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Installation Guide
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Oracle Database Installation Guide, 11g Release 2 (11.2) for Linux

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Glossary

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Preface

This guide provides instructions about how to install and configure Oracle Database for Linux. This guide describes Optimal Flexible Architecture, Database Storage Options, and Database Configuration Options. This guide also describes installing and configuring a database using response files, globalization support, ports, and troubleshooting.

The preface contains the following topics:

- [Audience](#)
- [Documentation Accessibility](#)
- [Related Documentation](#)
- [Conventions](#)

Audience

This guide is intended for anyone responsible for installing Oracle Database 11g Release 2 (11.2) on Linux systems. Additional installation guides for Oracle Database, Oracle Real Application Clusters, Oracle Clusterware, Oracle Database Examples, and Oracle Enterprise Manager Grid Control are available on the relevant installation media.

See Also:

To install Oracle Database using the default settings refer to:

- *Oracle Database Quick Installation Guide for Linux x86*
- *Oracle Database Quick Installation Guide for Linux x86-64*
- *Oracle Database Quick Installation Guide for IBM: Linux on System z*

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Related Documentation

The related documentation for Oracle Database 11g products includes the following manuals:

- *Oracle Database Concepts*
- *Oracle Database New Features Guide*
- *Oracle Database Licensing Information*
- *Oracle Database Readme*
- *Oracle Universal Installer and OPatch User's Guide for Windows and UNIX*
- *Oracle Grid Infrastructure Installation Guide*
- *Oracle Database Release Notes for Linux*
- *Oracle Database Client Installation Guide for Linux*
- *Oracle Database Examples Installation Guide*
- *Oracle Real Application Clusters Installation Guide for Linux and UNIX*
- *Oracle Database Quick Installation Guide for Linux x86*
- *Oracle Database Quick Installation Guide for Linux x86-64*
- *Oracle Database Client Quick Installation Guide for Linux x86*
- *Oracle Database Client Quick Installation Guide for Linux x86-64*
- *Oracle Database Quick Installation Guide for IBM: Linux on System z*
- *Oracle Database Client Quick Installation Guide for IBM: Linux on System z*
- *Oracle Database Administrator's Reference for Linux and UNIX-Based Operating Systems*
- *Oracle Automatic Storage Management Administrator's Guide*
- *Oracle Database Upgrade Guide*
- *Oracle Database 2 Day DBA*
- *Oracle Application Express Installation Guide*

For information about Oracle error messages, see *Oracle Database Error Messages*. Oracle error message documentation is available only in HTML. If you only have access to the Oracle Database 11g Release 2 (11.2) Online Documentation Library, then you can browse the error messages by range. After you find the specific range, use your browser's "find in page" feature to locate the specific message. When connected to the Internet, you can search for a specific error message using the error message search feature of the Oracle online documentation.

Many books in the documentation set use the sample schemas of the seed database, which is installed by default when you install Oracle Database. See *Oracle Database Sample Schemas* for information about how these schemas were created and how you can use them yourself.

To download free release notes, installation documentation, white papers, or other collateral, visit Oracle Technology Network. You must register online before using Oracle Technology Network; registration is free and can be done at:

<http://www.oracle.com/technetwork/community/join/overview/index.html>

If you have a user name and password for Oracle Technology Network, then you can go directly to the documentation section at:

<http://docs.oracle.com/>

See *Oracle Database Release Notes for Linux* for important information that was not available when this book was released. The release notes for Oracle Database is updated regularly. The most recent version is available at:

<http://docs.oracle.com/>

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.

What's New in Oracle Database 11g Release 2 (11.2)

This section describes new features that are documented in this guide and provides pointers to additional information.

- [Oracle Database 11g Release 2 \(11.2.0.4\) New Features and Enhancements](#)
- [Oracle Database 11g Release 2 \(11.2.0.3\) New Features and Enhancements](#)
- [Oracle Database 11g Release 2 \(11.2.0.2\) New Features](#)
- [Oracle Database 11g Release 2 \(11.2.0.1\) New Features](#)
- [Deprecated in Oracle Database 11g Release 2 \(11.2\)](#)
- [Desupported in Oracle Database 11g Release 2 \(11.2\)](#)

Oracle Database 11g Release 2 (11.2.0.4) New Features and Enhancements

- [RACcheck Configuration Audit Tool](#)

RACcheck Configuration Audit Tool

Oracle Real Application Clusters (Oracle RAC) Configuration Audit Tool (RACcheck) is available to check your Oracle Database installation.

Note: The RACcheck tool is available starting with Oracle Database 11g Release 2 (11.2.0.4).

See Also: "[Running RACcheck Configuration Audit Tool](#)" on page 5-6

Oracle Database 11g Release 2 (11.2.0.3) New Features and Enhancements

- [Proxy Realm Information](#)

Proxy Realm Information

Starting with Oracle Database 11g Release 2 (11.2.0.3) you can enter the Proxy Realm information when providing the details for downloading software updates. The proxy realm identifies the security database used for authentication. If you do not have a

proxy realm, then you do not have to provide an entry for the Proxy Username, Proxy Password, and Proxy Realm fields. It is case-sensitive.

This proxy realm is for software updates download only.

Oracle Database 11g Release 2 (11.2.0.2) New Features

The following is a list of new features or enhancements provided with Oracle Database 11g Release 2 (11.2.0.2):

- [Enhanced Patch Set Installation](#)
- [New Software Updates Option](#)
- [In-Place Upgrade of Oracle Database Client](#)
- [TDE Hardware Acceleration](#)

Enhanced Patch Set Installation

Starting with the release of the 11.2.0.2 patch set for Oracle Database 11g Release 2, Oracle Database patch sets are full installations of the Oracle Database software. Note the following changes with the new patch set packaging:

- Direct upgrades from previous releases (11.x, 10.x) to the most recent patch set are supported.
- Out-of-place patch set upgrades, in which you install the patch set into a new, separate Oracle home, are the best practices recommendation. In-place upgrades are supported but are not recommended.
- New installations consist of installing the most recent patch set, rather than installing a base release and then upgrading to a patch release.

See Also:

- My Oracle Support notes 1189783.1 and 854428.1 at:
<https://support.oracle.com>
- *Oracle OPatch User's Guide for Windows and UNIX*

New Software Updates Option

This functionality is available starting with Oracle Database 11g Release 2 (11.2.0.2). Use the Software Updates feature to dynamically download and apply software updates as part of the Oracle Database installation. You can also download the updates separately using the `-downloadUpdates` option and later apply them during the installation by providing the location where the updates are present.

See Also: ["Software Updates Option"](#) on page 1-6

In-Place Upgrade of Oracle Database Client

This functionality is available starting with Oracle Database 11g Release 2 (11.2.0.2). Use the In-Place Upgrade feature of Oracle Database Client to upgrade an existing Oracle Database Client 11g Release 2 (11.2) version with the latest Oracle Database Client version.

See Also: *Oracle Database Client Installation Guide for Linux* for more information about In-Place Upgrade

TDE Hardware Acceleration

Transparent Data Encryption (TDE) can automatically detect whether the database host system includes specialized cryptographic silicon that accelerates the encryption or decryption processing. When detected, TDE uses the specialized silicon for cryptographic processing accelerating the overall cryptographic performance significantly.

Starting with Oracle Database 11g Release 2 (11.2.0.2), cryptographic hardware acceleration for TDE is available on Intel Xeon with AES-NI, and for Linux x86 and Linux X86-64 on Oracle Linux 5 and Red Hat Enterprise Linux 5.

Oracle Database 11g Release 2 (11.2.0.1) New Features

The following is a list of new features or enhancements provided with Oracle Database 11g Release 2 (11.2.0.1):

- [New Oracle Grid Infrastructure Installation Option](#)
- [New Desktop and Server Class Options](#)
- [Daylight Saving Time Upgrade of Timestamp with Timezone Data Type](#)
- [SYSASM Privilege](#)
- [Fixup Scripts and Prerequisite Checks](#)
- [Database Smart Flash Cache](#)
- [New Tool to Configure Custom Installation Options](#)
- [Deinstallation Tool](#)
- [Intelligent Data Placement](#)
- [Oracle Automatic Storage Management Cluster File System](#)
- [Oracle Data Pump Export and Oracle Data Pump Import](#)
- [Use Oracle Restart to Automatically Restart Your Database](#)
- [SRVCTL Support for a Single-Instance Database in a Cluster](#)

New Oracle Grid Infrastructure Installation Option

Oracle Database 11g Release 2 introduces the Oracle Grid Infrastructure installation. For single instance databases, Oracle Grid Infrastructure includes Oracle Automatic Storage Management (Oracle ASM), the listener, and Oracle Restart. Oracle Restart is a new feature that provides the ability to monitor, manage, and automatically restart if the Oracle Database environment including the Oracle Database instance, Oracle Automatic Storage Management instance, and listeners fails. In a clustered environment, Oracle Grid Infrastructure includes Oracle Clusterware, Oracle ASM, and the listener.

To use Oracle Grid Infrastructure for a standalone server, you must install the Oracle software from the Oracle Grid Infrastructure media before you install the database.

See Also: [Chapter 3, "Oracle Grid Infrastructure for a Standalone Server"](#)

New Desktop and Server Class Options

Oracle Database 11g Release 2 introduces a new option that enables you to specify the type of system on which the database is installed. If you are installing on a laptop or a

desktop, then select the Desktop Class option; otherwise, select the Server Class option to install on a server. These options are available on the System Class screen.

There is no difference in the software that gets installed after you select any one option but the Desktop Class option installs a single instance database without the advanced configuration options.

See Also: ["Interactive Installation Types"](#) on page 1-5 for more information about the desktop and server class options

Daylight Saving Time Upgrade of Timestamp with Timezone Data Type

When time zone version files are updated due to daylight saving time changes, `TIMESTAMP WITH TIMEZONE (TSTZ)` data could become stale. In previous releases, database administrators ran the SQL script `ut1tzuv2.sql` to detect TSTZ data affected by the time zone version changes and then had to perform extensive manual procedures to update the TSTZ data.

With this release, TSTZ data is updated transparently with minimal manual procedures using newly provided `DBMS_DST` PL/SQL packages. In addition, there is no longer a need for clients to patch their time zone data files.

See Also:

- *Oracle Database Upgrade Guide* for information about preparing to upgrade Timestamp with Time Zone data
- *Oracle Database Globalization Support Guide* for information about how to upgrade the Time Zone file and Timestamp with Time Zone data
- *Oracle Call Interface Programmer's Guide* for information about performance effects of clients and servers operating with different versions of Time Zone files

SYSASM Privilege

Starting with Oracle Database 11g Release 2 (11.2), Oracle ASM administration must be done with the `SYSASM` privilege. The `SYSASM` privilege also can be granted using password authentication on the Oracle ASM instance.

You can designate `OPERATOR` privileges (a subset of the `SYSASM` privileges, including starting and stopping Oracle ASM) to members of the `OSOPER` for an Oracle ASM group.

Using the `SYSASM` privilege for ASM administration creates a clear division of responsibility between ASM administration and database administration. It also provides the optional capability to prevent different databases using the same storage from accidentally overwriting each other's files.

See Also: *Oracle Automatic Storage Management Administrator's Guide* for more information about the `SYSASM` privilege, `ASMSNMP` account, and `OSASM` operating system group

Fixup Scripts and Prerequisite Checks

Starting with Oracle Database 11g Release 2 (11.2), the Oracle Universal Installer (OUI) detects when minimum requirements for an installation are not completed, and creates scripts, called fixup scripts, to resolve many incomplete system configuration requirements. If OUI detects an incomplete task, then click the Fix & Check Again button to generate the fixup script.

For Oracle Clusterware, you also can have Cluster Verification Utility (CVU) generate fixup scripts before the installation.

The fixup script is generated during the installation. You are prompted to run the script as root in a separate terminal session. When you run the script, it sets some system parameters to Oracle-recommended values, if necessary, and completes other operating system configuration tasks.

Database Smart Flash Cache

Database Smart Flash Cache feature is a transparent extension of the database buffer cache using solid state device (SSD) technology. The SSD acts as a Level 2 cache to the (Level 1) Oracle system global area (SGA).

SSD storage is faster than disk storage, and cheaper than RAM. Database Smart Flash Cache with SSD storage gives you the ability to greatly improve the performance of your Oracle databases by reducing the amount of disk I/O at a lower cost than adding an equivalent amount of RAM.

Database Smart Flash Cache is supported on Oracle Solaris and Oracle Linux only.

See Also:

- *Oracle Database New Features Guide*
- *Oracle Database Concepts*
- *Oracle Database Administrator's Guide* for more information about Database Smart Flash Cache

New Tool to Configure Custom Installation Options

Oracle Universal Installer no longer provides the custom installation option of individual components. Use the `chopt` tool, a command-line utility that is located in the `ORACLE_HOME/bin` directory, to configure the database options.

See Also: ["Enabling and Disabling Database Options"](#) on page 5-6

Deinstallation Tool

Use the new deinstallation tool (`deinstall`) available as an Oracle Technology Network download (before installation) and in the Oracle home directory (after installation) to remove Oracle Database software.

See [Chapter 7, "Removing Oracle Database Software"](#)

Intelligent Data Placement

The Intelligent Data Placement feature enables you to specify disk regions on Oracle ASM disks to ensure that frequently accessed data is placed on the outermost (hot) tracks which provide higher performance.

See Also: *Oracle Automatic Storage Management Administrator's Guide* for more information about Oracle ASM Intelligent Data Placement

Oracle Automatic Storage Management Cluster File System

Oracle Automatic Storage Management Cluster File System (Oracle ACFS) is a new multiplatform, scalable file system, and storage management design that extends Oracle ASM technology, to support data that cannot be stored in Oracle ASM, in both single instance and cluster configurations. Additionally, Oracle ACFS provides snapshot functionality for a point in time copy of an Oracle ACFS system.

The software required for Oracle Automatic Storage Management Cluster File System is installed with the Oracle Grid Infrastructure installation.

See Also:

- ["Oracle ACFS and Oracle ADVM Support"](#) on page 3-4
- *Oracle Automatic Storage Management Administrator's Guide* for more information about Oracle ACFS

Oracle Data Pump Export and Oracle Data Pump Import

Data Pump provides a legacy mode in which you can use original export and import parameters when performing Oracle Data Pump export and import operations.

See Also: *Oracle Database Utilities* for more information about Data Pump Legacy Mode

Use Oracle Restart to Automatically Restart Your Database

Oracle Restart is a new feature included in this release to enhance the availability of Oracle databases in a single-instance environment. If you install Oracle Restart, and there is a temporary failure of any part of the Oracle Database software stack, including the database, listener, and Oracle ASM instance, Oracle Restart automatically restarts the failed component. In addition, Oracle Restart starts all these components when the database host computer is restarted. The components are started in the proper order, taking into consideration the dependencies among components.

See Also: Chapter 4, "Configuring Automatic Restart of an Oracle Database" in the *Oracle Database Administrator's Guide* for more information about Oracle Restart

New Method of Installing Oracle Automatic Storage Management

In past releases, Oracle ASM was installed as part of the Oracle Database installation. With Oracle Database 11g Release 2 (11.2), Oracle ASM is installed when you install the Oracle Grid Infrastructure components and shares an Oracle home with Oracle Clusterware when installed in a cluster such as with Oracle Real Application Cluster (Oracle RAC) or with Oracle Restart on a single instance database.

If you want to upgrade an existing Oracle ASM, then you must upgrade Oracle ASM by running an Oracle Grid Infrastructure upgrade. If you do not have Oracle ASM installed and you want to use Oracle ASM as your storage option, then you must complete an Oracle Grid Infrastructure installation before you start your Oracle Database installation.

See Also: [Appendix 3, "Oracle Grid Infrastructure for a Standalone Server"](#)

SRVCTL Support for a Single-Instance Database in a Cluster

SRVCTL was enhanced to support single-instance databases with Oracle Restart on standalone servers and on clusters with Oracle Clusterware. SRVCTL is a command-line interface used to manage Oracle processes (database instance, listener, Oracle ASM instance) when using Oracle Restart. With SRVCTL, you can manage the Oracle Restart configuration, see the status of processes managed by Oracle Restart, and start or stop processes such as the Oracle Database.

See Also: Chapter 4, "Configuring Automatic Restart of an Oracle Database" in the *Oracle Database Administrator's Guide* for more information about SRVCTL commands

Deprecated in Oracle Database 11g Release 2 (11.2)

The following are not supported or not available anymore with Oracle Database 11g Release 2:

- Installing data files directly on raw devices is no longer available during installation with Oracle Universal Installer or Database Configuration Assistant. You must use a file system or use Oracle ASM.
- Oracle Ultra Search

Desupported in Oracle Database 11g Release 2 (11.2)

The following feature is no longer supported with Oracle Database 11g Release 2 (11.2):

- The `-cleanupOBASE` flag of the deinstallation tool is desupported. There is no replacement for this flag.

Overview of Oracle Database Installation

This chapter describes the different installation types of Oracle Database and issues to consider before you install Oracle Database:

- [New Oracle Products and Features Installed with This Release](#)
- [Planning the Installation](#)
- [Installation Considerations](#)
- [Oracle Database Installation Methods](#)
- [Software Updates Option](#)
- [Oracle Database Editions](#)
- [Database Configuration Options](#)
- [Database Storage Options](#)
- [Database Management Options](#)
- [Database Backup and Recovery Options](#)
- [E-mail Notification Options](#)
- [Migration Consideration](#)
- [Upgrade Considerations](#)

New Oracle Products and Features Installed with This Release

Refer to [What's New in Oracle Database 11g Release 2 \(11.2\)](#) for more information about the new features and products installed with this release.

Planning the Installation

The Oracle Database installation process consists of the following steps:

1. **Read the release notes:** Read *Oracle Database Release Notes for Linux* before you begin the installation. The release notes are available with the platform-specific documentation.

The latest version of the release notes is available at:

<http://docs.oracle.com/>

2. **Review the licensing information:** Although the installation media in the media pack contain many Oracle components, you are permitted to use only those components for which you have purchased licenses.

Oracle Support Services does not provide support for components for which licenses have not been purchased.

See Also: *Oracle Database Licensing Information*

3. **Plan 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 H](#), which covers frequently asked questions about installing Oracle Database components, such as how to install Oracle Database if the site uses Oracle applications or if you need multiple Oracle Database connections.
4. **Complete preinstallation tasks:** [Chapter 2](#) describes preinstallation tasks that you must complete before installing the product. Additionally, see [Chapter 3](#) for Oracle Restart preinstallation tasks.
5. **Install the software:** Use the following sections to install Oracle Database and Oracle Grid Infrastructure for a standalone server:
 - [Chapter 3](#) describes how to install Oracle Grid Infrastructure for a standalone server.
 - [Chapter 4](#) describes how to use Oracle Universal Installer to install Oracle Database and how to clone an Oracle home.
 - [Chapter 7](#) describes how to remove Oracle Database software.
 - [Appendix A](#) provides information about performing silent, or response file installations, which you may want to use if you must perform multiple installations of Oracle Database.
 - [Appendix B](#) provides information about cloning an Oracle home.
 - [Appendix F](#) describes globalization support information.
 - [Appendix G](#) provides troubleshooting advice in case you encounter problems with the installation.
6. **Complete postinstallation tasks:** [Chapter 5](#) describes recommended and required postinstallation tasks.
7. **Get started using Oracle Database:** Use the following sections to get started with Oracle Database:
 - [Chapter 6](#) describes how to verify the contents of the installed Oracle Database, how to start various tools, and how to locate various files.
 - [Appendix C](#) describes the network-attached storage (NAS) devices, which you can use to store Oracle database files and Oracle software.
 - [Appendix D](#) describes the Optimal Flexible Architecture, which is a set of guidelines that ensures reliable Oracle installations that require little maintenance.
 - [Appendix E](#) explains the method to manage Oracle Database port numbers.

Installation Considerations

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

- [Hardware and Software Certification](#)

- [Multiple Oracle Homes Support](#)
- [Oracle Grid Infrastructure for a Standalone Server](#)
- [Oracle Cluster Synchronization Services](#)
- [Installing Oracle Database Vault in an Oracle Data Guard Environment](#)
- [Oracle Database Vault Default Audit Policy and Initialization Parameters](#)

Hardware and Software Certification

The platform-specific hardware and software requirements included in this guide were current when 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 My Oracle Support website for the most up-to-date list of certified hardware platforms and operating system versions. The My Oracle Support website is available at:

<https://support.oracle.com/>

You must register online before using My Oracle Support. After logging in, from the menu options, select the **Certifications** tab. On the **Certifications** page, use the **Certification Search** options to search by Product, Release, and Platform. You can also search using the **Certification Quick Link** options such as Product Delivery, and Lifetime Support.

Third-Party Database Certification for Oracle SQL Developer

You can use Oracle SQL Developer to view metadata and data of several non-Oracle databases. Refer to "Database Certification for SQL Developer (Oracle and Third-Party)" in *Oracle SQL Developer Installation Guide* for more information.

Multiple Oracle Homes Support

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

Installing Oracle Database on a System with an Existing Oracle Installation

You must install Oracle Database 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 Oracle Database 11g Release 2 software into an existing Oracle9i Oracle home directory.

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

Oracle Grid Infrastructure for a Standalone Server

The Oracle Grid Infrastructure for a standalone server provides the infrastructure to include your single-instance database in an enterprise grid architecture. Oracle Database 11g Release 2 (11.2) combines these infrastructure products into one software installation called the Oracle Grid Infrastructure home. On a single-instance database, the Oracle Grid Infrastructure home includes Oracle Restart and Oracle Automatic Storage Management (Oracle ASM) software.

To use Oracle ASM or Oracle Restart, you must first install Oracle Grid Infrastructure for a standalone server before you install and create the database. Otherwise, you must manually register the database with Oracle Restart.

See Also: [Chapter 3, "Oracle Grid Infrastructure for a Standalone Server"](#) for more information about installing Oracle Grid Infrastructure for a standalone server

Oracle Cluster Synchronization Services

When you install Oracle Grid Infrastructure for a standalone server, Oracle Universal Installer (OUI) configures the single-node version of Oracle Cluster Synchronization Services (CSS). Specifically, CSS is a daemon process that is configured by the `root.sh` script.

The CSS service is required to enable synchronization between an Oracle ASM instance and the database instances that rely on it for database file storage. Because the service must be running before an Oracle ASM instance or database instance starts, it is configured to start automatically by Oracle Restart before the Oracle ASM instance is started. It must be running if an Oracle database is using Oracle ASM for database file storage.

For single-instance installations, the CSS daemon is installed-in and runs from the Oracle Grid Infrastructure home which is the same home that runs Oracle ASM.

Note: On cluster systems with Oracle RAC installations, the CSS daemon is configured during the Oracle Clusterware installation. If the system is running Oracle Clusterware, then see *Oracle Real Application Clusters Installation Guide for Linux and UNIX* for information about removing Oracle RAC or Oracle Clusterware.

See Also:

["Oracle Automatic Storage Management"](#) on page 1-9

Installing Oracle Database Vault in an Oracle Data Guard Environment

If you plan to use Oracle Data Guard with Oracle Database Vault, then see My Oracle Support note 754065.1 at:

<https://support.oracle.com/>

Oracle Database Vault Default Audit Policy and Initialization Parameters

Oracle Database Vault installs a baseline database auditing policy. This policy covers the access control configuration information stored in Oracle Database Vault database tables, information stored in Oracle Catalog (rollback segments, tablespaces, and so on), the use of system privileges, and Oracle Label Security configuration. When you install Oracle Database Vault, the security specific database initialization parameters are initialized with default values.

See Also: *Oracle Database Vault Administrator's Guide* for more information about the database audit policy

Oracle Database Installation Methods

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

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

Interactive Installation Types

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

Starting with Oracle Database 11g Release 2 (11.2), Oracle Universal Installer provides you the following options:

- **Desktop Class:** Select this option if you are installing on a laptop or desktop class system. This option includes a starter database and allows minimal configuration. This option is designed for those who want to quickly set up a database.
- **Server Class:** Select this option if you are installing on a server class system, such as what you would use when deploying Oracle Database in a production data center. This option allows for more advanced configuration options. Advanced configuration options available with this option include Oracle RAC, Oracle ASM, backup and recovery configuration, integration with Oracle Enterprise Manager Grid Control, and more fine-grained memory tuning, among others.

Furthermore, the Server Class option provides you with the following installation types:

- **Typical:** Select this installation method to quickly install Oracle Database. This installation type requires minimal user input. OUI installs the software and optionally creates a general-purpose database using the information that you specify on the screen. It is the default installation type.
- **Advanced:** Select this installation type to complete any of the following tasks:
 - 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.
 - Specify different passwords for administrative schemas.
 - Configure automated backups or Oracle Enterprise Manager notifications.
 - Configure Oracle Configuration Manager.
 - Customize components from the available components list. In the Select Database Edition screen, if you select **Enterprise Edition**, then Oracle Universal Installer automatically selects the components most customers need for their Oracle Database installation. You can also click **Select Options** to customize components from the components list.

See Also: ["Reviewing Component-Specific Installation Guidelines"](#) on page 4-1 for additional information about Oracle database installation

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 must 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:

- **Silent Mode:** Oracle Universal Installer runs in silent mode if you use a response file that specifies all required information, and specify the `-silent` option when starting Oracle Universal Installer. None of the Oracle Universal Installer screens are displayed.
- **Response File Mode:** Oracle Universal Installer runs in response file mode if you do not specify all required information in the response file.

For more information about these modes and about how to complete an installation using response files, see [Appendix A](#).

Software Updates Option

Use the Software Updates feature to dynamically download and apply the latest updates released by Oracle; such as, interim patch updates, critical patch updates, Oracle Universal Installer updates, and the latest patch set updates. This functionality is available with Oracle Database 11g Release 2 (11.2.0.2).

You can choose to download the latest updates by providing your My Oracle Support credentials or you can apply previously downloaded updates. You can also download the updates separately using the `-downloadUpdates` option and later apply them during the Oracle Database installation by providing the location of the updates.

See Also: "[Running Oracle Universal Installer](#)" on page 4-10 for more information on the `-downloadUpdates` option and dynamically applying software updates during installation

Oracle Database Editions

You can choose one of the following database editions when installing Oracle Database 11g Release 2 (11.2):

- **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. This option also allows you to enable or disable individual components from a components list.
- **Standard Edition:** This installation type is designed for department-level or workgroup-level applications and for small and medium-sized enterprises (SMEs). It is engineered to provide core relational database management services and options. It installs an integrated set of management tools, full distribution, replication, web features, and it helps build business-critical applications.
- **Standard Edition One:** This installation type is designed for department-level, workgroup-level, or web applications. From single-instance environments for small business to highly distributed branch environments, Oracle Database

Standard Edition One includes all the features necessary to build business-critical applications.

Note:

- You must install Oracle Database Client separately. You cannot install it during an Oracle Database installation. See *Oracle Database Client Installation Guide for Linux* for installation instructions.
 - The installation process is the same for all the database editions.
 - Ensure that you install only those products for which you have a valid license.
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See Also: *Oracle Database Licensing Information* for more information about the features available with each Oracle Database edition and for information about licensing

Database Configuration Options

During the Oracle Database installation, you can choose to create an Oracle database as part of the installation. If you choose to create an Oracle database, then Oracle Universal Installer uses Oracle Database Configuration Assistant to create it. You can create the database with 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 meet 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 the online help provided by either Oracle Universal Installer or Oracle Database Configuration Assistant for a description of these preconfigured database types.

