage Management instance. You must have an available partition in order to create disk groups.

- **Disk Group Name:** Enter a name for the disk group.
- **Redundancy:** Select one of the following choices to set the redundancy level for the disks within the disk group.
 - **High:** The contents of the disk group are three-way mirrored by default. To create a disk group with high redundancy, you must specify at least three failure groups (a minimum of three devices).
 - **Normal:** The contents of the disk group are two-way mirrored by default. However, you can choose to create certain files that are three-way mirrored or not mirrored. To create a disk group with normal redundancy, you must specify at least two failure groups (a minimum of two devices) for two-way mirroring.
 - **External:** Automatic Storage Management does not mirror the contents of the disk group. Choose this redundancy level when 1) the disk group contains devices, such as RAID devices, that provide their own data protection; or 2) your use of the database does not require uninterrupted access to data, for example, in a development environment where you have a suitable backup strategy.
- **Add Disks:** Enter `/dev/raw` as the disk recovery path.

10. Click **Next**.
11. On the Install screen, check the installed contents, and then click **Install**.
12. To create another disk group for this instance, run Oracle Database Control Assistant from the `$ORACLE_HOME/bin` directory manually, and select the **Configure Automatic Storage Management** option.

At this stage, subsequent databases that you create are able to use Automatic Storage Management. If you have databases that were created before you installed Automatic Storage Management, then you now can migrate them to Automatic Storage Management by using the Enterprise Manager Migrate Database Wizard. This wizard is available in Enterprise Manager Grid Control or Database Control. Alternatively, you can use Oracle Database Recovery Manager (RMAN) to perform the migration.

See Also:

- Enterprise Manager Migrate Database Wizard online Help instructions on how to migrate an existing Oracle Database to Automatic Storage Management
- *Oracle Database Backup and Recovery Advanced User's Guide* for information about migrating an existing Oracle Database to Automatic Storage Management using Oracle Database Recovery Manager

Step 3: Installing Oracle Database to Use with Automatic Storage Management

After you have created the Automatic Storage Management instance and Automatic Storage Management disk groups, you are ready to create a database instance that can use Automatic Storage Management.

To create a database instance to use with Automatic Storage Management:

1. Start Oracle Universal Installer.
2. On the Welcome screen, select **Advanced Installation** and then click **Next**.
3. On the Select Installation Type screen, select one of the installation types, and then click **Next**.
4. On the Specify Home Details screen, select a different Oracle home from the home used for Automatic Storage Management.
5. If you selected the Custom installation type, then select from the products to install.
6. On the Product-Specific Prerequisite Checks screen, check that the requirements have been met and then click **Next**.
7. On the Select Configuration Option screen, select **Create a Database**.
8. On the Select Database Configuration screen, select from the database types displayed and click **Next**.
9. On the Specify Database Configuration Options screen, enter the following settings and then click **Next**.
 - **Database Naming:** Enter a name for the database.
 - **Database Character Set:** Select the database character set that you want to use. The default offered is based on the character set that the operating system uses.

- **Database Examples:** Select this option to create the `EXAMPLE` tablespace, which contains sample schemas. This is optional, but recommended.
- 10. On the Select Database Management Option screen, select either **Use Grid Control for Database Management** if you have Oracle Enterprise Manager installed, or if you do not have Enterprise Manager, select **Use Database Control for Database Management**. Optionally, select **Enable Email Notifications** and then enter the outgoing SMTP server and e-mail address. Then, click **Next**.

After you complete the installation, you can use either of these utilities to manage the Automatic Storage Management instance.
- 11. On the Specify Database Storage Option screen, select **Automatic Storage Management (ASM)** and click **Next**.
- 12. On the Specify Backup and Recovery Options screen, perform the following actions:
 - **Enable Automated Backups:** Select this option, and then select **Automatic Storage Management**.
 - **Backup Job Credentials:** Enter the user name and password of the person responsible for managing backups.
- 13. Click **Next**.
- 14. On the Select ASM Disk Group screen, select the Automatic Storage Management disk group that you created in "[Step 2: Creating the Automatic Storage Management Instance and Disk Groups](#)" on page 3-10 for recovery and backups.

If the Automatic Storage Management disks that you select do not provide enough space, then the Configure Storage Management screen is displayed so that you can select additional disks as needed. As you select the disks, the adjusted sizes are displayed in the Required Storage Space region. Ideally, the **Additional Space Needed** value should be a negative number.
- 15. Click **Next**.
- 16. On the Specify Database Schema Passwords screen, enter and confirm passwords for the privileged database accounts, then click **Next**.
- 17. On the Summary screen, check that the contents to be installed are correct, and then click **Install**.

Step 4: Testing the Automatic Storage Management Installation

To test the Automatic Storage Management installation, try logging in by using the `asmcmd` command-line utility, which lets you manage Automatic Storage Management disk group files and directories. To do this:

1. Open a shell window, and temporarily set the `ORACLE_SID` and `ORACLE_HOME` environment variables to specify the appropriate values for the Automatic Storage Management instance that you want to use.

For example, if the Automatic Storage Management SID, which is named `+ASM` and is located in the `asm` subdirectory of the `ORACLE_BASE` directory, then enter the following commands to create the required settings:

- Bourne, Bash, or Korn shell:


```
$ ORACLE_SID=+ASM
$ export ORACLE_SID
$ ORACLE_HOME=/u01/app/oracle/product/10.2.0/asm
$ export ORACLE_HOME
```

- C shell:

```
% setenv ORACLE_SID +ASM
% setenv ORACLE_HOME /u01/app/oracle/product/10.2.0/asm
```

2. By using SQL*Plus, connect to the Automatic Storage Management instance as the SYS user with SYSDBA privilege and start the instance if necessary:

```
# $ORACLE_HOME/bin/sqlplus "SYS/SYS_password as SYSDBA"
SQL> STARTUP
```

3. Enter the following command to view the existing disk groups, their redundancy level, and the amount of free disk space in each one:

```
SQL> SELECT NAME,TYPE,TOTAL_MB,FREE_MB FROM V$ASM_DISKGROUP;
```

See Also:

- *Oracle Database Utilities* for more information about `asmcmd`
- "[Managing Automatic Storage Management](#)" on page 5-2 for information about other tools that you can use to manage Automatic Storage Management
- *Oracle Database Administrator's Guide* for a more detailed description of Automatic Storage Management

Postinstallation Tasks

This chapter describes how to complete postinstallation tasks after you have installed the software. It includes information about the following sections:

- [Required Postinstallation Tasks](#)
- [Recommended Postinstallation Tasks](#)
- [Required Product-Specific Postinstallation Tasks](#)
- [Installing Oracle Database 10g Products from the Companion CD](#)

You must perform the tasks listed in the "[Required Postinstallation Tasks](#)" section. Oracle recommends that you perform the tasks listed in the "[Recommended Postinstallation Tasks](#)" section after all installations.

If you installed and intend to use any of the products listed in the "[Required Product-Specific Postinstallation Tasks](#)" section, then you must perform the tasks listed in the product-specific subsections.

Note: This chapter describes basic configuration only. Refer to *Oracle Database Administrator's Reference for Linux and Solaris Operating Systems* and product-specific administration and tuning guides for more detailed configuration and tuning information.

Required Postinstallation Tasks

You must perform the tasks described in the following sections after completing an installation:

- [Downloading and Installing Patches](#)
- [Configuring Oracle Products](#)

Downloading and Installing Patches

Check the *OracleMetaLink* Web site for required patches for your installation.

To download required patches:

1. Use a Web browser to view the *OracleMetaLink* Web site:
<http://metalink.oracle.com>
2. Log in to *OracleMetaLink*.

Note: If you are not an Oracle*MetaLink* registered user, click **Register for MetaLink!** and follow the registration instructions.

3. On the main Oracle*MetaLink* page, click **Patches**.
4. Select **Simple Search**.
5. Specify the following information, then click **Go**:
 - In the **Search By** field, choose Product or Family, then specify RDBMS Server.
 - In the **Release** field, specify the current release number.
 - In the **Patch Type** field, specify Patchset/Minipack.
 - In the **Platform or Language** field, select your platform.

Configuring Oracle Products

Many Oracle products and options must be configured before you use them for the first time. Before using individual Oracle products or options, refer to the appropriate manual in the product documentation library.

Recommended Postinstallation Tasks

Oracle recommends that you perform the tasks described in the following section after completing an installation:

- [Creating a Backup of the root.sh Script](#)
- [Configuring New or Upgraded Databases](#)
- [Setting Up User Accounts](#)
- [Setting the NLS_LANG Environment Variable](#)
- [Generating the Client Static Library](#)

Creating a Backup of the root.sh Script

Oracle recommends that you back up the `root.sh` script after you complete an installation. If you install other products in the same Oracle home directory, then Oracle Universal Installer updates the contents of the existing `root.sh` script during the installation. If you require information contained in the original `root.sh` script, then you can recover it from the backed up `root.sh` file.

Configuring New or Upgraded Databases

Oracle recommends that you run the `utlrp.sql` script after creating or upgrading a database. This script recompiles all PL/SQL modules that might be in an invalid state, including packages, procedures, and types. This is an optional step but Oracle recommends that you do it during installation and not at a later date.

To run the `utlrp.sql` script, follow these steps:

1. Switch user to `oracle`.
2. Use the `oraenv` or `coraenv` script to set the environment for the database where you want to run the `utlrp.sql` script:
 - Bourne, Bash, or Korn shell:

```
$ . /usr/local/bin/oraenv
```

- C shell:

```
% source /usr/local/bin/coraenv
```

When prompted, specify the SID for the database.

3. Start SQL*Plus, as follows:

```
$ sqlplus "/ AS SYSDBA"
```

4. If necessary, start the database:

```
SQL> STARTUP
```

5. Run the `utlrp.sql` script:

```
SQL> @?/rdbms/admin/utlrp.sql
```

Setting Up User Accounts

For information about setting up additional user accounts, refer to *Oracle Database Administrator's Reference for Linux and Solaris Operating Systems*.

Setting the NLS_LANG Environment Variable

NLS_LANG is an environment variable that specifies the locale behavior for Oracle software. This variable sets the language and territory used by the client application and the database server. It also sets the character set for the client, which is the character set for data entered or displayed by an Oracle client program, such as SQL*PLUS.

See Also: [Appendix E, "Globalization Support"](#) for more information about the NLS_LANG environment variable

Generating the Client Static Library

The client static library (`libclntst10.a`) is not generated during installation. If you want to link your applications to the client static library, you must first generate it as follows:

1. Switch user to `oracle`.

2. Set the `ORACLE_HOME` environment variable to specify the Oracle home directory used by the Oracle Database installation. For example:

- Bourne, Bash, or Korn shell:

```
$ ORACLE_HOME=/u01/app/oracle/product/10.2.0/db_1
$ export ORACLE_HOME
```

- C shell:

```
% setenv ORACLE_HOME /u01/app/oracle/product/10.2.0/db_1
```

3. Enter the following command:

```
$ $ORACLE_HOME/bin/genclntst
```

Required Product-Specific Postinstallation Tasks

The following sections describe platform-specific postinstallation tasks that you must perform if you install and intend to use the products mentioned:

- [Configuring Oracle Net Services](#)
- [Configuring Oracle Label Security](#)
- [Installing Natively Compiled Java Libraries for Oracle JVM and Oracle interMedia](#)
- [Installing Oracle Text Supplied Knowledge Bases](#)
- [Configuring Oracle Messaging Gateway](#)
- [Configuring Oracle Precompilers](#)
- [Configuring OCCI](#)
- [Configuring GCC as the Primary Compiler](#)

Note: You need only perform postinstallation tasks for products that you intend to use.

Configuring Oracle Net Services

If you have a previous release of Oracle software installed on this system, you might want to copy information from the Oracle Net `tnsnames.ora` and `listener.ora` configuration files from the previous release to the corresponding files for the new release.

Note: The default location for the `tnsnames.ora` and `listener.ora` files is the `$ORACLE_HOME/network/admin/` directory. However, you can also use a central location for these files, for example `/etc`.

Modifying the `listener.ora` File

If you are upgrading from a previous release of Oracle Database, Oracle recommends that you use the current release of Oracle Net listener instead of the listener from the previous release.

To use the listener from the current release, you may need to copy static service information from the `listener.ora` file from the previous release to the version of that file used by the new release.

For any database instances earlier than release 8.0.3, add static service information to the `listener.ora` file. Oracle Database releases later than release 8.0.3 do not require static service information.

Modifying the `tnsnames.ora` File

Unless you are using a central `tnsnames.ora` file, copy Oracle Net service names and connect descriptors from the previous release `tnsnames.ora` file to the version of that file used by the new release.

If necessary, you can also add connection information for additional database instances to the new file.

Configuring Oracle Label Security

If you installed Oracle Label Security, you must configure it in a database before you use it. You can configure Oracle Label Security in two ways; with Oracle Internet Directory integration and without Oracle Internet Directory integration. If you configure Oracle Label Security without Oracle Internet Directory integration, you cannot configure it to use Oracle Internet Directory at a later stage.

Note: To configure Oracle Label Security with Oracle Internet Directory integration, Oracle Internet Directory must be installed in your environment and the Oracle database must be registered in the directory.

See Also: *Oracle Label Security Administrator's Guide* for more information about Oracle Label Security enabled with Oracle Internet Directory

Installing Natively Compiled Java Libraries for Oracle JVM and Oracle *interMedia*

If you plan to use Oracle JVM or Oracle *interMedia*, Oracle strongly recommends that you install the natively compiled Java libraries (NCOMPs) used by those products from the Oracle Database 10g Companion CD. These libraries are required to improve the performance of the products on your platform.

For information about how to install products from the Companion CD, refer to the "[Installing Oracle Database 10g Products from the Companion CD](#)" section on page 4-10.

Installing Oracle Text Supplied Knowledge Bases

An Oracle Text knowledge base is a hierarchical tree of concepts used for theme indexing, ABOUT queries, and deriving themes for document services. If you plan to use any of these Oracle Text features, you can install two supplied knowledge bases (English and French) from the Oracle Database 10g Companion CD.

Note: You can extend the supplied knowledge bases depending on your requirements. Alternatively, you can create your own knowledge bases, possibly in languages other than English and French.

See Also: *Oracle Text Reference* for more information about creating and extending knowledge bases

The "[Installing Oracle Database 10g Products from the Companion CD](#)" section on page 4-10 for information about how to install products from the Companion CD

Configuring Oracle Messaging Gateway

To configure Oracle Messaging Gateway, refer to the section about Messaging Gateway in *Oracle Streams Advanced Queuing User's Guide and Reference*. When following the instructions listed in that manual, refer to this section for additional instructions about configuring the `listener.ora`, `tnsnames.ora`, and `mgw.ora` files.

Modifying the listener.ora File for External Procedures

To modify the `$ORACLE_HOME/network/admin/listener.ora` file for external procedures:

1. Back up the `listener.ora` file.
2. Ensure that the default IPC protocol address for external procedures is set as follows:


```
(ADDRESS = (PROTOCOL=IPC) (KEY=EXTPROC))
```
3. Add static service information for a service called `mgwextproc` by adding lines similar to the following to the `SID_LIST` parameter for the listener in the `listener.ora` file:

```
(SID_DESC =
  (SID_NAME = mgwextproc)
  (ENVS = EXTPROC_DLLS=/oracle_home/lib/libmgwagent.so,
LD_LIBRARY_PATH=/oracle_home/jdk/jre/lib/i386:/oracle_home/jdk/jre/lib/i386
/server:/oracle_home/lib32
  (ORACLE_HOME = oracle_home)
  (PROGRAM = extproc32)
)
```

In this example:

- The `ENVS` parameter defines the shared library path environment variable and any other required environment variables.

In the settings for the shared library path environment variable, you must also add any additional library paths required for non-Oracle messaging systems, for example WebSphere MQ or TIBCO Rendezvous.

- `oracle_home` is the path of the Oracle home directory.
- `extproc32` is the external procedure agent executable file

The following example shows a sample `listener.ora` file:

Note: In the following example, the `PLSExtProc` service is the default service for PL/SQL external procedures.

```
SID_LIST_LISTENER =
  (SID_LIST =
    (SID_DESC =
      (SID_NAME = PLSExtProc)
      (ORACLE_HOME = /u01/app/oracle/product/10.2.0/db_1)
      (PROGRAM = extproc)
    )
    (SID_DESC =
      (SID_NAME = mgwextproc)
      (ENVS = EXTPROC_DLLS=/oracle_home/lib/libmgwagent.so,
      LD_LIBRARY_PATH =/u01/app/oracle/product/10.2.0/db_1/jdk/jre/
lib/i386:/u01/app/oracle/product/10.2.0/db_1/jdk/jre/lib/i386/server:
/u01/app/oracle/product/10.2.0/db_1/lib)
      (ORACLE_HOME = /u01/app/oracle/product/10.2.0/db_1)
      (PROGRAM = extproc32)
    )
  )
```

Modifying the tnsnames.ora File for External Procedures

To modify the `$ORACLE_HOME/network/admin/tnsnames.ora` file for external procedures:

1. Back up the `tnsnames.ora` file.
2. In the `tnsnames.ora` file, add a connect descriptor with the net service name `MGW_AGENT`, as follows:

```
MGW_AGENT =
(DESCRIPTION=
  (ADDRESS_LIST= (ADDRESS= (PROTOCOL=IPC) (KEY=EXTPROC)))
  (CONNECT_DATA= (SID=mgwextproc) (PRESENTATION=RO)))
```

In this example:

- The value specified for the `KEY` parameter must match the value specified for that parameter in the `IPC` protocol address in the `listener.ora` file.
- The value of the `SID` parameter must match the service name in the `listener.ora` file that you specified for the Oracle Messaging Gateway external procedure agent in the previous section (`mgwextproc`).

Setting Up the mgw.ora Initialization File

To modify the `$ORACLE_HOME/mgw/admin/mgw.ora` file for external procedures, set the `CLASSPATH` environment variable to include the classes in the following table and any additional classes required for Oracle Messaging Gateway to access non-Oracle messaging systems, for example WebSphere MQ or TIBCO Rendezvous classes:

Classes	Path
Oracle Messaging Gateway	<code>ORACLE_HOME/mgw/classes/mgw.jar</code>
JRE internationalization	<code>ORACLE_HOME/JRE/lib/i18n.jar</code>
JRE runtime	<code>ORACLE_HOME/JRE/lib/rt.jar</code>
Oracle JDBC	<code>ORACLE_HOME/jdbc/lib/ojdbc14.jar</code>
Oracle internationalization	<code>ORACLE_HOME/jdbc/lib/orai18n.jar</code>
SQLJ	<code>ORACLE_HOME/sqlj/lib/translator.zip</code> <code>ORACLE_HOME/sqlj/lib/runtime12.zip</code>
JMS Interface	<code>ORACLE_HOME/rdbms/jlib/jmscommon.jar</code>
Oracle JMS implementation	<code>ORACLE_HOME/rdbms/jlib/aqapil3.jar</code>
Java Transaction API	<code>ORACLE_HOME/jlib/jta.jar</code>

Note: All the lines in the `mgw.ora` file should consist of less than 1024 characters.

Configuring Oracle Precompilers

This section describes postinstallation tasks for Oracle precompilers.

Note: All precompiler configuration files are located in the `$ORACLE_HOME/precomp/admin` directory.

Configuring Pro*C/C++

Verify that the `PATH` environment variable setting includes the directory that contains the C compiler executable.

Table 4–1 shows the default directories and the appropriate command to verify the path setting of the compiler.

Table 4–1 C/C++ Compiler Directory

Path	Command
<code>/usr/bin</code>	<code>\$ which gcc</code>
<code>/opt/intel/compiler70/ia32/bin</code>	<code>\$ which icc</code>

Configuring OCCl

Two sets of Oracle C++ Call Interface (OCCI) libraries are installed with this release on Red Hat Enterprise Linux 3. One set is for use with GNU C++ compiler version 2.96 and the other set is for use with GNU C++ version 3.2. The libraries are installed in the following locations:

- Libraries for use with GNU C++ version 2.96 supported on Red Hat Enterprise Linux 3 only:
 - `$ORACLE_HOME/lib/libocci10_296.a`
 - `$ORACLE_HOME/lib/libocci10_296.so.10.1`
- Libraries for use with GNU C++ version 3.2:
 - `$ORACLE_HOME/lib/libocci10.a`
 - `$ORACLE_HOME/lib/libocci10.so.10.1`
- Libraries for use with GNU C++ version 3.3 supported on SUSE Linux Enterprise Server 9:
 - `$ORACLE_HOME/lib/libocci10.a`
 - `$ORACLE_HOME/lib/libocci10.so.10.1`

Although the libraries are installed on all Linux distributions, they are not supported on all distributions. The following table shows the supported GNU C++ version for each distribution:

Linux Distribution	GNU C++ Versions Supported
Red Hat Enterprise Linux AS/ES 3	Both 2.96 and 3.2
SUSE Linux Enterprise Server 9	Only 3.3.3-43

To create the required symbolic links in the `$ORACLE_HOME/lib` directory to the appropriate libraries for a distribution, you must create symbolic links to the libraries or overwrite the libraries after taking their backup. For example, you can use the following commands to create symbolic links to the libraries after removing `$ORACLE_HOME/lib/libocci10.a` and `$ORACLE_HOME/lib/libocci10.so.10.1`:


```
$ ln -s $ORACLE_HOME/lib/libocci10_296.a $ORACLE_HOME/lib/libocci10.a
$ ln -s $ORACLE_HOME/lib/libocci10_296.so.10.1 $ORACLE_HOME/lib/libocci10.so.10.1
```

Note: If you run `$ORACLE_HOME/bin/genoccish`, then the `libocci.so.10.1` library is regenerated by default. To regenerate the gcc2.96 OCCI shared object when you have not renamed or created symbolic linked the gcc 2.96 OCCI libraries to the default names, you must set the `BUILD_CCC296` environment variable to 1 before running `$ORACLE_HOME/bin/genoccish`. This will regenerate the `libocci10_296.so.10.1` library.

Configuring GCC as the Primary Compiler

You can speed up the performance of PL/SQL modules such as packages by compiling them into native code that resides in shared libraries. This method translates the module into C code, compiles it with a C compiler, and then links it into the Oracle process. Remember that you must use one compiler to compile all your Oracle modules. You cannot compile some modules with the primary compiler and others with a different compiler.

If both the primary supported compiler for the operating system and GNU Compiler Collection (GCC) are available, then use the primary supported compiler. However, if the primary supported compiler is not available, then use GCC.

To configure GCC as the primary compiler:

1. Using a text editor, open the `spnc_commands` configuration file. In a default installation, the `spnc_commands` file is located in the `$ORACLE_HOME/plsql` directory.