Installation Choices that Affect Database Creation

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

- Silent or response file mode

If you choose either the Enterprise Edition or Standard Edition database edition, then choose to create a preconfigured database type. Oracle Universal Installer prompts you for the minimum amount of information required to create a database of the type you choose. It then runs Oracle Database Configuration

Assistant in silent or response file mode to create the database after it installs the software.

Note: Oracle recommends that you use this method to create a database if you have not previously created one.

- Interactive mode

Install the database using Oracle Universal Installer and start Oracle Database Configuration Assistant from the Oracle home. Oracle Database Configuration Assistant runs in interactive mode. Using the screens in Oracle Database Configuration Assistant, you can either modify one of the preconfigured database types or customize the database.

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

Creating a Database After Installation

If you did not create a database during the installation, then you can use Oracle Database Configuration Assistant to create a database after you install the software. For more information about using Oracle Database Configuration Assistant to create a database after installation, see "Creating and Managing a Database with DBCA" in *Oracle Database 2 Day DBA*.

Database Storage Options

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

- [File System](#)
- [Oracle Automatic Storage Management](#)

Note: Installing files on raw devices is no longer an option during installation. You must use a file system or Oracle Automatic Storage Management (Oracle ASM).

File System

If you use the file system option, then Oracle Database Configuration Assistant creates the database files in a directory on a file system mounted on the computer. Oracle recommends that the file system be separate from the file systems used by the operating system or the Oracle software. The file system 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 and distribute the database files over many disks.

- 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 have to specify multiple file system mount points for the database storage.

- A network file system (NFS) mounted from a certified network-attached storage (NAS) device. You also have the option to use the Direct NFS Client feature, which simplifies the administration of NFS configurations and also improves performance.

If the NAS device is certified by Oracle, then you can store the database files on them.

See Also:

- ["General Configuration Guidelines for NAS Devices"](#) on page C-1 for NAS device certification information
- ["Direct NFS Client"](#) on page 5-10

If you use the Advanced database creation option, then you can also use the Oracle Managed Files feature with the new database. If you use this feature, then you must specify only the database object name instead of file names when creating or deleting database files.

See Also: ["Specifying Oracle Managed Files at Database Creation"](#) in *Oracle Database Administrator's Guide*

Oracle Automatic Storage Management

Oracle Automatic Storage Management (Oracle ASM) is a high-performance storage management solution. For Oracle Database files, it simplifies the management of a dynamic database environment, for example, creating and laying out databases and managing disk space.

Oracle ASM can be used with single database installations, multiple database installations, and in Oracle RAC environments. It can be used with databases created in Oracle Database 10g Release 1 (10.1.0.3 or later). However, Oracle Database 11g Release 2 (11.2) databases must use Oracle ASM from Oracle Database 11g Release 2 (11.2) or later. Oracle ASM is installed as part of the Oracle Grid Infrastructure installation. If you plan to use Oracle ASM, then you must install Oracle Grid Infrastructure before you install and create the database. If you want to upgrade an existing Oracle ASM installation, then you must upgrade Oracle ASM by running an Oracle Grid Infrastructure upgrade.

See Also: [Chapter 3, "Oracle Grid Infrastructure for a Standalone Server"](#) for more information about installing the Oracle Grid Infrastructure software

Oracle ASM manages the storage of all database files, such as redo logs, control files, and data pump export files.

Oracle ASM can manage the Oracle Database executable binary files and any other non-database files by creating a file system with Oracle Automatic Storage Management Cluster File System. Although Oracle Automatic Storage Management Cluster File System is cluster-aware, it also works as a file system on a single-instance database.

See Also: *Oracle Automatic Storage Management Administrator's Guide*

At a high level, implementing Oracle ASM involves allocating partitioned disks for Oracle Database with preferences for striping and mirroring. Oracle ASM 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 Oracle ASM and the database instance is handled by CSS.

The following are components of an Oracle ASM installation:

- [Oracle Automatic Storage Management Disk Groups](#)
- [Oracle Automatic Storage Management Instance](#)

Oracle Automatic Storage Management Disk Groups

A disk group is a set of disk devices that Oracle ASM 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 a partition on a physical disk. In most cases, disk groups consist of one or more individual physical disks. To enable Oracle ASM to balance input/output operations 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 Oracle ASM disk group templates. When you create a disk group, Oracle ASM 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 control files for both normal and high redundancy disk groups is set to three-way mirroring. Other files are configured with two-way mirroring for normal redundancy, or three-way mirroring when configured for high redundancy. For a high redundancy disk group, the default mirroring cannot be changed, which implies that all files are always three-way mirrored in a high redundancy disk group. You can modify the default templates to suit your site's needs. See *Oracle Automatic Storage Management Administrator's Guide* for more information.

Oracle ASM 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, Oracle ASM rebalances the files across the disk group. You can create multiple disk groups to do 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, Oracle ASM can distribute data among the devices in the disk group to minimize the risk of data loss caused by component failures.

Oracle Automatic Storage Management Instance

The Oracle ASM instance is a special Oracle instance that manages Oracle ASM disk groups. The Oracle ASM instance and the `ASMSNMP` account are created and started, if necessary, when you install Oracle Grid Infrastructure. Oracle Enterprise Manager uses this account to monitor Oracle ASM instances to retrieve data from Oracle ASM-related data dictionary views. The `ASMSNMP` account status is set to `OPEN` upon creation, and it is granted the `SYSDBA` privilege.

Oracle recommends that you have the Oracle ASM instance in its own Oracle home. Oracle also recommends that you run this instance before you start a database instance that uses Oracle ASM.

For an Oracle Database installation, you only need one Oracle ASM instance, regardless of the number of database instances on the computer.

See Also: "Managing Oracle ASM Users with Oracle Enterprise Manager" in *Oracle Automatic Storage Management Administrator's Guide* for information about the ASMSNMP user

Database Management Options

To simplify database administration, Oracle provides a web-based management tool called Oracle Enterprise Manager. There are different ways to deploy Oracle Enterprise Manager:

- Deploy Oracle Enterprise Manager 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 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 (Grid Control).

Note:

- Oracle Enterprise Manager is available separately on the Oracle Enterprise Manager Grid Control installation media.
- For the latest certification information, see My Oracle Support note 412431.1, "Oracle Enterprise Manager Grid Control Certification Checker" at:

<https://support.oracle.com/>

- 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. This local installation provides a web-based interface called Oracle Enterprise Manager Database Control. The Database Control is similar to the Grid Control, but it can manage only a single database. If you want to administer multiple databases on a system, then you must either configure a separate Database Control for each database, or you must install Oracle Enterprise Manager Grid Control.

See Also: *Oracle Enterprise Manager Concepts* manual and the *Oracle Enterprise Manager Grid Control Basic Installation Guide* on the Oracle Enterprise Manager Grid Control installation media for more information about Oracle Enterprise Manager

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 create a preconfigured database during the installation, you must select the Oracle Enterprise Manager interface 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 Enterprise Manager Database Control 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 to use to manage the database.
If an Oracle Management Agent is not installed, then you must use Database Control to manage the database. However, if Oracle Management Agent is installed after Oracle Database, then you can 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, you can still configure Database Control to manage the database.

Management Options for Custom Databases

Install the database using Oracle Universal Installer and start Oracle Database Configuration Assistant from the Oracle home. Oracle Database Configuration Assistant runs in interactive mode. Using a screen in Oracle Database Configuration Assistant, you can specify the Oracle Enterprise Manager interface to use to manage the database. You can also choose not to configure the database with Oracle Enterprise Manager.

Oracle recommends that you configure the database to use Oracle Enterprise Manager during installation. However, if you do not configure the database to use Oracle Enterprise Manager during the installation, then you can use Oracle 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 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 matrix

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

Database Backup and Recovery Options

If you 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. 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](#)

See Also:

- *Oracle Database 2 Day DBA* for information about using Oracle Enterprise Manager Database Control to configure or customize automated backups or to recover a backed up database
- *Oracle Database Backup and Recovery User's Guide* for more detailed information about defining a backup strategy and backing up and recovering Oracle databases

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 a disk storage area called the fast 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 fast recovery area

You can use either a file system directory or an Oracle ASM disk group for the fast recovery area. To set the default values for fast recovery area and data file location, use Oracle base as the starting point. See "[Oracle Base Directory](#)" for more information on Oracle base.

- Default fast recovery area: `$ORACLE_BASE/recovery_area`
- Default data file location: `$ORACLE_BASE/oradata`

The default disk quota configured for the fast recovery area is 2 GB. For Oracle ASM 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 fast 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 `ORA_DBA` group). This user also must have `Logon As A Batch Job` privilege.

Backup Job Default Settings

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

- The backup job is scheduled to run every morning at 2.00 a.m.
- The disk quota for the fast recovery area is 2 GB.

If you enable automated backups by using Oracle 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 fast recovery area.

E-mail Notification Options

During the installation, if you choose the option to use Oracle Enterprise Manager Database Control for database management, then you can also configure Oracle Enterprise Manager to automatically send you an email when specific events occur. These events can include occurrences such as the disk space reaching a critical limit (a threshold) or a database shutting down unexpectedly.

If you enable email notifications, then you must specify the following information:

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

The email address that you specify could belong to an individual, or a shared email account, or a distribution list.

You can use Oracle Enterprise Manager Database Control to set up, change, or customize email notifications after you create the database.

Note: The Enable Email Notifications option is not available starting with Oracle Database 11g Release 2 (11.2.0.2).

Migration Consideration

Oracle Database 11g Release 2 (11.2) database for 32-bit Linux can be migrated to an Oracle Database 11g Release 2 (11.2) database for 64-bit Linux. See "Database Migration from a 32-Bit Linux to 64-Bit Linux Computer" section in the *Oracle Database Administrator's Reference for Linux and UNIX-Based Operating Systems* for migration information.

Upgrade Considerations

For information about upgrading an earlier release of Oracle Database to Oracle Database 11g Release 2 (11.2), see *Oracle Database Upgrade Guide*. The following sections provide additional platform-specific upgrade information that you must review before upgrading an existing database:

- [Upgrading Your Operating System Before a Database Upgrade](#)
- [Upgrading Oracle Automatic Storage Management](#)
- [Daylight Saving Time Upgrade](#)
- [Upgrading an Oracle Database in the Same Oracle Home](#)

Upgrading Your Operating System Before a Database Upgrade

When you upgrade to a new release of Oracle Database, the operating system requirements may have changed. If required, upgrade your operating system before upgrading Oracle Database. See [Chapter 2, "Oracle Database Preinstallation Tasks"](#) for a list of supported operating systems.

To upgrade the operating system and then perform a database upgrade, perform one of the following procedures:

- [Upgrading the Operating System](#)
- [Migrating to a New Computer](#)

Upgrading the Operating System

Upgrade the operating system. Then, upgrade the database either manually or by using Oracle Database Upgrade Assistant.

Migrating to a New Computer

Migrate to a new computer using one of the following methods:

- To upgrade the database on the new computer:
 1. Copy the database files from the computer running the previous operating system to the one running the supported operating system.
 2. Re-create the control files on the computer running the supported operating system.
 3. Manually upgrade the database using the method described in *Oracle Database Upgrade Guide*.

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

- You can also upgrade the database using the Export/Import utilities method described in *Oracle Database Upgrade Guide*.

See Also: The table on "Supported Upgrade Paths for Upgrading Oracle Database" in *Oracle Database Upgrade Guide* for information about upgrading your current database release

Upgrading Oracle Automatic Storage Management

In previous releases, Oracle ASM was installed as part of the Oracle Database installation. With Oracle Database 11g Release 2 (11.2), Oracle ASM is part of an Oracle Grid Infrastructure installation, either for a cluster or for a standalone server.

If you want to upgrade an existing Oracle ASM installation, then you must upgrade Oracle ASM by running an Oracle Grid Infrastructure upgrade. If you do not have Oracle ASM installed and you want to use Oracle ASM as your storage option, then you must complete an Oracle Grid Infrastructure installation before you start your Oracle Database installation.

See Also:

- *Oracle Automatic Storage Management Administrator's Guide*
- *Oracle Database Upgrade Guide*

Daylight Saving Time Upgrade

See "[Daylight Saving Time Upgrade of Timestamp with Timezone Data Type](#)" for information about Daylight Saving Time Upgrade.

Upgrading an Oracle Database in the Same Oracle Home

See the *Oracle Database Upgrade Guide* for more information about performing an in-place Oracle Database upgrade.

Oracle Database Preinstallation Tasks

This chapter describes the tasks that you must complete before you start Oracle Universal Installer (OUI).

This guide contains information required to install Oracle Database 11g Release 2 (11.2). Ensure that you review information related to the platform on which you intend to install Oracle Database 11g.

Note:

- To use Oracle Automatic Storage Management (Oracle ASM) or Oracle Restart, you must first install Oracle Grid Infrastructure before you install and create the database. Otherwise, you must manually register the database with Oracle Restart.
 - Additionally, see "[Requirements for Oracle Grid Infrastructure Installation](#)" on page 3-2 before you proceed with the database preinstallation tasks.
-
-

It includes information about the following topics:

- [About Installing the Linux Operating System](#)
- [Logging In to the System as root](#)
- [Checking the Hardware Requirements](#)
- [Checking the Software Requirements](#)
- [Reviewing Operating System Security Common Practices](#)
- [Installation Fixup Scripts](#)
- [Verifying UDP and TCP Kernel Parameters](#)
- [Installing the cvuqdisk Package for Linux](#)
- [Confirming Host Name Resolution](#)
- [Disabling Transparent HugePages](#)
- [Checking the Network Setup](#)
- [Creating Required Operating System Groups and Users](#)
- [Checking Resource Limits for the Oracle Software Installation Users](#)
- [Configuring Kernel Parameters for Linux](#)
- [Reviewing Operating System Security Common Practices](#)

- [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](#)
- [Configuring Storage for Oracle Database Files Using Block Devices](#)
- [Configuring Disk Devices for Oracle Database](#)
- [Stopping Existing Oracle Processes](#)
- [Configuring Oracle Software Owner Environment](#)

See Also:

- ["Requirements for Oracle Grid Infrastructure Installation"](#)
- "Preinstallation Requirements" section in *Oracle Configuration Manager Installation and Administration Guide* and *Oracle Configuration Manager Prerequisites*
- Appendix A, "Country Codes", in *Oracle Configuration Manager Installation and Administration Guide* for a list of valid country codes that can be used while installing Oracle Configuration Manager

About Installing the Linux Operating System

This section describes how to install a supported Linux distribution. It contains the following topics:

- [Completing a Minimal Linux Installation](#)
- [Completing a Default Linux Installation](#)
- [About Oracle Linux and the Unbreakable Enterprise Kernel](#)
- [About the Oracle Preinstallation RPMs and Oracle Validated RPMs](#)
- [Installing the Oracle Preinstallation RPM or Oracle Validated RPM with ULN Support](#)
- [Installing the Oracle Preinstallation RPM from DVD Disks or Images](#)
- [Using Ksplice to Perform a Zero Downtime Update](#)

Completing a Minimal Linux Installation

To complete a minimal Linux installation, select one of the minimal installation options (either a custom installation where you select the Minimal option from Package Group Selection, or where you deselect all packages except for the Base pack). This installation lacks many RPMs required for database installation, so you must use an RPM package for your Oracle Linux release to install the required packages. The package you use depends on your Linux release, and your support status with Unbreakable Linux Network (ULN).

Note: The Oracle Preinstallation RPM installs the X11 client libraries, but it does not install the X Window System server packages. To use graphical user interfaces such as OUI, configuration assistants, and Oracle Enterprise Manager, set the display to a system with X Window System server packages.

Refer to the following URL for documentation regarding installation of a reduced set of packages:

<https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&id=728346.1>

Note: If you are not a member of Unbreakable Linux Network or Red Hat Support network, and you are a My Oracle Support customer, then you can download instructions to configure a script that documents installation of a reduced set of packages:

<https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&id=579101.1>

You can also search for "Linux reduced set of packages" to locate the instructions.

SSH is required for an Oracle Grid Infrastructure installation. OpenSSH should be included in the Linux distribution minimal installation. To confirm that SSH packages are installed, enter the following command:

```
# rpm -qa |grep ssh
```

If you do not see a list of SSH packages, then install those packages for your Linux distribution.

Completing a Default Linux Installation

If you do not install the Oracle Preinstallation RPM, then Oracle recommends that you install your Linux operating system with the default software packages (RPMs). This installation includes most of the required packages and helps you limit manual verification of package dependencies. Oracle recommends that you do not customize the RPMs during installation.

For information about a default installation, log on to My Oracle Support:

<https://support.oracle.com>

Search for "default rpms linux installation," and look for your Linux distribution. For example:

<https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&id=401167.1>

After installation, review system requirements for your distribution to ensure that you have all required kernel packages installed, and complete all other configuration tasks required for your distribution and system configuration.

About Oracle Linux and the Unbreakable Enterprise Kernel

Oracle's Unbreakable Enterprise Kernel delivers the latest innovations from upstream development to customers who run Oracle Linux in the data center. The Unbreakable

Enterprise Kernel is included and enabled by default starting with Oracle Linux 5 Update 6.

The Unbreakable Enterprise Kernel is based on a recent stable mainline development Linux kernel, and also includes optimizations developed in collaboration with Oracle Database, Oracle middleware, and Oracle hardware engineering teams to ensure stability and optimal performance for the most demanding enterprise workloads.

Oracle highly recommends deploying the Oracle Unbreakable Enterprise Kernel in your Linux environment, especially if you run enterprise applications. However, using Oracle Unbreakable Enterprise Kernel is optional. If you require strict RHEL kernel compatibility, then Oracle Linux also includes a kernel compatible with the RHEL Linux kernel, compiled directly from the RHEL source code.

You can obtain more information about the Oracle Unbreakable Enterprise Kernel for Linux at the following URL:

<http://www.oracle.com/us/technologies/linux/index.html>

The Oracle Unbreakable Enterprise Kernel for Linux is the standard kernel used with Oracle products. The build and QA systems for Oracle Database and other Oracle products use the Oracle Unbreakable Enterprise Kernel for Linux exclusively. The Oracle Unbreakable Enterprise Kernel for Linux is also the kernel used in Oracle Exadata and Oracle Exalogic systems. Oracle Unbreakable Enterprise Kernel for Linux is used in all benchmark tests on Linux in which Oracle participates, as well as in the Oracle Preinstallation RPM program for x86-64.

Ksplice, which is part of Oracle Linux, updates the Linux operating system (OS) kernel, while it is running, without requiring restarts or any interruption. Ksplice is available only with Oracle Linux.

About the Oracle Preinstallation RPMs and Oracle Validated RPMs

If your Linux distribution is Oracle Linux, then you can complete most preinstallation configuration tasks by using the Oracle Preinstallation RPM or Oracle Validated RPM for your release, which is available from the Oracle Linux Network, or available on the Oracle Linux DVDs. Using the Oracle Preinstallation RPM is not required, but Oracle recommends you use it to save time in setting up your cluster servers.

When it is installed, the Oracle Preinstallation RPM or Oracle Validated RPM does the following:

- Automatically downloads and installs any additional RPM packages needed for installing Oracle Grid Infrastructure and Oracle Database, and resolves any dependencies
- Creates an `oracle` user, and creates the `oraInventory` (`oinstall`) and `OSDBA` (`dba`) groups for that user
- As needed, sets `sysctl.conf` settings, system startup parameters, and driver parameters to values based on recommendations from the Oracle RDBMS Pre-Install program
- Sets hard and soft resource limits
- Sets other recommended parameters, depending on your kernel version

To become an Oracle Linux Network customer, contact your sales representative, or purchase a license from the Oracle Linux store:

<https://shop.oracle.com/product/oraclelinux>

To register your server on the Unbreakable Linux Network, or to find out more information, see the following URL:

<https://linux.oracle.com>

If you are using Oracle Linux 5.2 and higher, then the Oracle Preinstallation RPM is included on the install media.

Note: The Oracle Preinstallation RPM designated for each Oracle Database release sets kernel parameters and resource limits only for the user account `oracle`. To use multiple software account owners, you must perform system configuration for other accounts manually.

You can obtain Linux kernels from the Oracle Linux public Yum repository. The public Yum repository for Oracle Linux 4, Oracle Linux 5 and Oracle Linux 6 is available at the following URL:

<http://public-yum.oracle.com/>

To become an Unbreakable Linux Network customer, contact your sales representative, or purchase a license from the Unbreakable Linux store:

<https://shop.oracle.com/product/oraclelinux>

To register your server on the Unbreakable Linux Network, or to find out more information, refer to the following URL:

<https://linux.oracle.com>

If you are using Oracle Linux 4.7 and higher, or Oracle Linux 5.2 and higher, then the Oracle Preinstallation RPM or Oracle Validated RPM is included on the install media.

Note: The Oracle Preinstallation RPM sets kernel parameters and resource limits only for the user account `oracle`. To use multiple software account owners, you must perform system configuration for other accounts manually.

In addition, users and groups are created using the next available ID numbers. If server group and user IDs are not identical on the cluster nodes where you run the Oracle Preinstallation RPM, then it is possible that these ids will be different on the nodes, and the different group and user IDs will cause installation to fail.

To avoid this issue, run the command `id user` on all nodes, where `user` is the software owner user account. If group or user IDs are not identical on all the nodes, then change them as necessary to ensure that they are identical.

Installing the Oracle Preinstallation RPM or Oracle Validated RPM with ULN Support

Use the following procedure to subscribe to Unbreakable Linux Network (ULN) Oracle Linux channels, and to add the Oracle Linux channel that distributes the Oracle Preinstallation RPM or Oracle Validated RPM for your release:

1. Register your server with Unbreakable Linux Network (ULN). By default, you are registered for the Oracle Linux Latest channel for your operating system and hardware.
2. Log in to Unbreakable Linux Network:

<https://linux.oracle.com>

3. Click the **Systems** tab, and in the System Profiles list, select a registered server. The System Details window opens and displays the subscriptions for the server.
4. Click **Manage Subscriptions**. The System Summary window opens.
5. From the **Available Channels** list, select the Linux installation media copy and update patch channels corresponding to your Oracle Linux distribution. For example, if your distribution is Oracle Linux 5 Update 6 for x86_64, then select the following:
 - Oracle Linux 5 Update 6 installation media copy (x86_64)
 - Oracle Linux 5 Update 6 Patch (x86_64)
6. Click **Subscribe**.
7. Start a terminal session and enter the following command as root, depending on your platform.

Oracle Linux 6:

```
# yum install oracle-rdbms-server-11gR2-preinstall
```

Oracle Linux 5 or Oracle Linux 4:

```
# yum install oracle-validated
```

You should see output indicating that you have subscribed to the Oracle Linux channel, and that packages are being installed. For example:

```
e15_u6_i386_base  
e15_u6_x86_64_patch
```

Oracle Linux automatically creates a standard (not role-allocated) Oracle installation owner and groups, and sets up other kernel configuration settings as required for Oracle installations.

8. Repeat steps 1 through 8 on all other servers in your cluster.

Note: Check the RPM log file to review the system configuration changes. For example:

Oracle Linux 6:

```
/var/log/oracle-rdbms-server-11gR2-preinstall/results/orakernel.log
```

Oracle Linux 5 and Oracle Linux 4:

```
/var/log/oracle-validated/results/orakernel.log
```

Installing the Oracle Preinstallation RPM from DVD Disks or Images

Use the following procedure to install the Oracle Preinstallation RPM or Oracle Validated RPM from the Oracle Linux distribution:

1. Get Oracle Linux disks either by ordering the Oracle Linux media pack from Oracle Store, or downloading disk images from the Oracle Software Delivery Cloud portal for Oracle Linux and Oracle Virtual Machine (Oracle VM).

Oracle Store:

<https://shop.oracle.com/store/enterpriselinu>

Oracle Software Delivery Cloud:

<https://edelivery.oracle.com/linux>

2. Start the Oracle Linux installation.
3. At the first software selection screen, which lists task-specific software options, there is an option at the bottom of the screen to customize now or customize later. Select **Customize now**, and click **Next**.
4. On the Customize selection page, select **Base System** on the list on the left side of the screen, and then select **System Tools** on the right side of the screen. Then, click **Optional Packages**.
5. The Packages in System Tools window opens. Select the Oracle Preinstallation RPM package box from the package list, and click **Next**.
6. Complete the other screens to finish the Oracle Linux installation.

Oracle Linux automatically creates a standard (not role-allocated) Oracle installation owner and groups, and sets up other kernel configuration settings as required for Oracle installations.

Using Ksplice to Perform a Zero Downtime Update

Ksplice Uptrack updates provide Linux security and bug fix updates, repackaged in a form that allows these updates to be applied without restarting the kernel.

To use Ksplice Uptrack:

1. Obtain or verify your Oracle Linux premium support subscription from Unbreakable Linux Network:

<https://linux.oracle.com>

2. Log in as root.
3. Ensure that you have access to the Internet on the server where you want to use Ksplice. For example, if you are using a proxy server, then set the proxy server and port values in the shell with commands similar to the following:

```
# export http_proxy=http://proxy.example.com:port
# export https_proxy=http://proxy.example.com:port
```

4. Download the Ksplice Uptrack repository RPM package:

<https://www.ksplice.com/yum/uptrack/ol/ksplice-uptrack-release.noarch.rpm>

5. Run the following commands:

```
rpm -i ksplice-uptrack-release.noarch.rpm
yum -y install uptrack
```

6. Open `/etc/uptrack/uptrack.conf` with a text editor, enter your premium support access key, and save the file. You must use the same access key for all of your systems.
7. Run the following command to carry out a zero downtime update of your kernel:

```
uptrack-upgrade -y
```

See Also:

- The Oracle Ksplice Uptrack website for more information:
<http://www.ksplice.com>
- Oracle Ksplice for Oracle Linux:
<https://oss.oracle.com/ksplice/docs/ksplice-quickstart.pdf>

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, a PC, or other system with X server software installed.

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

- To install the software from an X Window System workstation or X terminal:
 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.example.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 the user to `root`:

```
$ sudo sh
password:
#
```

- To install the software from a PC or other system with X server software:

Note: If necessary, see the X server documentation, or contact your X server vendor or system administrator for more information about completing this procedure. Depending on the X server software that you are using, you may have 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 the user to `root`:

```
$ sudo sh
password:
#
```

Checking the Hardware Requirements

The system must meet the following minimum hardware requirements:

- [Memory Requirements](#)
- [System Architecture](#)
- [Disk Space Requirements](#)
- [Display Requirements](#)

Memory Requirements

The following are the memory requirements for installing Oracle Database 11g Release 2 (11.2):

Minimum: 1 GB of RAM

Recommended: 2 GB of RAM or more

- To determine the RAM size, enter the following command:

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

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

- The following table describes the relationship between the installed RAM and the configured swap space recommendation:

Note: On Linux, the HugePages feature allocates non-swappable memory for large page tables using memory-mapped files. If you enable HugePages, then you should deduct the memory allocated to HugePages from the available RAM before calculating swap space.

RAM	Swap Space
Between 1 GB and 2 GB	1.5 times the size of the RAM
Between 2 GB and 16 GB	Equal to the size of the RAM
More than 16 GB	16 GB

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

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

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

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

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 finalizing a value. This is because the available RAM and swap space keep changing depending on the user interactions with the computer.
 - Contact your operating system vendor for swap space allocation guidance for your server. The vendor guidelines supersede the swap space requirements listed in this guide.
-
-

Automatic Memory Management

Starting with Oracle Database 11g, the Automatic Memory Management feature requires more shared memory (`/dev/shm`) and file descriptors. The size of the shared memory must be at least the greater of the `MEMORY_MAX_TARGET` and `MEMORY_TARGET` parameters for each Oracle instance on the computer. If the `MEMORY_MAX_TARGET` parameter or the `MEMORY_TARGET` parameter is set to a nonzero value, and an incorrect size is assigned to the shared memory, it results in an `ORA-00845` error at startup. On Linux systems, if the operating system `/dev/shm` mount size is too small for the Oracle system global area (SGA) and program global area (PGA), it results in an `ORA-00845` error.

The number of file descriptors for each Oracle instance must be at least $512 * PROCESSES$. The limit of descriptors for each process must be at least 512. If file descriptors are not sized correctly, you see an `ORA-27123` error from various Oracle processes and potentially Linux Error `EMFILE` (Too many open files) in non-Oracle processes.

To determine the amount of shared memory available, enter the following command:

```
# df -h /dev/shm/
```

Note: The `MEMORY_MAX_TARGET` and `MEMORY_TARGET` parameters cannot be used when the `LOCK_SGA` parameter is enabled, or with HugePages on Linux.

On the Initialization Parameters page, note the **Memory Size** (SGA and PGA), which sets the initialization parameter `MEMORY_TARGET` or `MEMORY_MAX_TARGET`. The initialization parameters cannot be greater than the shared memory file system on the operating system. For example, if the shared memory file system allocation on your system is 1 GB, but you set **Memory Size** (`MEMORY_TARGET`) to 2 GB, then the following error messages are displayed during database startup:

```
ORA-00845: MEMORY_TARGET not supported on this system
ORA-01078: Failure in processing system parameters
```


In addition, if you click **All Initialization Parameters** and the global database name is longer than eight characters, then the database name value (in the `DB_NAME` parameter) is truncated to the first eight characters, and the `DB_UNIQUE_NAME` parameter value is set to the global name.

The workaround, if you encounter the `ORA-00845` error, is to increase the `/dev/shm` mountpoint size.

For example:

```
# mount -t tmpfs shmfs -o size=7g /dev/shm
```

To make this change persistent across system restarts, add an entry in `/etc/fstab` similar to the following:

```
shmfs /dev/shm tmpfs size=7g 0
```

System Architecture

To determine if the system architecture can run the software, enter the following command:

```
# uname -m
```

Verify that the processor architecture matches the Oracle software release to install. If you do not see the expected output, then you cannot install the software on this system.

Disk Space Requirements

The following are the disk space requirements for installing Oracle Database 11g Release 2 (11.2):

- 1 GB of space in the `/tmp` directory

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

```
# df -h /tmp
```

If the free space available in the `/tmp` directory is less than what is required, then complete one of the following steps:

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

See Also: ["Configuring Oracle Software Owner Environment"](#) on page 2-61 for more information about setting `TMP` and `TMPDIR`

- Extend the file system that contains the `/tmp` directory. If necessary, contact the system administrator for information about extending file systems.
- The following tables describe the disk space requirements for software files and data files for each installation type on Linux x86:

Installation Type	Requirement for Software Files (GB)
Enterprise Edition	4.5
Standard Edition	4.4

Installation Type	Disk Space for Data Files (GB)
Enterprise Edition	1.7
Standard Edition	1.5

- The following tables describe the disk space requirements for software files and data files for each installation type on Linux x86-64:

Installation Type	Requirement for Software Files (GB)
Enterprise Edition	4.7
Standard Edition	4.6

Installation Type	Disk Space for Data Files (GB)
Enterprise Edition	1.7
Standard Edition	1.5

- The following tables describe the disk space requirements for software files and data files for each installation type on IBM: Linux on System z:

Installation Type	Requirement for Software Files (GB)
Enterprise Edition	4.9
Standard Edition	4.8

Installation Type	Disk Space for Data Files (GB)
Enterprise Edition	2.0
Standard Edition	1.5

To determine the amount of free disk space on the system, enter the following command:

```
# df -h
```

Additional disk space, either on a file system or on an Oracle ASM disk group is required for the fast recovery area if you configure automated backups.

Display Requirements

The minimum resolution for Oracle Database 11g Release 2 (11.2) is 1024 x 768 or higher.

Checking the Software Requirements

Depending on the products that you intend to install, verify that the following software is installed on your system:

- [Operating System Requirements](#)
- [Kernel Requirements](#)
- [Package Requirements](#)
- [Compiler Requirements](#)
- [Additional Software Requirements](#)

Note:

- This guide contains information required to install Oracle Database 11g Release 2 (11.2). Ensure that you review information related to the platform on which you intend to install Oracle Database 11g.
 - Oracle Universal Installer performs checks on the system to verify that it meets the listed requirements. To ensure that these checks pass, verify the requirements before you start Oracle Universal Installer.
-
-

Note: The platform-specific hardware and software requirements included in this guide were current when 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 My Oracle Support website for the most up-to-date list of certified hardware platforms and operating system versions:

<https://support.oracle.com/>

Operating System Requirements

The following operating system versions (or later) are required for Oracle Database 11g Release 2 (11.2):

Note:

- Starting with Oracle Database 11g Release 2 (11.2.0.4), Oracle Linux 7 and Red Hat Enterprise Linux 7 are supported on Linux x86-64.
 - Starting with Oracle Database 11g Release 2 (11.2.0.3), Oracle Linux 6 and Red Hat Enterprise Linux 6 are supported on Linux x86 and Linux x86-64.
 - Starting with Oracle Database 11g Release 2 (11.2.0.3), Asianux 4 is supported on Linux x86 and Linux x86-64.
 - Starting with Oracle Database 11g Release 2 (11.2.0.4), SUSE Linux Enterprise Server 12 is certified on Linux x86-64 systems.
 - Starting with Oracle Database 11g Release 2 (11.2.0.4), NeoKylin Linux Advanced Server 6 is certified on Linux x86-64 systems.
 - Starting with Oracle Database 11g Release 2 (11.2.0.4), NeoKylin Linux Advanced Server 7 is certified on Linux x86-64 systems.
 - Starting with Oracle Database 11g Release 2 (11.2.0.4), Red Hat Enterprise Linux 7 is supported on IBM: Linux on System z.
-
-

- **On Linux x86**

- Asianux Server 3 SP2
- Asianux Server 4 SP3
- Oracle Linux 4 Update 7
- Oracle Linux 5 Update 2
- Oracle Linux 6
- Red Hat Enterprise Linux 4 Update 7
- Red Hat Enterprise Linux 5 Update 2
- Red Hat Enterprise Linux 6
- SUSE Linux Enterprise Server 10 SP2
- SUSE Linux Enterprise Server 11

- **On Linux x86-64**

- Asianux Server 3 SP2
- Asianux Server 4 SP3
- Oracle Linux 4 Update 7
- Oracle Linux 5 Update 2 (with Red Hat Compatible Kernel)
- Oracle Linux 5 Update 5
- Oracle Linux 6
- Oracle Linux 6 (with Red Hat Compatible Kernel)
- Oracle Linux 7
- Oracle Linux 7 (with Red Hat Compatible Kernel)

- Red Hat Enterprise Linux 4 Update 7
- Red Hat Enterprise Linux 5 Update 2
- Red Hat Enterprise Linux 6
- Red Hat Enterprise Linux 7
- SUSE Linux Enterprise Server 10 SP2
- SUSE Linux Enterprise Server 11
- SUSE Linux Enterprise Server 12 SP1
- NeoKylin Linux Advanced Server 6
- NeoKylin Linux Advanced Server 7
- **On IBM: Linux on System z**
 - Red Hat Enterprise Linux 7 Update 1
 - Red Hat Enterprise Linux 6 Update 2
 - Red Hat Enterprise Linux 4 Update 8
 - Red Hat Enterprise Linux 5 Update 4
 - SUSE Linux Enterprise Server 10 SP3
 - SUSE Linux Enterprise Server 11 SP1

Starting with Oracle Database 11g Release 2 (11.2), the Security Enhanced Linux (SELinux) feature is supported for Oracle Linux 4, Oracle Linux 5, Oracle Linux 6, Red Hat Enterprise Linux 4, Red Hat Enterprise Linux 5, and Red Hat Enterprise Linux 6.

Note: For Asianux Server, Oracle Linux, and Red Hat Enterprise Linux, the system requirements are identical by kernel version, specifically:

- Oracle Linux 4 and Red Hat Enterprise Linux 4 requirements are the same.
 - Asianux Server 3, Oracle Linux 5, and Red Hat Enterprise Linux 5 Update 2 requirements are the same.
 - Oracle Unbreakable Enterprise Kernel for Linux 5 Update 5 (2.6.32) and above, available for x86-64 systems, contains several additional features and performance enhancements not available either with Oracle Linux or with other supported Linux distributions. This kernel can be installed on either Oracle Linux or Red Hat Enterprise Linux distributions. Before installing the Oracle Unbreakable Enterprise Kernel, you must have either Oracle Linux 5 Update 5, Oracle Linux 6, Red Hat Enterprise Linux 5 Update 5, or Red Hat Enterprise Linux 6 installed on an x86-64 server.
 - The Oracle Unbreakable Enterprise Kernel for Linux is installed by default with the Oracle Linux 6 installation.
-

To determine the distribution and version of Linux installed, enter the following command:

```
# cat /proc/version
```

You can also enter the following command on some distributions of Linux:

```
# lsb_release -id
```

See Also: "[Hardware and Software Certification](#)" on page 1-3 for information about how to access the latest system requirements

Kernel Requirements

The following are the kernel requirements for Oracle Database 11g Release 2 (11.2):

For Linux x86

- On Oracle Linux 4 and Red Hat Enterprise Linux 4
2.6.9 or later
- On Asianux Server 3, Oracle Linux 5, and Red Hat Enterprise Linux 5
2.6.18 or later
- On Oracle Linux 6
2.6.32.100 or later
- On Asianux Server 4 and Red Hat Enterprise Linux 6
2.6.32-71 or later
- On SUSE Linux Enterprise Server 10
2.6.16.21 or later
- On SUSE Linux Enterprise Server 11:
2.6.27.19 or later

For Linux x86-64

- On Oracle Linux 4 and Red Hat Enterprise Linux 4
2.6.9 or later
- On Oracle Linux 5 Update 2 with Red Hat Compatible Kernel
2.6.18 or later
- On Oracle Linux 5 Update 5 with Red Hat Compatible Kernel
2.6.18 or later
- On Oracle Linux 5 Update 5 with Unbreakable Enterprise Kernel
2.6.32-100.0.19 or later
- On Oracle Linux 6
2.6.32-100.28.5.el6.x86_64 or later
- On Oracle Linux 6 with Red Hat Compatible Kernel
2.6.32-71.el6.x86_64 or later
- On Oracle Linux 7
3.8.13-33.el7uek.x86_64 or later
- On Oracle Linux 7 with Red Hat Compatible Kernel
3.10.0-54.0.1.el7.x86_64 or later

- On Red Hat Enterprise Linux 5 Update 2
2.6.18 or later
- On Red Hat Enterprise Linux 5 Update 5
2.6.18 or later
- On Red Hat Enterprise Linux 6
2.6.32-71.el6.x86_64 or later
- On Red Hat Enterprise Linux 7
3.10.0-54.0.1.el7.x86_64 or later
- On Asianux Server 3
2.6.18 or later
- On Asianux Server 4
2.6.32-71.el6.x86_64 or later
- On SUSE Linux Enterprise Server 10
2.6.16.21 or later
- On SUSE Linux Enterprise Server 11
2.6.27.19 or later
- On SUSE Linux Enterprise Server 12
3.12.49-11 or later
- On NeoKylin Linux Advanced Server 6
2.6.32-431.el6.x86_64 or later
- On NeoKylin Linux Advanced Server 7
3.10.0-327.el7.x86_64 or later

For IBM: Linux on System z

- On Red Hat Enterprise Linux 7
3.10.0-229.el7 or later
- On Red Hat Enterprise Linux 6
2.6.32-200 or later
- On Red Hat Enterprise Linux 4
2.6.9 or later
- On Red Hat Enterprise Linux 5
2.6.18 or later
- On SUSE Linux Enterprise Server 10
2.6.16.60 or later
- On SUSE Linux Enterprise Server 11
2.6.32.12 or later

See Also: ["About Oracle Linux and the Unbreakable Enterprise Kernel"](#) on page 2-3

To determine if the required kernel is installed, enter the following command:

```
# uname -r
```

The following is a sample output displayed by running this command on an Oracle Linux 5 system:

```
2.6.18-128.el5PAE
```

In this example, the output shows the kernel version (2.6.18) and errata level (-128.el5PAE) on the system.

If the kernel version does not meet the requirement, then contact the operating system vendor for information about obtaining and installing kernel updates.

Package Requirements

The following are the list of packages required for Oracle Database 11g Release 2 (11.2):

- [Oracle Database Package Requirements for Linux x86](#)
- [Oracle Database Package Requirements for Linux x86-64](#)
- [Oracle Database Package Requirements for IBM: Linux on System z](#)

Note:

- Oracle recommends that you install your Linux operating system with the default software packages (RPMs), unless you specifically intend to perform a minimal installation and follow the directions for performing such an installation to ensure that you have all required packages for Oracle software.
 - Oracle recommends that you do not customize RPMs during a default operating system installation. A default installation includes most required packages and helps you to limit manual verification of package dependencies.
 - If you did not perform a default Linux installation, you intend to use LDAP, and you want to use the scripts `odisrvreg`, `oidca`, or `schemasync`, then install the Korn shell RPM for the Linux distribution.
 - You must install the packages (or later versions) listed in the following table, and ensure that the list of RPMs and all of the prerequisites for these RPMs are installed.
-
-

See Also:

- ["About Installing the Linux Operating System"](#) on page 2-2 for information about installing Oracle Validated RPM
- ["Installing the cvuqdisk Package for Linux"](#) on page 2-36

Oracle Database Package Requirements for Linux x86

Operating System	Requirement
Oracle Linux 4 and Red Hat Enterprise Linux 4	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.15.92.0.2 compat-libstdc++-33-3.2.3 elfutils-libelf-0.97 elfutils-libelf-devel-0.97 gcc-3.4.6 gcc-c++-3.4.6 glibc-2.3.4-2.41 glibc-common-2.3.4 glibc-devel-2.3.4 glibc-headers-2.3.4 libaio-devel-0.3.105 libaio-0.3.105 libgcc-3.4.6 libstdc++-3.4.6 libstdc++-devel-3.4.6 make-3.80 numactl-0.6.4.i386 pdksh-5.2.14 sysstat-5.0.5 </pre>
Asianux Server 3, Oracle Linux 5, and Red Hat Enterprise Linux 5	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.17.50.0.6 compat-libstdc++-33-3.2.3 elfutils-libelf-0.125 elfutils-libelf-devel-0.125 elfutils-libelf-devel-static-0.125 gcc-4.1.2 gcc-c++-4.1.2 glibc-2.5-24 glibc-common-2.5 glibc-devel-2.5 glibc-headers-2.5 kernel-headers-2.6.18 ksh-20060214 libaio-0.3.106 libaio-devel-0.3.106 libgcc-4.1.2 libgomp-4.1.2 libstdc++-4.1.2 libstdc++-devel-4.1.2 make-3.81 sysstat-7.0.2 </pre>

Operating System	Requirement
Oracle Linux 6, Red Hat Enterprise Linux 6 and Asianux Server 4	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.20.51.0.2-5.11.el6.i686 compat-libcap1-1.10-1.i686 compat-libstdc++-33-3.2.3-69.el6.i686 gcc-4.4.4-13.el6.i686 gcc-c++-4.4.4-13.el6.i686 glibc-2.12-1.7.el6.i686 glibc-devel-2.12-1.7.el6.i686 ksh libgcc-4.4.4-13.el6.i686 libstdc++-4.4.4-13.el6.i686 libstdc++-devel-4.4.4-13.el6.i686 libaio-0.3.107-10.el6.i686 libaio-devel-0.3.107-10.el6.i686 make-3.81-19.el6.i686 sysstat-9.0.4-11.el6.i686 </pre>
SUSE Linux Enterprise Server 10	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.16.91.0.5 compat-libstdc++-5.0.7 gcc-4.1.2 gcc-c++-4.1.2 glibc-2.4-31.63 glibc-devel-2.4-31.63 ksh-93r-12.9 libaio-0.3.104 libaio-devel-0.3.104 libelf-0.8.5 libgcc-4.1.2 libstdc++-4.1.2 libstdc++-devel-4.1.2 make-3.80 sysstat-8.0.4 </pre>
SUSE Linux Enterprise Server 11	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.19 gcc-4.3 gcc-c++-4.3 glibc-2.9 glibc-devel-2.9 ksh-93t libstdc++33-3.3.3 libstdc++43-4.3.3_20081022 libstdc++43-devel-4.3.3_20081022 libaio-0.3.104 libaio-devel-0.3.104 libgcc43-4.3.3_20081022 libstdc++-devel-4.3 make-3.81 sysstat-8.1.5 </pre>

Note:

- The `kernel-headers-2.6.18` package is not mandatory for database installations on Linux x86. You can ignore the OUI or CVU warning to install this package.
 - The `numa` package link for Linux x86 is `/usr/lib`.
-

Oracle Database Package Requirements for Linux x86-64

Note:

- Starting with Oracle Database 11g Release 2 (11.2.0.2), all the 32-bit packages, except for `gcc-32bit-4.3`, listed in the following table are no longer required for installing a database on Linux x86-64. Only the 64-bit packages are required. However, for any Oracle Database 11g release before 11.2.0.2, both the 32-bit and 64-bit packages listed in the following table are required.
 - If you are using Oracle Unbreakable Enterprise Kernel, then all required kernel packages are installed as part of the Oracle Unbreakable Enterprise Kernel installation.
 - For Oracle Linux 6 the Oracle Validated RPM has been replaced by the Oracle RDBMS Server 11gR2 Pre-install RPM. See "[Completing a Minimal Linux Installation](#)" on page 2-2 for more information.
-

Operating System	Requirement
Oracle Linux 4 and Red Hat Enterprise Linux 4	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.15.92.0.2 compat-libstdc++-33-3.2.3 compat-libstdc++-33-3.2.3 (32 bit) elfutils-libelf-0.97 elfutils-libelf-devel-0.97 expat-1.95.7 gcc-3.4.6 gcc-c++-3.4.6 glibc-2.3.4-2.41 glibc-2.3.4-2.41 (32 bit) glibc-common-2.3.4 glibc-devel-2.3.4 glibc-headers-2.3.4 libaio-0.3.105 libaio-0.3.105 (32 bit) libaio-devel-0.3.105 libaio-devel-0.3.105 (32 bit) libgcc-3.4.6 libgcc-3.4.6 (32-bit) libstdc++-3.4.6 libstdc++-3.4.6 (32 bit) libstdc++-devel 3.4.6 make-3.80 numactl-0.6.4.x86_64 pdksh-5.2.14 sysstat-5.0.5 </pre>

Operating System	Requirement
Oracle Linux 5, Red Hat Enterprise Linux 5, and Asianux Server 3	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.17.50.0.6 compat-libstdc++-33-3.2.3 compat-libstdc++-33-3.2.3 (32 bit) coreutils-5.97-23.el5_4.1 elfutils-libelf-0.125 elfutils-libelf-devel-0.125 gcc-4.1.2 gcc-c++-4.1.2 glibc-2.5-24 glibc-2.5-24 (32 bit) glibc-common-2.5 glibc-devel-2.5 glibc-devel-2.5 (32 bit) glibc-headers-2.5 ksh-20060214 libaio-0.3.106 libaio-0.3.106 (32 bit) libaio-devel-0.3.106 libaio-devel-0.3.106 (32 bit) libgcc-4.1.2 libgcc-4.1.2 (32 bit) libstdc++-4.1.2 libstdc++-4.1.2 (32 bit) libstdc++-devel-4.1.2 make-3.81 sysstat-7.0.2 </pre>
Oracle Linux 6, Red Hat Enterprise Linux 6, and Asianux Server 4	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.20.51.0.2-5.11.el6 (x86_64) compat-libcap1-1.10-1 (x86_64) compat-libstdc++-33-3.2.3-69.el6 (x86_64) compat-libstdc++-33-3.2.3-69.el6.i686 gcc-4.4.4-13.el6 (x86_64) gcc-c++-4.4.4-13.el6 (x86_64) glibc-2.12-1.7.el6 (i686) glibc-2.12-1.7.el6 (x86_64) glibc-devel-2.12-1.7.el6 (x86_64) glibc-devel-2.12-1.7.el6.i686 ksh libgcc-4.4.4-13.el6 (i686) libgcc-4.4.4-13.el6 (x86_64) libstdc++-4.4.4-13.el6 (x86_64) libstdc++-4.4.4-13.el6.i686 libstdc++-devel-4.4.4-13.el6 (x86_64) libstdc++-devel-4.4.4-13.el6.i686 libaio-0.3.107-10.el6 (x86_64) libaio-0.3.107-10.el6.i686 libaio-devel-0.3.107-10.el6 (x86_64) libaio-devel-0.3.107-10.el6.i686 make-3.81-19.el6 sysstat-9.0.4-11.el6 (x86_64) </pre>

Operating System	Requirement
Oracle Linux 7 and Red Hat Enterprise Linux 7	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.23.52.0.1-12.el7.x86_64 compat-libcap1-1.10-3.el7.x86_64 compat-libstdc++-33-3.2.3-71.el7.i686 compat-libstdc++-33-3.2.3-71.el7.x86_64 gcc-4.8.2-3.el7.x86_64 gcc-c++-4.8.2-3.el7.x86_64 glibc-2.17-36.el7.i686 glibc-2.17-36.el7.x86_64 glibc-devel-2.17-36.el7.i686 glibc-devel-2.17-36.el7.x86_64 ksh libaio-0.3.109-9.el7.i686 libaio-0.3.109-9.el7.x86_64 libaio-devel-0.3.109-9.el7.i686 libaio-devel-0.3.109-9.el7.x86_64 libgcc-4.8.2-3.el7.i686 libgcc-4.8.2-3.el7.x86_64 libstdc++-4.8.2-3.el7.i686 libstdc++-4.8.2-3.el7.x86_64 libstdc++-devel-4.8.2-3.el7.i686 libstdc++-devel-4.8.2-3.el7.x86_64 libXi-1.7.2-1.el7.i686 libXi-1.7.2-1.el7.x86_64 libXtst-1.2.2-1.el7.i686 libXtst-1.2.2-1.el7.x86_64 make-3.82-19.el7.x86_64 sysstat-10.1.5-1.el7.x86_64 </pre>
SUSE Linux Enterprise Server 10	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.16.91.0.5 compat-libstdc++-5.0.7 gcc-4.1.0 gcc-c++-4.1.2 glibc-2.4-31.63 glibc-devel-2.4-31.63 glibc-devel-32bit-2.4-31.63 ksh-93r-12.9 libaio-0.3.104 libaio-32bit-0.3.104 libaio-devel-0.3.104 libaio-devel-32bit-0.3.104 libelf-0.8.5 libgcc-4.1.2 libstdc++-4.1.2 libstdc++-devel-4.1.2 make-3.80 numactl-0.9.6.x86_64 sysstat-8.0.4 </pre>

Operating System	Requirement
SUSE Linux Enterprise Server 11	The following packages (or later versions) must be installed: binutils-2.19 gcc-4.3 gcc-32bit-4.3 gcc-c++-4.3 glibc-2.9 glibc-32bit-2.9 glibc-devel-2.9 glibc-devel-32bit-2.9 ksh-93t libaio-0.3.104 libaio-32bit-0.3.104 libaio-devel-0.3.104 libaio-devel-32bit-0.3.104 libstdc++33-3.3.3 libstdc++33-32bit-3.3.3 libstdc++43-4.3.3_20081022 libstdc++43-32bit-4.3.3_20081022 libstdc++43-devel-4.3.3_20081022 libstdc++43-devel-32bit-4.3.3_20081022 libgcc43-4.3.3_20081022 libstdc++-devel-4.3 make-3.81 sysstat-8.1.5

Operating System	Requirement
SUSE Linux Enterprise Server 12	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.25.0-13.1 gcc-4.8-6.189 gcc48-4.8.5-24.1 glibc-2.19-31.9 glibc-32bit-2.19-31.9 glibc-devel-2.19-31.9.x86_64 glibc-devel-32bit-2.19-31.9.x86_64 libaio1-0.3.109-17.15 libaio-devel-0.3.109-17.15 libcap1-1.10-59.61 libstdc++48-devel-4.8.5-24.1.x86_64 libstdc++48-devel-32bit-4.8.5-24.1.x86_64 libstdc++6-5.2.1+r226025-4.1.x86_64 libstdc++6-32bit-5.2.1+r226025-4.1.x86_64 libstdc++-devel-4.8-6.189.x86_64 libstdc++-devel-32bit-4.8-6.189.x86_64 libgcc_s1-5.2.1+r226025-4.1.x86_64 libgcc_s1-32bit-5.2.1+r226025-4.1.x86_64 mksh-50-2.13 make-4.0-4.1.x86_64 sysstat-10.2.1-3.1.x86_64 xorg-x11-driver-video-7.6_1-14.30.x86_64 xorg-x11-server-7.6_1.15.2-36.21.x86_64 xorg-x11-essentials-7.6_1-14.17.noarch xorg-x11-Xvnc-1.4.3-7.2.x86_64 xorg-x11-fonts-core-7.6-29.45.noarch xorg-x11-7.6_1-14.17.noarch xorg-x11-server-extra-7.6_1.15.2-36.21.x86_64 xorg-x11-libs-7.6-45.14.noarch xorg-x11-fonts-7.6-29.45.noarch </pre> <p>Note: You must download and install patch 18370031. For more information about how to download and install this patch see: https://support.oracle.com</p> <p><i>Oracle Database Release Notes for Linux</i></p>

Operating System	Requirement
NeoKylin Linux Advanced Server 6	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.20.51.0.2-5.36.el6 (x86_64) compat-libcap1-1.10-1 (x86_64) compat-libstdc++-33-3.2.3-69.el6 (x86_64) compat-libstdc++-33-3.2.3-69.el6 (i686) gcc-4.4.7-4.el6 (x86_64) gcc-c++-4.4.7-4.el6 (x86_64) glibc-2.12-1.132.el6 (i686) glibc-2.12-1.132.el6 (x86_64) glibc-devel-2.12-1.132.el6 (x86_64) glibc-devel-2.12-1.132.el6 (i686) ksh libgcc-4.4.7-4.el6 (i686) libgcc-4.4.7-4.el6 (x86_64) libstdc++-4.4.7-4.el6 (x86_64) libstdc++-4.4.7-4.el6 (i686) libstdc++-devel-4.4.7-4.el6 (x86_64) libstdc++-devel-4.4.7-4.el6 (i686) libaio-0.3.107-10.el6 (x86_64) libaio-0.3.107-10.el6 (i686) libaio-devel-0.3.107-10.el6 (x86_64) libaio-devel-0.3.107-10.el6 (i686) make-3.81-20.el6 sysstat-9.0.4-22.el6 (x86_64) </pre>
NeoKylin Linux Advanced Server 7	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.23.52.0.1-55.el7.x86_64 compat-libcap1-1.10-7.el7.x86_64 gcc-4.8.5-4.el7.ns7.01.x86_64 gcc-c++-4.8.5-4.el7.ns7.01.x86_64 glibc-2.17-105.el7.ns7.01.i686 glibc-2.17-105.el7.ns7.01.x86_64 glibc-devel-2.17-105.el7.ns7.01.i686 glibc-devel-2.17-105.el7.ns7.01.x86_64 ksh-20120801-22.el7_1.2.x86_64 libaio-0.3.109-13.el7.i686 libaio-0.3.109-13.el7.x86_64 libaio-devel-0.3.109-13.el7.i686 libaio-devel-0.3.109-13.el7.x86_64 libgcc-4.8.5-4.el7.ns7.01.i686 libgcc-4.8.5-4.el7.ns7.01.x86_64 libstdc++-4.8.5-4.el7.ns7.01.i686 libstdc++-4.8.5-4.el7.ns7.01.x86_64 libstdc++-devel-4.8.5-4.el7.ns7.01.i686 libstdc++-devel-4.8.5-4.el7.ns7.01.x86_64 libXi-1.7.4-2.el7.i686 libXi-1.7.4-2.el7.x86_64 libXtst-1.2.2-2.1.el7.i686 libXtst-1.2.2-2.1.el7.x86_64 make-3.82-21.el7.x86_64 sysstat-10.1.5-7.el7.x86_64 </pre>

Note: The numa package link for Linux x86-64 is /usr/lib64/.