2. Look for the following line of text and comment it out:

```
/opt/intel/compiler70/ia32/bin/icc -Qlocation,as,/usr/bin/
-Qlocation,ld,/usr/bin/ %(src) -O1 -fPIC -fp -mp1 -fp_port
-I$(ORACLE_HOME)/plsql/include -I$(ORACLE_HOME)/plsql/public -wl,-s -shared -o
%(so)
```

3. Look for the following lines, which pertain to GCC, and uncomment them:

```
/usr/bin/gcc -B/usr/bin/ %(src) -c -O1 -fPIC -I$(ORACLE_HOME)/plsql/include
-I$(ORACLE_HOME)/plsql/public -o %(obj)
/usr/bin/ld -s -shared %(obj) -o %(so)
```

4. Save and close the `spnc_commands` configuration file.

See Also: *Oracle Database PL/SQL User's Guide and Reference* for more information on PL/SQL native compilation and the `spnc_commands` configuration file

Using the Intel C++ Compiler for PL/SQL Native Compilation

By default, PL/SQL native compilation is configured to use the GCC compiler. If you want to use the Intel C++ compiler (ICC) instead of the GCC compiler, then make the following changes in the `$ORACLE_HOME/plsql/spnc_commands` file:

1. Comment out the lines for the GCC compiler.
2. Uncomment the lines for ICC.

Installing Oracle Database 10g Products from the Companion CD

The Oracle Database 10g Companion CD contains additional products that you can install. Whether you need to install these products depends on which Oracle Database products or features you plan to use. If you plan to use the following products or features, then you must complete the Oracle Database 10g Products installation from the Companion CD:

- JPublisher
- Oracle JVM
- Oracle *interMedia*
- Oracle JDBC development drivers
- Oracle SQLJ
- Oracle Database Examples
- Oracle Text supplied knowledge bases
- Oracle Ultra Search
- Oracle HTML DB
- Oracle Workflow server and middle-tier components

For information about installing software from the Companion CD, refer to *Oracle Database Companion CD Installation Guide for Linux x86*.

Getting Started with Oracle Database

This chapter provides information about the default preconfigured database, including information about Oracle database accounts, passwords, and file locations. It includes information about the following topics:

- [Checking the Installed Oracle Database Contents and Directory Location](#)
- [Logging In to Oracle Enterprise Manager Database Control](#)
- [Managing Automatic Storage Management](#)
- [Reviewing Accounts and Passwords](#)
- [Unlocking and Resetting User Passwords](#)
- [Identifying Databases](#)
- [Locating the Server Parameter File](#)
- [Reviewing Tablespaces and Data Files, Redo Log Files, and Control Files](#)

Checking the Installed Oracle Database Contents and Directory Location

You can use Oracle Universal Installer to check the contents and directory location of an Oracle Database installation. To do this:

1. Start Oracle Universal Installer, follow the instructions in "[Running Oracle Universal Installer](#)" on page 3-7.
2. Click **Installed Products** to display the Inventory dialog box on the Welcome screen.
3. Select the Oracle Database product from the list to check the installed contents.
4. Click **Details** to find additional information about an installed product.
5. Click the **Environment** tab to check the directory location of the installed contents.
6. Click **Close** to close the Inventory dialog box.
7. Click **Cancel** to close Oracle Universal Installer, and then click **Yes** to confirm.

Logging In to Oracle Enterprise Manager Database Control

If you configured Oracle Enterprise Manager Database Control during the installation, you can use it to manage your database. Alternatively, you can use Oracle Enterprise Manager Grid Control to manage your database. To display the Database Control:

1. Use a Web browser to access the Database Control URL:

`http://host:port/em`

In this example:

- *host* is the name of the computer on which you installed Oracle Database
- *port* is the port number reserved for the Database Control during installation

If you do not know the correct port number to use, look for the following line in the `$ORACLE_HOME/install/portlist.ini` file:

```
Enterprise Manager Console HTTP Port (db_name) = 1158
```

The installation reserves the first available port from the range 5500 to 5519. For example, if you installed Oracle Database on host `mgmt42`, and the Database Control uses port 1158, use the following URL:

```
http://mgmt42:1158/em
```

Oracle Enterprise Manager displays the Database Control login page.

2. Log in to the database using the user name `SYS` and connect as `SYSDBA`.
Use the password that you specified for the `SYS` account during the installation.

Note: You can also log in to the Database Control using the `SYSTEM` or `SYSMAN` accounts or you can grant login privileges to other database users.

Understanding Database Control Login Privileges

When you log in to the Oracle Enterprise Manager Database Control using the `SYSMAN` user account, you are logging in as the Oracle Enterprise Manager super user. The `SYSMAN` account is automatically granted the roles and privileges required to access all the management features provided by the Database Control.

You can also use the `SYS` and `SYSTEM` accounts to log in to the Database Control. In addition, you can grant login privileges to other database users, as follows:

1. Log in to the Database Control.

See Also: The "[Logging In to Oracle Enterprise Manager Database Control](#)" section on page 5-1 for information about logging in to the Database Control

2. Click **Setup** at the top of the Database Control home page.
3. Click **Administrators** in the left navigation bar.
4. Click **Create** to create an Enterprise Manager user.
5. In the **Name** field, enter the user name of an existing database user or click the flashlight icon and select a user from the pop-up window.
6. Enter the password for this user, and then click **Finish**.

Enterprise Manager assigns login privileges to the specified user and includes this user in the list of Enterprise Manager users on the Setup Administrators page.

Managing Automatic Storage Management

This section provides information about managing an Automatic Storage Management installation. It covers the following topics:

- [Starting and Stopping Automatic Storage Management](#)
- [Automatic Storage Management Utilities](#)

Starting and Stopping Automatic Storage Management

To start and stop Automatic Storage Management, refer to the *Oracle Database Administrator's Reference for UNIX-Based Operating Systems* guide.

Automatic Storage Management Utilities

To manage Automatic Storage Management, you can use the following tools:

- `asmcmd`

This command-line tool enables you to manage Automatic Storage Management disk group files and directories.
- Oracle Enterprise Manager Grid Control

If you have Oracle Enterprise Manager installed, you can use Grid Control to manage Automatic Storage Management functions, such as migrating an existing database to Automatic Storage Management, checking the status of the Automatic Storage Management instance, checking the performance of the Automatic Storage Management disk groups, and creating or dropping Automatic Storage Management disk groups.
- Oracle Enterprise Manager Database Control

This utility enables you to perform functions similar to Grid Control.
- SQL*Plus and iSQL*Plus

You can run commands that are specific to Automatic Storage Management from either of these tools. To connect to an Automatic Storage Management instance, use the same methods that you use to connect to an Oracle database instance.

See Also:

- ["Logging In to Oracle Enterprise Manager Database Control"](#) on page 5-1
- *Oracle Database Administrator's Guide* for more information about managing Automatic Storage Management
- *Oracle Database Utilities* for more information about `asmcmd`

Reviewing Accounts and Passwords

All databases created by the Database Configuration Assistant (DBCA) include the SYS, SYSTEM, SYSMAN, and DBSNMP database accounts. In addition, Oracle provides several other administrative accounts. Before using these other accounts, you must unlock them and reset their passwords. [Table 5-1](#) describes these accounts, listing their user names and default passwords.

Note: You can use the Oracle Enterprise Manager Database Control to view the complete list of database accounts. For more information, refer to the ["Unlocking and Resetting User Passwords"](#) section on page 5-6.

Table 5–1 Database Accounts

User Name	Default Password	Description	See Also
ANONYMOUS	ANONYMOUS	Allows HTTP access to Oracle XML DB.	None
BI	BI	The account that owns the Business Intelligence schema included in the Oracle Sample Schemas. It is available only if you loaded the Sample Schemas.	<i>Oracle Database Sample Schemas</i>
CTXSYS	CTXSYS	The Oracle Text account.	<i>Oracle Text Reference</i>
DBSNMP	Password set during installation or in the Database Configuration Assistant	The account used by the Management Agent component of Oracle Enterprise Manager to monitor and manage the database. It is created only if you configure the database to use the Database Control.	<i>Oracle Enterprise Manager Grid Control Installation and Basic Configuration</i>
DIP	DIP	The account used by the Directory Integration Platform (DIP) to synchronize the changes in Oracle Internet Directory with the applications in the database.	<i>Oracle Internet Directory Administrator's Guide</i>
DMSYS	DMSYS	The data mining account. DMSYS performs data mining operations.	<i>Oracle Data Mining Administrator's Guide</i>
EXFSYS	EXFSYS	The account that owns the Expression Filter schema.	None
HR	HR	The account that owns the Human Resources schema included in the Oracle Sample Schemas. It is available only if you loaded the Sample Schemas.	<i>Oracle Database Sample Schemas</i>
IX	IX	The account that owns the Information Transport schema included in the Oracle Sample Schemas. It is available only if you loaded the Sample Schemas.	<i>Oracle Database Sample Schemas</i>
LBACSYS	LBACSYS	The Oracle Label Security administrator account.	<i>Oracle Label Security Administrator's Guide</i>
MDDATA	MDDATA	The schema used by Oracle Spatial for storing Geocoder and router data.	<i>Oracle Spatial User's Guide and Reference</i>
MDSYS	MDSYS	The Oracle Spatial and Oracle <i>interMedia</i> Locator administrator account.	<i>Oracle Spatial User's Guide and Reference</i>
MGMT_VIEW	Randomly generated	An account used by Oracle Enterprise Manager Database Control.	None
OE	OE	The account that owns the Order Entry schema included in the Oracle Sample Schemas. It is available only if you loaded the Sample Schemas.	<i>Oracle Database Sample Schemas</i>
OLAPSYS	MANAGER	The account that owns the OLAP catalogs.	<i>Oracle OLAP Application Developer's Guide</i>
ORDPLUGINS	ORDPLUGINS	The Oracle <i>interMedia</i> user. Plugins supplied by Oracle and third-party plugins are installed in this schema.	<i>Oracle interMedia Reference</i>
ORDSYS	ORDSYS	The Oracle <i>interMedia</i> administrator account.	<i>Oracle interMedia Reference</i>

Table 5–1 (Cont.) Database Accounts

User Name	Default Password	Description	See Also
OUTLN	OUTLN	The account that supports plan stability. Plan stability enables you to maintain the same execution plans for the same SQL statements. OUTLN acts as a role to centrally manage metadata associated with stored outlines.	<i>Oracle Database Concepts</i>
PM	PM	The account that owns the Product Media schema included in the Oracle Sample Schemas. It is available only if you loaded the Sample Schemas.	<i>Oracle Database Sample Schemas</i>
SCOTT	TIGER	An account used by Oracle sample programs and examples.	<i>Oracle Database Administrator's Guide</i>
SH	SH	The account that owns the Sales History schema included in the Oracle Sample Schemas. It is available only if you loaded the Sample Schemas during an Enterprise Edition installation.	<i>Oracle Database Administrator's Guide</i>
SI_INFORMTN_SCHEMA	SI_INFORMTN_SCHEMA	The account that stores the information views for the SQL/MM Still Image Standard.	<i>Oracle interMedia Reference</i>
SYS	Password set during installation or in the Database Configuration Assistant	The account used to perform database administration tasks.	<i>Oracle Database Administrator's Guide</i>
SYSMAN	Password set during installation or in the Database Configuration Assistant	The account used to perform Oracle Enterprise Manager database administration tasks. It is created only if you configure the database to use the Database Control.	<i>Oracle Enterprise Manager Grid Control Installation and Basic Configuration</i>
SYSTEM	Password set during installation or in the Database Configuration Assistant	Another account used to perform database administration tasks.	<i>Oracle Database Administrator's Guide</i>
WMSYS	WMSYS	The account used to store the metadata information for Oracle Workspace Manager.	<i>Oracle Database Application Developer's Guide - Workspace Manager</i>
WKPROXY	WMSYS	The Ultra Search proxy user.	<i>Oracle Ultra Search Administrator's Guide</i>
WK_TEST	WK_TEST	The default Ultra Search instance schema.	<i>Oracle Ultra Search Administrator's Guide</i>
WMSYS	WMSYS	The account used to store Ultra Search system dictionaries and PL/SQL packages.	<i>Oracle Ultra Search Administrator's Guide</i>
XDB	XDB	The account used for storing Oracle XML DB data and metadata.	<i>Oracle XML DB Developer's Guide</i>

Unlocking and Resetting User Passwords

Passwords for all Oracle system administration accounts except SYS, SYSTEM, SYSMAN, and DBSMP are revoked after installation. Before you use a locked account, you must unlock it and reset its password. If you created a preconfigured database during the installation, but you did not unlock a required account, you must unlock it now, using one of the following methods:

- [Using Database Control to Unlock Accounts and Reset Passwords](#)
- [Using SQL*Plus to Unlock Accounts and Reset Passwords](#)

Note: If you are creating a database using Database Configuration Assistant, you can unlock accounts after the database is created by clicking **Password Management** before you exit from Database Configuration Assistant.

Using Database Control to Unlock Accounts and Reset Passwords

To unlock and reset user account passwords using Oracle Enterprise Manager Database Control:

1. Log in to the Database Control.

See Also: The "[Logging In to Oracle Enterprise Manager Database Control](#)" section on page 5-1 for information about logging in to the Database Control

2. Click **Administration**.
3. In the Security section of the Administration page, click **Users**.
Enterprise Manager displays a table listing all database accounts. The Account Status column indicates whether the account is locked and whether the password is expired.
4. Select the user account that you want to modify, then click **Edit**.
5. Use the General page of the Users property sheet to unlock the account and, optionally, to change the password.

See Also: Click **Help** in the Database Control window for more information about using the Database Control

Using SQL*Plus to Unlock Accounts and Reset Passwords

To unlock and reset user account passwords using SQL*Plus:

1. Start SQL*Plus and log in as the SYS user, connecting as SYSDBA:

```
$ sqlplus /nolog
SQL> CONNECT SYS/SYS_password AS SYSDBA
```

2. Enter a command similar to the following, where *account* is the user account that you want to unlock and *password* is the new password:

```
SQL> ALTER USER account [ IDENTIFIED BY password ] ACCOUNT UNLOCK;
```

In this example:

- The ACCOUNT UNLOCK clause unlocks the account.

- The `IDENTIFIED BY password` clause resets the password.

Note: If you unlock an account but do not reset the password, then the password remains expired. The first time someone connects as that user, they must change the user's password.

To permit unauthenticated access to your data through HTTP, unlock the `ANONYMOUS` user account.

See Also: *Oracle Database Administrator's Guide* for more information about:

- Unlocking and changing passwords after installation
- Oracle security procedures
- Best security practices

Identifying Databases

The Oracle Database 10g software identifies a database by its global database name. A global database name consists of the database name and database domain. Usually, the database domain is the same as the network domain, but it need not be. The global database name uniquely distinguishes a database from any other database in the same network. You specify the global database name when you create a database during the installation, or using the Database Configuration Assistant. For example:

```
sales.us.oracle.com
```

In this example:

- `sales` is the name of the database. The database name portion is a string of no more than 8 characters that can contain alphanumeric, underscore (`_`), and pound (`#`) characters. The `DB_NAME` initialization parameter specifies the database name.
- `us.oracle.com` is the database domain in which the database is located. In this example, the database domain is the same as the network domain. Together, the database name and the database domain make the global database name unique. The domain portion is a string of no more than 128 characters that can contain alphanumeric, underscore (`_`), and pound (`#`) characters. The `DB_DOMAIN` initialization parameter specifies the database domain name.

The `DB_NAME` parameter and the `DB_DOMAIN` name parameter combine to create the global database name value assigned to the `SERVICE_NAMES` parameter in the initialization parameter file.

The System Identifier (SID) identifies a specific database instance. The SID uniquely distinguishes the instance from any other instance on the same computer. Each database instance requires a unique SID and database name. In most cases, the SID is the same as the database name portion of the global database name.

Locating the Server Parameter File

By default, the preconfigured database uses a server parameter file named `spfilesid.ora`, which is stored in the `$ORACLE_HOME/dbs` directory. However, if you choose Automatic Storage Management or raw device storage for the database, Database Configuration Assistant typically uses the same storage mechanism for the server parameter file.

If the server parameter file is not located in the `$ORACLE_HOME/dbs` directory, the database uses the `SPFILE` parameter in an initialization parameter file to locate it. The default initialization parameter file is `$ORACLE_HOME/dbs/init sid .ora`.

You can use the Oracle Enterprise Manager Database Control to view the location of the server parameter file and list all of the initialization parameters, as follows:

1. Log in to the Database Control.

See Also: The "[Logging In to Oracle Enterprise Manager Database Control](#)" section on page 5-1 for information about logging in to the Database Control

2. Click **Administration**.

3. In the Instance section of the Administration page, click **All Initialization Parameters**.

Enterprise Manager displays a table listing the current value of each initialization parameter.

4. Click **SPFile**.

Enterprise Manager displays a table listing the value of each initialization parameter specified in the server parameter file. The location of the server parameter file is displayed above the table.

Reviewing Tablespaces and Data Files, Redo Log Files, and Control Files

The following sections contain information about tablespaces and data files, redo log files, and control files:

- [Identifying Tablespaces and Data Files](#)
- [Locating Redo Log Files](#)
- [Locating Control Files](#)

Identifying Tablespaces and Data Files

An Oracle database is divided into smaller logical areas of space known as tablespaces. Each tablespace corresponds to one or more physical data files. Data files contain the contents of logical database structures such as tables and indexes. You can associate each data file with only one tablespace and database.

Note: The `SYSAUX` and `SYSTEM` tablespaces must be present in all Oracle Database 10g databases.

[Table 5–2](#) describes the tablespaces provided by the default preconfigured database.

Table 5–2 Tablespaces and Descriptions

Tablespace	Description
EXAMPLE	Stores the sample schemas, if you included them.
SYSAUX	Serves as an auxiliary tablespace to the <code>SYSTEM</code> tablespace. Some products and options that previously used the <code>SYSTEM</code> tablespace now use the <code>SYSAUX</code> tablespace, which reduces the load on the <code>SYSTEM</code> tablespace.

Table 5–2 (Cont.) Tablespaces and Descriptions

Tablespace	Description
SYSTEM	Stores the data dictionary, which includes definitions of tables, views, and stored procedures needed by Oracle Database.
TEMP	Stores temporary tables and indexes when processing SQL statements.
UNDOTBS1	Stores undo information.
USERS	Stores database objects created by database users.

See Also: *Oracle Database Concepts* and the *Oracle Database Administrator's Guide* for more information about tablespaces and data files

To use the Oracle Enterprise Manager Database Control to view the list of data files used by the database and their associated tablespaces:

1. Log in to the Database Control.

See Also: The "[Logging In to Oracle Enterprise Manager Database Control](#)" section on page 5-1 for information about logging in to the Database Control

2. Click **Administration**.

3. In the Storage section of the Administration page, click **Datafiles**.

Enterprise Manager displays a table listing each data file, and the tablespace with which it is associated.

See Also: For more information about using the Database Control to view, modify, and create tablespaces, click **Help** in the Database Control window.

Locating Redo Log Files

The preconfigured database uses three redo log files. Redo log files record all changes made to data in the database buffer cache. If an instance fails, then Oracle Database 10g uses the redo log files to recover the modified data in memory.

Oracle Database uses redo log files in a cyclical fashion. For example, if three files constitute the online redo log, Oracle Database fills the first file, then the second file, and then the third file. In the next cycle, it reuses and fills the first file, the second file, and so on.

See Also: *Oracle Database Backup and Recovery Basics* for more information about redo log files

To use the Oracle Enterprise Manager Database Control to view or modify the redo log files for your preconfigured database:

1. Log in to the Database Control.

See Also: The "[Logging In to Oracle Enterprise Manager Database Control](#)" section on page 5-1 for information about logging in to the Database Control

2. Click **Administration**.
3. In the Storage section of the Administration page, click **Redo Log Groups**.
Enterprise Manager displays a table listing the redo log groups used by the database.
4. To view the name and location of the redo log file associated with a particular group, select that group then click **View**.

See Also: For more information about using the Database Control to view, modify, and create redo log files, click **Help** in the Database Control window

Locating Control Files

The preconfigured database uses three control files. Oracle recommends that you keep at least three control files for each database and set the `CONTROL_FILES` initialization parameter to specify the location of each file.

A control file is an administrative file. Oracle Database 10g requires a control file to start and run the database. The control file defines the physical structure of the database. For example, it defines the database name and the names and locations of the database data files and redo log files.

To use the Oracle Enterprise Manager Database Control to view information about the control files for your preconfigured database:

1. Log in to the Database Control.

See Also: "[Logging In to Oracle Enterprise Manager Database Control](#)" on page 5-1 for information about logging in to the Database Control

2. Click **Administration**.
3. In the Storage section of the Administration page, click **Controlfiles**.
Enterprise Manager displays a table listing the control files used by the database.

See Also: For more information about using the Database Control to view information about control files and creating backups of these files to trace them, click **Help** in the Database Control window

For more information about setting the `CONTROL_FILES` initialization parameter value, refer to *Oracle Database Administrator's Guide*

Removing Oracle Software

This chapter describes how to completely remove all Oracle databases, instances, and software from an Oracle home directory. It includes information about the following topics:

- [Overview](#)
- [Identifying All Instances](#)
- [Removing an Oracle Database](#)
- [Removing an Automatic Storage Management Installation](#)
- [Reconfiguring Oracle Cluster Synchronization Services](#)
- [Removing Oracle Software](#)

See Also: If you want to remove an Oracle Real Application Clusters installation, refer to *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux* for more information

If you want to remove an individual product, refer to the product-specific documentation for requirements and restrictions

Overview

To completely remove all Oracle databases, instances, and software from an Oracle home directory, you must:

- Identify all instances associated with the Oracle home.
- Remove database and Automatic Storage Management instances.
- Shut down processes.
- Reconfigure the Oracle Cluster Synchronization Services Daemon, if necessary.
- Remove the Oracle software.

Identifying All Instances

To identify all instances associated with the Oracle home that you want to remove, enter the following command:

```
$ more /etc/oratab
```

The output of this command contains entries similar to the following:

```
+ASM:/u01/app/oracle/product/10.2.0/db_1:N  
CUST:/u01/app/oracle/product/10.2.0/db_1:N
```

These entries show that the +ASM Automatic Storage Manager instance and the CUST Oracle database instance are associated with the /u01/app/oracle/product/10.2.0/db_1 Oracle home directory.

Removing an Oracle Database

To completely remove Oracle Database software, you must remove any installed databases. To remove an Oracle database:

Note: Removing an Oracle database deletes all of the data in the database. If you want to keep this data, make sure that you back up the database before deleting it.