Oracle Database Package Requirements for IBM: Linux on System z

Operating System	Requirement
Red Hat Enterprise Linux 4	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.15.92.0.2-25 (s390x) compat-libstdc++-33-3.2.3-47.3 (s390) compat-libstdc++-33-3.2.3-47.3 (s390x) gcc-3.4.6-11 (s390x) gcc-c++-3.4.6-11 (s390x) glibc-2.3.4-2.43 (s390) glibc-2.3.4-2.43 (s390x) glibc-devel-2.3.4-2.43 (s390) glibc-devel-2.3.4-2.43 (s390x) libaio-0.3.105-2 (s390) libaio-0.3.105-2 (s390x) libaio-devel-0.3.105-2 (s390) libaio-devel-0.3.105-2 (s390x) libgcc-3.4.6-11 (s390) libgcc-3.4.6-11 (s390x) libstdc++-3.4.6-10.0.1 libstdc++-3.4.6-10.0.1 (32-bit) libstdc++-devel-3.4.6-10.0.1 libstdc++-devel-3.4.6-10.0.1 (x86_64) make-3.80 pdksh sysstat-5.0.5-25.e14 (s390x) </pre>
Red Hat Enterprise Linux 5	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.17.50.0.6-12.e15 (s390x) compat-libstdc++-33-3.2.3-61 (s390) compat-libstdc++-33-3.2.3-61 (s390x) gcc-4.1.2-46.e15 (s390x) gcc-c++-4.1.2-46.e15 (s390x) glibc-2.5-42 (s390) glibc-2.5-42 (s390x) glibc-devel-2.5-42 (s390) glibc-devel-2.5-42 (s390x) ksh libaio-0.3.106-3.2 (s390) libaio-0.3.106-3.2 (s390x) libaio-devel-0.3.106-3.2 (s390) libaio-devel-0.3.106-3.2 (s390x) libgcc-4.1.2-46.e15 (s390) libgcc-4.1.2-46.e15 (s390x) libstdc++-4.1.2-46.e15 (s390) libstdc++-4.1.2-46.e15 (s390x) libstdc++-devel-4.1.2-46.e15 (s390x) make-3.81 sysstat-7.0.2-3.e15 (s390x) </pre>

Operating System	Requirement
Red Hat Enterprise Linux 6	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.20.51.0.2-5.28 (s390x) compat-libstdc++-33-3.2.3-69.el6 (s390x) gcc-4.4.6-3.el6 (s390x) gcc-c++-4.4.6-3.el6 (s390x) glibc-2.12-1.47.el6 (s390) glibc-2.12-1.47.el6 (s390x) glibc-devel-2.12-1.47.el6 (s390) glibc-devel-2.12-1.47.el6 (s390x) libaio-0.3.107-10.el6 (s390) libaio-0.3.107-10.el6 (s390x) libaio-devel-0.3.107-10.el6 (s390x) libgcc-4.4.6-3.el6 (s390) libgcc-4.4.6-3.el6 (s390x) libstdc++-4.4.6-3.el6 (s390x) libstdc++-devel-4.4.6-3.el6 (s390x) make-3.81-19.el6 (s390x) pdksh sysstat-9.0.4-18.el6 (s390x) </pre>
Red Hat Enterprise Linux 7	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.23.52.0.1-30.el7.s390x compat-libcap1-1.10-7.el7.s390x cpp-4.8.2-16.el7.s390x gcc-4.8.3-9.el7.s390x gcc-c++-4.8.3-9.el7.s390x glibc-2.17-78.el7.s390 glibc-2.17-78.el7.s390x glibc-devel-2.17-78.el7.s390 glibc-devel-2.17-78.el7.s390x glibc-headers-2.17-55.el7.s390x ksh-20120801-22.el7.s390x libaio-0.3.109-12.el7.s390 libaio-0.3.109-12.el7.s390x libaio-devel-0.3.109-12.el7.s390 libaio-devel-0.3.109-12.el7.s390x libgcc-4.8.3-9.el7.s390 libgcc-4.8.3-9.el7.s390x libstdc++-4.8.3-9.el7.s390 libstdc++-4.8.3-9.el7.s390x libstdc++-devel-4.8.3-9.el7.s390 libstdc++-devel-4.8.3-9.el7.s390x libXi-1.2.2-2.1.el7.s390 libXi-1.2.2-2.1.el7.s390x libXtst-1.2.2-2.1.el7.s390 libXtst-1.2.2-2.1.el7.s390x make-3.82-21.el7.s390x mpfr-3.1.1-4.el7.s390x sysstat-10.1.5-7.el7.s390x </pre>

Operating System	Requirement
SUSE Linux Enterprise Server 10	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-32bit-2.16.91.0.5-23.34.33 (s390x) gcc-4.1.2_20070115-0.29.6 (s390x) gcc-c++-4.1.2_20070115-0.29.6 (s390x) glibc-2.4-31.74.1 (s390x) glibc-32bit-2.4-31.74.1 (s390x) glibc-devel-2.4-31.74.1 (s390x) glibc-devel-32bit-2.4-31.74.1 (s390x) ksh libaio-0.3.104-14.2 (s390x) libaio-32bit-0.3.104-14.2 (s390x) libaio-devel-0.3.104-14.2 (s390x) libaio-devel-32bit-0.3.104-14.2 (s390x) libstdc++-4.1.2_20070115-0.29.6 (s390x) libstdc++-devel-4.1.2_20070115-0.29.6 (s390x) make-3.80-202.2 (s390x) sysstat-8.0.4-1.7.27 (s390x) </pre>
SUSE Linux Enterprise Server 11	<p>The following packages (or later versions) must be installed:</p> <pre> binutils-2.20.0-0.7.9 (s390x) gcc-4.3-62.198 (s390x) gcc-c++-4.3-62.198 (s390x) glibc-2.11.1-0.17.4 (s390x) glibc-32bit-2.11.1-0.17.4 (s390x) glibc-devel-2.11.1-0.17.4 (s390x) glibc-devel-32bit-2.11.1-0.17.4 (s390x) ksh libaio-0.3.109-0.1.46 (s390x) libaio-32bit-0.3.109-0.1.46 (s390x) libaio-devel-0.3.109-0.1.46 (s390x) libaio-devel-32bit-0.3.109-0.1.46 (s390x) libstdc++43-4.3.4_20091019-0.7.35 (s390x) libstdc++43-32bit-4.3.4_20091019-0.7.35 (s390x) libstdc++43-devel-4.3.4_20091019-0.7.35 (s390x) libstdc++43-devel-32bit-4.3.4_20091019-0.7.35 (s390x) libgcc43-4.3.4_20091019-0.7.35 (s390x) make-3.81 sysstat-8.1.5-7.9.56 (s390x) </pre>

See "[Oracle ODBC Drivers](#)" on page 2-31 for information on ODBC packages.

To determine if 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 the Linux distribution media or download the required package version from the Linux vendor's website.

Compiler Requirements

For Linux x86 and Linux x86-64, Intel C++ Compiler 10.1 or later and the version of GNU C and C++ compilers listed under "[Package Requirements](#)" on page 2-18 are supported with Pro*C/C++, Oracle Call Interface, Oracle C++ Call Interface, and Oracle XML Developer's Kit (XDK) for Oracle Database 11g Release 2.

Note: On Linux x86 and Linux x86-64, Intel C++ Compiler 10.1 can be used only with the standard template libraries of the gcc versions mentioned in "Package Requirements" on page 2-18 to build Oracle C++ Call Interface (OCCI) applications.

Oracle XML Developer's Kit is supported with the same compilers as OCCI.

For IBM: Linux on System z the version of GNU C and C++ compilers listed under "Package Requirements" on page 2-18 are supported for Oracle Database 11g Release 2.

Additional Software Requirements

Depending on the components you want to use, you must ensure that the following software is installed:

- [Oracle ODBC Drivers](#)
- [Oracle JDBC/OCI Drivers](#)
- [Linux-PAM Library](#)
- [Oracle Messaging Gateway](#)
- [Programming Languages](#)
- [Browser Requirements](#)
- [Oracle Database Vault Preinstallation Requirement](#)

See Also: Chapter 2, "Oracle Application Express Installation Requirements" and "Recommended Pre-installation Tasks" in *Oracle Application Express Installation Guide*

Oracle ODBC Drivers

If you intend to use ODBC, then install the most recent ODBC Driver Manager for Linux. Download and install the ODBC Driver Manager and Linux RPMs from the following website:

<http://www.unixodbc.org>

To use ODBC on Linux x86, the following additional 32-bit ODBC RPMs are required:

- On Oracle Linux 4 and Red Hat Enterprise Linux 4:
 - unixODBC-2.2.11 (32 bit) or later
 - unixODBC-devel-2.2.11 (32 bit) or later
- On Oracle Linux 5, Red Hat Enterprise Linux 5, and Asianux Server 3:
 - unixODBC-2.2.11 (32 bit) or later
 - unixODBC-devel-2.2.11 (32 bit) or later
- On Oracle Linux 6, Red Hat Enterprise Linux 6, and Asianux Server 4:
 - unixODBC-2.2.14-11 (32 bit) or later
 - unixODBC-devel-2.2.14-11 (32 bit) or later
- On SUSE Linux Enterprise Server 10:
 - unixODBC-32bit-2.2.11 (32 bit) or later
 - unixODBC-devel-32bit-2.2.11 (32 bit) or later

- On SUSE Linux Enterprise Server 11:

unixODBC-32bit-2.2.12 (32-bit) or later
 unixODBC-devel-32bit-2.2.12 (32 bit) or later

To use ODBC on Linux x86-64, the following additional ODBC RPMs are required:

- On Oracle Linux 4 and Red Hat Enterprise Linux 4:

unixODBC-2.2.11 (32 bit) or later
 unixODBC-devel-2.2.11 (64 bit) or later
 unixODBC-2.2.11 (64 bit) or later

- On Oracle Linux 5, Red Hat Enterprise Linux 5, and Asianux Server 3:

unixODBC-2.2.11 (32 bit) or later
 unixODBC-devel-2.2.11 (64 bit) or later
 unixODBC-2.2.11 (64 bit) or later

- On Oracle Linux 6, Red Hat Enterprise Linux 6, and Asianux Server 4:

unixODBC-2.2.14-11.el6 (x86_64) or later
 unixODBC-2.2.14-11.el6.i686 or later
 unixODBC-devel-2.2.14-11.el6 (x86_64) or later
 unixODBC-devel-2.2.14-11.el6.i686 or later

- On Oracle Linux 7, and Red Hat Enterprise Linux 7:

unixODBC-2.3.1-6.el7.x86_64 or later
 unixODBC-2.3.1-6.el7.i686 or later
 unixODBC-devel-2.3.1-6.el7.x86_64 or later
 unixODBC-devel-2.3.1-6.el7.i686 or later

- On SUSE Linux Enterprise Server 10:

unixODBC-32bit-2.2.11 (32 bit) or later
 unixODBC-2.2.11 (64 bit) or later
 unixODBC-devel-2.2.11 (64 bit) or later

- On SUSE Linux Enterprise Server 11:

unixODBC-2.2.12 or later
 unixODBC-devel-2.2.12 or later
 unixODBC-32bit-2.2.12 (32 bit) or later

- On NeoKylin Linux Advanced Server 6:

unixODBC-2.2.14-12.el6_3.i686 or later
 unixODBC-2.2.14-12.el6_3.x86_64 or later
 unixODBC-devel-2.2.14-12.el6_3.x86_64 or later
 unixODBC-devel-2.2.14-12.el6_3.i686 or later

- On NeoKylin Linux Advanced Server 7:

unixODBC-2.3.1-11.el7.i686 or later
 unixODBC-2.3.1-11.el7.x86_64 or later
 unixODBC-devel-2.3.1-11.el7.i686 or later
 unixODBC-devel-2.3.1-11.el7.x86_64 or later

To use ODBC on IBM: Linux on System z, the following additional ODBC RPMs are required:

- On Red Hat Enterprise Linux 4:

unixODBC-2.2.11 (32 bit) or later
 unixODBC-devel-2.2.11 (64 bit) or later
 unixODBC-2.2.11 (64 bit) or later

- **On Red Hat Enterprise Linux 5:**

unixODBC-2.2.11 (32 bit) or later
 unixODBC-devel-2.2.11 (64 bit) or later
 unixODBC-2.2.11 (64 bit) or later

- **On Red Hat Enterprise Linux 6:**

unixODBC-2.2.14-11 (32 bit) or later
 unixODBC-2.2.14-11 (64 bit) or later
 unixODBC-devel-2.2.14-11 (64 bit) or later

- **On Red Hat Enterprise Linux 7:**

unixODBC-2.3.1-11 (32 bit) or later
 unixODBC-2.3.1-11 (64 bit) or later
 unixODBC-devel-2.3.1-11 (32 bit) or later
 unixODBC-devel-2.3.1-11 (64 bit) or later

- **On SUSE Linux Enterprise Server 10:**

unixODBC-32bit-2.2.11 (32 bit) or later
 unixODBC-2.2.11 (64 bit) or later
 unixODBC-devel-2.2.11 (64 bit) or later

- **On SUSE Linux Enterprise Server 11:**

unixODBC-2.2.12 or later
 unixODBC-devel-2.2.12 or later
 unixODBC-32bit-2.2.12 (32 bit) or later

Oracle JDBC/OCI Drivers

You can use the following optional JDK versions with the Oracle JDBC/OCI drivers. However, these are not mandatory for the database installation:

For Linux x86 and Linux x86-64

Use JDK 6 (Java SE Development Kit 1.6.0_21) or JDK 5 (1.5.0_24) with the JNDI extension with the Oracle Java Database Connectivity and Oracle Call Interface drivers. JDK 1.5 is installed with this release.

For IBM: Linux on System z

- JDK 6 SR16 FP1 or higher
- JDK 5 SR16 FP3 or higher

Linux-PAM Library

Install the latest Linux-PAM (Pluggable Authentication Modules for Linux) library to enable the system administrator to choose how applications authenticate users.

Oracle Messaging Gateway

Oracle Messaging Gateway supports the integration of Oracle Streams Advanced Queuing (AQ) with the following software:

- IBM WebSphere MQ V7.0, client and server:

MQSeriesClient
MQSeriesServer
MQSeriesRuntime

- TIBCO Rendezvous 7.3

Note: Oracle Messaging Gateway does not support the integration of Advanced Queuing with TIBCO Rendezvous on IBM: Linux on System z.

Programming Languages

The following products are certified for use with:

- Pro* COBOL
 - Micro Focus Server Express 5.1

Browser Requirements

You do not require a web browser to install Oracle Database. However, browsers are required to access documentation, and if you intend to use Oracle Enterprise Manager Database Control and Oracle Application Express. Web browsers must support JavaScript, and the HTML 4.0 and CSS 1.0 standards.

Oracle Enterprise Manager Database Control supports the following browsers:

- Microsoft Internet Explorer 10.0 (supports Oracle Enterprise Manager Database Control 11.2.0.3 and higher)
- Microsoft Internet Explorer 9.0
- Microsoft Internet Explorer 8.0
- Microsoft Internet Explorer 7.0 SP1
- Microsoft Internet Explorer 6.0 SP2
- Firefox 21.0 (supports Oracle Enterprise Manager Database Control 11.2.0.4)
- Firefox 17.0.6 ESR (supports Oracle Enterprise Manager Database Control 11.2.0.4)
- Firefox 3.6
- Firefox 3.5
- Firefox 3.0.7
- Firefox 2.0
- Safari 4.0.x
- Safari 3.2
- Safari 3.1
- Google Chrome 27.0 (supports Oracle Enterprise Manager Database Control 11.2.0.4)
- Google Chrome 4.0
- Google Chrome 3.0
- Netscape Navigator 9.0

- Netscape Navigator 8.1

See Also: *Oracle Application Express Installation Guide*

Oracle Database Vault Preinstallation Requirement

To install Oracle Database Vault, set the `DB_BLOCK_SIZE` initialization parameter to 4096 or larger. If the value is less than 4096, then you cannot change it. The only way to change the `DB_BLOCK_SIZE` value is by re-creating the database.

See Also: "Specifying Database Block Sizes" in *Oracle Database Administrator's Guide*

Reviewing Operating System Security Common Practices

Secure operating systems are an important basis for general system security. Ensure that your operating system deployment is in compliance with common security practices as described in your operating system vendor security guide.

Installation Fixup Scripts

During installation, for certain prerequisite verification failures, click **Fix & Check Again** to generate a fixup script (`runfixup.sh`). You can run this script as the `root` user to complete the required preinstallation steps.

The fixup script:

- Checks for and sets kernel parameters to values required for successful installation, including:
 - Shared memory parameters
 - Open file descriptor and UDP send/receive parameters

Oracle recommends that you do not modify the contents of the generated fixup script.

Note: Using fixup scripts does not ensure that all the prerequisites for installing Oracle Database are met. You must still verify that all the preinstallation requirements are met to ensure a successful installation.

Verifying UDP and TCP Kernel Parameters

Set TCP/IP ephemeral port range parameters to provide enough ephemeral ports for the anticipated server workload. Ensure that the lower range is set to at least 9000 or higher, to avoid Well Known ports, and to avoid ports in the Registered Ports range commonly used by Oracle and other server ports. Set the port range high enough to avoid reserved ports for any applications you may intend to use. If the lower value of the range you have is greater than 9000, and the range is large enough for your anticipated workload, then you can ignore OUI warnings regarding the ephemeral port range.

For example, with IPv4, use the following command to check your current range for ephemeral ports:

```
$ cat /proc/sys/net/ipv4/ip_local_port_range
32768 61000
```

In the preceding example, the lowest port (32768) and the highest port (61000) are set to the default range.

If necessary, update the UDP and TCP ephemeral port range to a range high enough for anticipated system workloads, and to ensure that the ephemeral port range starts at 9000 and above. For example:

```
# echo 9000 65500 > /proc/sys/net/ipv4/ip_local_port_range
```

Oracle recommends that you make these settings permanent. For example, as root, use a text editor to open `/etc/sysctl.conf`, and add or change to the following: `net.ipv4.ip_local_port_range = 9000 65500`, and then restart the network (`# /etc/rc.d/init.d/network restart`). Refer to your Linux distribution system administration documentation for detailed information about how to automate this ephemeral port range alteration on system restarts.

See Also: ["Configuring Kernel Parameters for Linux"](#) on page 2-47

Installing the cvuqdisk Package for Linux

Install the operating system package `cvuqdisk`. Without `cvuqdisk`, the Cluster Verification Utility (CVU) cannot find shared disks, and you receive a "Package `cvuqdisk` not installed" error when you run the Cluster Verification Utility. Use the `cvuqdisk` RPM for your hardware (for example, `x86_64`, or `i386`).

To install the `cvuqdisk` RPM, complete the following procedure:

Note: If you prefer, you can disable Cluster Verification Utility shared disk checks by adding the following line to the file `oracle_home1/cv/admin/cvu_config`:

```
CV_RAW_CHECK_ENABLED=FALSE
```

In this example, `oracle_home1` is the Oracle home directory where the database is installed.

1. Locate the `cvuqdisk` RPM package, which is in the directory `rpm` on the installation media. If you installed Oracle Grid Infrastructure, then it is in the directory `oracle_home1/cv/rpm`.

2. Log in as root.

3. Use the following command to find if you have an existing version of the `cvuqdisk` package:

```
# rpm -qi cvuqdisk
```

If you have an existing version, then enter the following command to deinstall the existing version:

```
# rpm -e cvuqdisk
```

4. Set the environment variable `CVUQDISK_GRP` to point to the group that owns `cvuqdisk`, typically `oinstall`, for example:

```
# CVUQDISK_GRP=oinstall; export CVUQDISK_GRP
```

5. In the directory where you have saved the `cvuqdisk` RPM, use the following command to install the `cvuqdisk` package:

```
rpm -iv package
```

For example:

```
# rpm -iv cvugdisk-1.0.9-1.rpm
```

Confirming Host Name Resolution

Typically, the computer on which you want to install Oracle Database is connected to a network. Ensure that the computer host name is resolvable through a Domain Name System (DNS), a network information service (NIS), or a centrally-maintained TCP/IP host file, such as `/etc/hosts`. Use the `ping` command to ensure that your computer host name is resolvable. For example:

```
ping myhostname
pinging myhostname.example.com [192.0.2.2] with 32 bytes of data:
Reply from 192.0.2.2: bytes=32 time=138ms TTL=56
```

If your computer host name does not resolve, then contact your system administrator.

Disabling Transparent HugePages

Starting with Red Hat Enterprise Linux 6, Oracle Linux 6, SUSE 11 and Unbreakable Enterprise Kernel 2 (UEK2) kernels, Transparent HugePages are enabled by default at runtime. However, Transparent HugePages might cause delays in memory allocation because memory is allocated dynamically. Hence, Oracle recommends that you disable Transparent HugePages on all Oracle Database servers to avoid performance issues.

Although Transparent HugePages are similar to HugePages, they are set up dynamically at runtime by the `khugepaged` thread in the kernel while standard HugePages are preallocated at startup. Oracle recommends that you use standard HugePages for enhanced performance.

See Also: *Oracle Database Administrator's Reference for Linux and UNIX-Based Operating Systems* for information about HugePages

To check if Transparent HugePages are enabled run one of the following commands as the `root` user:

Red Hat Enterprise Linux kernels:

```
# cat /sys/kernel/mm/redhat_transparent_hugepage/enabled
```

Other kernels:

```
# cat /sys/kernel/mm/transparent_hugepage/enabled
```

The following is a sample output that shows Transparent HugePages are being used as the `[always]` flag is enabled.

```
[always] never
```

Note: If Transparent HugePages are removed from the kernel then the `/sys/kernel/mm/transparent_hugepage` or `/sys/kernel/mm/redhat_transparent_hugepage` files do not exist.

To disable Transparent HugePages perform the following steps:

1. Add the following entry to the kernel boot line in the `/etc/grub.conf` file:

```
transparent_hugepage=never
```

For example:

```
title Oracle Linux Server (2.6.32-300.25.1.el6uek.x86_64)
  root (hd0,0)
  kernel /vmlinuz-2.6.32-300.25.1.el6uek.x86_64 ro root=LABEL=/
transparent_hugepage=never
  initrd /initramfs-2.6.32-300.25.1.el6uek.x86_64.img
```

2. Restart the system to make the changes permanent.

Checking the Network Setup

Typically, the computer on which you want to install Oracle Database is connected to the network. The computer has local storage to store the Oracle Database installation. It also contains a display monitor and DVD drive. This section describes how to install Oracle Database on computers that do not meet the typical scenario. It describes the following cases:

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

Confirm Host Name Resolution

Typically, the computer on which you want to install Oracle Database is connected to a network. Ensure that the computer host name is resolvable through a Domain Name System (DNS), a network information service (NIS), or a centrally-maintained TCP/IP host file, such as `/etc/hosts`. Use the `ping` command to ensure that your computer host name is resolvable. For example:

```
$ ping myhostname
pinging myhostname.example.com [192.0.2.2] with 32 bytes of data:
Reply from 192.0.2.2: bytes=32 time=138ms TTL=56
```

If your computer host name does not resolve, then contact your system administrator.

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 from 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, ping the host name from the client computers

using the short name (host name only) and the full name (host name 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.example.com`, then enter one of the following commands:

In Bourne, Bash, or Korn shell:

```
$ ORACLE_HOSTNAME=somehost.example.com
$ export ORACLE_HOSTNAME
```

In C shell:

```
% setenv ORACLE_HOSTNAME somehost.example.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 the system 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 the 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 if this is the first time Oracle software is being installed on this system and on the products that you are installing, you may have to create several operating system groups and users.

If you prefer to allocate operating system user privileges so that you can use one administrative user and one group for operating system authentication for all administrative privileges, then you can use the `oracle` user as the installation owner, and use one group as the primary group for any user requiring administrative privileges for Oracle ASM, and Oracle Database administration. This group must also

be the Oracle Inventory group. To simplify using the defaults for Oracle tools the group name should be `oinstall`.

You can also create custom configuration groups and users based on job role separation. A custom configuration is a configuration with groups and users that divide access privileges granted by membership in separate operating system groups and users. You can create a single user (for example, `oracle`) to own both Oracle Database, and Oracle Grid Infrastructure installations. Alternatively, you can create a separate user (for example, `grid`) to own the Oracle Grid Infrastructure installation.

The Oracle Database, and the Oracle Grid Infrastructure for a standalone server installation owner users must be members of the Oracle Inventory group (`oinstall`).

- [Creating Custom Configuration Groups and Users for Job Roles](#)
- [Creating Database Operating System Groups and Users with Job Role Separation](#)

Note: In Oracle documentation, a user created to own only Oracle Grid Infrastructure software installations is called the `grid` user. A user created to own either all Oracle installations, or only Oracle database installations, is called the `oracle` user.

Creating Custom Configuration Groups and Users for Job Roles

This section provides an overview of how to create users and groups to divide access privileges by job roles. Log in as `root` to create these groups and users.

- [Understanding Restrictions for Oracle Installations with Job Role Separation](#)
- [Database Groups for Job Role Installations](#)
- [Oracle Grid Infrastructure Groups for Job Role Installations](#)

Understanding Restrictions for Oracle Installations with Job Role Separation

Oracle recommends that you create one software owner to own each Oracle software installation (typically, `oracle`, for the database software and `grid` for the Oracle Restart owner user). You must create at least one software owner the first time you install Oracle software on the system.

To create separate Oracle software owners, to create separate users, and separate operating system privileges groups for different Oracle software installations, each of these users must have the Oracle central inventory group (`oraInventory` group) as their primary group. Members of this group have write privileges to the Oracle central inventory (`oraInventory`) directory, and are also granted permissions for various Oracle Restart resources and directories in the Oracle Restart home to which DBAs need write access, and other necessary privileges. In Oracle documentation, this group is represented as `oinstall` in code examples. See "[Creating the Oracle Inventory Group](#)" on page 2-43.

The database software owner (typically, `oracle`) must also have the `OSDBA` group of the Oracle Grid Infrastructure home so that database instances can log on to Oracle ASM, and (if you create it) the `OSOPER` group as secondary groups. In Oracle documentation, the Oracle software owner users are referred to as `oracle` users.

The Oracle Database, and the Oracle Grid Infrastructure for a standalone server installation owner users (`oracle` and `grid` respectively) must belong to the Oracle Inventory group (`oinstall`).

Each Oracle software owner must be a member of the same central inventory group. Oracle recommends that you do not have more than one central inventory for Oracle installations. If an Oracle software owner has a different central inventory group, then you may corrupt the central inventory.

For Oracle Grid Infrastructure for a standalone server, the grid user (`grid`) must be in the OSDBA group of every database home.

See Also: *Oracle Database Administrator's Guide* for more information about the OSDBA, OSASM and OSOPER groups, and the `SYSDBA`, `SYSASM` and `SYSOPER` privileges

Database Groups for Job Role Installations

Create the following operating system groups if you are installing Oracle Database:

- The OSDBA group (typically, `dba`)

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

- The OSOPER group for Oracle Database (typically, `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). This group cannot directly connect as `SYSOPER`, unless explicitly granted. However, they have the privileges granted by the `SYSOPER` privilege. By default, members of the OSDBA group have all privileges granted by the `SYSOPER` privilege.

Oracle Universal Installer prompts you to specify the name of this group. The usual name chosen for this group is `oper`.

Oracle Grid Infrastructure Groups for Job Role Installations

Create the following operating system groups if you are installing Oracle Grid Infrastructure:

Note: You can designate a unique group, separate from database administrator groups, or you can use the same group as the OSASM and OSDBA groups, to grant system privileges to administer both the Oracle ASM instances and Oracle Database instances.

- The OSDBA group for Oracle ASM (typically, `asmdba`)

The OSDBA group for Oracle ASM can be the same group used as the OSDBA group for the database, or you can create a separate OSDBA group for Oracle ASM (typically, `asmdba`) to provide administrative access to Oracle ASM instances.

The Oracle Grid Infrastructure software owner (typically, `grid`) must be a member of the OSDBA group. Membership in the OSDBA group enables access to the files managed by Oracle ASM. If you have a separate OSDBA group for Oracle ASM, then the Oracle Restart software owner must be a member of the OSDBA group for each database and the OSDBA group for Oracle ASM.

- The OSASM group for Oracle ASM (typically, `asmadmin`)

SYSASM privileges for Oracle ASM files provide administrator privileges for storage file. In Oracle documentation, the operating system group whose members are granted *SYSASM* privileges is called the OSASM group, and in command lines, is referred to as *asmadmin*. Oracle ASM can support multiple databases.

Members of the OSASM group can use SQL to connect to an Oracle ASM instance as *SYSASM* using operating system authentication. The *SYSASM* privileges permit mounting and dismounting of disk groups, and other storage administration tasks. *SYSASM* privileges provide no access privileges on an RDBMS instance.

If you do not designate a separate group as the OSASM group, then the OSDBA group you define is also, by default, the OSASM group.

- The OSOPER group for Oracle ASM (typically, *asmoper*)

This is an optional group. Create this group if you want a separate group of operating system users to have a limited set of Oracle instance administrative privileges (the *SYSOPER* for ASM privilege), including starting up and stopping the Oracle ASM instance. By default, members of the OSASM group also have all privileges granted by the *SYSOPER* for ASM privilege.

If you want to have an OSOPER group for Oracle ASM, then the Oracle Grid Infrastructure owner must be a member of this group.

Creating Database Operating System Groups and Users with Job Role Separation

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

- [Creating the Oracle Inventory Group](#)
- [Creating the OSDBA Group for Database Installations](#)
- [Creating an OSOPER Group for Database Installations](#)
- [Creating the OSASM Group for Oracle Automatic Storage Management](#)
- [Creating the OSDBA Group for Oracle Automatic Storage Management](#)
- [Creating the OSOPER Group for Oracle Automatic Storage Management](#)
- [Creating the Oracle Software Owner User](#)

Note:

- After you create the required operating system groups described in this section, you must add the Oracle software owner user (typically, *oracle*) to these groups, otherwise these groups will not be available as an option in Oracle Universal Installer while performing the database installation.
 - The UIDs and GIDs mentioned in this section are illustrative only. Oracle recommends that you do not use the UID and GID defaults. Instead, provide common assigned group and user IDs, and confirm that they are unused before you create or modify groups and users.
 - If necessary, contact your system administrator before using or modifying an existing user.
-
-

Creating the Oracle Inventory Group

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 (typically, `oinstall`) and the path of the Oracle Inventory directory.

You can configure one group to be the access control group for Oracle Inventory, for database administrators (OSDBA), and for all other access control groups used by Oracle software for operating system authentication. However, this group then must be the primary group for all users granted administrative privileges.

Log in as `root`, and use the following instructions to locate or create the Oracle Inventory group and a software owner:

- [Determining if the Oracle Inventory Group Exists](#)
- [Creating the Oracle Inventory Group](#)

Determining if the Oracle Inventory Group Exists

An `oraInst.loc` file has content similar to the following:

```
inventory_loc=central_inventory_location
inst_group=group
```

In the preceding example, `central_inventory_location` is the location of the Oracle Central Inventory, and `group` is the name of the group that has permissions to write to the central inventory.

If you have an existing Oracle Inventory, then ensure that you use the same Oracle Inventory for all Oracle software installations, and ensure that all Oracle software users you intend to use for installation have permissions to write to this directory.

To determine if the Oracle Inventory group exist, enter the following command:

```
# grep oinstall /etc/group
```

To determine if the `oraInst.loc` file exists, enter the following command:

```
# 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/oraInventory
inst_group=oinstall
```

In the previous output example:

- The `inventory_loc` group shows the location of the Oracle Inventory
- The `inst_group` parameter shows the name of the Oracle Inventory group (in this example, `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 for Database Installations

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 for a new Oracle Database installation

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

```
# /usr/sbin/groupadd -g 502 dba
```

Creating an OSOPER Group for Database Installations

Create an OSOPER group only 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 (typically, `oper`), then create it as follows. In the following, use the group name `oper` unless a group with that name exists:

```
# /usr/sbin/groupadd -g 503 oper
```

Creating the OSASM Group for Oracle Automatic Storage Management

If the OSASM group does not exist or if you require a new OSASM group, then create it as follows. In the following procedure, use the group name `asmadmin` unless a group with that name exists:

```
# /usr/sbin/groupadd -g 504 asmadmin
```

Creating the OSDBA Group for Oracle Automatic Storage Management

If you require a new OSDBA group for Oracle ASM, then create it as follows. In the following procedure, use the group name `asmdba` unless a group with that name exists:

```
# /usr/sbin/groupadd -g 506 asmdba
```

Creating the OSOPER Group for Oracle Automatic Storage Management

If you require an OSOPER group, then create it as follows. In the following procedure, use the group name `asmoper` unless a group with that name exists:

```
# /usr/sbin/groupadd -g 505 asmoper
```

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.
- If you have created an Oracle software owner for Oracle Grid Infrastructure, such as `grid`, and you want to create a separate Oracle software owner for Oracle Database software, such as `oracle`.

Determining if an Oracle Software Owner User Exists To determine if an Oracle software owner user named `oracle`, or `grid` exists, enter a command similar to the following:

```
# id oracle
# id grid
```

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

```
uid=501(oracle) gid=501(oinstall) groups=502(dba),503(oper)
```

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

```
uid=8001(grid) gid=8001(oinstall)
groups=8001(oinstall),8002(asmadmin),8003(asmdba),8006(dba)
```

Ensure that the Oracle software owner user (`oracle` or `grid`) has the Oracle Inventory group (`oinstall`) as its primary group and is a member of the appropriate OSDBA, ASMDBA, OSBACKUPDBA, OSDGDBA, and OSKMDBA groups you created in the preceding sections. Depending on whether you want to create a new user, or use an existing user to do this, see the following sections:

- [Creating an Oracle Software Owner User](#)
- [Modifying an Existing Oracle Software Owner User](#)

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

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, such as `oracle` or `grid`, then create it as described in this section (in this case to create the `oracle` user).

In the following procedure, use the user name `oracle` unless a user with that name exists:

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

```
# /usr/sbin/useradd -u 502 -g oinstall -G dba,asmdba oracle
```

In the preceding command:

- The `-u` option specifies the user ID. Using this command flag is optional because the system can provide you with an automatically generated user ID number. You must note the `oracle` user ID number because you need it during preinstallation.
- 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 and ASMDBA groups, for example, `dba`, `asmdba`, or `oper`.

2. Set the password of the oracle user:

```
# passwd oracle
```

Modifying an Existing 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 modify it as follows:

Specify the primary group using the `-g` option and any required secondary group using the `-G` option:

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

Checking Resource Limits for the Oracle Software Installation Users

On Oracle Linux systems, Oracle recommends that you install Oracle Preinstallation RPMs to meet preinstallation requirements like configuring your operating system to set the resource limits in the `limits.conf` file. Oracle Preinstallation RPM only configures the `limits.conf` file for the `oracle` user. If you are implementing Oracle Grid Infrastructure job role separation, then copy the values from the `oracle` user to the `grid` user in the `limits.conf` file.

For each installation software owner, check the resource limits for installation, using the following recommended ranges:

Table 2–1 Installation Owner Resource Limit Recommended Ranges

Resource Shell Limit	Resource	Soft Limit	Hard Limit
Open file descriptors	<code>nofile</code>	at least 1024	at least 65536
Number of processes available to a single user	<code>nproc</code>	at least 2047	at least 16384
Size of the stack segment of the process	<code>stack</code>	at least 10240 KB	at least 10240 KB, and at most 32768 KB

To check resource limits:

1. Log in as an installation owner.
2. Check the soft and hard limits for the file descriptor setting. Ensure that the result is in the recommended range, for example:

```
$ ulimit -Sn
1024
$ ulimit -Hn
65536
```

3. Check the soft and hard limits for the number of processes available to a user. Ensure that the result is in the recommended range, for example:

```
$ ulimit -Su
2047
$ ulimit -Hu
16384
```

4. Check the soft limit for the stack setting. Ensure that the result is in the recommended range, for example:

```
$ ulimit -Ss
10240
$ ulimit -Hs
32768
```

5. Repeat this procedure for each Oracle software installation owner.

If necessary, update the resource limits in the `/etc/security/limits.conf` configuration file for the installation owner. However, note that the configuration file may be distribution specific. Contact your system administrator for distribution specific configuration file information.

Note: If the `grid` or `oracle` users are logged in, then changes in the `limits.conf` file do not take effect until you log these users out and log them back in. You must do this before you use these accounts for installation.

See Also: ["Configuring Oracle Software Owner Environment"](#) on page 2-61

Configuring Kernel Parameters for Linux

During the Oracle Database installation, you can generate and run the `fixup` script to check and set the kernel parameter values required for successful installation of the database. This script updates required kernel packages, if necessary, to minimum values.

If you cannot use the `fixup` script, then verify that the kernel parameters shown in the following table are set to values greater than or equal to the minimum value shown. See ["Displaying and Changing Kernel Parameter Values"](#) on page 2-49 for information on how to verify and set the values manually.

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

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
shmmx	<p>Minimum: 536870912</p> <ul style="list-style-type: none"> <p>■ 32-bit Linux Systems</p> <p>Maximum: A value that is 1 byte less than 4 GB, or 4294967295</p> <p>Recommended: More than half the physical memory</p> <p>■ 64-bit Linux Systems</p> <p>Maximum: A value that is 1 byte less than the physical memory</p> <p>Recommended: More than half the physical memory</p> <p>See <i>My Oracle Support</i> Note 567506.1 for additional information about configuring shmmx.</p>	/proc/sys/kernel/shmmx
shmni	4096	/proc/sys/kernel/shmni
file-max	6815744	/proc/sys/fs/file-max
aio-max-nr	1048576	/proc/sys/fs/aio-max-nr
	<p>Note: This value limits concurrent outstanding requests and should be set to avoid I/O subsystem failures.</p>	
ip_local_port_range	<p>Minimum: 9000</p> <p>Maximum: 65500</p> <p>See Verifying UDP and TCP Kernel Parameters</p>	/proc/sys/net/ipv4/ip_local_port_range
rmem_default	262144	/proc/sys/net/core/rmem_default
rmem_max	4194304	/proc/sys/net/core/rmem_max
wmem_default	262144	/proc/sys/net/core/wmem_default
wmem_max	1048576	/proc/sys/net/core/wmem_max

Ensure that you set the TCP and UDP kernel parameters by following the procedure described in the [Verifying UDP and TCP Kernel Parameters](#) section.

Note: If the current value for any parameter is greater than the value listed in this table, then the fixup script does not change the value of that parameter.

See Also:

- ["Verifying UDP and TCP Kernel Parameters"](#) on page 2-35
- ["Guidelines for Setting Semaphore Parameters"](#) on page 5-4
- ["Installation Fixup Scripts"](#) on page 2-35

Displaying and Changing Kernel Parameter Values

Enter the commands shown in the following table to display the current values of the kernel parameters. Note these 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
aio-max-nr	# /sbin/sysctl -a grep aio-max-nr

If the value of any kernel parameter is different from the minimum value, then perform the following:

1. 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 to change. For the semaphore parameters (`kernel.sem`), you must specify all four values. If any of the current values are larger than the minimum value, then specify the larger value.

```
fs.aio-max-nr = 1048576
fs.file-max = 6815744
kernel.shmall = 2097152
kernel.shmmax = 4294967295
kernel.shmmni = 4096
kernel.sem = 250 32000 100 128
net.ipv4.ip_local_port_range = 9000 65500
net.core.rmem_default = 262144
net.core.rmem_max = 4194304
net.core.wmem_default = 262144
net.core.wmem_max = 1048576
```

By specifying the values in the `/etc/sysctl.conf` file, they persist when you restart the system. On SUSE Linux Enterprise Server systems, enter the following command to ensure that the system reads the `/etc/sysctl.conf` file when it restarts:

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

2. Enter the following command to change the current values of the kernel parameters:

```
# /sbin/sysctl -p
```

Review the output from this command to verify that the values are correct. If the values are incorrect, edit the `/etc/sysctl.conf` file, then enter this command again.

3. Enter the command `/sbin/sysctl -a` to confirm that the values are set correctly.
4. On SUSE Linux Enterprise Server systems only, enter the following command for the system to read the `/etc/sysctl.conf` file when it restarts:

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

5. On SUSE Linux Enterprise Server systems only, you must enter the GID of the `oinstall` group as the value for the parameter `/proc/sys/vm/hugetlb_shm_group`. Doing this grants members of `oinstall` a group permission to create shared memory segments.

For example, where the `oinstall` group GID is 501:

```
# echo 501 > /proc/sys/vm/hugetlb_shm_group
```

After running this command, use `vi` to add the following text to `/etc/sysctl.conf`, and enable the `boot.sysctl` script to run when the system restarts:

```
vm.hugetlb_shm_group=501
```

Note: Only one group can be defined as the `vm.hugetlb_shm_group`.

6. After updating the values of the kernel parameters in the `/etc/sysctl.conf` file, either restart the computer, or run the command `sysctl -p` to make the changes in the `/etc/sysctl.conf` file available in the active kernel memory.

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](#)

Note:

- Ensure that the paths you select for Oracle software, such as the Oracle home path and the Oracle base path, use only ASCII characters. Because installation owner names are used by default for some paths, this ASCII character restriction applies to user names, file names, and directory names.
- Ensure that all paths used by the database software, such as the Oracle home path and the Oracle base path, use characters only from the following set: "# % & ' () * + , - . / : ; < = > ? @ _ A-Z a-z 0-9. This includes user names, file names, and directory names. At the time of this release, the use of other characters for an Oracle Grid Infrastructure home or Oracle Database home is not supported. The set of characters provided is further restricted by user and file naming rules of the operating system.

Oracle Base Directory

The Oracle base directory is a top-level directory for Oracle software installations. The Optimal Flexible Architecture (OFA) guidelines recommend that you use a path similar to the following for the Oracle base directory:

```
/mount_point/app/software_owner
```

In this example:

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

The examples in this guide use `/u01` for the mount point directory.

- *software_owner* is the operating system user name of the software owner installing the Oracle software, for example `oracle` or `grid`.

Note: If you start a database instance using the server parameter file (`spfile`) with the `ORACLE_BASE` environment variable set, then its value is automatically stored in `spfile`. If you unset the `ORACLE_BASE` environment variable and start the instance again, then the database uses the value of the Oracle base directory stored in `spfile`.

You must specify the Oracle base directory that contains all Oracle products.

Note: If you have an existing Oracle base directory, then you can select it from the Oracle Base list during the database installation. If you do not have an Oracle base, then you can create one by editing the text in the list box. By default, the list contains the existing value for the Oracle base. See ["Installing the Oracle Database Software"](#) on page 4-9 for more information.

You can use the same Oracle base directory for multiple installations 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 are examples of Oracle base directories that can exist on the same system:

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

See ["Creating an Oracle Base Directory"](#) on page 2-54.

Oracle Inventory Directory

The Oracle Inventory directory (`oraInventory`) stores an inventory of all software installed on the system. It is required and shared by all Oracle software installations on a single system. If you have an existing Oracle Inventory path, then Oracle Universal Installer continues to use that Oracle Inventory.

The first time you install Oracle software on a system, Oracle Universal Installer provides an Optimal Flexible Architecture-compliant path in the format `/u[01-09]/app`, such as `/u01/app`. The user running the installation has permissions to write to that path. If this is true, then Oracle Universal Installer creates the Oracle Inventory directory in the path `/u[01-09]/app/oraInventory`. For example:

```
/u01/app/oraInventory
```

If you have set `ORACLE_BASE` for the `oracle` user during installation, then Oracle Universal Installer creates the Oracle Inventory directory in the path `ORACLE_BASE/./oraInventory`. For example, if `ORACLE_BASE` is set to `/u01/app/oracle`, then the Oracle Inventory directory is created in the path `/u01/app/oraInventory`.

If you have neither created an OFA-compliant path nor set `ORACLE_BASE`, then the Oracle Inventory directory is placed in the home directory of the user that is performing the installation. For example:

```
/home/oracle/oraInventory
```

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

Note:

- All Oracle software installations rely on the Oracle Inventory directory. Ensure that you back it up regularly.
 - Do not delete this directory unless you have completely removed all Oracle software from the system.
 - By default, the Oracle Inventory directory is not installed under the Oracle Base directory. This is because all Oracle software installations share a common Oracle Inventory, so there is only one Oracle Inventory for all users. Whereas, there is a separate Oracle Base for each user.
-
-

Oracle Home Directory

The Oracle home directory is the directory where you 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 and a name that identifies it. In accordance with the OFA guidelines, Oracle strongly recommends that the Oracle home directory you specify is a subdirectory of the Oracle base directory for the user account performing the installation. Oracle recommends that you specify a path similar to the following for the Oracle home directory:

```
oracle_base/product/11.1.0/dbhome_1
oracle_base/product/11.2.0/dbhome_1
oracle_base/product/11.2.0/grid
```

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 have to create this directory.

Note: During the installation, you must not specify an existing directory that has predefined permissions applied to it as the Oracle home directory. If you do, then you may experience installation failure due to file and group ownership permission errors.

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 topics:

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

Note: You can 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 follow the Optimal Flexible Architecture (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. See "[Creating the Oracle Inventory Group](#)" on page 2-43 for more information.

Note: Oracle recommends that you do not put the `oraInventory` directory under the Oracle base directory for a new installation. If you have an existing installation, then follow the steps in this section.

- Identifying an existing Oracle home directory

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

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

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

```
*:/u03/app/oracle/product/11.2.0/dbhome_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 to use are valid choices for an Oracle base directory. If you intend to use the `oracle` user

to install the software, then you can choose one of the following directories listed in the previous example:

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

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

- Identifying an existing Oracle base directory

After you locate the Oracle home directory, run a similar command to confirm the location of Oracle base:

```
cat /u01/app/oraInventory/ContentsXML/inventory.xml
```

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

- It is not on the same file system as the operating system.
- It has sufficient free disk space, as follows:

Requirement	Free Disk Space
The Oracle base directory contains only software files.	Up to 4 GB
The Oracle base directory contains both software and database files (not recommended for production databases).	Up to 6 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
```

See the following sections for more information:

- If an Oracle base directory exists and you want to use it, then see "[Choosing a Storage Option for Oracle Database and Recovery Files](#)" section on page 2-55.
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 to create an Oracle base directory, see "[Creating an Oracle Base Directory](#)" on page 2-54.

Creating an Oracle Base Directory

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

To identify an appropriate file system:

1. To determine the free disk space on each mounted file system, use the following command:

```
# df -h
```
2. From the display, identify a file system that has the appropriate amount of 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:

```
# mkdir -p /u01/app/oracle
# chown -R oracle:oinstall /u01/app/oracle
# chmod -R 775 /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 created.

Choosing a Storage Option for Oracle Database and 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 to use for Oracle Database files. If you want to enable automated backups during the installation, then you must also choose the storage option to use for recovery files (the fast recovery area). You do not have to use the same storage option for each file type.

Note: Database files and recovery files are supported on file systems and Oracle ASM.

Use the following guidelines when choosing the storage options for each file type:

- You can choose any combination of the supported storage options for each file type.
- Determine whether you want to use Oracle ASM for Oracle Database files, recovery files, or both. See ["Step 1: Identifying Storage Requirements for Oracle Automatic Storage Management"](#) on page 3-8 for more information.
- For more information about these storage options, see ["Database Storage Options"](#) on page 1-8.

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

- To use a file system for database or recovery file storage, see the ["Creating Directories for Oracle Database or Recovery Files"](#) section on page 2-56.
- To use Oracle ASM for database or recovery file storage, see the ["Preparing Disks for an Oracle Automatic Storage Management Installation"](#) section on page 3-7.

- To identify disk groups and determine the free disk space that they contain, see the ["Using an Oracle Automatic Storage Management Disk Group"](#) section on page 4-3.

Creating Directories for Oracle Database or Recovery Files

This section contains the following topics:

- [Guidelines for Placing Oracle Database 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 input-output operations and create separate control files on different devices for increased reliability. It also enables you to fully implement the OFA guidelines. You can choose the Advanced database creation option 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 2 GB of free disk space.

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

- For optimum performance, the file systems that you choose must 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.

Creating Required Directories

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

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

1. Use the following to determine the free disk space on each mounted file system:

```
# df -h
```

2. From the display, identify the file systems to use:

File Type	File System Requirements
Database files	Choose either: <ul style="list-style-type: none"> ■ A single file system with at least 2 GB of free disk space ■ Two or more file systems with at least 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 many file types, then add the disk space requirements for each type to determine the total disk space requirement.

3. Note the names of the mount point directories for the file systems that you identified.
4. 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
```

The default location for the database file directory is `$ORACLE_BASE/oradata`.

- Recovery file directory (fast recovery area):

```
# mkdir /mount_point/fast_recovery_area
# chown oracle:oinstall /mount_point/fast_recovery_area
# chmod 775 /mount_point/fast_recovery_area
```

The default fast recovery area is `$ORACLE_BASE/fast_recovery_area`. Oracle recommends that you keep the fast recovery area on a separate physical disk than that of the database file directory. This enables you to use the fast recovery area to retrieve data if the disk containing `oradata` is unusable for any reason.

5. If you also want to use Oracle ASM for storage, then see ["Preparing Disks for an Oracle Automatic Storage Management Installation"](#) on page 3-7 and ["Stopping Existing Oracle Processes"](#) section on page 2-59.

Configuring Storage for Oracle Database Files Using Block Devices

This section describes how to configure Oracle Database files on block devices. Use the following procedure to create block device partitions:

1. Use `fdisk` to create disk partitions on block devices for database files.

If you intend to configure block devices and use Oracle ASM to manage data files, then create one partition for each disk comprising the whole disk, and go through the section [Configuring Disks for Oracle ASM with ASMLIB](#) in *Oracle Grid Infrastructure Installation Guide*.

2. Create or modify the rules file in `/etc/udev/rules.d` to change the permissions of the data files from the default `root` ownership.

Ensure that the file you create is appropriate for your distribution. For example, name this file `99-oracle.rules` on Asianux, Red Hat Enterprise Linux, Oracle Linux, and SUSE Linux Enterprise Server systems.

Example 2-1 Example of a Rules File with User oracle

```
/etc/udev/rules.d/99-oracle.rules
#
# ASM disks
KERNEL=="sdb[6-9]", OWNER="oracle", GROUP="dba", MODE="0660"
KERNEL=="sdb10", OWNER="oracle", GROUP="dba", MODE="0660"
```

Example 2-2 Example of a Rules File with User grid

```
/etc/udev/rules.d/99-oracle.rules
#
# ASM disks
KERNEL=="sdb[6-9]", OWNER="grid", GROUP="asmadmin", MODE="0660"
KERNEL=="sdb10", OWNER="grid", GROUP="asmadmin", MODE="0660"
```

See Also: Chapter 2, "Preparing Storage for ASM" in the *Oracle Automatic Storage Management Administrator's Guide* for information about preparing the storage subsystem before you configure Oracle ASM

Configuring Disk Devices for Oracle Database

The `O_DIRECT` parameter enables direct read and writes to block devices, avoiding kernel overhead. With Oracle Database Release 10.2 and later, Oracle Database files are configured by default to use direct input/output.

With the 2.6 kernel or later for Red Hat Enterprise Linux, Oracle Linux, and SUSE Linux Enterprise Server, you must create a permissions file to maintain permissions on Oracle database files. If you do not create this permissions file, then permissions on disk devices revert to their default values, `root:disk`, and Oracle Database fails to start. Use the following steps to set the permissions file number:

- On Red Hat Enterprise Linux 4 and Oracle Linux 4, you must create a permissions file number that is lower than 50.
- On Asianux Server 3, Red Hat Enterprise Linux 5, Red Hat Enterprise Linux 6, Oracle Linux 5, Oracle Linux 6, SUSE Linux Enterprise Server 10, or SUSE Linux Enterprise Server 11, you must create a permissions file number that is higher than 50.

To configure a permissions file for disk devices, see the following examples:

- [Example of Creating a Udev Permissions File for Oracle Database](#)
- [Example of Configuring Block Device Storage for Oracle Database](#)

See Also: *Oracle Grid Infrastructure Installation Guide* for information about configuring storage for Oracle database files on shared storage devices

Example of Creating a Udev Permissions File for Oracle Database

See the examples mentioned in "[Configuring Storage for Oracle Database Files Using Block Devices](#)" on page 2-57 for more information about creating a permissions file.

Example of Configuring Block Device Storage for Oracle Database

The following procedure creates partitions for Oracle Database files on block devices:

1. Log in as root
2. Enter the `fdisk` command to format a specific storage disk. For example, `/sbin/fdisk /dev/sdb`
3. Create a partition. For example, create a 280 MB partition for data files.
4. Use the command similar to the following to update the kernel partition table for the shared storage device:

```
/sbin/partprobe diskpath
```

The following is an example of how to use the `fdisk` command to create one partition on a shared storage block disk device for a data file:

```
$ sudo sh
Password:
# /sbin/fdisk /dev/sdb
The number of cylinders for this disk is set to 1024.
Command (m for help): n
Command action
   e   extended
   P   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-1024, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-4462, default 1)
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-1024, default 4462): using default
value 4462

Command (m for help):w

The partition table has been altered!
Calling ioctl () to re-read partition table.
Synching disks.
# exit
Last login Wed Feb 21 20:23:01 from localnode
$ sudo sh
Password:
# /sbin/partprobe /dev/sdb1
```

Stopping Existing Oracle Processes

Note: If you are installing additional Oracle Database 11g products in an existing Oracle home, then stop *all* processes, including the listener and database, running in the Oracle home. You must complete this task to enable Oracle Universal Installer to relink certain executables and libraries.

Consider the following before you install Oracle Grid Infrastructure or Oracle Database:

- If you plan to use Oracle Restart, then you must install Oracle Grid Infrastructure before you install and create the database. When you perform a database installation, the database must use the same listener created during the Oracle Grid Infrastructure installation, thereafter you do not have to perform the steps listed in this section.

The default listener and any additional listeners must run from the Oracle Grid Infrastructure home. See "[Configuring Oracle Software Owner Environment](#)" on page 2-61 to continue.

- If you have an existing Oracle Database 11g Release 2 (11.2) running on Oracle ASM, then stop any existing Oracle ASM instances. After you finish installing the Oracle Grid Infrastructure software, start the Oracle ASM instance again.

If you create a database during the software installation, then most installation types configure and start a default Oracle Net listener using TCP/IP port 1521 and the IPC key value `EXTPROC`. If an existing Oracle Net listener process is using the same port or key value, Oracle Universal Installer looks for the next available port (for example, 1522) and configures and starts the new listener on this available port.

To determine if 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 if 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 see the "[Configuring Oracle Software Owner Environment](#)" section on page 2-61 to continue.

3. At the command prompt, 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 Oracle Software Owner Environment

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

Caution: Use shell programs supported by your operating system vendor. If you use a shell program that is not supported by your operating system, then you can encounter errors during installation.

To set the Oracle software owners' environments, follow these steps, for each software owner (`oracle`, `grid`). The following procedure lists the steps for the `oracle` user only:

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

```
$ xhost + RemoteHost
```

where *RemoteHost* is the fully qualified remote host name. For example:

```
$ xhost + somehost.example.com
```

3. If you are not logged in as the user, then switch to the software owner user you are configuring. For example, as the `oracle` user.