1. Log in as the `oracle` user:

```
$ su - oracle
```
2. Run the `oraenv` or `coraenv` script to set the environment for the database that you want to remove, for example:
 - Bourne, Bash, or Korn shell:

```
$ . /usr/local/bin/oraenv
```
 - C shell:

```
% source /usr/local/bin/coraenv
```
3. At the prompt, specify the SID for the database that you want to remove.
4. Start the Database Configuration Assistant:

```
$ dbca
```

The Welcome window appears.
5. Click **Next**.
The Operations window appears.
6. Select **Delete a Database**, then click **Next**.
7. Select the database that you want to delete, then click **Finish**.
8. In the window that appears, confirm that you want to delete the database.
9. When Database Configuration Assistant removes the database, you are prompted to choose whether you want to perform another operation. Click **Yes** to return to the Operations screen or click **No** to exit from Database Configuration Assistant. If you want to remove another database, click **Yes** and repeat steps 6 through 8.

Removing an Automatic Storage Management Installation

To completely remove Oracle database software, you must also remove any Automatic Storage Management instances running in the Oracle home. To remove an Automatic Storage Management instance:

1. If necessary, log in as the `oracle` user:

```
$ su - oracle
```

2. Run the `oraenv` or `coraenv` script to set the environment for the Automatic Storage Management instance that you want to remove, for example:
 - Bourne, Bash, or Korn shell:


```
$ . /usr/local/bin/oraenv
```
 - C shell:


```
$ source /usr/local/bin/coraenv
```
3. At the prompt, specify the SID for the Automatic Storage Management instance that you want to remove.
4. Connect to the Automatic Storage Management instance as the SYS user:


```
$ sqlplus "SYS/SYS_PASSWORD AS SYSDBA"
```
5. Enter the following command to determine whether any Oracle database instance is using the Automatic Storage Management instance:


```
SQL> SELECT INSTANCE_NAME FROM V$ASM_CLIENT;
```

This command lists all of the database instances that are using this Automatic Storage Management instance.

Note: This command only lists database instances that are running. It is possible that other instances are associated with the Automatic Storage Management instance, but they are not currently running.

If you removed a database from this Oracle home but the output from the command shows that this Automatic Storage Management instance is supporting a database instance in another Oracle home, do not remove the Automatic Storage Management instance or the Oracle home.

6. If there are no database instances associated with this Automatic Storage Management instance, drop the disk groups associated with this instance as follows:

Note: Dropping the Automatic Storage Management disk group makes the disk device available for use with another Automatic Storage Management instance if required. However, all data in the disk group is lost. Make sure that no other database instance requires any data from this disk group before you drop it.

- a. Identify the disk groups associated with the Automatic Storage Management instance:


```
SQL> SELECT NAME FROM V$ASM_DISKGROUP;
```
- b. For each disk group that you want to delete, enter a command similar to the following:


```
SQL> DROP DISKGROUP name INCLUDING CONTENTS;
```

7. Enter the following command to shut down the Automatic Storage Management instance:

```
SQL> SHUTDOWN
```
8. Remove the entry for the Automatic Storage Management instance from the `/etc/oratab` file.

Reconfiguring Oracle Cluster Synchronization Services

Oracle Cluster Synchronization Services (CSS) is a daemon process that is configured by the `root.sh` script when you configure an Automatic Storage Management instance. It is configured to start every time the system boots. This daemon process is required to enable synchronization between Oracle Automatic Storage Management and database instances. It must be running if an Oracle database is using Automatic Storage Management for database file storage.

Note: On cluster systems with Oracle Real Application Clusters (RAC) installations, the CSS daemon is configured during the Oracle Clusterware installation. If the system is running Oracle Clusterware, refer to *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux* for information about removing RAC or Oracle Clusterware.

Before you remove an Oracle Database 10g Oracle home, you must determine whether the CSS daemon is running from that Oracle home and whether any other Oracle Database 10g Oracle homes exist on the system:

- If the Oracle Database 10g Oracle home that you want to remove is the only Oracle Database 10g installation on the system, you can delete the CSS daemon configuration.
- If the CSS daemon is running from the Oracle Database 10g Oracle home that you want to remove and other Oracle Database 10g installations exist on the system, you must reconfigure the CSS daemon to run from another Oracle Database 10g Oracle home.

The following sections describe how to complete these tasks:

- [Identifying Oracle Database 10g Oracle Homes](#)
- [Reconfiguring the Oracle CSS Daemon](#)
- [Deleting the Oracle CSS Daemon Configuration](#)

Identifying Oracle Database 10g Oracle Homes

To identify all of the Oracle Database 10g Oracle home directories, enter the following command:

```
$ more /etc/oratab
```

From the output, identify any Oracle home directories where Oracle Database 10g is installed. Oracle homes that contain Oracle Database 10g typically have paths similar to the following. However, they might use different paths.

```
/mount_point/app/oracle/product/10.2.0/db_n
```


If there is only one Oracle home directory that contains Oracle Database 10g, refer to the "[Deleting the Oracle CSS Daemon Configuration](#)" section on page 6-6 for information about deleting the Oracle CSS daemon configuration.

If you identify more than one Oracle Database 10g Oracle home directory, refer to the following section for information about reconfiguring the Oracle CSS daemon.

Reconfiguring the Oracle CSS Daemon

To reconfigure the Oracle CSS daemon so that it runs from an Oracle home that you are not removing, follow these steps:

1. In all Oracle home directories on the system, stop all Oracle Automatic Storage Management instances and any Oracle Database instances that use Automatic Storage Management for database file storage.
2. Switch user to `root`.
3. Enter the following command to identify the Oracle home directory being used to run the CSS daemon:

```
# more /etc/oracle/ocr.loc
```

The output from this command is similar to the following:

```
ocrconfig_loc=/u01/app/oracle/product/10.2.0/db_1/cdata/localhost/local.ocr
local_only=TRUE
```

The `ocrconfig_loc` parameter specifies the location of the Oracle Cluster Registry (OCR) used by the CSS daemon. The path up to the `cdata` directory is the Oracle home directory where the CSS daemon is running (`/u01/app/oracle/product/10.2.0/db_1` in this example).

Note: If the value of the `local_only` parameter is `FALSE`, Oracle Clusterware is installed on this system.

See Also: *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux* for information about removing Oracle Real Applications Clusters or Oracle Clusterware

If this Oracle home directory is not the Oracle home that you want to remove, go to the "[Removing Oracle Software](#)" section on page 6-6.

4. Change directory to the Oracle home directory for an Oracle Database 10g installation that you are *not* removing.
5. Set the `ORACLE_HOME` environment variable to specify the path to this Oracle home directory:

- Bourne, Bash, or Korn shell:

```
# ORACLE_HOME=/u01/app/oracle/product/10.2.0/db_2;
# export ORACLE_HOME
```

- C shell:

```
# setenv ORACLE_HOME /u01/app/oracle/product/10.2.0/db_2
```

6. Enter the following command to reconfigure the CSS daemon to run from this Oracle home:

```
# $ORACLE_HOME/bin/localconfig reset $ORACLE_HOME
```

This command stops the Oracle CSS daemon, reconfigures it in the new Oracle home, and then restarts it. When the system boots, the CSS daemon starts automatically from the new Oracle home.

7. To remove the original Oracle home directory, refer to the "[Removing Oracle Software](#)" section on page 6-6.

Deleting the Oracle CSS Daemon Configuration

To delete the Oracle CSS daemon configuration, follow these steps:

Note: Delete the CSS daemon configuration only if you are certain that no other Oracle Database 10g installation requires it.

1. Remove any databases or Automatic Storage Management instances associated with this Oracle home. Refer to the preceding sections for information about how to complete these tasks.
2. Switch user to `root`.
3. Change directory to the Oracle home directory that you are removing.
4. Set the `ORACLE_HOME` environment variable to specify the path to this Oracle home directory:

- Bourne, Bash, or Korn shell:

```
# ORACLE_HOME=/u01/app/oracle/product/10.2.0/db_1  
# export ORACLE_HOME
```

- C shell:

```
# setenv ORACLE_HOME /u01/app/oracle/product/10.2.0/db_1
```

5. Enter the following command to delete the CSS daemon configuration from this Oracle home:

```
# $ORACLE_HOME/bin/localconfig delete
```

The script stops the Oracle CSS daemon, then deletes its configuration. When the system boots, the CSS daemon no longer starts.

Removing Oracle Software

The following steps describe how to use Oracle Universal Installer to remove Oracle software from an Oracle home:

Note: Always use Oracle Universal Installer to remove Oracle software. Do not delete any Oracle home directories without first using Oracle Universal Installer to remove the software.

1. If necessary, log in as the `oracle` user:

```
$ su - oracle
```

2. Set the ORACLE_HOME environment variable to specify the path of the Oracle home directory that you want to remove:

- Bourne, Bash, or Korn shell:

```
$ ORACLE_HOME=/u01/app/oracle/product/10.2.0/db_1
$ export ORACLE_HOME
```

- C shell:

```
$ setenv ORACLE_HOME /u01/app/oracle/product/10.2.0/db_1
```

3. Remove any databases or Automatic Storage Management instances associated with this Oracle home and delete or reconfigure the Oracle CSS daemon.

Refer to the preceding sections for information about how to complete these tasks.

4. Stop any processes running in this Oracle home:

Process Name	Command
Database Control	<code>\$ORACLE_HOME/bin/emctl stop dbconsole</code>
Oracle Net listener	<code>\$ORACLE_HOME/bin/lsnrctl stop</code>
iSQL*Plus	<code>\$ORACLE_HOME/bin/isqlplusctl stop</code>
Ultra Search	<code>\$ORACLE_HOME/bin/searchctl stop</code>

5. Start Oracle Universal Installer as follows:

```
$ $ORACLE_HOME/oui/bin/runInstaller
```

6. In the Welcome window, click **Deinstall Products**.

The Inventory screen appears, listing all of the Oracle homes on the system.

7. In the Inventory screen, select the Oracle home and the products that you want to remove, then click **Remove**.

Note: If you choose to remove Oracle JVM, Oracle Universal Installer removes all installed products that depend on Oracle JVM, including Oracle Database 10g.

Oracle Universal Installer displays a confirmation window asking you to confirm that you want to deinstall the products and their dependent components.

8. Click **Yes**.

Oracle Universal Installer displays a progress indicator as it removes the software.

9. When the products have been deleted, click **Cancel** to exit from Oracle Universal Installer, and then click **Yes**.

Installing and Configuring Oracle Database Using Response Files

This appendix describes how to install and configure Oracle products using response files. It includes information about the following topics:

- [Introduction](#)
- [Creating the oraInst.loc File](#)
- [Preparing a Response File](#)
- [Running Oracle Universal Installer in Silent or Suppressed Mode](#)
- [Running NetCA in Silent Mode](#)
- [Running Database Configuration Assistant in Noninteractive or Silent Mode](#)

Introduction

You can automate the installation and configuration of Oracle software, either fully or partially, by specifying a response file when you start Oracle Universal Installer. Oracle Universal Installer uses the values contained in the response file to provide answers to some or all of Oracle Universal Installer prompts:

- If you include responses for all of the prompts in the response file and specify the `-silent` option when starting Oracle Universal Installer, then Oracle Universal Installer runs in silent mode. During a silent-mode installation, Oracle Universal Installer does not display any screens. Instead, it displays progress information in the terminal that you used to start it.
- If you include responses for some or all of the prompts in the response file and omit the `-silent` option, then Oracle Universal Installer runs in suppressed mode. During a suppressed-mode installation, Oracle Universal Installer displays only the screens for which you did not specify all required information. You can also use variables in the response file or command-line options to suppress other installer screens, such as the Welcome screen or Summary screen, that do not prompt for information.

The following table describes several reasons why you might want to run Oracle Universal Installer in silent mode or suppressed mode:

Mode	Uses
Silent	<p>Use silent mode if you want to:</p> <ul style="list-style-type: none"> ■ Complete an unattended installation, which you might schedule using operating system utilities such as <code>at</code> ■ Complete several similar installations on multiple systems without user interaction ■ Install the software on a system that does not have X Window System software installed on it <p>Oracle Universal Installer displays progress information in the terminal that you used to start it, but it does not display any of Oracle Universal Installer screens.</p>
Suppressed	<p>Use suppressed mode if you want to complete similar Oracle software installations on more than one system, providing default answers to some, but not all of Oracle Universal Installer prompts.</p> <p>If you do not specify information required for a particular Installer screen in the response file, Oracle Universal Installer displays that screen. It suppresses screens for which you have provided all of the required information.</p>

Creating a Database Using Automatic Storage Management as the Storage Option for Database Files

Before you create a database that uses Automatic Storage Management, you must run the `root.sh` script. For this reason, you cannot create a database using Automatic Storage Management as the storage option for database files during a silent-mode installation. Instead, you can complete a software-only installation using silent-mode, then run the Oracle Net Configuration Assistant (NetCA) and Database Configuration Assistant configuration assistants in silent mode after you have completed the software-only installation and you have run the `root.sh` script.

Note: This limitation applies only to databases that use Automatic Storage Management as the storage option for database files. You can create a database that uses the file system or raw devices storage option during a silent-mode installation.

Installation Overview

To install and configure Oracle products using Oracle Universal Installer in silent or suppressed mode, follow these steps:

Note: You must complete all required preinstallation tasks on a system before running Oracle Universal Installer in silent or suppressed mode.

1. Create the `oraInst.loc` file.
2. Prepare a response file.
3. Run Oracle Universal Installer in silent or suppressed mode.
4. If you completed a software-only installation, run NetCA and Database Configuration Assistant in silent or noninteractive mode if required.

These steps are described in the following sections.

Creating the oraInst.loc File

If you plan to install Oracle products using Oracle Universal Installer in silent or suppressed mode, you must manually create the `oraInst.loc` file if it does not already exist. This file specifies the location of the Oracle Inventory directory where Oracle Universal Installer creates the inventory of Oracle products installed on the system.

Note: If Oracle software has been installed previously on the system, the `oraInst.loc` file might already exist. If the file does exist, you do not need to create a file.

To create the `oraInst.loc` file, follow these steps:

1. Switch user to root:

```
$ su - root
```

2. Change directory as follows:

```
# cd /etc
```

3. Use a text editor to create the `oraInst.loc` file, containing the following lines:

```
inventory_loc=ORACLE_BASE/oraInventory
inst_group=
```

In this example, `ORACLE_BASE` is the path of the Oracle base directory, for example, `/01/app/oracle`.

4. Enter the following commands to set the appropriate owner, group, and permissions on the `oraInst.loc` file:

```
# chown oracle:oinstall oraInst.loc
# chmod 664 oraInst.loc
```

Preparing a Response File

This section describes the methods that you can use to prepare a response file for use during silent-mode or suppressed-mode installations:

- [Editing a Response File Template](#)
- [Recording a Response File](#)

Editing a Response File Template

This method is most useful for the Enterprise Edition or Standard Edition installation types.

Oracle provides response file templates for each product and installation type, and for each configuration tool. These files are located in the `db/response` directory on the DVD.

Note: If you copied the software to a hard disk, the response files are located in the `Disk1/response` directory.

[Table A-1](#) lists the response files provided with Oracle Database.

Table A-1 Response Files

Response File	Description
enterprise.rsp	Enterprise Edition installation of Oracle Database 10g
standard.rsp	Standard Edition installation of Oracle Database 10g
custom.rsp	Custom installation of Oracle Database 10g
dbca.rsp	Database Configuration Assistant
netca.rsp	Oracle Net Configuration Assistant
emca.rsp	Enterprise Manager Configuration Assistant

To prepare a response file:

1. Copy the response file from the response file directory to a directory on your system:

```
$ cp /directory_path/response/response_file.rsp local_directory
```

In this example, *directory_path* is the path to the db directory on the DVD. If you have copied the software to a hard drive, then you can edit the file in the response directory if you prefer.

2. Open the response file in a text editor:

```
$ vi /local_dir/response_file.rsp
```

3. Edit the file, following the instructions in the file.

Note: Oracle Universal Installer or configuration assistant fails if you do not correctly configure the response file. Refer to the ["Silent-Mode Response File Error Handling"](#) section on page F-4 for more information about troubleshooting a failed silent-mode installation.

4. Change the permissions on the file to 700:

```
$ chmod 700 /local_dir/response_file.rsp
```

Caution: A fully specified response file for an Oracle Database installation contains the passwords for database administrative accounts and for a user that is a member of the OSDBA group (required for automated backups). Ensure that only the Oracle software owner user can view or modify response files or consider deleting them after the installation succeeds.

Recording a Response File

This method is most useful for Custom or software-only installations.

You can use Oracle Universal Installer in interactive mode to record a response file that you can edit and then use to complete silent-mode or suppressed-mode installations. When you are recording the response file, you can either complete the installation, or you can exit from Oracle Universal Installer on the Summary page, before it starts to copy the software to the system.

Note: You cannot use record mode to create a response file during an installation that uses the Basic Installation method.

To record a new response file:

1. Complete the preinstallation tasks listed in [Chapter 2](#).

When you run Oracle Universal Installer to record a response file, it checks the system to verify that it meets the requirements to install the software. For this reason, Oracle recommends that you complete all of the required preinstallation tasks and record the response file while completing an installation.

2. If you have not installed Oracle software on this system previously, create the `oraInst.loc` file, as described in the previous section.
3. Ensure that the Oracle software owner user (typically `oracle`) has permissions to create or write to the Oracle home path that you will specify when you run Oracle Universal Installer.
4. To record a response file, enter a command similar to the following to start Oracle Universal Installer:

Note: Do not specify a relative path to the response file. If you specify a relative path, Oracle Universal Installer fails.

```
$ /directory_path/runInstaller -record -destinationFile filename
```

In the previous example:

- *directory_path* is the path of the `db` directory on the DVD or the path of the `Disk1` directory on the hard drive
 - The `-record` parameter specifies that you want to record the responses that you enter in a response file
 - *filename* is the full path and file name of the response file that you want to record
5. On each Installer screen, specify the required information.
 6. When Oracle Universal Installer displays the Summary screen, do one of the following:
 - Click **Install** to create the response file, then continue with the installation.
 - Click **Cancel**, then **Yes** to create the response file but exit from Oracle Universal Installer without installing the software.

The response file is saved in the location that you specified using the `-destinationFile` option.

7. If you did not complete the installation, delete the Oracle home directory that Oracle Universal Installer created using the path you specified on the Specify File Locations screen.
8. Before using the recorded response file on another system, use a text editor to edit the file and make any required changes.

Use the comments in the file as a guide when editing it.

Running Oracle Universal Installer in Silent or Suppressed Mode

To run Oracle Universal Installer in silent or suppressed mode, follow these steps:

1. Complete the preinstallation tasks listed in [Chapter 2](#).
2. Log in as the Oracle software owner user (typically `oracle`).
3. If you are completing a suppressed-mode installation, set the `DISPLAY` environment variable.

Note: You do not have to set the `DISPLAY` environment variable if you are completing a silent-mode installation.

4. To start Oracle Universal Installer in silent or suppressed mode, enter a command similar to the following:

Note: Do not specify a relative path to the response file. If you specify a relative path, Oracle Universal Installer fails.

```
$ /directory_path/runInstaller [-silent] [-noconfig] -responseFile filename
```

In this example:

- `directory_path` is the path of the `db` directory on the DVD or the path of the `Disk1` directory on the hard drive.
- `-silent` indicates that you want to run Oracle Universal Installer in silent mode.
- `-noconfig` suppresses running the configuration assistants during installation, and a software-only installation is performed instead.
- `filename` is the full path and file name of the installation response file that you configured.

Note: For more information about other options for the `runInstaller` command, enter the following command:

```
$ /directory_path/runInstaller -help
```

5. When the installation completes, log in as the `root` user and run the `root.sh` script:

```
$ su
# /oracle_home_path/root.sh
```

Running NetCA in Silent Mode

You can run NetCA in silent mode to configure and start an Oracle Net listener on the system, configure naming methods, and configure Oracle Net service names. To run NetCA in silent mode, you must copy and edit a response file template. Oracle provides a response file template named `netca.resp` in the `response` directory in the `db/response` directory on the DVD.

Note: If you copied the software to a hard disk, the response file template is located in the `Disk1/response` directory.

To run NetCA in silent mode, follow these steps:

1. Copy the `netca.rsp` response file template from the response file directory to a directory on your system:

```
$ cp /directory_path/response/netca.rsp local_directory
```

In this example, `directory_path` is the path of the `db` directory on the DVD. If you have copied the software to a hard drive, you can edit the file in the `response` directory if you prefer.

2. Open the response file in a text editor:

```
$ vi /local_dir/netca.rsp
```

3. Edit the file, following the instructions in the file.

Note: NetCA fails if you do not correctly configure the response file.

4. Log in as the Oracle software owner user (typically `oracle`) and set the `ORACLE_HOME` environment variable to specify the correct Oracle home directory.
5. Enter a command similar to the following to run NetCA in silent mode:

```
$ $ORACLE_HOME/bin/netca /silent /responsefile /local_dir/netca.rsp
```

In this example:

- The `/silent` option indicates that you want to run NetCA in silent mode.
- `local_dir` is the full path of the directory where you copied the `netca.rsp` response file template.

Running Database Configuration Assistant in Noninteractive or Silent Mode

You can run Database Configuration Assistant in noninteractive or silent mode to configure and start an Oracle Database on your system. To run Database Configuration Assistant in noninteractive or silent mode, you must copy and edit a response file template. Oracle provides a response file template named `dbca.rsp` in the `db/response` directory on the DVD.

Note: If you copied the software to a hard disk, the response file template is located in the `Disk1/response` directory.

This section contains the following topics:

- [Using Database Configuration Assistant in Noninteractive Mode](#)
- [Using Database Configuration Assistant in Silent Mode](#)
- [Running Database Configuration Assistant in Noninteractive or Silent Mode](#)

Using Database Configuration Assistant in Noninteractive Mode

In noninteractive mode, Database Configuration Assistant uses values that you specify, in the response file or as command line options, to create a database. As it configures and starts the database, it displays a window that contains status messages and a progress bar. The window that it displays is the same window that is displayed when you choose to create a preconfigured database during an Enterprise Edition or Standard Edition installation.

To run Database Configuration Assistant in noninteractive mode, you must use a graphical display and set the `DISPLAY` environment variable.

Using Database Configuration Assistant in Silent Mode

In silent mode, Database Configuration Assistant uses values that you specify, in the response file or as command line options, to create a database. Database Configuration Assistant does not display any screens or information while it creates the database.

Running Database Configuration Assistant in Noninteractive or Silent Mode

To run Database Configuration Assistant in noninteractive or silent mode, follow these steps:

Note: As an alternative to editing the response file template, you can also create a database by specifying all required information as command line options when you run Database Configuration Assistant. For information about the list of options supported, enter the following command:

```
$ $ORACLE_HOME/bin/dbca -help
```

1. Copy the `dbca.rsp` response file template from the response file directory to a directory on your system:

```
$ cp /directory_path/response/dbca.rsp local_directory
```

In this example, `directory_path` is the path of the `db` directory on the DVD. If you have copied the software to a hard drive, you can edit the file in the response directory if you prefer.

2. Open the response file in a text editor:

```
$ vi /local_dir/dbca.rsp
```

3. Edit the file, following the instructions in the file.

Note: Database Configuration Assistant fails if you do not correctly configure the response file.

4. Log in as the Oracle software owner user (typically `oracle`) and set the `ORACLE_HOME` environment variable to specify the correct Oracle home directory.
5. If you intend running Database Configuration Assistant in noninteractive mode, set the `DISPLAY` environment variable.
6. Enter a command similar to the following to run Database Configuration Assistant in noninteractive or silent mode with a response file:

```
$ $ORACLE_HOME/bin/dbca {-progressOnly | -silent} [-cloneTemplate] \  
[-datafileDestination /datafilepath] -responseFile /local_dir/dbca.rsp
```

In this example:

- The `-silent` option indicates that you want to run Database Configuration Assistant in silent mode.
- The `-progressOnly` option indicates that you want to run Database Configuration Assistant in noninteractive mode.
- The `-cloneTemplate` option is required if you want to create one of the following preconfigured databases:
 - General Purpose
 - Transaction Processing
 - Data Warehouse
- `-datafileDestination` specifies the parent directory where you want to create the database files. If you do not specify this option, the parent directory for database files is the `$ORACLE_BASE/oradata` directory if the `ORACLE_BASE` environment variable is set, or the `$ORACLE_HOME/oradata` directory if `ORACLE_BASE` is not set.
- `local_dir` is the full path of the directory where you copied the `dbca.rsp` response file template.

Using NAS Devices

If you have a network attached storage (NAS) device that has been certified through the Oracle Storage Compatibility Program (OSCP), you can use it to store the Oracle software, the Oracle database files, or both. This appendix provides guidelines for using a NAS storage device for Oracle software and database files. It includes information about the following:

- [General Configuration Guidelines for NAS Devices](#)
- [Choosing Mount Points](#)
- [Creating Files on a NAS Device for Use with Automatic Storage Management](#)
- [NFS Mount Options](#)

General Configuration Guidelines for NAS Devices

Refer to the documentation provided with your NAS device for specific information about how to configure it. In addition, use the following guidelines to ensure that the performance of the Oracle software meets your requirements:

- Before using the NAS device for the installation, verify that it is certified. To identify certified devices, check the Oracle Storage Compatibility Program list at the following Web site:

<http://www.oracle.com/technology/deploy/availability/htdocs/oscp.html>

Note: The OSCP certifies NAS devices only for single-instance databases. For Oracle Real Application Clusters installations, refer to the *Certify* page on the Oracle *MetaLink* Web site for information about certified storage solutions, including NAS:

<http://metalink.oracle.com>

- The performance of Oracle software and databases stored on NAS devices depends on the performance of the network connection between the Oracle server and the NAS device.

For this reason, Oracle recommends that you connect the server to the NAS device using a private dedicated network connection, which should be Gigabit Ethernet or better.

- For single instance installations (as opposed to RAC installations), you must create a separate Oracle home directory for each installation. Run the software in this Oracle home directory only from the system that you used to install it.

For Oracle Real Application Clusters (RAC) installations, you can use a single Oracle home directory mounted from each node in the cluster. You must mount this Oracle home directory on each node so that it has the same directory path on all nodes.

Choosing Mount Points

This section provides guidelines on how to choose the mount points for the file systems that you want to use for the Oracle software and database files. The guidelines contained in this section comply with the Optimal Flexible Architecture recommendations.

Choosing Mount Points for Oracle Software Files

Oracle software files are stored in three different directories:

- Oracle base directory
- Oracle Inventory directory
- Oracle home directory

For the first installation of Oracle software on a system, the Oracle base directory, identified by the `ORACLE_BASE` environment variable, is normally the parent directory for both the Oracle Inventory and Oracle home directories. For example, for a first installation, the Oracle base, Oracle Inventory, and Oracle home directories might have paths similar to the following:

Directory	Path
Oracle base (<code>\$ORACLE_BASE</code>)	<code>/u01/app/oracle</code>
Oracle Inventory	<code>\$ORACLE_BASE/oraInventory</code>
Oracle home	<code>\$ORACLE_BASE/product/10.2.0/db_1</code>

For subsequent installations, you can choose to use either the same Oracle base directory or a different one, but every subsequent installation uses the original Oracle Inventory directory. For example, if you use the `/u02/app/oracle` directory as the Oracle base directory for a new installation, the Oracle Inventory directory continues to be `/u01/app/oracle/oraInventory`.

To enable you to effectively maintain the Oracle software on a particular system, Oracle recommends that you locate the Oracle Inventory directory only on a local file system, if possible. If you must place the Oracle Inventory directory on a NAS device, create a specific directory for each system, to prevent more than one system from writing to the same Inventory.

Directory-Specific Guidelines

You can use any of the following directories as mount points for NFS file systems used to store Oracle software:

Note: In the following examples, the paths shown are the defaults if the `ORACLE_BASE` environment variable is set before you start Oracle Universal Installer.

- Oracle base directory or its parents (`/u01/app/oracle` for example)

If you use the Oracle base directory of one of its parents as a mount point, the default location for all Oracle software and database files will be on that file system. During the installation, you might consider changing the default location of the following directories:

- The Oracle Inventory directory (*oracle_base/oraInventory*)

Specify a local file system or a host-specific directory on the NFS file system, for example:

```
oracle_base/hostname/oraInventory
```

- The Oracle database file directory (*oracle_base/oradata*)

You might want to use a different file system for database files, for example, to enable you to specify different mount options or to distribute I/O.

- The Oracle database recovery file directory (*oracle_base/flash_recovery_area*)

Oracle recommends that you use different file systems for database and recovery files.

If you use this mount point, all Oracle installations that use this Oracle base directory will use the NFS file system.

- The product directory (*oracle_base/product*)

By default, only software files will be located on the NFS file system. You can also use this mount point to install software from different releases, for example:

```
/u01/app/oracle/product/9.2.0
/u01/app/oracle/product/10.2.0/db_1
```

- The release directory (*oracle_base/product/10.2.0*)

By default, only software files will be located on the NFS file system. You can also use this mount point to install different products from the same release, for example:

```
/u01/app/oracle/product/10.2.0/crs
/u01/app/oracle/product/10.2.0/db_1
/u01/app/oracle/product/10.2.0/companion_1
```

- The Oracle home directory (*oracle_base/product/10.2.0/db_1*)

By default, only software files will be located on the NFS file system. This is the most restrictive mount point. You can use it only to install a single release of one product:

```
/u01/app/oracle/product/10.2.0/db_1
```

Choosing Mount Points for Oracle Database and Recovery Files

To store Oracle database or recovery files on a NAS device, you can use different paths depending on whether you want to store files from only one database or from more than one database:

- Use the NFS file system for files from more than one database

If you want to store the database files or recovery files from more than one database on the same NFS file systems, use paths or mount points similar to the following:

File Type	Path or Mount Point
Database files	/u02/oradata
Recovery files	/u03/flash_recovery_area

When Oracle Universal Installer prompts you for the data file and the recovery file directories, specify these paths. The Database Configuration Assistant and Enterprise Manager create subdirectories in these directories using the value you specify for the database name (DB_NAME) as the directory name, for example:

```
/u02/oradata/db_name1
/u03/flash_recovery_area/db_name1
```

- Use the NFS file system for files from only one database

If you want to store the database files or recovery files for only one database in the NFS file system, you can create mount points similar to the following, where `orcl` is the name that you want to use for the database:

```
/u02/oradata/orcl
/u03/flash_recovery_area/orcl
```

Specify the directory `/u02/oradata` when Oracle Universal Installer prompts you for the data file directory and specify the directory `/u03/flash_recovery_area` when Oracle Universal Installer prompts you for the recovery file location. The `orcl` directory will be used automatically either by Database Configuration Assistant or by Enterprise Manager.

Creating Files on a NAS Device for Use with Automatic Storage Management

If you have a certified NAS storage device, you can create zero-padded files in an NFS mounted directory and use those files as disk devices in an Automatic Storage Management disk group. To create these files, follow these steps:

Note: To use files as disk devices in an Automatic Storage Management disk group, the files must be on an NFS mounted file system. You cannot use files on local file systems.

1. If necessary, create an exported directory for the disk group files on the NAS device.
Refer to the NAS device documentation for more information about completing this step.
2. Switch user to root:

```
$ su -
```
3. Create a mount point directory on the local system:

```
# mkdir -p /mnt/oracleasm
```
4. To ensure that the NFS file system is mounted when the system reboots, add an entry for the file system in the `/etc/fstab` mount file.

For more information about editing the mount file for your operating system, refer to the man pages. For more information about recommended mount options, refer to the "NFS Mount Options" section on page B-5.

5. Enter a command similar to the following to mount the NFS file system on the local system:

```
# mount /mnt/oracleasm
```

6. Choose a name for the disk group that you want to create, for example `nfsdg`.

7. Create a directory for the files on the NFS file system, using the disk group name as the directory name:

```
# mkdir /mnt/oracleasm/nfsdg
```

8. Use commands similar to the following to create the required number of zero-padded files in this directory:

```
# dd if=/dev/zero of=/mnt/oracleasm/nfsdg/disk1 bs=1024k count=1000
```

This example creates 1 GB files on the NFS file system. You must create one, two, or three files respectively to create an external, normal, or high redundancy disk group.

9. Enter the following commands to change the owner, group, and permissions on the directory and files that you created:

```
# chown -R oracle:dba /mnt/oracleasm
# chmod -R 660 /mnt/oracleasm
```

10. When you are creating the database, edit the Automatic Storage Management disk discovery string to specify a regular expression that matches the file names you created. For example, you might specify a disk discovery string similar to the following:

```
/mnt/oracleasm/nfsdg/*
```

NFS Mount Options

You must mount NFS volumes used for storing database files with special mount options on the host where the database server is running. When mounting an NFS file system, Oracle recommends that you use the same mount point options that your NAS vendor used when certifying the device. Refer to your device documentation or contact your vendor for information about recommended mount-point options.

In general, most vendors recommend that you use the NFS mount options listed in the following table.

Option	Requirement	Description
<code>hard</code>	Mandatory	Generate a hard mount of the NFS file system. If the connection to the server fails or is temporarily lost, connection attempts are made until the NAS device responds.
<code>bg</code>	Optional	Try to connect in the background if connection fails.
<code>tcp</code>	Optional	Use the TCP protocol rather than UDP. TCP is more reliable than UDP.

Option	Requirement	Description
<code>nfsvers=3</code>	Optional	Use NFS version 3. Oracle recommends that you use NFS version 3 where available, unless the performance of version 2 is higher.
<code>suid</code>	Optional	Allow clients to run executables with SUID enabled. This option is required for Oracle software mount points.
<code>rsize</code>	Mandatory	The number of bytes used when reading from the NAS device. This value should be set to the maximum database block size supported by this platform. A value of 8192 is often recommended for NFS version 2 and 32768 is often recommended for NFS version 3.
<code>wsize</code>	Mandatory	The number of bytes used when writing to the NAS device. This value should be set to the maximum database block size supported by this platform. A value of 8192 is often recommended for NFS version 2 and 32768 is often recommended for NFS version 3.
<code>nointr</code> (or <code>intr</code>)	Optional	Do not allow (or allow) keyboard interrupts to kill a process that is hung while waiting for a response on a hard-mounted file system. Note: Different vendors have different recommendations about this option. Contact your vendor for advice.
<code>actime=0</code> or <code>noac</code>	Mandatory	Disable attribute caching. Note: You must specify this option for NFS file systems where you want to install the software. If you do not use this option, Oracle Universal Installer will not install the software in the directory that you specify.

The mandatory mount options comprise the minimum set of mount options that you must use while mounting the NFS volumes. These mount options are essential to protect the integrity of the data and to prevent any database corruption. Failure to use these mount options may result in the generation of file access errors. Refer to your operating system or NAS device documentation for more information about the specific options supported on your platform.

Optimal Flexible Architecture

This appendix describes the Optimal Flexible Architecture standard. The standard is a set of configuration guidelines created to ensure reliable Oracle installations that require little maintenance. It includes information about the following topics:

- [Overview of the Optimal Flexible Architecture Standard](#)
- [Changes to the Optimal Flexible Architecture for Oracle Database 10g](#)
- [Implementing Optimal Flexible Architecture](#)
- [Improving Reliability and Performance](#)

Overview of the Optimal Flexible Architecture Standard

The Optimal Flexible Architecture standard is designed to:

- Organize large amounts of complicated software and data on disk, to avoid device bottlenecks and poor performance
- Facilitate routine administrative tasks such as software and data backup, which are often vulnerable to data corruption
- Facilitate switching between multiple Oracle databases
- Adequately manage and administer database growth
- Help eliminate fragmentation of free space in the data dictionary, isolate other fragmentation, and minimize resource contention

Optimal Flexible Architecture is a set of guidelines that you should adopt when organizing Oracle directories and files on your computer. All Oracle components on the installation media are compliant with Optimal Flexible Architecture. This means that Oracle Universal Installer places Oracle Database components in directory locations that follow Optimal Flexible Architecture guidelines.

Although using Optimal Flexible Architecture is not a requirement, Oracle recommends that you use it if your database will grow in size, or if you plan to have multiple databases.

Characteristics of an Optimal Flexible Architecture Compliant Installation

The following are the characteristics of an Oracle product installation that complies with the Optimal Flexible Architecture standard:

- File system organization

The file system is organized to enable easy administration and to facilitate:

- Adding data into existing databases
- Adding users
- Creating databases
- Adding hardware
- Distributed I/O loads
I/O loads are distributed across enough disk drives to prevent performance bottlenecks.
- Hardware support
In most cases, you do not require new hardware to implement the Optimal Flexible Architecture standard.
- Safeguards Against Drive Failures
By distributing applications across more than one drive, drive failures affect as few applications as possible.
- Distribution of Oracle home directories
The following items can be distributed across more than one disk drive:
 - The collection of home directories
 - The contents of an individual home directory
- Integrity of login home directories
You can add, move, or delete login home directories without having to revise programs that refer to them.
- Independence of UNIX directory subtrees
Categories of files are separated into independent UNIX directory subtrees so that files in one category are minimally affected by operations on files in other categories.
- Supports concurrent execution of application software
You can run multiple versions of Oracle software simultaneously, enabling you to test and use a new release before retiring the previous release. Transferring to a new release after an upgrade is simple for the administrator and transparent for the user.
- Separates administrative information for each database
The ability to separate administrative information for each database ensures a reasonable structure for the organization and storage of administrative data.
- Uses consistent database file naming
Database files are named so that:
 - Database files are easy to distinguish from other files
 - Files belonging to one database are easy to distinguish from files that belong to another database
 - Control files, redo log files, and data files can be identified as such
 - The association of data file to tablespace is clearly indicated
- Separation of tablespace contents
Tablespace contents are separated to:

- Minimize tablespace free space fragmentation
- Minimize I/O request contention
- Maximize administrative flexibility
- I/O loads tuned across all drives
 - I/O loads are tuned across all drives, including drives storing Oracle data in either Automatic Storage Management disk groups or in raw devices.

Changes to the Optimal Flexible Architecture for Oracle Database 10g

For previous releases of Oracle Database, the Optimal Flexible Architecture standard recommended Oracle home path was similar to the following:

```
/u01/app/oracle/product/9.2.0
```

For Oracle Database 10g, the Optimal Flexible Architecture recommended Oracle home path has changed. The Optimal Flexible Architecture recommended path is now similar to the following:

```
/u01/app/oracle/product/10.2.0/type[_n]
```

In this example, *type* is the type of Oracle home, for example Oracle Database (*db*) or Oracle Client (*client*), and *n* is an optional counter. This syntax provides the following benefits:

- You can install different products with the same release number in the same Oracle base directory, for example:

```
/u01/app/oracle/product/10.2.0/db_1
/u01/app/oracle/product/10.2.0/client_1
```

- You can install the same product more than once in the same Oracle base directory, for example:

```
/u01/app/oracle/product/10.2.0/db_1
/u01/app/oracle/product/10.2.0/db_2
```

Implementing Optimal Flexible Architecture

This section describes the naming strategy recommended by the Optimal Flexible Architecture standard. It contains the following sections:

- [File Systems](#)
- [Naming Directories](#)
- [Naming Database Files](#)
- [Separating Segments with Different Requirements](#)
- [Naming Tablespaces](#)
- [Exploiting the Optimal Flexible Architecture Structure for Oracle Files](#)
- [Optimal Flexible Architecture File Mapping](#)

File Systems

This section describes the conventions for mount points.

Number of File Systems

To fully implement the Optimal Flexible Architecture recommendations for a database stored on file systems that are not striped or mirrored, you require at least three file systems located on separate physical devices.

Naming Conventions

Name all file system mount points using the syntax `/pm`, where `p` is a string constant and `m` is a unique fixed-length key (typically a two-digit number) used to distinguish each mount point. For example: `/u01` and `/u02`, or `/disk01` and `/disk02`.

Naming Mount Points for Very Large Databases (VLDBs)

If each disk drive contains database files from one application and there are enough drives for each database to prevent I/O bottlenecks, use the syntax `/pm/q/dm` for naming mount points. [Table C-1](#) describes the variables used in this syntax.

Table C-1 Syntax for Naming Mount Points for Very Large Databases

Variable	Description
<code>p_m</code>	A mount point name
<code>q</code>	A string denoting that Oracle data is stored in this directory, for example, <code>oradata</code>
<code>d_m</code>	The value of the initialization parameter <code>DB_NAME</code> (typically the same as the instance <code>SID</code> for single-instance databases)

For example, to allocate two drives exclusively for the `test` database, name the mount points `/u01/oradata/test` and `/u02/oradata/test`.

Naming Directories

This section describes the naming conventions for directories that are compliant with the Optimal Flexible Architecture standard.

Oracle Base Directory Naming Convention

The Oracle base directory is the top-level directory for Oracle products installed by the same user. Name Oracle base directories using the syntax `/pm/h/u`. [Table C-2](#) describes the variables used in this syntax.

Table C-2 Syntax for Naming Oracle Base Directories

Variable	Description
<code>p_m</code>	A mount point name
<code>h</code>	A standard directory name
<code>u</code>	The name of the owner of the directory (the user running Oracle Universal Installer)

For example, `/u01/app/oracle` is an Oracle base directory created by the `oracle` user and `/u01/app/applmgr` is an Oracle base directory created by the `applmgr` user.

Placing Oracle base directories at the same level in the UNIX file system is advantageous because it enables you to refer to the collection of Oracle base directories on different mount points using a single pattern matching string, `/* /app/*`.

Referring to Path Names

Refer to explicit path names only in files designed specifically to store them, such as the password file, `/etc/passwd`, and the Oracle `oratab` file. Refer to group memberships only in the `/etc/group` file.

Oracle Home Directory Naming Convention

To help fulfill the Optimal Flexible Architecture requirement of simultaneously running multiple versions of Oracle software, install the software in a directory matching the pattern `/pm/h/u/product/v/type_[n]`.

Table C-3 describes the variables used in this syntax.

Table C-3 Syntax for Naming Oracle Home Directories

Variable	Description
<code>pm</code>	A mount point name
<code>h</code>	A standard directory name
<code>u</code>	The name of the owner of the directory
<code>v</code>	The version of the software
<code>type</code>	The type of installation, for example Database (<code>db</code>), Client (<code>client</code>), Companion (<code>companion</code>), or CRS (<code>crs</code>)
<code>n</code>	An optional counter, which enables you to install the same product more than once in the same Oracle base directory

For example:

- `/u01/app/oracle/product/10.2.0/db_1` indicates the Oracle home directory for the first installation of Oracle Database on this system.
- `/u01/app/oracle/product/10.2.0/crs` indicates the Oracle home directory for Oracle Clusterware (Clusterware is required for RAC installations).

Oracle Clusterware can be installed only once on the system, so the optional counter is not required.

Set the `ORACLE_HOME` environment variable after installation to specify the Oracle home directory.

Naming Subdirectories

To facilitate the organization of administrative data, Oracle recommends that you store database-specific administration files in subdirectories matching the pattern `/h/admin/d/a/`, where `h` is the Oracle base directory, `d` is the database name (`DB_NAME`), and `a` is a subdirectory for specific types of database administration files. Table C-4 describes the database administration file subdirectories.

Table C-4 Subdirectories for Database Administration Files

Subdirectory	Description
<code>adhoc</code>	Ad hoc SQL scripts
<code>arch</code>	Archived redo log files
<code>adump</code>	Audit files (Set the <code>AUDIT_FILE_DEST</code> initialization parameter to specify the <code>adump</code> directory. Clean out this subdirectory periodically.)
<code>bdump</code>	Background process trace files

Table C-4 (Cont.) Subdirectories for Database Administration Files

Subdirectory	Description
cdump	Core dump files
create	Scripts used to create the database
exp	Database export files
logbook	Files recording the status and history of the database
pfile	Instance parameter files
udump	User SQL trace files

For example, `/u01/app/oracle/admin/sab/adhoc/` is the `adhoc` subdirectory associated with the database named `sab`.

Naming Database Files

The following table lists the recommended file naming conventions for database files:

Note: Oracle Managed Files (OMF) and files stored in Automatic Storage Management disk groups use different naming conventions. For more information about these naming conventions, refer to the *Oracle Database Administrator's Guide*.

File Type	File Naming Convention
Control files	<code>/pm/q/d/control.ctl</code>
Redo log files	<code>/pm/q/d/redo.n.log</code>
Data files	<code>/pm/q/d/tn.dbf</code>

The following table describes this syntax:

Variable	Description
<code>pm</code>	A mount point name described previously in this appendix
<code>q</code>	A string (typically <code>oradata</code>) distinguishing Oracle data from all other files
<code>d</code>	The value of the <code>DB_NAME</code> initialization parameter (typically, the same as the instance <code>SID</code> for single-instance databases)
<code>t</code>	An Oracle tablespace name
<code>n</code>	A two-digit string

Note: Do not store files other than control files, redo log files, or data files associated with database `d` in the path `/pm/q/d`.

Using this convention, it is easy to determine the database to which the `/u03/oradata/sab/system01.dbf` file belongs.

Separating Segments with Different Requirements

Separate groups of segments with different lifespans, I/O request demands, and backup frequencies across different tablespaces.

Table C-5 describes the special tablespaces that the Database Configuration Assistant creates for each Oracle database. If you manually create a database, you must create the required tablespaces. These tablespaces are in addition to those required for application segments.