```
$ su - oracle
```

4. To determine the default shell for the `oracle` user, enter the following command:

```
$ echo $SHELL
```

5. Open the user's shell startup file in any text editor:

- Bash shell (`bash`):

```
$ vi .bash_profile
```

- Bourne shell (`sh`) or Korn shell (`ksh`):

```
$ vi .profile
```

- C shell (`csh` or `tcsh`):

```
% vi .login
```

6. Enter or edit the following line, specifying a value of 022 for the default file mode creation mask:

```
umask 022
```

7. Save the file and exit from the text editor.
8. To run the shell startup script, enter one of the following commands:

- Bash shell:

```
$ . ~/.bash_profile
```

- Bourne or Korn shell:

```
$ . ~/.profile
```

- C shell:

```
% source ~/.login
```

9. If you are not installing the software on the local computer, then run the following command on the remote computer to set the `DISPLAY` variable:

- Bourne, Bash or Korn shell:

```
$ export DISPLAY=local_host:0.0
```

- C shell:

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

In this example, `local_host` is the host name or IP address of the system (your workstation, or another client) on which you want to display the installer.

Run the following command on the remote system to check if the `SHELL` and the `DISPLAY` environment variables are set correctly:

```
echo $SHELL  
echo $DISPLAY
```

To change the display location from the default display to a remote system display, run the following command on the local computer:

```
$ xhost + RemoteHost
```

To verify that the X applications display is set properly, run an X11-based program that comes with the operating system such as `xclock`.

```
$ xclock
```

In this example, you can find `xclock` at `/usr/X11R6/bin/xclocks`.

If the `DISPLAY` environment variable is set correctly, then you can see `xclock` on your computer screen. If `xclock` does not start, then contact your system administrator.

10. If the `/tmp` directory has less than 1 GB of free disk space, then identify a file system with at least 1 GB of free space and set the `TMP` and `TMPDIR` environment variables to specify a temporary directory on this file system:
 - a. To determine the free disk space on each mounted file system use the following command:

```
# df -h /tmp
```

- 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:

```
$ sudo - s
# mkdir /mount_point/tmp
# chmod 775 /mount_point/tmp
# exit
```

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

- * Bourne, Bash, or Korn shell:

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

- * C shell:

```
% setenv TMP /mount_point/tmp
% setenv TMPDIR /mount_point/tmp
```

11. If you have had an existing installation on your system, and you are using the same user account to install this installation, then unset the ORACLE_HOME, ORACLE_BASE, ORACLE_SID, TNS_ADMIN environment variables and any other environment variable set for the Oracle installation user that is connected with Oracle software homes.

Enter the following commands to ensure that the ORACLE_HOME, ORACLE_BASE, ORACLE_SID and TNS_ADMIN environment variables are not set:

- Bourne, Bash, or Korn shell:

```
$ unset ORACLE_HOME
$ unset ORACLE_BASE
$ unset ORACLE_SID
$ unset TNS_ADMIN
```

- C shell:

```
% unsetenv ORACLE_HOME
% unsetenv ORACLE_BASE
% unsetenv ORACLE_SID
% unsetenv TNS_ADMIN
```

Use the following command to check the PATH environment variable:

```
$ echo $PATH
```

Ensure that the \$ORACLE_HOME/bin path is removed from your PATH environment variable.

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. 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.

12. 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 that the environment variables you set in this section have the correct values.

See Also: ["Configuring the User's Environment"](#) on page 3-3 for information about setting the Oracle Grid Infrastructure software owner user's environment

Oracle Grid Infrastructure for a Standalone Server

The Oracle Grid Infrastructure for a standalone server is the Oracle software that provides system support for an Oracle database including volume management, file system, and automatic restart capabilities. If you plan to use Oracle Restart or Oracle Automatic Storage Management (Oracle ASM), then you must install Oracle Grid Infrastructure before you install and create the database. Oracle Grid Infrastructure for a standalone server is the software that includes Oracle Restart and Oracle ASM. Oracle combines the two infrastructure products into a single set of binaries that is installed as the Oracle Grid Infrastructure home.

Oracle ASM is a volume manager and a file system for Oracle database files that supports single-instance Oracle Database and Oracle Real Application Clusters (Oracle RAC) configurations. Oracle ASM also supports a general purpose file system for your application needs including Oracle Database binaries. Oracle ASM is Oracle's recommended storage management solution that provides an alternative to conventional volume managers, file systems, and raw devices.

Oracle Restart improves the availability of your Oracle database by providing the following:

- When there is a hardware or a software failure, Oracle Restart automatically starts all Oracle components, including the Oracle database instance, Oracle Net Listener, database services, and Oracle ASM.
- Oracle Restart starts components in the proper order when the database host is restarted.
- Oracle Restart runs periodic checks to monitor the status of Oracle components. If a check operation fails for a component, then the component is shut down and restarted.

Note:

- If you want to use Oracle ASM or Oracle Restart, then you must install Oracle Grid Infrastructure for a standalone server before you install and create the database. Otherwise, you must manually register the database with Oracle Restart.
 - Oracle Restart is used in single-instance (nonclustered) environments only.
-
-

This chapter contains the following sections:

- [Requirements for Oracle Grid Infrastructure Installation](#)

- [Oracle ACFS and Oracle ADVM Support](#)
- [Managing Disk Groups for Older Database Versions](#)
- [Upgrading Existing Oracle Automatic Storage Management Instances](#)
- [Oracle Automatic Storage Management Installation Considerations](#)
- [Preparing Disks for an Oracle Automatic Storage Management Installation](#)
- [Installing Oracle Grid Infrastructure Using a Software-Only Installation](#)
- [Installing and Configuring Oracle Grid Infrastructure for a Standalone Server](#)
- [Modifying Oracle Grid Infrastructure for a Standalone Server Binaries](#)
- [Manually Configuring Oracle Automatic Storage Management Disk Groups](#)
- [Testing the Oracle Automatic Storage Management Installation](#)

Requirements for Oracle Grid Infrastructure Installation

The system must meet the following requirements:

- [Memory Requirements](#)
- [Disk Space Requirements](#)
- [Configuring the User's Environment](#)

Memory Requirements

The following are the memory requirements for installing Oracle Grid Infrastructure for a Standalone Server:

Minimum: At least 1.5 GB of RAM for Oracle Grid Infrastructure for a Standalone Server; at least 1 GB of additional RAM if you plan to install Oracle Database after installing Oracle Grid Infrastructure for a Standalone Server.

Recommended: 4 GB of RAM or more if you plan to install both Oracle Grid Infrastructure for a Standalone Server and Oracle Database.

- To determine the RAM size, enter the following command:

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

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

- The following table describes the relationship between installed RAM and the configured swap space recommendation:

Note: On Linux, the HugePages feature allocates non-swappable memory for large page tables using memory-mapped files. If you enable HugePages, then you should deduct the memory allocated to HugePages from the available RAM before calculating swap space.

RAM	Swap Space
Between 1.5 GB and 2 GB	1.5 times the size of the RAM
Between 2 GB and 16 GB	Equal to the size of the RAM

RAM	Swap Space
More than 16 GB	16 GB

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

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

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

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

```
# free
```

IMPORTANT:

- Oracle recommends that you take multiple values for the available RAM and swap space before finalizing a value. This is because the available RAM and swap space keep changing depending on the user interactions with the computer.
 - Contact your operating system vendor for swap space allocation guidance for your server. The vendor guidelines supersede the swap space requirements listed in this guide.
-
-

Disk Space Requirements

The following are the disk space requirements for installing Oracle Grid Infrastructure:

- At least 5.5 GB of disk space.
- At least 1 GB of space in the /tmp directory.

To determine the amount of free space available in the /tmp directory, enter the following command:

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

If there is less than 1 GB of free 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 TMP and TMPDIR environment variables to specify a temporary directory when setting the oracle user's environment.

See Also: ["Configuring Oracle Software Owner Environment"](#) on page 2-61 for more information about setting TMP and TMPDIR

- Extend the file system that contains the /tmp directory. If necessary, contact the system administrator for information about extending file systems.

Configuring the User's Environment

Complete the following tasks to set the Oracle Grid Infrastructure software owner user's environment:

- Review the information in "[Logging In to the System as root](#)" on page 2-8.
- Ensure that you set the path to the Oracle base directory. Oracle Restart and Oracle Database are under the same Oracle base directory. For example:

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

- Set the Oracle Grid Infrastructure software owner user default file mode creation mask (`umask`) to 022 in the shell startup file. Setting the mask to 022 ensures that the user performing the software installation creates files with 644 permissions.
- Set `ulimit` settings for file descriptors and processes for the Oracle Grid Infrastructure installation software owner.
- Set the `DISPLAY` environment variable in preparation for installation.

If you plan to install Oracle Database, then you must meet additional preinstallation requirements. See [Chapter 2](#).

Oracle ACFS and Oracle ADVM Support

Oracle Automatic Storage Management Cluster File System (Oracle ACFS) extends Oracle ASM technology to support of all of your application data in both single instance and cluster configurations. Oracle Automatic Storage Management Dynamic Volume Manager (Oracle ADVM) provides volume management services and a standard disk device driver interface to clients. Oracle Automatic Storage Management Cluster File System is layered on Oracle ASM through the Oracle Automatic Storage Management Dynamic Volume Manager interface.

Oracle ACFS and Oracle ADVM are supported on Oracle Linux 5 and Red Hat Enterprise Linux 5 for Linux x86 and Linux x86-64. [Table 3-1](#) lists the releases, platforms and kernel versions that support Oracle ACFS and Oracle ADVM.

Table 3-1 Platforms That Support Oracle ACFS and Oracle ADVM

Release	Platform / Operating System	Kernel
11.2.x	Linux x86: Oracle Linux 5 and Red Hat Enterprise Linux 5	2.6.18 or later updates to 2.6.18
11.2.0.1	Linux x86-64: Oracle Linux 5 and Red Hat Enterprise Linux 5	2.6.18 or later updates to 2.6.18
11.2.0.2	Linux x86-64: Oracle Linux 5, Red Hat Enterprise Linux 5, SUSE Linux Enterprise Server 10 SP3 and later	2.6.18 or later updates to 2.6.18
11.2.0.3	Linux x86-64: Oracle Linux 5, Red Hat Enterprise Linux 5, SUSE Linux Enterprise Server 10 SP3 and later, SUSE Linux Enterprise Server 11 SP1	2.6.18 or later updates to 2.6.18 Oracle Unbreakable Enterprise Kernel 2.6.32-100.34.1 and later updates to 2.6.32-100
11.2.0.3	Linux x86-64: Oracle Linux 6 (with Oracle Unbreakable Enterprise Kernel)	Oracle Unbreakable Enterprise Kernel 2.6.32-100.34.1 and later updates to 2.6.32-100
11.2.0.3.3 (Oracle Grid Infrastructure PSU)	Linux x86-64: Red Hat Enterprise Linux 6, Oracle Linux with the Red Hat Compatible Kernel	6.0, 6.1, 6.2

Table 3–1 (Cont.) Platforms That Support Oracle ACFS and Oracle ADVM

Release	Platform / Operating System	Kernel
11.2.0.3.4 (Oracle Grid Infrastructure PSU)	Linux x86-64: Red Hat Enterprise Linux 6 , Oracle Linux with the Red Hat Compatible Kernel	6.3 and later
11.2.0.3.7 (Oracle Grid Infrastructure PSU)	Linux x86-64: Oracle Linux 6 (with Oracle Unbreakable Enterprise Kernel), SUSE Linux Enterprise Server 11 SP2	Oracle Unbreakable Enterprise Kernel 2.6.39-100 and later updates to 2.6.39-100
11.2.0.4	Linux x86-64: SUSE Linux Enterprise Server 11 SP3	-

See Also:

- For current information on platforms and releases that support Oracle ACFS and Oracle ADVM refer to My Oracle Support Note 1369107.1 at:
<https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&id=1369107.1>
- For current Patch Set Update (PSU) release and support information refer to the PSU document on My Oracle Support.

Note: Security Enhanced Linux (SELinux) is not supported on Oracle ACFS file systems.

Note: Oracle recommends that you create Oracle data files in Oracle ASM disk groups. Creating Oracle data files on an Oracle ACFS file system is not supported. Oracle ACFS can be used as an option only when Oracle ASM is configured.

Oracle ACFS resources are not supported for Oracle Restart configurations on all platforms. You must manually load ACFS drivers after a system restart. Oracle ACFS database home file systems can be placed into the Oracle ACFS mount registry to be mounted along with other registered Oracle ACFS file systems.

Oracle Database homes can be stored on Oracle ACFS only if the database version is Oracle Database 11g Release 2 or higher. Earlier releases of Oracle Database cannot be installed on Oracle ACFS.

See Also:

- *Oracle Database Release Notes for Linux* for latest information about supported platforms and releases
- *Oracle Automatic Storage Management Administrator's Guide* for more information about Oracle Automatic Storage Management Cluster File System and Oracle Automatic Storage Management Dynamic Volume Manager

Managing Disk Groups for Older Database Versions

Use Oracle ASM Configuration Assistant (Oracle ASMCA) to create and modify disk groups when you install earlier Oracle databases on Oracle Grid Infrastructure installations.

Releases prior to Oracle Database 11g Release 2 used Oracle Database Configuration Assistant (Oracle DBCA) to perform administrative tasks on Oracle ASM. Starting with Oracle Database 11g Release 2 (11.2), Oracle ASM is installed as part of an Oracle Grid Infrastructure installation. You can no longer use Oracle DBCA to perform administrative tasks on Oracle ASM.

See Also: *Oracle Automatic Storage Management Administrator's Guide* for details about configuring disk group compatibility for databases using Oracle Database 10g or earlier software with Oracle Grid Infrastructure

Upgrading Existing Oracle Automatic Storage Management Instances

If you have an Oracle ASM installation from an earlier release installed on your server, or in an existing Oracle Grid Infrastructure installation, you can use Oracle Automatic Storage Management Configuration Assistant (Oracle ASMCA) to upgrade the existing Oracle ASM instance to 11g Release 2 (11.2), and subsequently configure disk groups, Oracle ASM volumes and Oracle ASM file systems.

Note: You must first shut down all databases and applications using an existing Oracle ASM instance before upgrading it.

During the installation, if you use Oracle ASM, and Oracle ASMCA detects that there is a prior Oracle ASM version installed in another Oracle ASM home, then after installing the Oracle ASM 11g Release 2 (11.2) binaries, you can start Oracle ASMCA to upgrade the existing Oracle ASM instance.

See Also:

- "Upgrading an Oracle ASM Instance with Oracle Universal Installer" in *Oracle Automatic Storage Management Administrator's Guide*
- "Upgrading an Oracle ASM Instance with Oracle ASM Configuration Assistant" in *Oracle Automatic Storage Management Administrator's Guide*
- "Downgrading an Oracle ASM Instance in an Oracle Restart Configuration" in *Oracle Automatic Storage Management Administrator's Guide*

Oracle Automatic Storage Management Installation Considerations

In previous releases, Oracle Automatic Storage Management (Oracle ASM) was installed as part of the Oracle Database installation. With Oracle Database 11g Release 2 (11.2), Oracle ASM is part of an Oracle Grid Infrastructure installation, either for a cluster, or for a standalone server.

If you want to upgrade an existing Oracle ASM installation, then you must upgrade Oracle ASM by running an Oracle Grid Infrastructure upgrade (upgrades of existing

Oracle ASM installations). If you do not have Oracle ASM installed and you want to use Oracle ASM as your storage option, then you must complete an Oracle Grid Infrastructure installation before you start your Oracle Database installation.

Oracle Automatic Storage Management Configuration Assistant (Oracle ASMCA) is installed as part of the Oracle Grid Infrastructure for a Standalone Server installation. You must run Oracle ASMCA for installing and configuring Oracle ASM instances, disk groups, volumes, and Oracle ACFS. In addition, you can use the ASMCA command-line interface.

See Also: Chapter 11, "Oracle ASM Configuration Assistant" in *Oracle Automatic Storage Management Administrator's Guide* for information about Oracle ASMCA

Apply the following guidelines when you install Oracle ASM:

- You must complete the steps listed under "[Preparing Disks for an Oracle Automatic Storage Management Installation](#)" on page 3-7 to prepare a disk partition to use for the Oracle ASM disk groups.
- Ensure that at least one disk is configured appropriately for use in an Oracle ASM disk group before beginning the installation.
- When you install Oracle ASM, Oracle Automatic Storage Management Configuration Assistant (Oracle ASMCA) creates a separate server parameter file (SPFILE) and password file for the Oracle ASM instance. As soon as Oracle ASM is installed, the ASMSNMP schema and user are created. See *Oracle Automatic Storage Management Administrator's Guide* for more information.
- The Oracle ASM instance that manages the existing disk group runs in the Oracle Grid Infrastructure home directory.

Preparing Disks for an Oracle Automatic Storage Management Installation

This section describes how to configure disks for use with Oracle ASM. The following sections describe how to identify the requirements and configure the disks on each platform:

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

Note: Oracle does not recommend using identifiers for database object names that must be quoted. While these quoted identifiers may be valid as names in the SQL CREATE statement, such as CREATE DISKGROUP "1data" . . . , the names may not be valid when using other tools that manage the database object.

See Also: "Creating Disk Groups for a New Oracle Installation" in *Oracle Automatic Storage Management Administrator's Guide* for information about creating and managing disk groups

General Steps for Configuring Oracle Automatic Storage Management

The following are the general steps to configure Oracle ASM:

1. Identify the storage requirements of the site.
2. If you are creating a new Oracle ASM disk group, create partitions for DAS or SAN disks.
3. Configure the disks for use with Oracle ASM. You must provide the Oracle ASM disk configuration information during the Oracle Grid Infrastructure installation.

Step 1: Identifying Storage Requirements for Oracle Automatic Storage Management

To identify the storage requirements for using Oracle ASM, 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 Oracle ASM for Oracle Database files, recovery files, or both.

Note: You do not have to use the same storage mechanism for Oracle Database files and recovery files. You can use a file system for one file type and Oracle ASM for the other.

If you enable automated backups and you do not have a shared file system available, then you must choose Oracle ASM for recovery file storage.

During the database installation, if you plan to enable automated backups, then you can choose Oracle ASM as the storage mechanism for recovery files by specifying an Oracle ASM disk group for the fast recovery area. Depending on how you create a database during the database installation, you have the following options:

- You can run Oracle ASMCA in interactive mode to create and configure the required disk groups.

During the database installation, if you select an installation method that runs Database Configuration Assistant in interactive mode (Advanced Installation type), then you can select the disk groups that you created using Oracle ASMCA.

You have the option to use the disk groups you created using Oracle ASMCA both for database files and recovery files, or you can use different disk groups for each file type. Ideally, create separate Oracle ASM disk groups for data files and for recovery files.

- If you run Oracle ASMCA in noninteractive mode, then you must use the same Oracle ASM disk group for data files and recovery files. During the database installation (Typical Installation type), you must select the same disk group for both data files and recovery files.

See Also:

- "Oracle ASM Configuration Assistant Command-Line Interface" section in *Oracle Automatic Storage Management Administrator's Guide*
- ["Creating a Fast Recovery Area Disk Group"](#) on page 5-4

2. Choose the Oracle ASM redundancy level to use for each Oracle ASM disk group that you create.

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

- External redundancy

This option does not allow Oracle ASM to mirror the contents of the disk group. Oracle recommends that you select this redundancy level either when the disk group contains devices, such as RAID devices, that provide their own data protection or when the database does not require uninterrupted access to data.

- Normal redundancy

To optimize performance and reliability in a normal redundancy disk group, Oracle ASM uses two-way mirroring for data files and three-way mirroring for control files, by default. In addition, you can choose the mirroring characteristics for individual files in a disk group. You can use two-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 of 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 three failure groups (a minimum of three 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.

If an Oracle ASM instance is 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 database installation.

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	1.8 GB	3.6 GB	5.4 GB
Normal	2	3.6 GB	7.2 GB	10.8 GB
High	3	5.4 GB	10.8 GB	16.2 GB

4. Optionally, identify failure groups for the Oracle ASM disk group devices.

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 is included in 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.

For instance, to avoid failures of this type, you can use two small computer system interface (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:

- The disk devices must be owned by the user performing the grid installation.

See Also: ["Example of a Rules File with User grid"](#) on page 2-58 for information about creating or modifying permissions

- All the devices in an Oracle ASM disk group must be the same size and have the same performance characteristics.
- Do not specify multiple partitions on a single physical disk as a disk group device. Oracle ASM expects each disk group device to be on a separate physical disk.
- Although you can specify a logical volume as a device in an Oracle ASM disk group, Oracle does not recommend their use because it adds a layer of complexity that is unnecessary with Oracle ASM. Oracle recommends that if you choose to use a logical volume manager, then use the logical volume manager to represent a single logical unit number (LUN) without striping or mirroring, so that you can minimize the effect on storage performance of the additional storage layer.

See Also:

- ["Step 3: Configuring Disks for Oracle Automatic Storage Management"](#) on page 3-11 for information about completing this task
- ["Preparing Storage for ASM"](#) in *Oracle Automatic Storage Management Administrator's Guide* for information about configuring Oracle ASM disk groups

Step 2: Creating DAS or SAN Disk Partitions for Oracle Automatic Storage Management

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

Note: You can use any physical disk for Oracle ASM, if it is partitioned.

Step 3: Configuring Disks for Oracle Automatic Storage Management

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

If you intend to use Oracle ASM for database storage, then Oracle recommends that you install the Automatic Storage Management library driver (ASMLIB) and associated utilities and use them to configure the devices to include in an Oracle ASM disk group.

Note: If you configure disks using the Oracle Automatic Storage Management library driver, then you must change the default disk discovery string to `ORCL:*`. If the diskstring is set to `ORCL:*`, or is left empty (""), then the installer discovers these disks.

This section describes how to configure storage for use with Oracle ASM.

- [Configuring Disks for Oracle Automatic Storage Management Using the Automatic Storage Management Library Driver \(ASMLIB\)](#)
- [Configuring Disk Devices Manually for Oracle Automatic Storage Management](#)

Configuring Disks for Oracle Automatic Storage Management Using the Automatic Storage Management Library Driver (ASMLIB)

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](#)
- [Configuring the Disk Devices to Use the Oracle Automatic Storage Management Library Driver](#)
- [Administering the Oracle Automatic Storage Management Library Driver and Disks](#)

Installing and Configuring the Automatic Storage Management Library Driver Software

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

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

```
# uname -rm
```

2. If necessary, download the required Oracle Automatic Storage Management library driver packages from the Oracle Technology Network website:

<http://www.oracle.com/technetwork/topics/linux/asmlib/index-101839.html>

You must install the following packages, where *version* is the version of the Oracle 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
```

3. Enter a command similar to the following to install the packages:

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

If you are using the Red Hat Enterprise Linux AS 3.0 enterprise kernel on an x86 system, then enter a command similar to the following:

```
# sudo 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
```

4. Enter a command similar to the following to determine the UID of the Oracle software owner user that you are using for this installation and the GID of the OSASM group:

```
# id oracle
```

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

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

6. 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 Grid Infrastructure owner user (typically, <code>grid</code>).
Default GID to own the driver interface:	Specify the GID of the OSASM group (typically, <code>asmadmin</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.
Scan for Oracle ASM disks on boot (y/n):	Enter <code>y</code> to scan for the presence of any Oracle Automatic Storage Management disks when the system starts.

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

To configure the disk devices to use in an Oracle Automatic Storage Management disk group:

1. If you intend to use IDE, SCSI, or RAID devices in the Oracle 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 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.

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

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

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

In this example, `DISK1` is a name assigned to the disk.

Note:

- If you are using a multipathing disk driver with Oracle Automatic Storage Management, then ensure that you specify the correct logical device name for the disk.
The disk names that you specify can contain uppercase letters, numbers, and the underscore character. They must start with an uppercase letter.
 - To create a database during the installation using the Oracle Automatic Storage Management library driver, you must change the default disk discovery string to `ORCL:*`.
-

Administering the Oracle Automatic Storage Management Library Driver and Disks

To administer the Oracle Automatic Storage Management library driver and disks, use the `/usr/sbin/oracleasm` initialization script with different options, as described in [Table 3-2](#):

Table 3–2 Disk Management Tasks Using ORACLEASM

Task	Command Example	Description
Configure or reconfigure ASMLIB	<code>oracleasm configure -i</code>	Use the <code>configure</code> option to reconfigure the Oracle Automatic Storage Management library driver, if necessary. To see command options, enter <code>oracleasm configure</code> without the <code>-i</code> flag.
Change system restart load options for ASMLIB	<code>oracleasm enable</code>	Options are <code>disable</code> and <code>enable</code> . Use the <code>disable</code> and <code>enable</code> options to change the actions of the Oracle Automatic Storage Management library driver when the system starts. The <code>enable</code> option causes the Oracle Automatic Storage Management library driver to load when the system starts.
Load or unload ASMLIB without restarting the system	<code>oracleasm restart</code>	Options are <code>start</code> , <code>stop</code> and <code>restart</code> . Use the <code>start</code> , <code>stop</code> , and <code>restart</code> options to load or unload the Oracle Automatic Storage Management library driver without restarting the system.
Mark a disk for use with ASMLIB	<code>oracleasm createdisk VOL1 /dev/sda1</code>	Use the <code>createdisk</code> option to mark a disk device for use with the Oracle Automatic Storage Management library driver and give it a name, where <i>labelname</i> is the name you want to use to mark the device, and <i>devicepath</i> is the path to the device: <code>oracleasm createdisk labelname devicepath</code>
Unmark a named disk device	<code>oracleasm deletedisk VOL1</code>	Use the <code>deletedisk</code> option to unmark a named disk device, where <i>diskname</i> is the name of the disk: <code>oracleasm deletedisk diskname</code> Caution: Do not use this command to unmark disks that are being used by an Oracle Automatic Storage Management disk group. You must delete the disk from the Oracle Automatic Storage Management disk group before you unmark it.
Determine if ASMLIB is using a disk device	<code>oracleasm querydisk</code>	Use the <code>querydisk</code> option to determine if a disk device or disk name is being used by the Oracle Automatic Storage Management library driver, where <i>diskname_devicename</i> is the name of the disk or device that you want to query: <code>oracleasm querydisk diskname_devicename</code>

Table 3–2 (Cont.) Disk Management Tasks Using ORACLEASM

Task	Command Example	Description
List Oracle ASMLIB disks	<code>oracleasm listdisks</code>	Use the <code>listdisks</code> option to list the disk names of marked Oracle ASM library driver disks.
Identify disks marked as ASMLIB disks	<code>oracleasm scandisks</code>	Use the <code>scandisks</code> option to enable cluster nodes to identify which shared disks have been marked as ASMLIB disks on another node.
Rename ASMLIB disks	<code>oracleasm renamedisk VOL1 VOL2</code>	<p>Use the <code>renamedisk</code> option to change the label of an Oracle ASM library driver disk or device by using the following syntax, where <i>manager</i> specifies the manager device, <i>label_device</i> specifies the disk you intend to rename, as specified either by OracleASM label name or by the device path, and <i>new_label</i> specifies the new label you want to use for the disk:</p> <pre>oracleasm renamedisk [-l manager] [-v] label_device new_label</pre> <p>Use the <code>-v</code> flag to provide a verbose output for debugging.</p> <p>Caution: You must ensure that all Oracle Database and Oracle ASM instances have ceased using the disk before you relabel the disk. If you do not do this, then you may lose data.</p>

Configuring Disk Devices Manually for Oracle Automatic Storage Management

By default, the 2.6 kernel device file naming scheme `udev` dynamically creates device file names when the server is started, and assigns ownership of them to `root`. If `udev` applies default settings, then it changes device file names and owners for the disks, corrupting them when an Oracle ASM instance is restarted. If you use ASMLIB, then you do not have to ensure permissions and device path persistency in `udev`.