See Also: *Oracle Database Administrator's Guide* for information about creating databases manually

Table C-5 Special Tablespaces

Tablespace	Required	Description
EXAMPLE	No	The EXAMPLE tablespace used to store the Sample Schemas
SYSAUX	Yes	Auxiliary tablespace to the SYSTEM tablespace
SYSTEM	Yes	Data dictionary segments
TEMP	Yes	Temporary segments
UNDOTBS1	Yes	Used by Oracle to store undo information
USERS	No	Miscellaneous user segments

Creating these special tablespaces is effective because data dictionary segments are never dropped, and no other segments that can be dropped are allowed in the SYSTEM tablespace. Doing this ensures that the SYSTEM tablespace does not require a rebuild due to tablespace free-space fragmentation.

Naming Tablespaces

Name tablespaces descriptively using a maximum of eight characters. Although Oracle Database tablespace names can be 30 characters long, portable UNIX file names are restricted to 14 characters. The recommended standard for a data file basename is *tn.dbf*, where *t* is a descriptive tablespace name and *n* is a two-digit string. Because the extension and the two-digit string take six characters, only eight characters remain for the tablespace name.

Descriptive names enable the data file to be associated with the tablespace that uses it. For example, the names GLD and GLX might be used for the tablespaces storing General Ledger data and General Ledger indexes, respectively.

Note: Do not embed reminders of the word "tablespace" in your tablespace names. Tablespace names can be distinguished by context. For example, do not name the General Ledger tablespace `GLD_TBS01.dbf`.

Exploiting the Optimal Flexible Architecture Structure for Oracle Files

Table C-6 describes the syntax used for identifying classes of files.

Table C-6 Directory Structure Syntax for Identifying Classes of Files

Directory Structure Syntax	Description
/u[0-9][0-9]	User data directories
/home/	User home directories
/app/	User application software directories
*/app/applmgr	Oracle applications software subtrees
*/app/oracle/product	Oracle software subtrees
*/app/oracle/product/10.2.0	Oracle software subtree for release 10.2.0 products
/app/oracle/product/10.2.0/db	Oracle home directories for Oracle Database 10g
*/app/oracle/admin/sab	sab database administrative subtrees
/app/oracle/admin/sab/arch/	sab database archived log files
*/oradata	Oracle data directories
/oradata/sab/	sab database files
/oradata/sab/.log	sab database redo log files

Optimal Flexible Architecture File Mapping

Table C-7 shows a hierarchical file mapping of a sample Optimal Flexible Architecture-compliant installation with two Oracle home directories and two databases. The database files are distributed across three mount points, /u02, /u03, and /u04.

Table C-7 Hierarchical File Mapping for an Optimal Flexible Architecture Installation

Directory	Description
/	Root directory
/u01/	User data mount point 1
/u01/app/	Subtree for application software
/u01/app/oracle/	Oracle Base directory
/u01/app/oracle/admin/	Subtree for database administration files
/u01/app/oracle/admin/TAR	Subtree for support log files
/u01/app/oracle/admin/db_name1/	admin subtree for db_name1 database
/u01/app/oracle/admin/db_name2/	admin subtree for db_name2 database
/u01/app/oracle/doc/	Online documentation
/u01/app/oracle/flash_recovery_area/	Subtree for recovery files
/u01/app/oracle/flash_recovery_area/db_name1	Recovery files for db_name1 database
/u01/app/oracle/flash_recovery_area/db_name2	Recovery files for db_name2 database
/u01/app/oracle/product/	Distribution files
/u01/app/oracle/product/9.2.0	Oracle home directory for Oracle9i release 2 (9.2.0)
/u01/app/oracle/product/10.2.0/db_1	Oracle home directory for Oracle Database 10g release 2 (10.2)
/u01/app/kjff/	Oracle base directory for user kjff
/u01/app/edm/	Oracle base directory for user edm

Table C-7 (Cont.) Hierarchical File Mapping for an Optimal Flexible Architecture Installation

Directory	Description
/u02	User data mount point 2
/u02/oradata/	Subtree for Oracle data
/u02/oradata/db_name1/	Subtree for <i>db_name1</i> database files
/u02/oradata/db_name2/	Subtree for <i>db_name2</i> database files
/u03/	User data mount point 3
/u03/oradata/	Subtree for Oracle data
/u03/oradata/db_name1/	Subtree for <i>db_name1</i> database files
/u03/oradata/db_name2/	Subtree for <i>db_name2</i> database files
/u04/	User data mount point 4
/u04/oradata/	Subtree for Oracle data
/u04/oradata/db_name1/	Subtree for <i>db_name1</i> database files
/u04/oradata/db_name2/	Subtree for <i>db_name2</i> database files

Improving Reliability and Performance

One of the goals of Optimal Flexible Architecture is to improve reliability and performance by distributing I/O loads across different physical drives. The following are methods to accomplish this:

- [Disk Mirroring](#)
- [Disk Striping](#)

Disk Mirroring

You can separate and treat Oracle Database log files and database files with different levels of hardware reliability. Oracle Database log files are highly reliable to start with, because they are stored redundantly. Creating similar reliability for database files may require you to duplicate all of your data, using disk mirrors.

Disk mirroring usually involves two or more identical drives and either a hardware controller or Windows Disk Administrator. If one disk fails, then the other disks can recover data that would otherwise be lost. Using one of the disks to recover lost data may involve losing the mirror. If this happens, then you must build a new mirror.

Disk mirroring is part of some levels of Redundant Array of Independent Disks (RAID) configurations, provided by the disk controller. The RAID level determines the amount of redundancy. Some RAID levels can use the hot swapping feature, which means that you can replace a bad disk with a good one without turning off the computer or losing functionality.

Disk Striping

How you set up disks for use in a database depends on the number of disks and the type of hard disk controllers available. If the hard disk controllers support both striping and mirroring, then Oracle recommends that you configure the controllers to support striping.

You can configure some controllers at system startup time by issuing a keyboard sequence that brings up configuration programs written by the controller

manufacturer. One goal is to stripe as many drives together as possible by configuring the controllers. Each stripe shows up as one logical device.

Striping provides significant performance advantages. All the space from the striped drives appears as a single logical drive. In addition, the space is used by interlacing stripes of space from all of the disks in the stripe. This means that a large file uses some space from the first disk, then some from the second disk, and so on to the last disk, and then starting back at the first disk again. Each file can be spread over all of the striped disks. Multiple CPUs can access data randomly in such a file without contention.

Controllers that support striping usually provide caching as well. This means that data can be written to the controller and cached and saved for a time in storage not on the disk. Data that is read can be cached on the controller in the same manner. Read caching should not be used with Oracle Database, because all database reads are already cached in the System Global Area (SGA). The value of the `DB_CACHE_SIZE` parameter in the initialization parameter file, `init.ora`, determines the buffer size that can be used in the SGA. This value also configures Oracle Database on startup.

Note:

- Read caching should be disabled.
 - Disk write caching should be disabled on disks containing Oracle Database data files and redo log files where the contents of the write cache are not flushed to disk in the event of a power failure or operating system failure. Consult your vendor documentation for more information.
-
-

Managing Oracle Database Port Numbers

During installation, Oracle Universal Installer assigns port numbers to components from a set of default port numbers. This appendix lists the default port numbers and describes how to change the assigned port after installation. It includes information about the following topics:

- [About Managing Ports](#)
- [Viewing Port Numbers and Access URLs](#)
- [Port Numbers and Protocols of Oracle Components](#)
- [Changing the Oracle Enterprise Management Agent Port](#)
- [Changing the Oracle Enterprise Manager Database Control Ports](#)
- [Changing the iSQL*Plus Ports](#)
- [Changing the Oracle Ultra Search Ports](#)
- [Changing the Oracle XDB Ports](#)

About Managing Ports

Many Oracle Database components and services use ports. As an administrator, it is important to know the port numbers used by these services, and to make sure that the same port number is not used by two services on your host.

Most port numbers are assigned during installation. Every component and service has an allotted port range, which is the set of port numbers Oracle Database attempts to use when assigning a port. Oracle Database starts with the lowest number in the range and performs the following checks:

- Is the port used by another Oracle Database installation on the host?
The installation may be up or down at the time; Oracle Database can still detect if the port is used.
- Is the port used by a process that is currently running?
This could be any process on the host, even a non-Oracle Database process.
- Is the port listed in the `/etc/services` files?

If the answer to any of the preceding questions is yes, Oracle Database moves to the next highest port in the allotted port range and continues checking until it finds a free port.

Viewing Port Numbers and Access URLs

In most cases, the Oracle Database component's port number is listed in the tool used to configure the port. In addition, ports for some Oracle Database applications are listed in the `portlist.ini` file. This file is located in the `$ORACLE_HOME/install` directory.

If you change a port number, it is not updated in the `portlist.ini` file, so you can only rely on this file immediately after installation. To change a port number, use the methods described in this appendix.

Port Numbers and Protocols of Oracle Components

The following table lists the port numbers and protocols used by components that are configured during the installation. By default, the first port in the range is assigned to the component, if it is available.

Table D-1 Ports Used in Oracle Components

Component and Description	Default Port Number	Port Range	Protocol
Oracle SQL*Net Listener Allows Oracle client connections to the database over Oracle's SQL*Net protocol. You can configure it during installation. To reconfigure this port, use Net Configuration Assistant.	1521	1521	TCP
Data Guard Shares the SQL*Net port and is configured during installation. To reconfigure this port, use Net Configuration Assistant to reconfigure the Oracle SQL*Net listener.	1521 (same value as the listener)	1521	TCP
Connection Manager Listening port for Oracle client connections to Oracle Connection Manager. It is not configured during installation, but can be configured using Net Configuration Assistant.	1630	1630	TCP
Oracle Enterprise Manager Database Agent HTTP port for Enterprise Manager Database Agent. It is configured during installation. "Changing the Oracle Enterprise Management Agent Port" on page D-4 explains how to modify its port number	3938	1830-1849	HTTP
Oracle Enterprise Manager Database Console HTTP port for Enterprise Manager Database Control. It is configured during installation. "Changing the Oracle Enterprise Manager Database Control Ports" on page D-4 explains how to modify its port number.	1158	5500-5519	TCP/HTTP
Oracle Enterprise Manager Database Console RMI port for Enterprise Manager Database Control. It is configured during installation. "Changing the Oracle Enterprise Manager Database Control Ports" on page D-4 explains how to modify its port number.	5520	5520-5539	TCP

Table D-1 (Cont.) Ports Used in Oracle Components

Component and Description	Default Port Number	Port Range	Protocol
Enterprise Manager Database Console JMS port for Enterprise Manager Database Control. It is configured during installation. " Changing the Oracle Enterprise Manager Database Control Ports " on page D-4 explains how to modify its port number.	5540	5540–5559	TCP
iSQL*Plus HTTP port for iSQL*Plus. The port number is automatically assigned during installation. " Changing the iSQL*Plus Ports " on page D-5 explains how to change its port number.	5560	5560–5579	TCP/HTTP
iSQL*Plus RMI port for iSQL*Plus. The port number is automatically assigned during installation. " Changing the iSQL*Plus Ports " on page D-5 explains how to change its port number.	5580	5580–5599	TCP
iSQL*Plus JMS port for iSQL*Plus. The port number is automatically assigned during installation. " Changing the iSQL*Plus Ports " on page D-5 explains how to change its port number.	5600	5600–5619	TCP
Oracle Ultra Search HTTP port for Oracle Ultra Search. Its port number is assigned automatically when you install Oracle Ultra Search, by using the Custom installation type. " Changing the Oracle Ultra Search Ports " on page D-5 explains how to change its port number.	5620	5620–5639	TCP/HTTP
Oracle Ultra Search RMI port for Oracle Ultra Search. Its port number is assigned automatically when you install Oracle Ultra Search, by using the Custom installation type. " Changing the Oracle Ultra Search Ports " on page D-5 explains how to change its port number.	5640	5640–5659	TCP
Oracle Ultra Search JMS port for Oracle Ultra Search. Its port number is assigned automatically when you install Oracle Ultra Search, by using the Custom installation type. " Changing the Oracle Ultra Search Ports " on page D-5 explains how to change its port number.	5660	5660–5679	TCP

Table D-1 (Cont.) Ports Used in Oracle Components

Component and Description	Default Port Number	Port Range	Protocol
Oracle XDB The Oracle XDB HTTP port is used if Web-based applications need to access an Oracle database from an HTTP listener. It is configured during installation, but you cannot view it afterward. "Changing the Oracle XDB Ports" on page D-6 explains how to change its port number.	Dynamic	Dynamic	HTTP
Oracle XDB The Oracle XDB FTP is used when applications need to access an Oracle database from an FTP listener. It is configured during installation, but you cannot view it afterward. "Changing the Oracle XDB Ports" on page D-6 explains how to change its port number.	Dynamic	Dynamic	FTP
Oracle Clusterware CRS daemon (Oracle Clusterware Daemon) internode connection. The port number is assigned automatically during installation. You cannot view or modify it afterward.	49896	49896	TCP

Changing the Oracle Enterprise Management Agent Port

To find the current setting for the Oracle Enterprise Management agent port, search for `EMD_URL` in the `$ORACLE_HOME/host_sid/sysman/config/emd.properties` file.

To change the Oracle Enterprise Management Agent HTTP port, use the `emca -reconfig ports` command:

```
emca -reconfig ports -AGENT_PORT 1831
```

Changing the Oracle Enterprise Manager Database Control Ports

To find the current HTTP, RMI, and JMS port settings, search in the following files:

- **HTTP port:** Search for `REPOSITORY_URL` in the `$ORACLE_HOME/host_sid/sysman/config/emd.properties` file.
- **RMI port:** Search for the `port` attribute in the `rmi-server` tag in the `$ORACLE_HOME/oc4j/j2ee/OC4J_DBConsole_host_sid/config/rmi.xml` file.
- **JMS port:** Search for the `port` attribute in the `jms-server` tag in the `$ORACLE_HOME/oc4j/j2ee/OC4J_DBConsole_host_sid/config/jms.xml` file.

To change the Oracle Enterprise Manager Database Control ports, use the `emca -reconfig ports` command:

```
$ORACLE_HOME/bin> emca -reconfig ports option setting
```

where *option* can be:

- `DBCONTROL_HTTP_PORT`: Sets the HTTP port, for example:

```
emca -reconfig ports -DBCONTROL_HTTP_PORT 1820
```
- `RMI_PORT`: Sets the RMI port, for example:

```
emca -reconfig ports -RMI_PORT 5520
```

- JMS_PORT: Sets the JMS port, for example:

```
emca -reconfig ports -JMS_PORT 5521
```

You can enter multiple `-reconfig port` settings in one line, for example:

```
emca -reconfig ports -DBCONTROL_HTTP_PORT 1820 -AGENT_PORT 1821 -RMI_PORT 5520
```

Changing the iSQL*Plus Ports

The following sections describe how to change the iSQL*Plus ports.

Changing the HTTP Port

To change the HTTP port, edit the following files:

- `$ORACLE_HOME/host_sid/sysman/config/emoms.properties`

Modify the following port parameters (for example, 5560) in the file:

```
oracle.sysman.db.isqlplusUrl=http://host.domain:5560/isqlplus/dynamic
oracle.sysman.db.isqlplusWebDBAUrl=http://host.domain:5560/isqlplus/dynamic
```

- `$ORACLE_HOME/oc4j/j2ee/isqlplus/config/http-web-site.xml`

Modify the port attribute of the `web-site` element:

```
<web-site port="5560" ...>
```

Changing the RMI Port

To change the RMI port, modify the port attribute of the `rmi-server` element in the `$ORACLE_HOME/oc4j/j2ee/isqlplus/config/rmi.xml` file:

```
<rmi-server port="5580" ...>
```

Changing the JMS Port

To change the JMS port, modify the port attribute of the `jms-server` element in the `$ORACLE_HOME/oc4j/j2ee/isqlplus/config/jms.xml` file:

```
<jms-server port="5600" ...>
```

Changing the Oracle Ultra Search Ports

The following sections describe how to change the Oracle Ultra Search ports.

Changing the HTTP Port

To change the HTTP port, modify the port attribute of the `web-site` element in the `$ORACLE_HOME/oc4j/j2ee/OC4J_SEARCH/config/http-web-site.xml` file:

```
<web-site port="5620" ...>
```

Changing the RMI Port

To change the RMI port, modify the port attribute of the `rmi-server` element in the `$ORACLE_HOME/oc4j/j2ee/OC4J_SEARCH/config/rmi.xml` file:

```
<rmi-server port="5640" ...>
```

Changing the JMS Port

To change the JMS port, modify the `port` attribute of the `jms-server` element in the `$ORACLE_HOME/oc4j/j2ee/OC4J_SEARCH/config/jms.xml` file:

```
<jms-server port="5660"...>
```

Changing the Oracle XDB Ports

To change the Oracle XDB FTP and HTTP ports, you need to run the `catxdbdbca.sql` script, which in a default installation is located in `$ORACLE_HOME/rdbms/admin`.

To change the Oracle XDB ports:

1. Check that the Oracle listener is running. To do so, in the Services control panel, make sure that the Oracle TNS Listener service (for example, `OracleOraDb10g_home1TNSListener`) is set to **Started**.

If you cannot start the listener, refer to *Oracle Database Net Services Administrator's Guide*.

2. Log into SQL*Plus or iSQL*Plus as `SYS` or `XDB` using the `SYSDBA` role.

For example, to log in to SQL*Plus as `SYS` using the password `welcome`:

```
$ sqlplus "sys/welcome AS SYSDBA"
```

3. Run the `catxdbdbca.sql` script.

For example, to use 2200 for the FTP port and 8200 for the HTTP port, and assuming your Oracle home is in the following location, enter the following command:

```
SQL> @$ORACLE_HOME/rdbms/admin/catxdbdbca.sql 2200 8200
```

4. Exit SQL*Plus or iSQL*Plus.

Globalization Support

This appendix describes these Globalization Support topics:

- [About NLS_LANG Environment Variable](#)
- [Running Oracle Universal Installer in Different Languages](#)

About NLS_LANG Environment Variable

Oracle provides Globalization Support that enables users to interact with a database in their preferred locale and character set settings. Setting the NLS_LANG environment variable specifies locale behavior for Oracle software. It sets the language and territory used by the client application and the database server. It also sets the character set for entering and displaying data by a client program, such as SQL*Plus.

The NLS_LANG environment variable uses the following format:

```
NLS_LANG=language_territory.characterset
```

where:

Parameter	Description
<i>language</i>	Specifies the language used for displaying Oracle messages, sorting, day names, and month names.
<i>territory</i>	Specifies the conventions for default date, monetary and numeric formats.
<i>characterset</i>	Specifies the encoding used by the client application (normally the Oracle character set that corresponds to the character set of the user terminal or the operating system)

The NLS_LANG environment variable is set as a local environment variable for the shell on all UNIX-based platforms. For example, if the operating system locale setting is `en_US.UTF-8`, then the corresponding NLS_LANG environment variable should be set to `AMERICAN_AMERICA.AL32UTF8`.

See Also: *Oracle Database Globalization Support Guide* for information about the NLS_LANG parameter and Globalization Support initialization parameters

Caution: AL32UTF8 is the Oracle Database character set that is appropriate for XMLType data. It is equivalent to the IANA registered standard UTF-8 encoding, which supports all valid XML characters.

Do not confuse Oracle Database database character set UTF8 (no hyphen) with database character set AL32UTF8 or with character encoding UTF-8. Database character set UTF8 has been superseded by AL32UTF8. Do not use UTF8 for XML data. UTF8 supports only Unicode version 3.1 and earlier; it does not support all valid XML characters. AL32UTF8 has no such limitation.

Using database character set UTF8 for XML data could potentially cause a fatal error or affect security negatively. If a character that is not supported by the database character set appears in an input-document element name, a replacement character (usually "?") is substituted for it. This will terminate parsing and raise an exception.

The following table lists some of the valid values for the NLS_LANG environment variable.

Note: Refer to the operating system specific documentation on how to determine the operating system locale environment setting.

Operating system locale	NLS_LANG values
French (France)	FRENCH_FRANCE.WE8ISO8859P15, FRENCH_FRANCE.WE8ISO8859P1, FRENCH_FRANCE.WE8MSWIN1252, FRENCH_FRANCE.AL32UTF8
Japanese (Japan)	JAPANESE_JAPAN.JA16EUC, JAPANESE_JAPAN.JA16SJIS, JAPANESE_JAPAN.AL32UTF8

Running Oracle Universal Installer in Different Languages

Oracle Universal Installer runs by default in the selected language of your operating system. You can also run Oracle Universal Installer in the following languages:

- Brazilian Portuguese
- German
- Japanese
- Simplified Chinese
- Traditional Chinese
- French
- Italian
- Korean
- Spanish

To run Oracle Universal Installer in a different language, you can use any of the following methods:

- Change the language in which the operating system is running before you run Oracle Universal Installer. You can change the language in which the operating

system is running by clicking **Language** on the Login screen and selecting the required language from the list.

- To run Oracle Universal Installer in another language from the shell prompt, use a command similar to the following after changing to the Disk1 directory (or to the directory that contains the runInstaller file):

```
# LANG=language_territory.characterset ./runInstaller
```

For example, to run Oracle Universal Installer in German, use the following command:

```
# LANG=de_DE.UTF-8 ./runInstaller
```

See Also: *Oracle Universal Installer and OPatch User's Guide* for information about running Oracle Universal Installer in different languages

Troubleshooting

This appendix contains information about troubleshooting. It includes information about the following topics:

- [Verify Requirements](#)
- [X Window Display Errors](#)
- [What to Do If an Installation Error Occurs](#)
- [Reviewing the Log of an Installation Session](#)
- [Troubleshooting Configuration Assistants](#)
- [Silent-Mode Response File Error Handling](#)
- [Cleaning Up After a Failed Installation](#)

Verify Requirements

Before performing any of the troubleshooting steps in this appendix, ensure that the system meets the requirements and that you have completed all of the preinstallation tasks specified in [Chapter 2](#).

Read the Release Notes

Read the release notes for the product before installing it. The release notes are available on the Oracle Database 10g disc. The latest version of the release notes is also available on the Oracle Technology Network Web site:

<http://www.oracle.com/technology/documentation/>

X Window Display Errors

If you are running Oracle Universal Installer on a remote system and you want to display Oracle Universal Installer's user interface on your local system, you might see error messages similar to the following:

```
"Failed to connect to server"  
"Connection refused by server"  
"Can't open display"
```

If you see one of these error messages, follow these steps:

Note: This procedure applies only to users of UNIX workstations. If you are using a PC or other system with X server software installed, refer to the X server documentation for information about how to permit remote systems to display X applications on the local system.