If you do not use ASMLIB, then you must create a custom rules file. When `udev` is started, it sequentially carries out rules (configuration directives) defined in rules files. These files are in the path `/etc/udev/rules.d/`. Rules files are read in lexical order. For example, rules in the file `10-wacom.rules` are parsed and carried out before rules in the rules file `90-ib.rules`.

Where rules files describe the same devices, on Asianux, Red Hat, and Oracle Linux, the last file read is the one that is applied. On SUSE Linux Enterprise Server 2.6 kernels, the first file read is the one that is applied.

To configure a permissions file for disk devices, complete the following tasks:

1. Configure SCSI devices as trusted devices, white listed, by editing the `/etc/scsi_id.config` file and adding "options=-g" to the file. For example:

```
# cat > /etc/scsi_id.config
vendor="ATA",options=-p 0x80
options=-g
```

2. Using a text editor, create a `udev` rules file for the Oracle ASM devices, setting permissions to 0660 for the installation owner and the group whose members are administrators of the grid infrastructure software.

For example, on Oracle Linux, to create a role-based configuration `rules.d` file, where the installation owner is `grid`, and the OSASM group is `asmadmin`, enter commands similar to the following:

```
# vi /etc/udev/rules.d/99-oracle-asmdevices.rules

KERNEL=="sd?1", BUS=="scsi", PROGRAM=="/sbin/scsi_id",
RESULT=="14f70656e66696c00000000", OWNER="grid", GROUP="asmadmin", MODE="0660"
KERNEL=="sd?2", BUS=="scsi", PROGRAM=="/sbin/scsi_id",
RESULT=="14f70656e66696c00000000", OWNER="grid", GROUP="asmadmin", MODE="0660"
KERNEL=="sd?3", BUS=="scsi", PROGRAM=="/sbin/scsi_id",
RESULT=="14f70656e66696c00000000", OWNER="grid", GROUP="asmadmin", MODE="0660"
```

3. Load updated block device partition tables on the server using: `/sbin/partprobe devicename`. You must do this as the root user.
4. Enter the command to restart the udev service.

On Asianux, Oracle Linux 5, and Red Hat Enterprise Linux 5, the commands are:

```
# /sbin/udevcontrol reload_rules
# /sbin/start_udev
```

On SUSE Linux Enterprise Server 10 and SUSE Linux Enterprise Server 11, the command is:

```
# /etc/init.d boot.udev restart
```

Verify that your system is configured correctly.

Installing Oracle Grid Infrastructure Using a Software-Only Installation

A software-only installation only copies the Oracle Grid Infrastructure for a standalone server binaries to the specified location. Configuring Oracle Grid Infrastructure for a standalone server and Oracle ASM must be done manually after the installation is finished.

When you perform a software-only installation of Oracle Grid Infrastructure software, you must complete a few manual configuration steps to enable Oracle Restart after you install the software.

Note: Oracle recommends that only advanced users perform the software-only installation because this installation method provides no validation of the installation, and this installation option requires manual postinstallation steps to enable the Oracle Grid Infrastructure software.

Performing a software-only installation involves the following steps:

1. [Installing the Software Binaries](#)
2. [Configuring the Software Binaries](#)

Installing the Software Binaries

1. Run the `runInstaller` command from the relevant directory on the Oracle Database 11g Release 2 (11.2) installation media or download directory.
2. Complete a software-only installation of Oracle Grid Infrastructure.

See "[Configuring the Software Binaries](#)" on page 3-17 for information about configuring Oracle Grid Infrastructure after performing a software-only installation.

3. Verify that the server meets the installation requirements using the command `runcluvfy.sh stage -pre hacfg`. Ensure that you complete all storage and server preinstallation requirements.

Configuring the Software Binaries

To configure and activate a software-only Oracle Grid Infrastructure installation for Oracle Restart, complete the following tasks:

1. Login as `root` and run the `roothas.pl` script from `Grid_home` using the following syntax:

```
Grid_home/perl/bin/perl -I Grid_home/perl/lib -I Grid_home/crs/install
Grid_home/crs/install/roothas.pl
```

For example, if your Oracle Grid Infrastructure home is `/u01/app/oracle/product/11.2.0/grid`, then run the following script:

```
# /u01/app/oracle/product/11.2.0/grid/perl/bin/perl -I
/u01/app/oracle/product/11.2.0/grid/perl/lib -I /u01/app/oracle/product
/11.2.0/grid/crs/install
/u01/app/oracle/product/11.2.0/grid/crs/install/roothas.pl
```

2. Change the directory to `Grid_home/oui/bin`, where `Grid_home` is the path of the Oracle Grid Infrastructure home.
3. Login as the Oracle Restart software owner user and enter the following command:

```
./runInstaller -updateNodeList ORACLE_HOME=Grid_home -defaultHomeName CLUSTER_
NODES= CRS=TRUE
```

For example:

```
$ ./runInstaller -updateNodeList ORACLE_
HOME=/u01/app/oracle/product/11.2.0/grid
-defaultHomeName CLUSTER_NODES= CRS=TRUE
```

4. Use the `SRVCTL` utility along with Network Configuration Assistant and Oracle ASMCA to add the listener, the Oracle ASM instance, and all Oracle ASM disk groups to the Oracle Restart configuration.

Installing and Configuring Oracle Grid Infrastructure for a Standalone Server

If you install Oracle Grid Infrastructure and then create your database, the database is automatically added to the Oracle Grid Infrastructure configuration and is automatically restarted when required. However, if you install Oracle Grid Infrastructure on a host computer on which a database exists, you must manually add the database, the listener, the Oracle ASM instance, and other components to the Oracle Grid Infrastructure configuration.

Note: Oracle Grid Infrastructure can accommodate multiple single-instance databases on a single host computer.

This section includes the following topics:

- [Installing Oracle Grid Infrastructure with a New Database Installation](#)

- [Installing Oracle Grid Infrastructure for an Existing Database](#)

Installing Oracle Grid Infrastructure with a New Database Installation

Perform the following steps to install Oracle Grid Infrastructure and then create a database that is managed by Oracle Restart. First install Oracle Grid Infrastructure, which installs Oracle Restart and Oracle ASM, then configure Oracle ASM with at least one disk group, and then install Oracle Database that stores database files in Oracle ASM disk groups. Click the help button on the Oracle Universal Installer page for page level assistance.

You may have to shut down existing Oracle processes before you proceed with the Oracle Grid Infrastructure installation. See "[Stopping Existing Oracle Processes](#)" on page 2-59 for more information.

To install Oracle Grid Infrastructure for a standalone server with a new database installation:

1. Start Oracle Universal Installer as the Oracle Grid Infrastructure software owner user. Complete one of the following steps depending on the location of the installation files:
 - If the installation files are on installation media, enter commands similar to the following, where *directory_path* is the path of the Oracle Grid Infrastructure directory on the installation media:

```
$ /directory_path/runInstaller
```

Note: You must install Oracle Grid Infrastructure for a standalone server from the Oracle Grid Infrastructure media.

- If the installation files are on the hard disk, change the directory to the path of the Oracle Grid Infrastructure (`clusterware`) directory and enter the following command:

```
$ ./runInstaller
```

Note: Start Oracle Universal Installer from the terminal session where you logged in as the Oracle Grid Infrastructure software owner user and set the user's environment.

If Oracle Universal Installer is not displayed, see "[X Window Display Errors](#)" on page G-2 and "[Remote Terminal Installation Error](#)" on page G-2 for information about troubleshooting.

2. Starting with Oracle Database 11g Release 2 (11.2.0.2), you can use the Software Updates feature to dynamically download and apply the latest updates. In the Download Software Updates screen, select one of the following options and click **Next**:

- Use My Oracle Support credentials for download: Select this option to download and apply the latest software updates.

Click **Proxy Settings** to configure a proxy for Oracle Universal Installer to use to connect to the Internet. Provide the proxy server information for your site, along with a user account that has access to the local area network through

which the server is connecting. Starting with Oracle Database 11g Release 2 (11.2.0.3) you can enter the Proxy Realm information. The proxy realm information is case-sensitive. If you do not have a proxy realm, then you do not have to provide an entry for the Proxy Username, Proxy Password, and Proxy Realm fields.

Click **Test Connection** to ensure that your proxy settings are correctly entered, and the installer can download the updates.

- Use pre-downloaded software updates: Select this option to apply the software updates previously downloaded using the `-downloadUpdates` flag.
 - Skip software updates: Select this option if you do not want to apply any updates.
3. The Apply Software Updates screen is displayed if you select to download the software updates, or provide the pre-downloaded software updates location.
 - a. If you selected Use My Oracle Support credentials for download in the previous screen, select **Download and apply all updates**, and then click **Next** to apply the updates.

By default, the download location for software updates is placed in the home directory of the Oracle installation owner you are using to run this installation. If you choose to download the software updates in another location, then click **Browse** and select a different location on your server.
 - b. If you selected Use pre-downloaded software updates in the previous screen, select **Apply all updates**, and then click **Next** to apply the updates downloaded before starting the installation.
 4. In the Select Installation Option screen, select the **Configure Oracle Grid Infrastructure for a Standalone Server** option to install and configure Oracle Restart and Oracle ASM. Click **Next**.
 5. In the Select Product Languages screen, select one or more languages. Move the languages from the Available Languages list to the Selected Languages list. Click **Next**.
 6. The Create ASM Disk Group screen lists all the Oracle ASM disks.

Click **Change Discovery Path** to select any devices to be used by Oracle ASM but are not listed in the screen. In the Change Disk Discovery Path window, enter a string to use to search for devices that Oracle ASM will use. If the disk string is set to `ORCL: *` or is left empty (""), then the installer discovers these disks. Click **OK**.

After you finish selecting the disks to be used by Oracle ASM, click **Next**.

Note: During installation, disk paths mounted on Oracle ASM and registered on ASMLIB with the string `ORCL: *` are listed as default database storage candidate disks.

Consider the following information about disk devices while performing this step:

- The default Disk Group Name is `DATA`. You can enter a new name for the disk group, or use the default name.
- The disk devices must be owned by the user performing the grid installation.

See Also: ["Example of a Rules File with User grid"](#) on page 2-58 for information about creating or modifying permissions

- Check with your system administrator to determine if the disks used by Oracle ASM are mirrored at the storage level. If so, select **External** for the redundancy. If the disks are not mirrored at the storage level, then select **Normal** for the redundancy.

Note: For normal redundancy, you require twice as much disk space to hold the same amount of data. For example, if your database is 100 GB, then you require approximately 200 GB of storage.

- Every Oracle ASM disk is divided into allocation units (AU). An allocation unit is the fundamental unit of allocation within a disk group. Starting with Oracle Database 11g Release 2 (11.2.0.3), you can select the **AU Size** value from 1, 2, 4, 8, 16, 32 or 64 MB, depending on the specific disk group compatibility level. The default value is set to 1 MB.
7. In the Specify ASM Password screen, enter the password required to connect to the Oracle ASM instance. The Oracle ASM instance is managed by a privileged role called `SYSASM`, which grants full access to Oracle ASM disk groups. Oracle recommends that you create a less privileged user, `ASMSNMP`, with `SYSDBA` privileges to monitor the Oracle ASM instance.

Enter passwords for the `SYS` and `ASMSNMP` user accounts. The passwords should be at least eight characters in length and include at least 1 alphabetic, 1 numeric, and 1 of the following three punctuation mark characters: hyphens (-), underscores (_), or number sign (#). No other special characters are allowed in the password field.

Optionally, you can use the same password for all accounts. However, Oracle recommends that you specify a different password for each account. You must remember the passwords that you specify.

8. In the Privileged Operating System Groups screen, select the name of the operating system group you created for the `OSDBA` group, the `OSASM` group, and the database operator group `OSOPER`. If you create only the `dba` group, then you can use that group for all three privileged groups. If you created a separate `asmadmin` group, then use that value for the `OSASM` group. Click **Next**.
9. In the Specify Installation Location screen, enter the following information, and click **Next**:
- **Oracle Base:** Enter the location for the Oracle base directory. Do not include spaces in the path.
 - **Software Location:** Accept the default value or enter the directory path in which you want to install the software. The directory path must not contain spaces..
- See Also:**
- ["Identifying Required Software Directories"](#) on page 2-50 for information about Oracle base directory and Oracle home directory
 - ["Naming Directories"](#) on page D-2 for directory naming conventions
10. If you have not installed Oracle software previously on this server, the Create Inventory screen appears.

Change the path for the Inventory Directory, if required. Select `oinstall` for the `oraInventory Group Name`, if required. Click **Next**.

11. The Perform Prerequisite Checks screen checks if the minimum system requirements are met to perform the Oracle Grid Infrastructure installation. If all the system requirements are met, then you are directed to the Summary screen. If an installation fails, you can review the error.

If you click **Check Again**, then you can run the prerequisite check again to see if the minimum requirements are met to carry on with the database installation.

Click **Fix & Check Again**, if you want the installer to fix the problem and check the system requirements again.

Note: The Fix & Check Again option generates a script that you must run as the `root` user. This generated script sets some system parameter values. Oracle recommends that you do not modify the contents of this script. See "[Installation Fixup Scripts](#)" on page 2-35 for more information.

To get a list of failed requirements, select **Show Failed** from the list. To get a list of all the prerequisites checks run by the OUI, select **Show All**. To get a list of the prerequisites checks that are successful, select **Show Succeeded**.

Note: Oracle recommends that you use caution when selecting the Ignore All option. If you select this option, then Oracle Universal Installer may not confirm that your system can install Oracle Database successfully.

12. Review the contents of the Summary screen, and click **Install**.

Starting with Oracle Database 11g Release 2 (11.2), you can click **Save Response File** to save all the installation steps into a response file. This file can be used for a silent installation.

13. The Install Product screen displays the progress of the Oracle Grid Infrastructure installation. During the installation process, the Execute Configuration Scripts window appears. Do *not* click **OK** until you run the scripts mentioned in this screen.

Run the `root.sh` and, if required, the `oraInstRoot.sh` configuration scripts as the `root` user.

14. The Finish screen displays the installation status. Click **Close** to end the installation, then click **Yes** to exit Oracle Universal Installer.

If you encounter any problems, see the configuration log for information. The path to the configuration log is displayed on the Configuration Assistants window.

15. Oracle ASMCA is installed as part of the Oracle Grid Infrastructure for a Standalone Server installation. To create additional disk groups, run the Oracle ASMCA utility. For example, you can create another disk group named `RECOVERY` to store the fast recovery area.

See Also:

- ["Manually Configuring Oracle Automatic Storage Management Disk Groups"](#) on page 3-24
- ["Creating a Fast Recovery Area Disk Group"](#) on page 5-4

Note: To verify that the Oracle High Availability Service is installed properly, run `./crsctl check has` command from `Grid_home/bin` directory.

Grid_home is the path to the Oracle Grid Infrastructure home for a standalone server. `ohasd` is a daemon installed with Oracle Grid Infrastructure that starts software services, such as Oracle ASM.

16. Install Oracle Database. See ["Installing the Oracle Database Software"](#) on page 4-9.

Note:

- If a new database is installed after a grid infrastructure installation, then the listener runs from the Oracle Grid Infrastructure home. Because Oracle ASM is installed as part of Oracle Grid Infrastructure, the default listener is created and runs from the Oracle Grid Infrastructure home. If you perform a database installation, then the database must use the same listener created during the Oracle Grid Infrastructure installation.
 - If you are using Oracle Restart, then the default listener and any additional listeners must run from the Oracle Grid Infrastructure home.
-

See ["Troubleshooting and Deconfiguring Oracle Restart"](#) on page G-4 to deconfigure Oracle Restart without removing installed binaries.

Installing Oracle Grid Infrastructure for an Existing Database

Follow the high-level instructions in this section to install Oracle Grid Infrastructure and configure it for an existing Oracle database. Oracle Restart can only manage existing release 11.2 resources and hence you can install Oracle Grid Infrastructure only for an existing release 11.2 database. However, Oracle database releases before 11.2 can coexist on the same server without being managed by Oracle Restart.

To install Oracle Grid Infrastructure for an existing database:

- On the same host computer as the database, use Oracle Universal Installer to install Oracle Grid Infrastructure, and select **Configure Oracle Grid Infrastructure for a Standalone Server** as the installation option.

The Oracle Grid Infrastructure components are installed in a separate Oracle home.

See ["Installing Oracle Grid Infrastructure with a New Database Installation"](#) on page 18 for detailed instructions.

- Go to the Grid home's `bin` directory.

Use the `srvctl add database` command with the `-c SINGLE` flag to add the database in an Oracle Restart configuration. Also use the `srvctl add` command to add the listener, the Oracle ASM instance, all Oracle ASM disk groups, and any database services to the Oracle Restart configuration.

See Also: "srvctl add" in *Oracle Database Administrator's Guide* for more information

Modifying Oracle Grid Infrastructure for a Standalone Server Binaries

After the Oracle Grid Infrastructure for a Standalone Server installation, you must first stop the Oracle Restart stack to modify the software installed in your Grid home. For example, to apply a one-off patch or modify any of the DLLs used by Oracle Restart or Oracle ASM, you must follow these steps to stop and restart the Oracle Restart stack.

However, if you run the OPatch utility with the `auto` option, `opatchauto`, then do not stop and restart the Oracle Restart stack manually as OPatch stops and starts the software stack for you. If you run OPatch with the `apply` option, `opatch apply`, then you must follow the steps in this section to stop and restart the Oracle Restart stack manually.

See Also: *Oracle OPatch User's Guide for Windows and UNIX* for information about using `opatchauto`

Caution: Before relinking executables, you must shut down all executables that run in the Oracle home directory that you are relinking. In addition, shut down applications linked with Oracle shared libraries.

Prepare the Oracle Grid Infrastructure for a Standalone Server home for modification using the following procedure:

1. Log in as the Oracle Grid Infrastructure software owner user and change the directory to the path `Grid_home/bin`, where `Grid_home` is the path to the Oracle Grid Infrastructure home:

```
$ cd Grid_home/bin
```

2. Shut down the Oracle Restart stack using the following command:

```
$ crsctl stop has -f
```

3. After the Oracle Restart stack is shut down, perform the updates to the software installed in the Oracle Grid Infrastructure home.

4. Use the following command to restart the Oracle Restart stack:

```
$ crsctl start has
```

Relink Oracle Grid Infrastructure for a Standalone Server using the following procedure:

1. Login as `root`

```
# cd Grid_home/crs/install
# perl roothas.pl -unlock
```

2. Log in as the Oracle Grid Infrastructure for a Standalone Server owner:

```
$ export ORACLE_HOME=Grid_home
$ Grid_home/bin/relink
```

3. Login as root again:

```
# cd Grid_home/rdbms/install/
# ./rootadd_rdbms.sh
# cd Grid_home/crs/install
# perl roothas.pl -patch
```

You must relink the Oracle Restart and Oracle ASM binaries every time you apply an operating system patch or after an operating system upgrade.

See Also: ["Deinstalling Previous Release Grid Home"](#) on page 7-4

Manually Configuring Oracle Automatic Storage Management Disk Groups

The Oracle Automatic Storage Management Configuration Assistant (Oracle ASMCA) utility creates a new Oracle Automatic Storage Management instance if there is no Oracle ASM instance currently configured on the computer.

After installing Oracle Grid Infrastructure, you can also use Oracle ASMCA to create and configure disk groups, Oracle Oracle ADVM and Oracle ACFS.

To create additional disk groups or manually configure Oracle ASM disks, you can run the Oracle ASMCA as follows:

```
$ cd Grid_home/bin
$ ./asmca
```

Grid_home is the path to the Oracle Grid Infrastructure home for a standalone server.

See Also: *Oracle Automatic Storage Management Administrator's Guide*

Testing the Oracle Automatic Storage Management Installation

To test the Oracle ASM installation, login using the `asmcmd` command-line utility, which lets you manage Oracle ASM 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 Oracle ASM instance to use.

For example, if the Oracle ASM SID is named `+ASM` and the Oracle home is located in the `grid` 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/11.2.0/grid
$ export ORACLE_HOME
```

- C shell:

```
% setenv ORACLE_SID +ASM
% setenv ORACLE_HOME /u01/app/oracle/product/11.2.0/grid
```

2. Use `ASMCMD` to list the disk groups for the Oracle ASM instance:

```
$ORACLE_HOME/bin/asmcmd lsdg
```

ASMCMD connects by default as the SYS user with SYSASM privileges.

If the Oracle ASM instance is not running, you can start the instance with the following:

```
$ORACLE_HOME/bin/asmcmd startup
```

See Also:

- *Oracle Database Utilities* or more information about ASMCMD
- *Oracle Automatic Storage Management Administrator's Guide*

Installing Oracle Database

The Oracle Database software is available on installation media, or you can download it from the Oracle Technology Network website, or the Oracle Software Delivery Cloud portal. 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.

- [Preinstallation Considerations](#)
- [Reviewing Component-Specific Installation Guidelines](#)
- [Accessing the Installation Software](#)
- [Database Security Options](#)
- [Installing the Oracle Database Software](#)
- [Installing Oracle Database Examples](#)

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

Preinstallation Considerations

Review the information in [Chapter 1, "Overview of Oracle Database Installation"](#) and complete the tasks listed in [Chapter 2, "Oracle Database Preinstallation Tasks"](#).

Performing Multiple Oracle Database Installations in Response File or Silent Mode

If you must perform multiple installations of Oracle Database, you may want to use silent mode or response file mode. In response file mode, at each node, you run Oracle Universal Installer from the command line using a response file. The response file is a text file that contains the settings you typically 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
Using Oracle Universal Installer from an earlier Oracle release to install components from this release is no longer allowed.

- Oracle Automatic Storage Management

In previous releases, Oracle Automatic Storage Management (Oracle ASM) was installed as part of the Oracle Database installation. With Oracle Database 11g Release 2 (11.2), Oracle ASM is part of an Oracle Grid Infrastructure installation, either for a cluster, or for a standalone server.

To upgrade an existing Oracle ASM installation, upgrade Oracle ASM by running an Oracle Grid Infrastructure upgrade. If you do not have Oracle ASM installed and you want to use Oracle ASM as your storage option, then you must complete an Oracle Grid Infrastructure installation before you start your Oracle Database installation.

See Also: [Chapter 3, "Oracle Grid Infrastructure for a Standalone Server"](#) for information about Oracle Grid Infrastructure for a standalone server

- Installations on a cluster

If Oracle Clusterware and Oracle RAC are installed on the system, Oracle Universal Installer displays the Specify Hardware Cluster Installation page. You must select the Local Installation option, unless you want to install Oracle RAC.

See Also: *Oracle Real Application Clusters Installation Guide for Linux and UNIX*

Selecting the Database Character Set

Oracle Database uses the database character set for:

- Data stored in SQL character datatypes (CHAR, VARCHAR2, CLOB, and LONG).
- Identifiers such as table names, column names, and PL/SQL variables.
- Stored SQL and PL/SQL source code, including text literals embedded in this code.

After a database is created, changing its character set is usually very expensive in terms of time and resources. Such operations may require converting all character data by exporting the whole database and importing it back. Therefore, it is important that you carefully select the database character set at installation time.

Oracle recommends Unicode AL32UTF8 as the database character set. Unicode is the universal character set that supports most of the currently spoken languages of the world. It also supports many historical scripts (alphabets). Unicode is the native encoding of many technologies, including Java, XML, XHTML, ECMAScript, and LDAP. Unicode is ideally suited for databases supporting the Internet and the global economy.

Because AL32UTF8 is a multibyte character set, database operations on character data may be slightly slower when compared to single-byte database character sets, such as WE8MSWIN1252. Storage space requirements for text in most languages that use characters outside of the ASCII repertoire are higher in AL32UTF8 compared to legacy character sets supporting the language. The increase in storage space concerns only character data and only data that is not in English. The universality and flexibility of Unicode usually outweighs these additional costs.

Consider legacy character sets when compatibility, storage requirements, or performance of text processing is critical and the database supports only a single group of languages. The database character set to be selected in this case is the character set of most clients connecting to this database.

The default character set suggested or used by Oracle Universal Installer and Database Configuration Assistant in this release is based on the language configuration of the operating system.

For most languages, the default character set is one of the Microsoft Windows character sets, for example WE8MSWIN1252, even though the database is not installed on Windows. This results from the assumption that most clients connecting to the database run under the Microsoft Windows operating system. Because the database should be able to store all characters coming from the clients and Microsoft Windows character sets have a richer character repertoire than the corresponding ISO 8859 character sets, the Microsoft Windows character sets are usually the better choice. For example, the EE8MSWIN1250 character set supports the Euro currency symbol and various smart quote characters, while the corresponding EE8ISO8859P2 character set does not support them. Oracle Database converts the data between the database character set and the client character sets, which are declared by the NLS_LANG settings.

The list of database character sets that is presented to you for selection by Oracle Universal Installer contains only the recommended character sets. Even though Oracle Database supports many more character sets, they are either deprecated or they are binary subsets of another recommended character set. For example, WE8DEC is a deprecated character set and US7ASCII and WE8ISO8859P1 are both binary subsets of WE8MSWIN1252.

If, for compatibility reasons, you must create a database in one of the character sets that was not recommended, select the Advanced database configuration option. Database Configuration Assistant in the interactive mode gives you the opportunity to select any of the database character sets supported on Linux.

Using an Oracle Automatic Storage Management Disk Group

This section is optional and describes how to identify disk groups and determine the free disk space that they contain. You can store either database or recovery files in an existing Oracle ASM disk group that you created during the Oracle Grid Infrastructure installation.

Note: The Oracle ASM instance that manages the existing disk group runs in the Oracle Grid Infrastructure home directory.

To determine if an existing Oracle ASM disk group exists or to determine if there is sufficient disk space in a disk group, use the following procedure:

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

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

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

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

In this example, `+ASM` is the system identifier (`SID`) of the Oracle ASM instance and `oracle_home_path` is the Oracle home directory where Oracle ASM is installed. By convention, the `SID` for an Oracle ASM instance should be `+ASM`.

2. Open a shell prompt and temporarily set the `ORACLE_SID` and `ORACLE_HOME` environment variables to specify the appropriate values for the Oracle ASM instance to use.

For example, if the Oracle ASM SID is named `+ASM` and is located in the `grid` 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/11.2.0/grid/
$ export ORACLE_HOME
```