1. In a local terminal window, log in as the user that started the X window session.
2. Enter the following command:

```
$ xhost fully_qualified_remote_host_name
```

For example:

```
$ xhost somehost.us.acme.com
```
3. Enter the following commands, where *workstation_name* is the host name or IP address of your workstation:
 - Bourne, Bash, or Korn shell:

```
$ DISPLAY=workstation_name:0.0  
$ export DISPLAY
```
 - C shell:

```
% setenv DISPLAY workstation_name:0.0
```
4. To determine whether X Window applications display correctly on the local system, enter the following command:

```
$ xclock
```

The X clock should appear on your monitor.
5. If the X clock appears, close the X clock and start Oracle Universal Installer again.

What to Do If an Installation Error Occurs

If you encounter an error during installation:

- Do not exit Oracle Universal Installer.
- If you clicked **Next** after you entered incorrect information on one of the installation screens, click **Back** to return to the screen and correct the information.
- If you encounter an error while Oracle Universal Installer is copying or linking files, refer to the "[Reviewing the Log of an Installation Session](#)" section on page F-3.
- If you encounter an error while a configuration assistant is running, refer to the "[Troubleshooting Configuration Assistants](#)" section on page F-3.
- If you cannot resolve the problem, remove the failed installation by following the steps listed in the "[Cleaning Up After a Failed Installation](#)" section on page F-4.

Reviewing the Log of an Installation Session

During an installation, Oracle Universal Installer records all of the actions that it performs in a log file. If you encounter problems during the installation, review the log file for information about possible causes of the problem.

To view the log file, follow these steps:

1. If necessary, enter the following command to determine the location of the oraInventory directory:

```
$ cat /etc/oraInst.loc
```

The `inventory_loc` parameter in this file specifies the location of the oraInventory directory.

2. Enter the following command to change directory to Oracle Universal Installer log file directory, where `orainventory_location` is the location of the oraInventory directory:

```
$ cd /orainventory_location/logs
```

3. Enter the following command to determine the name of the log file:

```
$ ls -ltr
```

This command lists the files in the order of creation, with the most recent file shown last. Installer log files have names similar to the following, where `date_time` indicates the date and time that the installation started:

```
installActionsdate_time.log
```

4. To view the most recent entries in the log file, where information about a problem is most likely to appear, enter a command similar to the following:

```
$ tail -50 installActionsdate_time.log | more
```

This command displays the last 50 lines in the log file.

5. If the error displayed by Oracle Universal Installer or listed in the log file indicates a relinking problem, refer to the following file for more information:

```
$ORACLE_HOME/install/make.log
```

Troubleshooting Configuration Assistants

To troubleshoot an installation error that occurs when a configuration assistant is running:

- Review the installation log files listed in the ["Reviewing the Log of an Installation Session"](#) section on page F-3.
- Review the specific configuration assistant log file located in the `$ORACLE_HOME/cfgtoollogs` directory. Try to fix the issue that caused the error.
- If you see the "Fatal Error. Reinstall" message, look for the cause of the problem by reviewing the log files. Refer to the ["Fatal Errors"](#) section on page F-4 for further instructions.

Configuration Assistant Failure

Oracle configuration assistant failures are noted at the bottom of the installation screen. The configuration assistant interface displays additional information, if available. The configuration assistant execution status is stored in the following file:

`oraInventory_location/logs/installActionsdate_time.log`

The execution status codes are listed in the following table:

Status	Result Code
Configuration assistant succeeded	0
Configuration assistant failed	1
Configuration assistant cancelled	-1

Fatal Errors

If you receive a fatal error while a configuration assistant is running, you must remove the current installation and reinstall the Oracle software, as follows:

1. Remove the failed installation as described in the ["Cleaning Up After a Failed Installation"](#) section on page F-4.
2. Correct the cause of the fatal error.
3. Reinstall the Oracle software.

Silent-Mode Response File Error Handling

To determine whether a silent-mode installation succeeds or fails, refer to the following log file:

`/oraInventory_location/logs/silentInstalldate_time.log`

If necessary, refer to the previous section for information about determining the location of the `oraInventory` directory.

A silent installation fails if:

- You do not specify a response file
- You specify an incorrect or incomplete response file
- Oracle Universal Installer encounters an error, such as insufficient disk space

Oracle Universal Installer or configuration assistant validates the response file at run time. If the validation fails, the silent-mode installation or configuration process ends. Oracle Universal Installer treats values for parameters that are of the wrong context, format, or type as if no value was specified in the file.

Cleaning Up After a Failed Installation

If an installation fails, you must remove files that Oracle Universal Installer created during the attempted installation and remove the Oracle home directory. Perform the following steps to remove the files:

1. Start Oracle Universal Installer as described in the ["Installing the Oracle Database Software"](#) section on page 3-5.

2. Click **Deinstall Products** on the Welcome window or click **Installed Products** on any Installer window.

The Inventory window appears, listing installed products.

3. Select the Oracle home that contains the products that you want to remove, then click **Remove**.
4. Manually remove the Oracle home directory created during the failed installation.
5. Reinstall the Oracle software.

Frequently Asked Questions About Installation

Use the following guidelines to decide how to install Oracle Database components:

- [Installing Oracle Database or Oracle Database Client](#)
- [Installing Oracle Database Tools](#)
- [Installing Oracle Database with Oracle Applications](#)
- [Installing Oracle Database Heterogeneous Connectivity Tools \(Gateways\)](#)

Installing Oracle Database or Oracle Database Client

- [I only need one instance of Oracle Database or I just want to install a test database to get familiar with the product.](#)
- [My site needs a database designed for transaction-heavy or data warehousing applications.](#)
- [I need to install multiple Oracle databases.](#)
- [My site requires client connections to the Oracle database.](#)
- [My Oracle Database client nodes have limited disk space.](#)
- [I need to upgrade my Oracle Database.](#)
- [The computers at my site have been configured to run as a cluster. How should I install Oracle Database?](#)
- [I need to migrate my non-Oracle databases to Oracle Database.](#)

I only need one instance of Oracle Database or I just want to install a test database to get familiar with the product.

- If you want a quick installation using the default installation settings, then refer to *Oracle Database Quick Installation Guide for Linux x86*.
- If your site has special requirements, then refer to *Oracle Database Installation Guide for Linux x86*.

My site needs a database designed for transaction-heavy or data warehousing applications.

If you want to create a starter database designed for transaction-heavy or data warehousing applications, then refer to *Oracle Database Installation Guide for Linux x86*. Select the Advanced Installation method, and then select the database type you want on the Select Database Configuration screen.

See Also: *Oracle Database Data Warehousing Guide* after installation

Alternatively, you can install Oracle OLAP during the Oracle Database installation. Oracle OLAP provides optimal support for database environments that must meet OLAP requirements. To do so, select Advanced Installation, then Custom, and on the Available Product Components screen, select Oracle OLAP.

See Also:

- *Oracle OLAP Application Developer's Guide*
- *Oracle OLAP Reference*
- *Oracle OLAP DML Reference*
- *Oracle OLAP Java API Reference*
- *Oracle OLAP Analytic Workspace Java API Reference*

I need to install multiple Oracle databases.

Use *Oracle Database Installation Guide for Linux x86* and consider running Oracle Universal Installer in noninteractive mode. This method lets you run Oracle Universal Installer at a command line using a response file that contains settings specific to each computer.

My site requires client connections to the Oracle database.

1. Install Oracle Database onto your server by using *Oracle Database Installation Guide for Linux x86*.
2. Use *Oracle Database Client Installation Guide for Linux x86* to install Oracle Database Client on each client node.

If you have many client nodes, consider staging the software centrally, mapping the drive, and running Oracle Universal Installer in noninteractive mode.

If the client nodes only require a default installation into a new Oracle home directory, consider using *Oracle Database Client Quick Installation Guide for Linux x86*.

My Oracle Database client nodes have limited disk space.

1. Install Oracle Database onto your server by using *Oracle Database Installation Guide*.
2. Use *Oracle Database Client Installation Guide for Linux x86* or *Oracle Database Client Quick Installation Guide for Linux x86* to install Oracle Database Client on each client node, and select the Instant Client installation type.

If you have many client nodes, then consider running Oracle Universal Installer in noninteractive mode.

I need to upgrade my Oracle Database.

Refer to *Oracle Database Upgrade Guide*.

The computers at my site have been configured to run as a cluster. How should I install Oracle Database?

Use any of the following installation scenarios:

- If you want to run a single-instance Oracle Database in a clustered environment, then install Oracle Clusterware either before or after you install Oracle Database.

- If you want a consolidated pool of storage for all databases in a cluster, then install Oracle Clusterware first and use Automatic Storage Management to manage this storage. Afterwards, install Oracle Database (which can be either single instance or Real Application Clusters).
- If you plan to use Oracle Real Application Clusters, first install Oracle Clusterware, and then install Oracle Real Application Clusters.

Refer to *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide* for the platform to install Oracle Clusterware or Oracle Real Application Clusters. Oracle Clusterware is available on the Oracle Clusterware installation media. *Oracle Database Installation Guide for Linux x86* explains how to install Automatic Storage Management as well as Oracle Database.

Oracle Clusterware is a key component required by Oracle Real Application Clusters installations. Oracle Clusterware is an integrated cluster management solution that can bind multiple servers together to act as a single system referred to as a cluster. It performs workload management and component restart. For example, when an instance supporting a particular service fails, Oracle Clusterware restarts the service on the next available instance that you have configured for that service. Oracle Clusterware can monitor non-Oracle programs, as long as they are defined within the Oracle Clusterware environment using the High Availability API.

I need to migrate my non-Oracle databases to Oracle Database.

Use Oracle Migration Workbench to migrate your non-Oracle databases and applications to Oracle. Oracle Migration Workbench software and documentation are available at:

<http://www.oracle.com/technology/tech/migration/>

Installing Oracle Database Tools

- [I need to install Oracle Application Server.](#)
- [I need to administer and monitor my Oracle Database products.](#)
- [How do I manage security for my Oracle Database products?](#)
- [Does Oracle Database provide OLAP tools so that I can analyze data such as trends and time series in my database?](#)
- [Does Oracle Database provide data mining tools that I can use to discover hidden meaning in my data and predict likely outcomes based on my data?](#)
- [How do I perform backup and recovery operations for Oracle Database?](#)

I need to install Oracle Application Server.

See *Oracle Application Server Installation Guide*. How you install Application Server depends on whether you already have Oracle Database installed:

- If you do not have Oracle Database installed or you do not want Oracle Application Server to use any of your existing Oracle Databases, the Oracle Universal Installer lets you install Oracle Application Server with its own Oracle Database. This database is populated with the metadata that Oracle Application Server needs in order to run.
- If you want Oracle Application Server to use an existing Oracle Database, do the following:

1. From the Oracle Application Server installation media, run Oracle Application Server Repository Creation Assistant to populate your database with the metadata that Application Server needs.
2. Install the remaining Oracle Application Server components by following the instructions in the *Oracle Application Server Installation Guide*.

I need to administer and monitor my Oracle Database products.

To perform regular administrative functions such as creating, configuring, or deleting databases, or managing database templates, use one of the following methods:

To manage only the single database and listener that you are installing:

1. Use *Oracle Database Installation Guide for Linux x86* to install Oracle Database.
2. From Oracle Database, use Database Configuration Assistant to manage your databases.

You can also administer and monitor the database with Oracle Enterprise Manager Grid Control, which is installed by default with Oracle Database. Oracle Enterprise Manager Grid Control includes the Oracle Management Agent, Oracle Management Service, and Oracle Management Repository, as well as Grid Control, a browser-based central console through which administrators can perform all monitoring, administration, and configuration tasks for the enterprise.

See Also: *Oracle Enterprise Manager Grid Control Installation and Basic Configuration* available on the Enterprise Manager Grid Control installation media

To perform advanced administration tasks, such as monitoring Oracle Database and managing multiple hosts, application servers, and databases including the one that you are installing, install Oracle Enterprise Manager as follows:

1. Use *Oracle Database Installation Guide for Linux x86* to install Oracle Database.
If you plan to use Oracle Real Application Clusters, then install Oracle Database by using *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Installation Guide for Linux*.
2. Use *Oracle Enterprise Manager Grid Control Installation and Basic Configuration* to install and configure Oracle Enterprise Manager. For postconfiguration tasks, use *Oracle Enterprise Manager Advanced Configuration*.

How do I manage security for my Oracle Database products?

Oracle provides a wide range of security solutions for your enterprise environment, including centralized administration and security features integrated with Oracle Internet Directory. The set of Oracle security services called Oracle Platform Security integrates the security features built into Oracle Database, Oracle Application Server, and the Oracle Identity Management infrastructure. Combined, these features enable the development and deployment of secure e-business applications.

Oracle Identity Management includes Oracle Internet Directory, a centralized repository that simplifies administration of users and applications in the Oracle environment by means of the following components:

- Oracle Internet Directory client tools, including LDAP command-line tools, the Oracle Internet Directory SDK, and Oracle Directory Manager.

- Oracle Internet Directory server components, including the directory server, the directory replication server, the directory integration server, and various tools for starting and stopping them.

Oracle Database includes the Oracle Internet Directory client tools, but not the Oracle Internet Directory server components. To install the Oracle Internet Directory server components, run Oracle Universal Installer from an Oracle 10g Application Server installation.

See Also:

- *Oracle Application Server Installation Guide* (to install Oracle Identity Management)
- *Oracle Database Security Guide*
- *Oracle Database Advanced Security Administrator's Guide*
- *Oracle Database Enterprise User Administrator's Guide*
- *Oracle Label Security Administrator's Guide*
- *Oracle Application Server Security Guide*
- http://www.oracle.com/technology/deploy/security/ols/pdf/OLS9iR2_faq.html for an FAQ on Oracle Label Security on Oracle Technology Network

Does Oracle Database provide OLAP tools so that I can analyze data such as trends and time series in my database?

Yes, install Oracle OLAP, which is provided in the Oracle Database installation. Oracle OLAP provides optimal support for database environments that must meet OLAP requirements.

Use either of the following methods in Oracle Database Installation Guide to install Oracle OLAP:

- Select the Custom installation type, and in the Available Product Components screen, select Oracle OLAP.

See Also: The following manuals after you install Oracle OLAP:

- *Oracle OLAP Application Developer's Guide*
- *Oracle OLAP Reference*
- *Oracle OLAP DML Reference*
- *Oracle OLAP Java API Reference*
- *Oracle OLAP Analytic Workspace Java API Reference*
- Select the Enterprise Edition installation type, and then on the Select Database Configuration screen, select the Data Warehouse configuration.

See Also: *Oracle Database Data Warehousing Guide* after installation

Does Oracle Database provide data mining tools that I can use to discover hidden meaning in my data and predict likely outcomes based on my data?

Yes. Install Oracle Data Mining, which is provided in the Oracle Database installation. With the Oracle Data Mining option, you can create and execute predictive and descriptive data mining models that use a variety of algorithms.

Use the following method in *Oracle Database Installation Guide for Linux x86* to install Oracle Data Mining:

1. Select the Enterprise Edition installation type.
2. On the Select Database Configuration screen, select the **General Purpose** configuration.

If you want the Database to execute predefined mining models, but not support model creation, install the Data Mining Scoring Engine instead of Oracle Data Mining. Use the following method in Oracle Database Installation Guide to install the Data Mining Scoring Engine:

1. Select the Custom installation type.
2. In the Available Product Components screen, select **Data Mining Scoring Engine**.

See Also: The following manuals after you have installed Oracle Data Mining:

- *Oracle Data Mining Concepts*
- *Oracle Data Mining Administrator's Guide*
- *Oracle Data Mining Application Developer's Guide*
- *Oracle Data Mining Java API Reference*
- *Oracle Database PL/SQL Packages and Types Reference* (search for "Data Mining")
- *Oracle Database SQL Reference* (search for "Data Mining")

How do I perform backup and recovery operations for Oracle Database?

Use Oracle Database Recovery Manager (RMAN), which is a backup and recovery tool integrated into Oracle Database. This tool satisfies the pressing demands of high-performance, manageable backup, and recovery. Recovery Manager is native to the database server, automatically tracks database structure changes, and optimizes operations accordingly. In addition, Recovery Manager is integrated with leading tape media management products, so that Oracle database backups can be integrated with your existing networked data protection infrastructure.

See Also:

- *Oracle Database Backup and Recovery Basics*
- *Oracle Database Backup and Recovery Advanced User's Guide*
- *Oracle Database Backup and Recovery Reference*
- *Oracle Database Backup and Recovery Quick Start Guide*

Installing Oracle Database with Oracle Applications

- [How do I install my Oracle applications with Oracle Database?](#)
- [I need to create Web applications that communicate with Oracle Database.](#)
- [I need to automate and streamline my processes for both traditional applications-based workflow as well as e-business integration workflow.](#)
- [My Oracle applications need a Web Server.](#)
- [I need to migrate my non-Oracle applications to Oracle.](#)

How do I install my Oracle applications with Oracle Database?

In most cases, install Oracle Database itself, then install the Oracle application. The Oracle Universal Installer for that application prompts you for the connection information. Check the application documentation requirements.

If you need to implement your applications with Oracle Real Applications Clusters databases, refer to *Oracle Database Oracle Clusterware and Oracle Real Application Clusters Administration and Deployment Guide*.

I need to create Web applications that communicate with Oracle Database.

Install Oracle HTML DB and Oracle HTTP Server:

1. Use *Oracle Database Installation Guide for Linux x86* to install Oracle Database.
2. Use *Oracle Database Companion CD Installation Guide for Linux x86* to install Oracle HTML DB and Oracle HTTP Server.

The following components are available on the Oracle Database Companion CD installation media:

- Oracle JDBC Development Drivers
- Oracle SQLJ
- Oracle Ultra Search
- JPublisher
- Natively Compiled Java Libraries
- Oracle Database Examples
- Oracle HTML DB
- Oracle HTTP Server
- Oracle Workflow server and middle-tier components
- Oracle Text Supplied Knowledge Bases

If you only need to install Oracle HTML DB and Oracle HTTP Server using the default settings into a new Oracle home, consider using *Oracle Database Companion CD Quick Installation Guide for Linux x86*.

I need to automate and streamline my processes for both traditional applications-based workflow as well as e-business integration workflow.

Install Oracle Workflow:

1. Use *Oracle Database Installation Guide for Linux x86* to install Oracle Database.
2. Use *Oracle Database Companion CD Installation Guide for Linux x86* to install Oracle Workflow.

My Oracle applications need a Web Server.

Install Oracle HTTP Server:

1. Use *Oracle Database Installation Guide for Linux x86* to install Oracle Database.
2. Use *Oracle Database Companion CD Installation Guide for Linux x86* to install Oracle HTTP Server.

I need to migrate my non-Oracle applications to Oracle.

Use Oracle Migration Workbench to migrate your non-Oracle applications to Oracle. Oracle Migration Workbench software and documentation are available at:

<http://www.oracle.com/technology/tech/migration/index.html>

Installing Oracle Database Heterogeneous Connectivity Tools (Gateways)

- [My AS/400 application needs to access data in an Oracle database.](#)
- [My Oracle applications need to access data in a non-Oracle database system.](#)

My AS/400 application needs to access data in an Oracle database.

Use Oracle Access Manager for AS/400, which enables AS/400 applications to access data in an Oracle database. To install Oracle Access Manager for AS/400, use *Oracle Access Manager for AS/400 Installation and User's Guide for IBM iSeries OS/400*.

My Oracle applications need to access data in a non-Oracle database system.

Use the following connectivity tools enable Oracle applications to access data in non-Oracle databases:

- Oracle Transparent Gateway: Integrates a non-Oracle database into your Oracle Database environment.
- Oracle Procedural Gateway: Enables Oracle PL/SQL applications to integrate with APPC-enabled transactions, or access messages in IBM Websphere MQ.

You can install the Gateway product on a computer independent of the Oracle application, Oracle database, and non-Oracle database.

For example, suppose you have the following scenario:

- Oracle Database is installed on a Linux computer.
- The Oracle application is installed on a Microsoft Windows computer and accesses data from the Oracle database on the Linux computer.
- The Oracle application needs to join data in a DB2 database on Solaris Operating System and an Oracle Database on Linux.

You have the option of installing the Transparent Gateway for DRDA on the Solaris computer where DB2 is running, on Linux where Oracle is running, or on a third computer.

[Table G-1](#) lists the non-Oracle database systems that you can access from Oracle applications, and the Gateways products that are available for those systems.

Table G–1 Oracle Gateway Products

Non-Oracle Database	Oracle Gateway Products and Documentation
IBM DB2 Universal Database (UDB)	<p>Transparent Gateway for DRDA. Available on the following platforms:</p> <ul style="list-style-type: none"> ■ Linux x86: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ Linux Itanium: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ Microsoft Windows (32-bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for Microsoft Windows</i>. ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ AIX 5L Based Systems (64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ IBM zSeries Based Linux: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>.
IBM DB2 z/OS	<p>Transparent Gateway for DB2. Available on z/OS. Use <i>Oracle Transparent Gateway for DB2 Installation and User's Guide for IBM z/OS (OS/390)</i>.</p> <p>Transparent Gateway for DRDA. Available on the following platforms:</p> <ul style="list-style-type: none"> ■ Linux x86: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ Linux Itanium: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ Microsoft Windows (32-bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for Microsoft Windows</i>. ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ AIX 5L Based Systems (64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ IBM zSeries Based Linux: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>.
IBM DB2/400	<p>Transparent Gateway for DB2/400. Available on IBM AS/ 400. Use <i>Oracle Transparent Gateway for DB2/400 Installation and User's Guide for IBM iSeries OS/400</i>.</p> <p>Transparent Gateway for DRDA. Available on the following platforms:</p> <ul style="list-style-type: none"> ■ Linux x86: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ Linux Itanium: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ Microsoft Windows (32-bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for Microsoft Windows</i>. ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ AIX 5L Based Systems (64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ IBM zSeries Based Linux: Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Transparent Gateway for DRDA Installation and User's Guide for UNIX</i>.

Table G-1 (Cont.) Oracle Gateway Products

Non-Oracle Database	Oracle Gateway Products and Documentation
IBM MQSeries	Procedural Gateway for WebSphere MQ. Available on the following platforms: <ul style="list-style-type: none"> ■ Linux x86: Use <i>Oracle Procedural Gateway for WebSphere MQ Installation and User's Guide for UNIX</i>. ■ Microsoft Windows (32-bit): Use <i>Oracle Procedural Gateway for WebSphere MQ Installation and User's Guide for Microsoft Windows</i>. ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Procedural Gateway for WebSphere MQ Installation and User's Guide for UNIX</i>. ■ AIX 5L Based Systems (64-Bit): Use <i>Oracle Procedural Gateway for WebSphere MQ Installation and User's Guide for UNIX</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Procedural Gateway for WebSphere MQ Installation and User's Guide for UNIX</i>.
Adabas Advantage CA-Datcom/DB Advantage CA-IDMS Advantage CA-IDMS/SQL FOCUS IMS/DB-DL/1 ISAM Model 04 QSAM Supra System 2000 TOTAL VSAM	Transparent Gateway for iWAY. Available on z/OS. Use <i>Oracle Transparent Gateway for iWay Installation and User's Guide for IBM z/OS (OS/390)</i> .
Advantage CA-IDMS/DC Transaction Server CICS/TS IMSTM	Procedural Gateway for APPC. Available on the following platforms: <ul style="list-style-type: none"> ■ Linux x86: Use <i>Oracle Procedural Gateway for APPC Installation and Configuration Guide for UNIX</i>. ■ Microsoft Windows (32-bit): Use <i>Oracle Procedural Gateway for APPC Installation and Configuration Guide for Microsoft Windows</i>. ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Procedural Gateway for APPC Installation and Configuration Guide for UNIX</i>. ■ AIX 5L Based Systems (64-Bit): Use <i>Oracle Procedural Gateway for APPC Installation and Configuration Guide for UNIX</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Procedural Gateway for APPC Installation and Configuration Guide for UNIX</i>.
Microsoft SQL Server	Transparent Gateway for SQL Server. Available on Microsoft Windows (32-Bit). Use <i>Oracle Transparent Gateway Installation Guide for Microsoft Windows (32-Bit)</i> , then <i>Oracle Transparent Gateway for Microsoft SQL Server Administrator's Guide for Microsoft Windows</i> .

Table G-1 (Cont.) Oracle Gateway Products

Non-Oracle Database	Oracle Gateway Products and Documentation
Sybase Adaptive Server	<p>Transparent Gateway for Sybase. Available on the following platforms:</p> <ul style="list-style-type: none"> ■ Microsoft Windows (32-bit): Use <i>Oracle Transparent Gateway Installation Guide for Microsoft Windows (32-Bit)</i>, then <i>Oracle Transparent Gateway for Sybase Administrator's Guide for Microsoft Windows</i>. ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Sybase Administrator's Guide for Solaris Operating System (SPARC 64-Bit)</i>. ■ AIX 5L Based Systems (64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Sybase Administrator's Guide for IBM AIX</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Sybase Administrator's Guide for hp-ux</i>. ■ hp Tru64 UNIX: Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Sybase Administrator's Guide for hp Tru64 UNIX</i>.
Teradata	<p>Transparent Gateway for Teradata. Available on the following platforms:</p> <ul style="list-style-type: none"> ■ Microsoft Windows (32-bit): Use <i>Oracle Transparent Gateway Installation Guide for Microsoft Windows (32-Bit)</i>, then <i>Oracle Transparent Gateway for Teradata Administrator's Guide for Microsoft Windows</i>. ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Teradata Administrator's Guide for Solaris Operating System (SPARC 64-Bit)</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Teradata Administrator's Guide for hp-ux</i>.
Informix Server	<p>Transparent Gateway for Informix. Available on the following platforms:</p> <ul style="list-style-type: none"> ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Informix Administrator's Guide for Solaris Operating System (SPARC 64-Bit)</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Informix Administrator's Guide for hp-ux</i>.
Ingres II	<p>Transparent Gateway for Ingres II. Available on the following platforms:</p> <ul style="list-style-type: none"> ■ Solaris Operating System (SPARC 64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Ingres II Administrator's Guide for Solaris Operating System (SPARC 64-Bit)</i>. ■ hp-ux PA-RISC (64-Bit): Use <i>Oracle Transparent Gateway Installation Guide for Solaris Operating System, hp-ux, IBM AIX, and hp Tru64 UNIX</i>, then <i>Oracle Transparent Gateway for Ingres II Administrator's Guide for hp-ux</i>.
Rdb	<p>Transparent Gateway for Rdb. Available on hp OpenVMS Alpha. Use <i>Oracle Transparent Gateway Installation Guide for hp OpenVMS</i>, then <i>Oracle Transparent Gateway for Rdb Administrator's Guide for hp OpenVMS</i>.</p>
RMS	<p>Transparent Gateway for RMS. Available on hp OpenVMS Alpha. Use <i>Oracle Transparent Gateway Installation Guide for hp OpenVMS</i>, then <i>Oracle Transparent Gateway for RMS Administrator's Guide for hp OpenVMS</i>.</p>

Symbols

, 2-6

A

Access Manager for AS/400, G-8

accounts

 reviewing, 5-3

 unauthenticated access to, 5-7

Advantage family of databases, G-10

aliases, multiple on computers, 2-8

ANONYMOUS user

 unauthenticated account access with, 5-7

APPC-enabled databases, G-10

APPC-enabled systems, G-10

applications, migrating non-Oracle applications to
 Oracle, G-8

applications-based workflows, G-7

architecture

 checking system architecture, 2-4

AS/400 applications, accessing Oracle database, G-8

ASM *See* Automatic Storage Management

asmcmd utility, 3-13

ASMLib add-on support library, 3-9

Automatic Storage Management

 asmcmd utility, 3-13

 ASMLib add-on support library, 3-9

 Automatic Storage Management disk group
 templates, 1-6

 block device names, 2-30, 2-32

 block devices, 3-9

 changing owner and permissions of raw
 devices, 2-33, 2-34, 2-38

 characteristics of failure groups, 2-25

 checking disk availability, 2-30, 2-32, 2-36

 configuring disks, 2-23, 2-28

 configuring disks for Automatic Storage
 Management, 2-28

 considerations before installing, 3-9

 DAS disks, 2-28

 database creation for, 3-12

 disk devices, 1-6

 disk groups, 2-24

 disks, supported, 2-28

 displaying attached disks, 2-30, 2-32, 2-36

Enterprise Manager Migrate Database
 wizard, 3-12

failure groups

 examples, 2-26

 identifying, 2-26

identifying available disks, 2-30, 2-32

identifying disks, 2-30, 2-32, 2-36

installation, testing, 3-13

installing, 3-9

managing, 5-3

migrating existing databases to, 3-12

mirroring, 2-24

Optimal Flexible Architecture file naming
 conventions, C-6

Oracle Clusterware, 1-6

Oracle home location for new installation, 3-10

partition creation, 2-28

password file, 3-10

recommendations for disk groups, 2-24

redundancy levels, 2-24

removing, 6-2

running multiple databases on a single
 server, 3-10

SAN disks, 2-28

space required for preconfigured database, 2-25

SPFILE server parameter file, 3-10

starting and stopping, 5-3

storage option for data files, 2-20

templates, 1-6

upgrade advantages with separate Oracle
 homes, 3-10

Automatic Storage Management disk groups

 about, 1-6

 creating, 3-10

 managing, 5-3

Automatic Storage Management failure groups

 about, 1-7

Automatic Storage Management instance

 about, 1-7

 creating, 3-10

B

backups of database

 Oracle Database Recovery Manager, G-6

base directory

- See* Oracle base directory
- Bash shell
 - default user startup file, 2-41
- .bash_profile file, 2-41
- Basic installation type
 - noninteractive installations, A-5
- block device
 - device name, 2-30, 2-32
- block device discovery on Automatic Storage Management, 3-9
- Bourne shell
 - default user startup file, 2-41

C

- C shell
 - default user startup file, 2-41
- certification, hardware and software, 1-12
- Character Set Scanner, 1-14
- checking distribution of the operating system, 2-6
- checking version of the operating system, 2-6
- chmod command, 2-19, 2-23, 2-33, 2-34, 2-38
- chown command, 2-19, 2-23, 2-33, 2-34, 2-38
- CLASSPATH environment variable, 4-7
- Cluster Ready Services (CRS). *See* Oracle Clusterware
- Cluster Synchronization Services (CSS)
 - Automatic Storage Management, 1-6
- clusters
 - installation guidelines, 3-2
 - See also* Oracle Clusterware, Oracle Real Application Clusters
- Clusterware
 - installed before Oracle Database, 3-2
- Clusterware. *See* Oracle Clusterware
- compilers
 - GNU Compiler Collection (GCC), 4-9
 - primary, 4-9
- computers with multiple aliases, 2-8
- computers, non-networked, 2-8
- configuration assistants
 - failure, F-4
 - troubleshooting, F-3
- configuring
 - kernel parameters, 2-13
- configuring disks for Automatic Storage Management, 2-23, 2-28
- Connection Manager
 - ports, ranges and protocol, D-2
- connectivity tools
 - Oracle Procedural Gateway, G-8
 - Oracle Transparent Gateway, G-8
 - See also* databases, non-Oracle
- control files
 - locating, 5-10
 - naming, C-6
 - raw devices for, 2-36
 - reviewing, 5-8
 - using Oracle Enterprise Manager Database Control with, 5-10
- CONTROL_FILES initialization parameter, 5-10

- CSD
 - download location for WebSphere MQ, 2-6
- csscan utility
 - See* Character Set Scanner
- custom database
 - failure groups for Automatic Storage Management, 2-26
 - requirements when using Automatic Storage Management, 2-25
- Custom installation type
 - reasons for choosing, 2-9
- custom.rsp file, A-4

D

- DAS (direct attached storage) disks, 2-28
- data files
 - creating separate directories for, 2-22
 - defined, 5-8
 - managing with Automatic Storage Management, 1-6
 - minimum disk space for, 2-21
 - naming, C-6
 - options for placing on file system, 2-20
 - recommendations for file system, 2-21
 - reviewing, 5-8
 - setting permissions on data file directories, 2-23
 - setting up, 5-8
- Data Guard
 - ports, ranges and protocol, D-2
- data loss
 - minimizing with Automatic Storage Management, 2-25
- Data Mining Scoring Engine
 - about, G-6
 - installing, G-6
- Data Mining Scoring Engine, installation guidelines, 3-2
- data mining tools
 - Data Mining Scoring Engine, G-6
 - Oracle Data Mining, G-5
- data warehousing tool
 - Oracle OLAP, G-5
- Database Configuration Assistant
 - running in silent mode, A-7
 - troubleshooting, F-3
- databases
 - administrative information, C-2
 - Automatic Storage Management
 - requirements, 2-25
 - files, 5-8
 - identifying, 5-7
 - initialization parameter file, 5-7
 - migrating non-Oracle databases to Oracle, G-3
 - non-Oracle
 - APPC-enabled, G-10
 - iWay, G-10
 - non-Oracle, listed, G-9
 - OLAP support (Oracle OLAP), G-5
 - Optimal Flexible Architecture file naming

- conventions, C-6
- recovery with Oracle Backup and Recovery, G-6
- redo log files, 5-9
- removing, 6-2
- security management, G-4
- tablespaces, 5-8
- DB_DOMAIN initialization parameter, 5-7
- DB_NAME initialization parameter, 5-7
- DB2 database, G-9
- DB2 z/OS database, G-9
- DB2/400 database, G-9
- dba group
 - and Automatic Storage Management disks, 2-33, 2-34, 2-38
 - and SYSDBA privilege, 2-9
 - creating, 2-11
 - description, 2-9
 - raw device group, 2-37
- DBCA_RAW_CONFIG environment variable, 2-39, 2-42
- dbca.rsp file, A-4
- DBSNMP user password, 3-8
- default file mode creation mask
 - setting, 2-40
- deprecated and desupported components, 15
- device names
 - IDE disks, 2-30, 2-32
 - RAID, 2-30, 2-32
 - raw devices, 2-33
 - SCSI disks, 2-30, 2-32
- DHCP computers, installing on, 2-8
- directory
 - creating separate data file directories, 2-22
 - database file directory, 2-21
 - Oracle base directory, 2-16
 - Oracle home directory, 2-17
 - Oracle Inventory directory, 2-17
 - oraInventory, 2-17
 - permission for data file directories, 2-23
- discs
 - mounting, 3-4
- disk devices
 - in Automatic Storage Management, 1-6
 - managing with Automatic Storage Management, 1-6
- disk mirroring, C-9
- disk space
 - checking, 2-4
 - requirement for Oracle base directory, 2-18, 2-19
 - requirements for preconfigured database in Automatic Storage Management, 2-25
- disk striping, C-9
- disks
 - checking availability for Automatic Storage Management, 2-30, 2-32, 2-36
 - configuring for Automatic Storage Management, 2-23, 2-28
 - displaying attached disks, 2-30, 2-32, 2-36
 - identifying for Automatic Storage Management, 2-36

- supported for Automatic Storage Management, 2-28
- DISPLAY environment variable
 - setting, 2-40, 2-41
- Distributed Computing Environment (DCE), 15
- DOMAIN_NAME initialization parameter, 5-7
- drive failure safeguards, C-2
- Dynamic Host Configuration Protocol. *See* DHCP

E

- e-business integration workflows, G-7
- enterprise.rsp file, A-4
- env command, 2-43
- environment
 - checking settings, 2-43
 - configuring for oracle user, 2-40
- environment variables
 - DBCA_RAW_CONFIG, 2-39
 - DISPLAY, 2-40, 2-41
 - NLS_LANG, 4-3, E-1
 - ORACLE_BASE, 2-17, 2-19, 2-40
 - ORACLE_HOME, 2-40, 2-42
 - ORACLE_HOSTNAME, 2-8
 - ORACLE_SID, 2-40
 - PATH, 2-40
 - removing from shell startup file, 2-41
 - SHELL, 2-41
 - TEMP and TMPDIR, 2-3, 2-42
 - TNS_ADMIN, 2-42
- errata
 - Linux kernel errata, 2-6
- errors
 - configuration assistants, F-3
 - fatal, F-4
 - installation, F-2, F-3
 - noninteractive installation, F-4
 - silent mode, F-4
 - X Window display errors, F-1
- /etc/oraInst.loc file, F-3
- EXAMPLE tablespace
 - raw device for, 2-35
- examples
 - Automatic Storage Management failure groups, 2-26
 - Oracle base directories, 2-16
- external jobs
 - operating system user required for, 2-9
- external redundancy
 - Automatic Storage Management redundancy level, 2-24
- extjob executable
 - operating system user required for, 2-9

F

- failure group
 - examples of Automatic Storage Management failure groups, 2-26
- failure groups

- characteristics of Automatic Storage Management
 - failure group, 2-25
- examples in Automatic Storage Management, 2-26
- in Automatic Storage Management, 1-7
- FAQ for installation, G-1
- fdisk command, 2-30, 2-32, 2-36
- features
 - deprecated, 15
 - desupported, 15
- file mode creation mask
 - setting, 2-40
- file naming, C-2
- file sets, 2-4
- file system
 - appropriate for Oracle base directory, 2-19
 - data file and recovery file placement
 - options, 2-20
 - NFS, 1-13
 - organization, C-1
 - requirements for Oracle base directory, 2-19
 - using for data files, 2-21
 - writing to, 1-13
- file-max file, 2-14
- files, C-6
 - \$ORACLE_HOME/dbs/initsid.ora, 5-8
 - \$ORACLE_HOME/install/portlist.ini, 5-2
 - .bash_profile, 2-41
 - control, 5-10, C-6
 - control files
 - raw devices for, 2-36
 - custom.rsp, A-4
 - data files, C-6
 - dbca.rsp, A-4
 - editing shell startup file, 2-41
 - enterprise.rsp, A-4
 - /etc/group, C-5
 - /etc/oraInst.loc, F-3
 - /etc/pam.d/login, 2-15
 - /etc/passwd, C-5
 - /etc/profile.local, 2-16
 - /etc/raw, 2-38
 - /etc/security/limits.so, 2-15
 - /etc/sysconfig/rawdevices, 2-33, 2-34, 2-37
 - /etc/sysctl.conf, 2-15
 - limits.conf, 2-15
 - listener.ora, 4-4
 - .login, 2-41
 - mgw.ora, 4-7
 - oraInst.loc, 2-11, 2-18, A-3
 - oratab, 2-18
 - password file
 - raw device for, 2-36
 - /proc/sys/fs/file-max, 2-14
 - /proc/sys/kernel/sem, 2-13
 - /proc/sys/kernel/shmall, 2-13
 - /proc/sys/kernel/shmmax
 - shmmax file, 2-14
 - /proc/sys/kernel/shmmni, 2-14
 - /proc/sys/net/core/rmem_default, 2-14

- /proc/sys/net/core/rmem_max, 2-14
- /proc/sys/net/core/wmem_default, 2-14
- /proc/sys/net/core/wmem_max, 2-14
- /proc/sys/net/ipv4/ip_local_port_range, 2-14
- .profile, 2-41
- profile.local, 2-16
- raw device mapping file, 2-38, 2-42
- redo log, 5-9
- redo log files
 - raw devices for, 2-35
- server parameter file
 - raw devices for, 2-36
- SPFILE
 - raw devices for, 2-36
- spnc_commands, 4-9
- standard.rsp, A-4
- tnsnames.ora, 4-4
- for raw devices, 2-37
- free
 - UNIX command, 2-3
- frequently asked installation questions, G-1

G

- Gateways products FAQ, G-8
- GCC, 2-6
 - postinstallation tasks, 4-9
- GCC *See* GNU Compiler Collection (GCC)
- global database name, 5-7
- globalization support, E-1
- GNU Compiler Collection (GCC) configuration, 4-9
- Grid Control. *See* Oracle Enterprise Manager Grid Control
- group file, C-5
- groupadd command, 2-11, 2-12
- groups
 - creating the dba group, 2-11
 - creating the oinstall group, 2-10
 - creating the oper group, 2-11

H

- hardware certification, 1-12
- hardware requirements, 2-2
- high redundancy
 - Automatic Storage Management redundancy level, 2-24
- home directory
 - distribution, C-2
 - login, C-2
 - See* Oracle home directory
- host name, setting before installation, 2-8

I

- IBM DB2 database, G-9
- IBM DB2 z/OS database, G-9
- IBM DB2/400 database, G-9
- IBM DRDA databases, connecting to, G-9
- IBM mainframe data, connecting to, G-10
- IBM WebSphere MQ

- Oracle Messaging Gateway requirement, 2-5
- IBM WebSphere MQ Series databases, G-10
- ICC *See* Intel C++ compiler (ICC)
- id command, 2-13
- IDE disks
 - device names, 2-30, 2-32, 2-36
- Informix Server database, G-11
- Ingres II database, G-11
- initialization parameter file
 - description, 5-8
 - in databases, 5-7
 - initsid.ora, 5-7
- initialization parameters
 - DB_NAME, 5-7
 - DOMAIN_NAME, 5-7
 - SERVICE_NAMES, 5-7
- initsid.ora file, 5-8
- initsid.ora initialization parameter file, 5-7
- installation
 - accessing installation software, 3-2
 - Automatic Storage Management
 - requirements, 2-25
 - cleaning up after a failed installation, F-4
 - clusters, installation guidelines, 3-2
 - completing, 3-9
 - component-specific guidelines, 3-1
 - computer aliases, multiple, 2-8
 - considerations, 1-12
 - errors, F-3
 - silent mode, F-4
 - FAQ for Oracle Database products, G-1
 - guidelines, 3-6
 - installation types, 1-3
 - laptops, 2-8
 - log files, F-2
 - noninteractive
 - error handling, F-4
 - oraInst.loc file, A-3
 - reinstalling Oracle software, 3-2
 - response files
 - preparing, A-3
 - silent mode, F-4
 - silent mode, A-6
 - upgrading, G-2
 - with other components, G-1
- installation errors
 - steps to resolve, F-2
- installation guidelines, 3-6, 3-7
 - Oracle Label Security, 3-6
 - Oracle Universal Installer, 3-6
 - reinstalling Oracle software, 3-6
- installation overview, 1-1
- installation software
 - copying to a hard disk, 3-5
 - extracting, 3-3
 - reinstalling, 3-6
- installation software, accessing, 3-2
- installation types
 - disk space requirements, 2-4
- instance

- instance identifier (SID), 2-40
- Intel C++ compiler (ICC), 4-9
- I/O loads, C-3
 - Optimal Flexible Architecture, C-2
- IP addresses, multiple, 2-8
- ip_local_port_range file, 2-14
- IPC protocol address
 - Oracle Messaging Gateway setting, 4-6
- iSQL*Plus
 - ports, changing, D-5
 - ports, ranges and protocol, D-3
- iWay databases, G-10

J

- Java Libraries for Oracle JVM and Oracle interMedia
 - postinstallation tasks, 4-5
- JDK
 - internationalization class, 4-7
 - run-time class, 4-7
- JDK requirements, 2-4
- JPublisher, G-7

K

- kernel
 - Linux errata, 2-6
- kernel parameters
 - changing, 2-15
 - configuring, 2-13
- Korn shell
 - default user startup file, 2-41

L

- languages
 - installing Oracle components in different languages, E-2
- laptops, installing Oracle Database on, 2-8
- Legato Single Server Version (LSSV), 15
- licensing information, 1-3
- limit command, 2-16
- limits.conf file, 2-15
- limits.so file, 2-15
- Linux
 - kernel errata, 2-6
- listener
 - identifying Oracle home for, 2-39
 - lsnrctl command, 2-40
 - stopping, 2-39, 2-40
 - stopping existing listener process, 2-39
- listener.ora file, 4-4
 - modifying for external procedures, 4-6
- local device
 - using for data files, 2-21
- log files, F-2
 - installation, reviewing, F-3
- logical volume manager
 - See* LVM
- .login file, 2-41
- login file, 2-15

- loopback adapters
 - non-networked computers, 2-8
- lsdev command, 2-30, 2-32, 2-36
- lsnrctl command, 2-40
- LVM, 1-5
 - recommendations for Automatic Storage Management, 2-24

M

- mapping file
 - for raw devices, 2-38, 2-42
- mask
 - setting default file mode creation mask, 2-40
- memory requirements, 2-2
- MGW_AGENT service name, 4-7
- mgwextproc service
 - adding static service information, 4-6
- mgw.ora file
 - modifying, 4-7
- Microsoft SQL Server database, G-10
- migrating
 - See upgrading
- migrating applications to Oracle, G-8
- migrating databases to Oracle, G-3
- mirroring Automatic Storage Management disk groups, 2-24
- mkdir command, 2-19, 2-23
- mode
 - setting default file mode creation mask, 2-40
- mount point
 - for Oracle base directory, 2-16
- mount point directories, 3-5
- mount point directory
 - choosing, B-2
- mount points
 - Optimal Flexible Architecture conventions for creating, C-3
- MQSeries
 - class, 4-7
- multihomed computers, installing on, 2-8
- multiple aliases, computers with, 2-8
- multiple Oracle homes, 1-12

N

- naming subdirectories, C-5
- NAS device, 2-19
- NAS devices
 - creating files on for use with Automatic Storage Management, B-4
 - guidelines for configuration, B-1
- natively compiled Java libraries, G-7
- Net Configuration Assistant
 - response file, A-4
 - running in silent mode, A-6
 - troubleshooting, F-3
- NetCA
 - See Net Configuration Assistant
- netca.rsp file, A-4

- network adapters
 - non-networked computers, 2-8
 - See also loopback adapters, primary network adapters
- network attached storage devices
 - See NAS devices
- network cards, multiple, 2-8
- Network File System See NFS
- network setup
 - about, 2-7
 - computers with multiple aliases, 2-8
- network topics
 - DHCP computers, 2-8
 - laptops, 2-8
 - multiple network cards, 2-8
 - non-networked computers, 2-8
- NFS
 - mount options, B-5
 - using for installation, 1-13
- NFS file system, 2-19
- NLS_LANG environment variable, 4-3, E-1
- NLS_LANG parameter
 - about, E-1
- nobody user
 - checking existence of, 2-13
 - description, 2-9
- noninteractive installation
 - oraInst.loc file, A-3
 - response files
 - preparing, A-3
 - silent mode, A-6
 - errors, F-4
- noninteractive installations
 - running
 - Oracle Universal Installer, A-6
- non-networked computers, 2-8
- non-Oracle databases, listed, G-9
- normal redundancy, Automatic Storage Management
 - redundancy level, 2-24

O

- OCCI
 - postinstallation tasks, 4-8
- OEM
 - See Oracle Enterprise Manager
- oinstall group
 - creating, 2-10
 - description, 2-9
- OLAP tools
 - Oracle OLAP, G-1, G-5
- OLS
 - See Oracle Label Security
- OMF
 - See Oracle Managed Files
- oper group
 - and SYSOPER privilege, 2-9
 - creating, 2-11
 - description, 2-9
- operating system

- checking distribution and version, 2-6
- operating system groups
 - creating the dba group, 2-11
 - creating the oinstall group, 2-10
 - creating the oper group, 2-11
 - oinstall, 2-9
 - OSDBA, 2-9
 - OSOPER, 2-9
 - osoper, 2-9
 - requirements, 2-9
- operating system requirements, 2-4
- operating system users
 - checking existence of the nobody user, 2-13
 - creating the oracle user, 2-12
 - nobody, 2-9
 - oracle, 2-10
 - requirements, 2-9
 - root user, 3-7
 - unprivileged user, 2-9
- Optimal Flexible Architecture
 - administrative information, C-2
 - Automatic Storage Management, C-6
 - changes for Oracle Database 10g, C-3
 - characteristics of an installation compliant with, C-1
 - concurrent execution of application software, C-2
 - conventions for creating mount points, C-3
 - distributed I/O loads, C-2
 - drive failure safeguards, C-2
 - file mapping, C-2, C-8
 - file naming, C-2
 - file system organization, C-1
 - hardware support, C-2
 - home directory distribution, C-2
 - identifying file, C-7
 - implementing, C-3
 - I/O loads, C-3
 - login home directories, C-2
 - naming
 - database files, C-6
 - Oracle base directory, C-4
 - subdirectories, C-5
 - tablespaces, C-7
 - very large databases, C-4
 - Oracle Managed Files, C-6
 - pathnames, C-5
 - recommendations for Oracle base directory, 2-16
 - recommended path for Oracle base directory, 2-16
 - recommended path for Oracle home directory, 2-17
 - recommended path for Oracle Inventory directory, 2-17
 - special tablespaces, C-7
 - standard, C-1
 - tablespace contents, C-2
 - UNIX directory subtrees, C-2
 - using separate segments, C-7
- Oracle Advanced Security
 - deprecated component, 15
- Oracle Application Server, G-3
- Oracle applications
 - APPC-enabled systems, connecting to, G-10
 - IBM DRDA databases, connecting to, G-9
- Oracle applications, installing with Oracle Database, G-7
- Oracle base directory
 - and ORACLE_BASE environment variable, 2-17
 - creating, 2-19
 - creating new, 2-19
 - description, 2-16
 - determining disk space on, 2-19
 - disk space requirements, 2-18, 2-19
 - equivalent directory on Microsoft Windows, 2-16
 - examples, 2-16
 - identifying appropriate file system, 2-19
 - identifying existing, 2-18
 - mount point for, 2-16
 - naming conventions, C-4
 - recommended path, 2-16
 - relationship with Oracle software owner user, 2-16
 - requirements on file system, 2-19
- Oracle C++ Call Interface requirements, 2-6
- Oracle Call Interface requirements, 2-6
- Oracle Cluster Registry
 - See OCR
- Oracle Clusterware
 - about, G-3
 - ports, D-4
 - ports, ranges and protocol, D-4
 - used with Automatic Storage Management, 1-6
 - used with Oracle Real Application Clusters, G-3
- Oracle Connection Manager, installation
 - guidelines, 3-2
- Oracle CSS Daemon
 - configuration, deleting, 6-6
- Oracle Data Mining
 - about, G-5
 - installing, G-5
- Oracle Database
 - administering and monitoring, G-4
 - AS/400 applications, G-8
 - creating data file directories, 2-22
 - Custom installation, 1-4
 - Enterprise Edition installation, 1-3
 - installing with Oracle applications, G-7
 - installing with other Oracle components, G-1
 - minimum disk space requirements, 2-21
 - multiple databases on a single server with Automatic Storage Management, 3-10
 - requirements with Automatic Storage Management, 2-25
 - security management, G-4
 - setting ORACLE_SID environment variable, 2-40
 - Standard Edition installation, 1-3
 - upgrading, G-2
 - Web application development tools (Oracle HTML DB), G-7
 - Web servers, G-7

- workflows, G-7
- Oracle Database Client, G-2
- Oracle Database Companion CD
 - components, G-7
- Oracle Database components
 - administering and monitoring, G-4
 - connectivity FAQ, G-8
 - FAQ for installing, G-1
 - FAQ on installing, G-1
 - installing with Oracle applications, G-7
 - installing with Oracle Database tools, G-3
- Oracle Database Configuration Assistant
 - response file, A-4
- Oracle Database Examples, G-7
- Oracle Database Recovery Manager (RMAN)
 - Automatic Storage Management, 1-7, 3-12
- Oracle Enterprise Management Agent
 - HTTP port, changing, D-4
- Oracle Enterprise Manager, 1-8
 - Database Control
 - logging in to, 5-1
 - port number, 5-1
 - using to modify control files, 5-10
 - using to modify redo log files, 5-9
 - using to view control files, 5-10
 - using to view redo log files, 5-9
 - database migration to Automatic Storage Management, 3-12
 - login privileges, 5-2
 - Migrate Wizard, 3-12
- Oracle Enterprise Manager Database Agent
 - ports, ranges and protocol, D-2
- Oracle Enterprise Manager Database Console
 - ports, ranges and protocol, D-2
- Oracle Enterprise Manager Database Control
 - ports, changing, D-4
- Oracle Enterprise Manager Migrate Database wizard, 3-12
- Oracle home directory
 - Automatic Storage Management
 - considerations, 3-10
 - description, 2-17
 - identifying for listener, 2-39
 - multiple homes, network considerations, 2-8
 - recommended path, 2-17
 - requirement for, 2-17
 - requirements, 2-17
 - using to identify Oracle base directory, 2-18
- Oracle home name, 2-17
- Oracle host name, setting before installation, 2-8
- Oracle HTML DB, G-7
- Oracle HTTP Server, G-7
- Oracle internationalization class, 4-7
- Oracle Internet Directory, G-5
- Oracle Inventory
 - description, 2-17
 - pointer file, 2-11
- Oracle Inventory directory
 - description, 2-17
 - recommended path, 2-17
- Oracle Inventory group
 - creating, 2-10
 - description, 2-9
- Oracle JDBC class, 4-7
- Oracle JDBC development drivers, G-7
- Oracle JDBC/OCI driver requirements, 2-6
- Oracle Label Security
 - installation guidelines, 3-2, 3-6
 - postinstallation tasks, 4-5
- Oracle Managed Files
 - Optimal Flexible Architecture naming conventions, C-6
- Oracle Messaging Gateway
 - postinstallation tasks, 4-5
- Oracle Messaging Gateway class, 4-7
- Oracle Messaging Gateway requirements
 - IBM WebSphere MQ, 2-5
 - TIBCO Rendezvous, 2-5
- Oracle Migration Workbench, G-3, G-8
- Oracle Net
 - configuration file directory, 4-4
 - identifying Oracle home for listener, 2-39
 - lsnrctl command, 2-40
 - stopping existing listener, 2-39
 - stopping listener, 2-39
 - stopping the listener, 2-40
- Oracle Net Configuration Assistant
 - See* Net Configuration Assistant
- Oracle Net Services
 - postinstallation tasks, 4-4
- Oracle OLAP, G-1, G-5
- Oracle precompilers
 - postinstallation tasks, 4-7
- Oracle Procedural Gateway
 - about, G-8
 - listed products, G-8
- Oracle Real Application Clusters (RAC)
 - installed before Oracle Database, 3-2
 - installing with Oracle Enterprise Manager, G-4
- Oracle Clusterware
 - about, G-3
- Oracle software
 - removing, 6-6
- Oracle software owner user
 - and Automatic Storage Management disks, 2-33, 2-34, 2-38
 - configuring environment for, 2-40
 - creating, 2-12
 - description, 2-10
 - determining default shell, 2-41
 - raw device owner, 2-37
 - relationship with Oracle base directory, 2-16
 - setting shell limits for, 2-15
- Oracle Spatial requirements
 - X Window, 2-5
- Oracle SQL*Net Listener
 - ports, ranges and protocol, D-2
- Oracle SQLJ, G-7
- Oracle Storage Compatibility Program (OSCP)
 - certification of NAS devices, B-1

- Oracle Text supplied knowledge bases, G-7
 - postinstallation tasks, 4-5
 - Oracle Transparent Gateway
 - about, G-8
 - listed products, G-8
 - Oracle Ultra Search, G-7
 - ports, changing, D-5
 - ports, ranges and protocol, D-3
 - Oracle Universal Installer
 - Automatic Storage Management behavior, 3-10
 - installation guidelines, 3-1, 3-6
 - response files
 - list of, A-4
 - running, 3-7
 - running in different languages, E-2
 - oracle user
 - and Automatic Storage Management disks, 2-33, 2-34, 2-38
 - configuring environment for, 2-40
 - creating, 2-12
 - description, 2-10
 - determining default shell, 2-41
 - raw device owner, 2-37
 - relationship with Oracle base directory, 2-16
 - setting shell limits for, 2-15
 - Oracle Workflow, G-7
 - Oracle XDB
 - ports, D-6
 - ports, changing, D-6
 - ports, ranges and protocol, D-4
 - Oracle XML Developer's Kit (XDK)
 - requirements, 2-6
 - ORACLE_BASE environment variable, 2-17, 2-19
 - removing from shell startup file, 2-41
 - setting, 2-40
 - ORACLE_HOME environment variable
 - removing from shell startup file, 2-41
 - setting, 2-40
 - unsetting, 2-42
 - ORACLE_HOSTNAME environment variable
 - about, 2-8
 - computers with multiple aliases, 2-8
 - multihomed computers, 2-8
 - setting before installation, 2-8
 - ORACLE_SID environment variable
 - removing from shell startup file, 2-41
 - setting, 2-40
 - oraInst.loc file, 2-11, 2-18
 - location, 2-11
 - oraInventory directory
 - See* Oracle Inventory directory
 - oratab file, 2-18
 - formats, 2-18
 - location of, 2-18
 - OSDBA group
 - and Automatic Storage Management disks, 2-33, 2-34, 2-38
 - and SYSDBA privilege, 2-9
 - creating, 2-11
 - description, 2-9
 - raw device group, 2-37
 - OSOPER group
 - and SYSOPER privilege, 2-9
 - creating, 2-11
 - description, 2-9
 - OTN Web site
 - downloading installation software from, 3-2
 - OUI
 - See* Oracle Universal Installer
- ## P
-
- packages, checking, 2-6
 - partition
 - using with Automatic Storage Management, 2-24
 - partitions
 - binding to raw devices, 2-37
 - creating, 2-36
 - creating raw partitions, 2-35
 - creation for Automatic Storage Management disks, 2-28
 - passwd command, 2-13
 - passwd file, C-5
 - password file
 - raw device for, 2-36
 - password file for Automatic Storage Management, 3-10
 - passwords
 - DBSNMP, 3-8
 - guidelines, 3-8
 - resetting, 5-6
 - with Database Control, 5-6
 - with SQL*Plus, 5-6
 - reviewing, 5-3
 - SYS, 3-8
 - SYSMAN, 3-8
 - SYSTEM, 3-8
 - unlocking, 5-6
 - with Database Control, 5-6
 - with SQL*Plus, 5-6
 - patches
 - installing and downloading, 4-1
 - PATH environment variable
 - setting, 2-40
 - pathnames
 - Optimal Flexible Architecture, C-5
 - permissions
 - for data file directories, 2-23
 - for Oracle base directory, 2-19
 - PL/SQL native compilation, 4-9
 - PL/SQL native compilation requirements, 2-6
 - PL/SQL native compilation, 4-9
 - port numbers
 - managing, D-1
 - portlist.ini file, 5-2, D-2
 - ports
 - access URLs, D-2
 - configured for applications, D-2
 - Connection Manager, ranges and protocol, D-2
 - Data Guard, ranges and protocol, D-2

- default ranges, D-1
- iSQL*Plus, changing, D-5
- iSQL*Plus, ranges and protocol, D-3
- Oracle Clusterware, D-4
- Oracle Clusterware, ranges and protocol, D-4
- Oracle Enterprise Management Agent HTTP, changing, D-4
- Oracle Enterprise Manager Database Agent, ranges and protocol, D-2
- Oracle Enterprise Manager Database Console, ranges and protocol, D-2
- Oracle Enterprise Manager Database Control, changing, D-4
- Oracle SQL*Net Listener, ranges and protocol, D-2
- Oracle Ultra Search, changing, D-5
- Oracle Ultra Search, ranges and protocol, D-3
- Oracle XDB, D-6
- Oracle XDB, changing, D-6
- Oracle XDB, ranges and protocol, D-4
- postinstallation
 - configuring required tasks
 - Oracle Net Services, 4-4
 - recommended tasks
 - root.sh script, backing up, 4-2
 - setting the NLS_LANG environment variable, 4-3
 - setting up user accounts, 4-3
 - required tasks, 4-1
 - configuring GCC as the primary compiler, 4-9
 - configuring OCCI, 4-8
 - configuring Oracle Label Security, 4-5
 - configuring Oracle Messaging Gateway, 4-5
 - configuring Oracle precompilers, 4-7
 - installing natively compiled Java Libraries for Oracle JVM and Oracle interMedia, 4-5
 - installing Oracle Text supplied knowledge bases, 4-5
 - patches, installing and downloading, 4-1
- preconfigured database
 - Automatic Storage Management disk space requirements, 2-25
 - requirements when using Automatic Storage Management, 2-25
- Pro*C/C++
 - configuring, 4-8
 - See also* C compiler
- Pro*C/C++ requirements, 2-6
- process
 - stopping existing, 2-39
 - stopping existing listener process, 2-39
 - stopping listener process, 2-39
- processor
 - checking system architecture, 2-4
- .profile file, 2-41
- profile.local file, 2-16
- ps command, 2-39

R

- RAC
 - configuring disks for raw devices, 2-35
- RAID
 - device names, 2-30, 2-32, 2-36
 - recommended Automatic Storage Management redundancy level, 2-25
 - using for Oracle data files, 2-21
- RAM requirements, 2-2
- raw command, 2-33, 2-37
- raw device
 - for password file, 2-36
 - for server parameter file, 2-36
 - for SPFILE, 2-36
- raw devices
 - binding, 2-33
 - binding to partitions, 2-37
 - changing permissions and owner for Automatic Storage Management, 2-33, 2-34, 2-38
 - creating a raw device mapping file, 2-38
 - creating partitions, 2-36
 - creating raw partitions, 2-35
 - DBCA_RAW_CONFIG environment variable, 2-42
 - device names, 2-33, 2-37
 - device names, 2-37
 - for control files, 2-36
 - for EXAMPLE tablespace, 2-35
 - for redo log files, 2-35
 - for SYSAUX tablespace, 2-35
 - for SYSTEM tablespace, 2-35
 - for TEMP tablespace, 2-35
 - for UNDOTBS tablespace, 2-35
 - for USER tablespace, 2-35
 - specifying location of mapping file, 2-42
 - specifying owner and permissions, 2-37
 - storage option for data files, 2-20
 - value for DBCA_RAW_CONFIG environment variable, 2-39
- raw file, 2-38
- rawdevices file, 2-33, 2-34, 2-37
- Rdb database, G-11
- readme.txt file, D-2
- reconfiguring CSS, 6-4
- recovery files
 - options for placing on file system, 2-20
- recovery of databases
 - Oracle Backup and Recovery, G-6
- Red Hat
 - operating system requirements, 2-4
- Red Hat Package Manager
 - See* RPM
- redo log, C-6
- redo log files
 - in starter database, 5-9
 - locating, 5-9
 - naming, C-6
 - raw devices for, 2-35
 - reviewing, 5-8
 - using Oracle Enterprise Manager Database Control

- with, 5-9
- redundancy level
 - and space requirements for preconfigured database, 2-25
 - for Automatic Storage Management, 2-24
- redundant array of independent disks
 - See* RAID
- reinstalling Oracle software, 3-2
- requirements
 - hardware, 2-2
- response files
 - custom.rsp, A-4
 - dbca.rsp, A-4
 - enterprise.rsp, A-4
 - netca.rsp, A-4
 - recording, A-4
 - standard.rsp, A-4
- rmem_default file, 2-14
- rmem_max file, 2-14
- RMS database, G-11
- roadmap for installing Oracle Database
 - components, G-1
- root user, 3-7
 - logging in as, 2-1
- root.sh script
 - backing up, 4-2
- RPM
 - checking, 2-6
- rpm command, 2-6

S

- SAME methodology, 1-5
- SAN (storage area network) disks, 2-28
- SCSI disks
 - device names, 2-30, 2-32, 2-36
- security
 - management tools, G-4
- sem file, 2-13
- server parameter file
 - raw device for, 2-36
- server parameter file (SPFILE), 3-10
- service command, 2-33, 2-37
- SERVICE_NAMES initialization parameter, 5-7
- shell
 - determining default shell for oracle user, 2-41
- SHELL environment variable
 - checking value of, 2-41
- shell limits
 - setting, 2-15
- shell startup file
 - editing, 2-41
 - removing environment variables, 2-41
- shmall file, 2-13
- shmmni file, 2-14
- SID, 5-7
 - setting ORACLE_SID environment variable, 2-40
- silent mode installation, A-6
- software certification, 1-12
- software requirements, 2-4

- checking, 2-6
- SPFILE
 - raw device for, 2-36
- SPFILE server parameter file, 3-10
- spnc_commands configuration file, 4-9
- SQL Server database, G-10
- SQLJ class, 4-7
- standard.rsp files, A-4
- startup file
 - for shell, 2-41
- static service information
 - adding for mgwextproc service, 4-6
- storage area network disks, 2-28
- storage management *See* Automatic Storage Management
- stripe and mirror everything methodology
 - See* SAME methodology
- SUSE
 - binding partitions to raw devices, 2-37
 - operating system requirements, 2-4
- swap space
 - checking, 2-3
 - requirements, 2-2
- Sybase Adapter Server database, G-11
- SYS user password, 3-8
- SYSAUX tablespace
 - raw device for, 2-35
- sysctl command, 2-14
- sysctl.conf file, 2-15
- SYSDBA privilege
 - associated operating system group, 2-9
- SYSMAN user password, 3-8
- SYSOPER privilege
 - associated operating system group, 2-9
- system architecture
 - checking, 2-4
- System Identifier, 5-7
 - See* SID
- SYSTEM tablespace
 - raw device for, 2-35
- SYSTEM user password, 3-8

T

- tablespaces
 - defined, 5-8
 - in databases, 5-8
 - Optimal Flexible Architecture
 - naming, C-7
 - special tablespaces, C-7
 - reviewing, 5-8
 - setting up, 5-8
- TEMP environment variable, 2-3
 - setting, 2-42
- TEMP tablespace
 - raw device for, 2-35
- temporary disk space
 - requirements, 2-2
- Teradata database, G-11
- TIBCO Rendezvous

- Oracle Messaging Gateway requirement, 2-5
- TMPDIR environment variable, 2-3
 - setting, 2-42
- TNS_ADMIN environment variable
 - unset, 2-42
- tnsnames.ora file, 4-4
 - adding a connect descriptor, 4-7
 - MGW_AGENT service name, 4-7
 - modifying for external procedures, 4-7
- troubleshooting, F-1
 - fatal errors, F-4

U

- ulimit command, 2-16
- umask, 2-43
- umask command, 2-40, 2-43
- UNDOTBS tablespace
 - raw device for, 2-35
- UNIX commands, 2-43
 - chmod, 2-19, 2-23, 2-33, 2-34, 2-38
 - chown, 2-19, 2-23, 2-33, 2-34, 2-38
 - env, 2-43
 - fdisk, 2-30, 2-32, 2-36
 - free, 2-3
 - groupadd, 2-11, 2-12
 - id, 2-13
 - limit, 2-16
 - lsdev, 2-30, 2-32, 2-36
 - mkdir, 2-19, 2-23
 - passwd, 2-13
 - ps, 2-39
 - raw, 2-33, 2-37
 - rpm, 2-6
 - service, 2-33, 2-37
 - sysctl, 2-14
 - ulimit, 2-16
 - umask, 2-40
 - unset, 2-42
 - unsetenv, 2-42
 - useradd, 2-12
 - xhost, 2-1
 - xterm, 2-2
- UNIX directory subtrees, C-2
- UNIX workstation
 - installing from, 2-1
- unprivileged user
 - checking existence of, 2-13
- unset command, 2-42
- unsetenv command, 2-42
- upgraded databases
 - configuring, 4-2
- upgrading, 1-13
 - advantages with separate Oracle homes, 3-10
- USER tablespace
 - raw device for, 2-35
- useradd command, 2-12
- users
 - checking existence of the nobody user, 2-13
 - creating the oracle user, 2-12

- operating system nobody user, 2-9
- Oracle software owner user, 2-10
- utlrlp.sql script
 - recompiling invalid SQL modules, 4-2

V

- very large databases
 - Optimal Flexible Architecture naming mount points, C-4

W

- Web applications, Oracle HTML DB, G-7
- Web servers (Oracle HTTP Server), G-7
- WebSphere MQ
 - CSD download location, 2-6
- WebSphere MQ class, 4-7
- WebSphere MQ Series database, G-10
- Windows
 - analogy for Oracle base directory, 2-16
- wmem_default file, 2-14
- wmem_max file, 2-14
- workflows
 - applications based, G-7
 - e-business integration, G-7

X

- X Window requirement
 - Oracle Spatial requirement, 2-5
- X Window system
 - enabling remote hosts, 2-1, 2-2
- xhost command, 2-1
- xterm command, 2-2