- C shell:

```
% setenv ORACLE_SID +ASM
% setenv ORACLE_HOME /u01/app/oracle/product/11.2.0/grid
```

3. Using SQL*Plus, connect to the Oracle ASM instance as the `SYS` user with `SYSASM` privilege and start the instance if necessary:

```
# $ORACLE_HOME/bin/sqlplus /nolog
SQL> CONNECT SYS as SYSASM
Enter password: SYS_password
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.

See Also: ["Upgrading Existing Oracle Automatic Storage Management Instances"](#) on page 3-6

Accessing the Installation Software

The Oracle Database software is available on installation media, or you can download it from the Oracle Technology Network website, or the Oracle Software Delivery Cloud portal. To install the software from the hard disk, you must either download it and unpack it, or copy it from the installation media, if you have it.

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

- To copy the software to a hard disk, see ["Copying the Software to the Hard Disk"](#) on page 4-7

- To download the software from Oracle Technology Network, see "[Downloading Oracle Software](#)" on page 4-5

Downloading Oracle Software

You can download the trial version of the installation files from the Oracle Technology Network (OTN) or the Oracle Software Delivery Cloud portal and extract them on your hard disk. Ensure that you review and understand the terms of the license. Most downloads include the development license. This section contains the following topics:

- [Downloading the Installation Archive Files from OTN](#)
- [Downloading the Software from Oracle Software Delivery Cloud](#)
- [Extracting the Installation Files](#)

Downloading the Installation Archive Files from OTN

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/technetwork/indexes/downloads/index.html>
2. Go to the download page for the product 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 `OraDB11g`, 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. Also verify the checksums are the same as noted on Oracle Technology Network using a command similar to the following:

```
cksum filename.zip
```

8. Extract the files in each directory that you just created.
9. After you have extracted the required installation files, see "[Installing the Oracle Database Software](#)" on page 4-9.

Downloading the Software from Oracle Software Delivery Cloud

You can download the software from Oracle Software Delivery Cloud as Media Packs. A Media Pack is an electronic version of the software that is also available to Oracle customers on CD-ROM or DVD. To download the Media Pack:

1. Use any browser to access the Oracle Software Delivery Cloud portal:

<https://edelivery.oracle.com/>

2. Complete the Export Validation process by entering information (name, company, email address, and country) in the online form.
3. In the Media Pack Search page, specify the Product Pack and Platform to identify the Media Pack you want to download. If you do not know the name of the Product Pack, you can search for it using the License List.
4. Optionally, select the relevant product to download from the **Results** list.
5. In the search results page, click **Readme** to download and review the Readme file for download instructions and product information.
6. After you review the Readme, choose the appropriate Media Pack from the search results to download the individual zip files. Follow the Download Notes instructions in this page. After you download and extract the contents of the required zip files, proceed with the installation of the software.

Note: Print the page with the list of downloadable files. It contains a list of part numbers and their corresponding descriptions that you may refer during the installation process.

7. After you download the files, click **View Digest** to verify that the MD5 or SHA-1 checksum matches with what is listed in the media download page.

See Also:

- My Oracle Support note 549617.1 for information on how to verify the integrity of a software download at:
<https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&id=549617.1>
- *Frequently Asked Questions* section on the Oracle Software Delivery Cloud portal for more information about Media Packs

Extracting the Installation Files

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

1. If necessary, change to the directory that contains the downloaded installation archive files.
2. Oracle RDBMS software is available as two archive files. Ensure that you extract both the archive files to the same directory.

If the downloaded file has the `zip` extension, use the following command to extract the content:

```
unzip file_name.zip
```

If the downloaded file has the `cpio.gz` extension, use the following command:

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

This command creates files with names similar to the following:

```
filename.cpio
```

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

```
$ cpio -idcmv < filename.cpio
```

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

Some browsers uncompress files while downloading them, but they leave the `.gz` file extension.

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

When you have extracted all of the required installation files, see the ["Installing the Oracle Database Software"](#) on page 4-9.

Copying the Software to the Hard Disk

Before installing Oracle Database, Oracle recommends that you copy the software to the hard disk to enable the installation process to run faster. Before copying the installation media content to the hard disk, you must mount the disk. The following sections describe how to mount the disk and copy its content to the hard disk.

Mounting Disks

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

1. If necessary, log in as the `root` user and enter a command similar to one of the following to eject the currently mounted disk, then remove it from the drive:

- Asianux, Oracle Linux, and Red Hat Enterprise Linux:

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

- SUSE Linux Enterprise Server:

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

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

2. Insert the appropriate installation media into the disk drive.
3. To verify if the disk is mounted automatically, enter one of the following commands depending on the platform:

- Asianux, Oracle Linux, and Red Hat Enterprise Linux:

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

- SUSE Linux Enterprise Server:

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

4. Before running the following command, ensure that the `/mnt/dvd` directory exists on Red Hat Enterprise Linux. If not, create the `/mnt/dvd` as required, to mount the installation media.

If this command fails to display the contents of the installation media, enter a command similar to the following to mount it, depending on the platform:

- Asianux, Oracle Linux, and Red Hat Enterprise Linux:

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

- SUSE Linux Enterprise Server:

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

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

5. If Oracle Universal Installer displays the Disk Location dialog box, enter the disk mount point directory path, for example:

```
/mnt/dvd
```

To continue, go to one of the following sections:

- To copy software to a hard disk, see "[Copying the Oracle Database Software to a Hard Disk](#)" on page 4-8.
- To install the software from the installation media, see "[Installing the Oracle Database Software](#)" on page 4-9.

Copying the Oracle Database Software to a Hard Disk

Note: If the system does not have an installation media, you can copy the software from the disk 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 installation media to a hard disk:

1. Create a directory on the hard disk, outside of the Oracle base directory, to hold the Oracle software:

```
$ mkdir OraDb11g
```

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

```
$ cd OraDb11g
```

3. Mount the disk, if it is not mounted.

Some platforms automatically mount the disk when you insert it into the drive. If the disk does not mount automatically, see the "[Mounting Disks](#)" section on page 4-7 for platform-specific information.

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

```
$ cp -R /directory_path OraDb11g
```

In this example, `/directory_path` is the disk mount point directory.

5. If necessary, mount the next disk and repeat Step 4.

Database Security Options

During installation, you are prompted to select a database security configuration. The Secure Configuration option configures the database with database auditing options, and password policy and expiration settings.

For new database installations, the default configuration for Oracle Database 11g Release 2 (11.2) includes the Secure Configuration option. To disable these enhanced

security controls you can deselect the **Assert all new security settings** check box in the Specify Configuration Option screen that appears during the database installation. Oracle Database is then installed with default options for Oracle Database 10g Release 2. You can enable or disable auditing or password security settings, or revert to a previous security setting. After installation, you can enable or disable the security configuration by starting Database Configuration Assistant through the command-line interface.

To enable the security configuration:

```
dbca -silent -configureDatabase -sourceDB SID -disableSecurityConfiguration NONE  
-enableSecurityConfiguration true
```

To disable the security configuration:

```
dbca -silent -configureDatabase -sourceDB SID -disableSecurityConfiguration  
[ALL|PASSWORD_PROFILE] -enableSecurityConfiguration false
```

SID is the system identifier.

For database upgrades, the upgraded database retains your existing database security configuration to ensure compatibility with existing applications.

Starting with Oracle Database 11g Release 2 (11.2), the Security Enhanced Linux (SELinux) feature is supported for Oracle Linux 4, Red Hat Enterprise Linux 4, Oracle Linux 5, and Red Hat Enterprise Linux 5.

Note:

- Oracle recommends configuring your database with the Secure Configuration option either during installation or after installation using Database Configuration Assistant.
 - Database Vault is an enhanced security feature. If it is installed with the database, then you cannot change the secure configuration using the Database Configuration Assistant option.
-
-

Installing the Oracle Database Software

In most cases, you use the graphical user interface (GUI) provided by Oracle Universal Installer to install Oracle Database. The instructions in this section explain how to run the Oracle Universal Installer GUI to perform most database installations.

Note:

- If you plan to use Oracle Restart or Oracle ASM, then you must install Oracle Grid Infrastructure before you install and create the database. Otherwise, you must manually register the database with Oracle Restart. For information about installing Oracle Grid Infrastructure, see ["Installing and Configuring Oracle Grid Infrastructure for a Standalone Server"](#) on page 3-17.
 - You may have to shut down existing Oracle processes before you start the database installation. See ["Stopping Existing Oracle Processes"](#) on page 2-59.
 - To install Oracle Database by using the silent or response file installation method, without the GUI, see [Appendix A](#). This method is useful to perform multiple installations of Oracle Database. This appendix also describes other advanced installation topics.
-

Running Oracle Universal Installer

For any type of installation process, start Oracle Universal Installer and install the software, as follows:

1. Logon as the Oracle software owner user (typically, `oracle`) to the computer on which you want to install Oracle components.
2. If you are installing the software from installation media, mount the disk if it is not mounted.

If the disk does not mount automatically, see the ["Mounting Disks"](#) section on page 4-7 for platform-specific information.

Some platforms automatically mount the disk when you insert the installation media into the drive.

3. 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.

See Also: ["Configuring Oracle Software Owner Environment"](#) on page 2-61

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

```
$ /directory_path/runInstaller
```

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

```
$ ./runInstaller
```

If Oracle Universal Installer is not displayed, see ["X Window Display Errors"](#) on page G-2 and ["Remote Terminal Installation Error"](#) on page G-2 for information about troubleshooting.

4. Use the following guidelines to complete the installation:

- Do not install Oracle Database 11g Release 2 (11.2) software into an existing Oracle home.
- Follow the instructions displayed on the Oracle Universal Installer screens. If you need additional information, click **Help**.

See Also: ["Reviewing Accounts and Passwords"](#) on page 6-5 for information about password guidelines

- Do not modify the Java Runtime Environment (JRE) except by using a patch provided by Oracle Support Services. Oracle Universal Installer automatically installs the Oracle-supplied version of the JRE. This version is required to run Oracle Universal Installer and several Oracle assistants.
- If errors are displayed while installing the software, see [Appendix G](#) for information about troubleshooting.
- If you chose an installation type that runs Oracle Database Configuration Assistant in interactive mode, then you must provide detailed information about configuring the database and network.

If you need help when using the Oracle Database Configuration Assistant in interactive mode, click **Help** on any screen.

Note: If you chose a default installation, Oracle Database Configuration Assistant does not run interactively.

5. When the configuration assistant tasks are complete click **finish**, click **Exit**, then click **Yes** to exit from Oracle Universal Installer.
6. During the database installation, 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 **OK**:

```
# /script_path/script_name
```

For more information see screen "Install product" in the installation table that follows.

7. See [Chapter 5](#) for information about tasks that you must complete after you install Oracle Database.

The following table lists the various screens displayed during an Enterprise Edition installation for Oracle Database 11g Release 2 (11.2):

Screen	Action
Configure Security Updates	<p>Enter your email address, preferably your My Oracle Support email address or user name in the Email field.</p> <p>Select the I wish to receive security updates via My Oracle Support check box to receive security updates.</p> <p>Enter your My Oracle Support password in the My Oracle Support Password field.</p> <p>Click Next.</p>
Download Software Updates	<p>Starting with Oracle Database 11g Release 2 (11.2.0.2), you can use the Software Updates feature to dynamically download and apply the latest updates. Select one of the following options, and click Next:</p> <ul style="list-style-type: none"> <li data-bbox="716 632 1375 1081"> <p>■ Use My Oracle Support credentials for download: Select this option to download and apply the latest software updates.</p> <p>Click Proxy Settings to configure a proxy for Oracle Universal Installer to use to connect to the Internet. Provide the proxy server information for your site and a user account that has access to the local area network through which the server is connecting. Starting with Oracle Database 11g Release 2 (11.2.0.3) you can enter the Proxy Realm information. The proxy realm information is case-sensitive. If you do not have a proxy realm, then you do not have to provide an entry for the Proxy Username, Proxy Password, and Proxy Realm fields.</p> <p>Click Test Connection to ensure that your proxy settings are correctly entered, and the installer can download the updates.</p> <li data-bbox="716 1094 1375 1241"> <p>■ Use pre-downloaded software updates: Select this option to apply the software updates previously downloaded using the <code>-downloadUpdates</code> flag.</p> <p>Specify the path to the location where you have already downloaded the software updates.</p> <li data-bbox="716 1253 1375 1308"> <p>■ Skip software updates: Select this option if you do not want to apply any updates.</p> <p>See Also: "Software Updates Option" on page 1-6</p>
Apply Software Updates	<p>This screen is displayed if you select to download the software updates, or provide the pre-downloaded software updates location.</p> <ul style="list-style-type: none"> <li data-bbox="716 1461 1375 1734"> <p>■ If you selected Use My Oracle Support credentials for download in the previous screen, select Download and apply all updates, and then click Next to apply the updates.</p> <p>By default, the download location for software updates is placed in the home directory of the Oracle installation owner you are using to run this installation. If you choose to download the software updates in another location, then click Browse and select a different location on your server.</p> <li data-bbox="716 1747 1375 1850"> <p>■ If you selected Use pre-downloaded software updates in the previous screen, select Apply all updates, and then click Next to apply the updates downloaded before starting the installation.</p>

Screen	Action
Select Installation Option	<p>Select one of the following installation options, and click Next:</p> <ul style="list-style-type: none"> ■ Create and configure a database: This option creates a new database with sample schemas. ■ Install database software only: This option only installs the database binaries. To configure the database, you must run Oracle Database Configuration Assistant after the software installation. ■ Upgrade an existing database: This option installs the software binaries in a new Oracle home. After the installation, you can upgrade the existing database.
System Class	<p>Select the type of system for installing the database, and click Next.</p> <ul style="list-style-type: none"> ■ Desktop Class: Select this option if you are installing on a laptop or desktop class system. This option includes a starter database and enables a minimal configuration. This option is designed for those who want to get the database running quickly. See Also: "Setting the ORACLE_HOSTNAME Environment Variable" on page 2-39 ■ Server Class: Select this option if you are installing on a server class system, such as what you would use when deploying Oracle Database in a production data center. This option provides more advanced configuration options. Advanced configuration options available using this option include Oracle RAC, Oracle ASM, backup and recovery configuration, integration with Oracle Enterprise Manager Grid Control, and more fine-grained memory tuning, among many others.
Grid Installation Options	<p>Select the type of database installation you want to perform, and click Next.</p> <ul style="list-style-type: none"> ■ Single instance database installation: This option installs the database and the listener. ■ Oracle Real Application Clusters database installation: This option installs Oracle Real Application Clusters. ■ Oracle RAC One Node database installation: This option installs the Oracle RAC One Node database. Note: Oracle RAC One Node is only supported with Oracle Clusterware.
Select Install Type	<p>Select one of the following, and click Next:</p> <ul style="list-style-type: none"> ■ Typical Install: This installation method is selected by default. It lets you quickly install Oracle Database using minimal input. It installs the software and optionally creates a general-purpose database using the information that you specify on this screen. ■ Advanced Install: This installation method enables you to perform more complex installations, such as creating individual passwords for different accounts, creating specific types of starter databases (for example, for transaction processing or data warehouse systems), using different language groups, specifying email notifications, and so on.

Screen	Action
Select Product Languages	<p>This option enables you to select the language in which you want to run the product.</p> <p>Select the product language from the Available Languages list, and move it to the Selected Languages list. Click Next.</p>
Select Database Edition	<p>Select Enterprise Edition, Standard Edition, or Standard Edition One. Click Next.</p> <p>If you click Select Options, then based on your selection you can enable or disable components from the components list. This screen enables you to customize the database. The components available in this screen are:</p> <ul style="list-style-type: none"> ■ Oracle Partitioning ■ Oracle OLAP ■ Oracle Label Security ■ Oracle Data Mining RDBMS Files ■ Oracle Database Vault option ■ Oracle Real Application Testing <p>Click OK to continue.</p> <p>Note: The Select Options button is enabled only if you select the Enterprise Edition installation type.</p>
Specify Installation Location	<p>The Oracle base path appears by default. You can change this path based on your requirement. Specify Oracle Base, Software Location, and click Next.</p> <p>The Oracle base directory is a top-level directory for Oracle software installations owned by an Oracle installation owner account. The default Oracle base path is <i>mountpoint/app/user</i>, where <i>user</i> is the user account running the installation. You can change the path based on your requirements.</p> <p>In the Software Location field, accept the default value or enter the Oracle home directory path in which you want to install Oracle software.</p> <p>The directory path must not contain spaces. Click Next.</p> <p>Note: This screen is available only with Advanced Installation.</p> <p>Ensure that the Oracle home path for the database home and the Oracle base path use only ASCII characters. At the time of this release, the use of non-ASCII characters for an Oracle database home or Oracle base is not supported.</p> <p>See Also: "Naming Directories" on page D-2 and "Identifying Required Software Directories" on page 2-50</p>

Screen	Action
Create Inventory	<p>You are prompted by the installer to specify the Inventory Directory path for the central inventory the first time you install any Oracle software on your computer.</p> <p>Select the oraInventory Group Name of the operating system group that will own the Oracle Inventory directory (the Oracle Inventory group).</p> <p>Click Next.</p> <p>Note: By default, the Oracle Inventory directory is not installed under the Oracle Base directory. This is because all Oracle software installations share a common Oracle Inventory, so there is only one Oracle Inventory for all users, whereas there is a separate Oracle Base directory for each user.</p>
Select Configuration Type	<p>Select one of the following, and click Next:</p> <ul style="list-style-type: none"><li data-bbox="797 674 1386 751">■ General Purpose / Transaction Processing: This is a starter database designed for general usage or transaction-heavy applications.<li data-bbox="797 768 1430 825">■ Data Warehousing: A starter database optimized to run Data Warehousing applications. <p>See the online help provided by either Oracle Universal Installer or Oracle Database Configuration Assistant for a description of these preconfigured database types.</p>

Screen	Action
Specify Database Identifiers	<p data-bbox="716 233 1252 260">Provide the following information, and click Next:</p> <p data-bbox="716 275 906 302">Database Naming</p> <p data-bbox="716 317 1300 365">Provide the Global Database Name using the following syntax:</p> <p data-bbox="716 380 1013 407"><i>db_unique_name.db_domain</i></p> <ul data-bbox="716 443 1328 751" style="list-style-type: none"><li data-bbox="716 443 1328 632">■ <i>db_unique_name</i> is the name of the database. It can contain a maximum of 30 characters if the first 8 characters are unique and begin with an alphabetic character. The characters can include alphanumeric, underscore (_), dollar sign (\$), and pound sign (#), no other special characters are permitted in a database name.<li data-bbox="716 646 1328 751">■ <i>db_domain</i> is the computer environment used for the database. It can contain no more than 128 characters (alphanumeric, underscore (_), and pound sign (#)), inclusive of all periods. <p data-bbox="716 766 1367 863">Note: Ensure that the combination of database name (first 8 unique characters of the unique name for the database), delimiter, and the database domain name does not exceed 128 characters.</p> <p data-bbox="716 884 854 911">For example:</p> <p data-bbox="716 926 964 953"><i>sales.us.example.com</i></p> <ul data-bbox="716 989 1078 1052" style="list-style-type: none"><li data-bbox="716 989 1029 1016">■ <i>db_unique_name</i> is <i>sales</i><li data-bbox="716 1031 1078 1058">■ <i>db_domain</i> is <i>us.example.com</i> <p data-bbox="716 1073 1367 1226">When you enter the Global Database Name, Oracle Universal Installer automatically populates the SID prefix with the database name. You can change this name in Advanced Installation. Oracle Universal Installer limits the SID to 12 alphanumeric characters and the SID cannot contain an underscore (_), dollar sign (\$), or pound sign (#).</p> <p data-bbox="716 1241 1289 1318">See "Setting the ORACLE_HOSTNAME Environment Variable" on page 2-39 and "Identifying Databases" on page 6-10</p>

Screen	Action
Specify Configuration Options	<p>Provide the following configuration information, and click Next:</p> <p>Memory:</p> <p>The Enable Automatic Memory Management option enables the database to automatically distribute memory between SGA and PGA. If you deselect this option, then the SGA and PGA must be sized manually.</p> <p>Character Sets:</p> <p>This option enables you to store the character data in the database in one of the following methods:</p> <ul style="list-style-type: none"> ■ Use the default: This option uses the operating system language settings. ■ Use Unicode: This option enables you to store multiple language groups ■ Choose from the following list of character sets: This option enables the Select Database Character Set drop down list. <p>See Also:</p> <ul style="list-style-type: none"> ■ "Selecting the Database Character Set" on page 4-2 ■ <i>Oracle Database Globalization Support Guide</i> for information about choosing a character set <p>Security:</p> <p>The Assert all new security settings option is selected by default. This setting includes enabling auditing and using new password profile.</p> <p>Note: Oracle recommends that you use the default settings.</p> <p>Sample Schemas:</p> <p>The Create database with sample schemas option is not selected by default. You can select this option, to create a starter database with sample schemas.</p>
Specify Management Options	<p>Select one of the following options, and click Next:</p> <ul style="list-style-type: none"> ■ Use an existing Oracle Enterprise Manager Grid Control for database management: This option is useful if you have Oracle Enterprise Manager installed. ■ Use Oracle Enterprise Manager Database Control for database management: This option enables you to manage Oracle Database locally. Optionally, select Enable Email Notifications and enter the outgoing SMTP server and e-mail address. <p>See Also: "E-mail Notification Options" on page 1-14</p> <p>Note: The Enable Email Notifications option is not available starting with Oracle Database 11g Release 2 (11.2.0.2).</p>

Screen	Action
Specify Database Storage Options	<p>Select one of the following options, and click Next.</p> <ul style="list-style-type: none"> ■ File System: Specify the database file location. ■ Oracle Automatic Storage Management: Specify a password for the ASMSNMP user. <p>Note: Installing Oracle data files on an Oracle ACFS file system is not supported. Oracle recommends that these data files are installed in Oracle ASM disk groups.</p> <p>See Also: "Using an Oracle Automatic Storage Management Disk Group" on page 4-3</p>
Specify Recovery Options	<p>Select one of the following options, and click Next.</p> <ul style="list-style-type: none"> ■ Do not enable automated backups ■ Enable automated backups: If you select this option, then the backup job uses a specified recovery area storage. <p>Select File System to use a file system directory for the fast recovery area, and then specify the fast recovery area path in the Recovery Area location field.</p> <p>Select Oracle Automatic Storage Management to use an Automatic Storage Management disk group for the fast recovery area.</p> <p>Specify your operating system user credentials to perform the backup job.</p> <p>See Also: "Preparing Disks for an Oracle Automatic Storage Management Installation" on page 3-7</p>
Select ASM Disk Group	<p>This screen is displayed only if you select Oracle Automatic Storage Management as your storage option in the Specify Storage Option screen.</p> <p>Disk groups are created during the Oracle Grid Infrastructure installation. Disk groups are configured with the <code>SYSASM</code> privilege using <code>asmcmd</code> or <code>SQL create diskgroup</code> commands. An ASM disk group consists of multiple disk partitions.</p> <p>The table in this screen displays existing disk groups created during the Oracle Grid Infrastructure installation. Select the disk group to use for database file storage.</p>
Specify Schema Passwords	<p>Enter and confirm passwords for the privileged database accounts, and click Next.</p> <p>Note: Optionally, you can use the same password for all accounts. However, Oracle recommends that you specify a different password for each account. You must remember the passwords that you specify.</p>
Privileged Operating System Groups	<p>The operating system groups are selected by default. You can also manually select the <code>OSDBA</code> and <code>OSOPER</code> groups.</p> <p>Click Next.</p> <p>See Also: "Creating Required Operating System Groups and Users" on page 2-39 for more information.</p>

Screen	Action
Perform Prerequisite Checks	<p>This option verifies that the minimum system requirements to perform the database installation are met.</p> <p>If you click Check Again, then you can run the prerequisite check again to see if the minimum requirements are met to carry on with the database installation.</p> <p>Click Fix & Check Again, if you want the installer to fix the problem and verify the system requirements again.</p> <p>Note: The Fix & Check Again option generates a script that you must run as the <code>root</code> user. This generated script sets some system parameters to Oracle-recommended values. Oracle recommends that you do not modify the contents of this script.</p> <p>See Also: "Installation Fixup Scripts" on page 2-35 for more information.</p> <p>To get a list of failed requirements, select ShowFailed from the list. To get a list of all the prerequisite checks run by the OUI, select Show All. To get a list of the prerequisite checks that are successful, select Show Succeeded.</p> <p>Note: Oracle recommends that you use caution when selecting the Ignore All option. If you select this option, then Oracle Universal Installer may not confirm that your system can install Oracle Database successfully.</p> <p>See Also: Chapter 2, "Oracle Database Preinstallation Tasks"</p>
Summary	<p>Review the information displayed on this screen, and click Install.</p> <p>Note: Starting with Oracle Database 11g Release 2 (11.2), you can save all the installation steps into a response file by clicking Save Response File. Later, this file can be used for a silent installation.</p>
Install Product	<p>This screen displays the progress of a database installation.</p> <p>This screen then displays the status information for the configuration assistants that configure the software and create a database.</p> <p>A message is displayed at the end of the Database Configuration Assistant process. Click OK.</p> <p>During the installation process, the Execute Configuration Scripts window appears. Run the <code>root.sh</code> and, if required, the <code>oraInstRoot.sh</code> configuration scripts as the <code>root</code> user to complete the installation. Click OK.</p> <p>Note: If this is the first time you are installing Oracle software on your system, then Oracle Universal Installer prompts you to run the <code>oraInstRoot.sh</code> script.</p> <p>See Also: <i>Oracle Database 2 Day DBA</i> for information about Oracle Database Configuration Assistant</p>
Finish	<p>This screen is shown automatically when all the configuration tools are successful.</p> <p>Review the Enterprise Manager Database Control URL information displayed in this screen and click Close.</p>

Caution: After installation is complete, do not manually remove or run cron jobs that remove `/tmp/.oracle` or `/var/tmp/.oracle` directories or their files while Oracle software is running. If you remove these files, then the Oracle software can intermittently stop responding. Oracle Restart installations fail with the following error:

CRS-0184: Cannot communicate with the CRS daemon.

Installing Oracle Database Examples

If you plan to use the following products or features, then download and install the products from the Oracle Database Examples media:

- Oracle JDBC Development Drivers
- Oracle Database Examples
- Oracle Text Knowledge Base
- Various Oracle product demonstrations

For information about installing software and various Oracle product demonstrations from the Oracle Database Examples media, see *Oracle Database Examples Installation Guide*

Oracle Database Postinstallation Tasks

This chapter describes tasks that you must perform after you have installed the database software. It includes information about the following topics:

- [Required Postinstallation Tasks](#)
- [Recommended Postinstallation Tasks](#)
- [Required Product-Specific Postinstallation Tasks](#)
- [Postinstallation Tasks for SQL Developer](#)

You must perform the tasks listed in "[Required Postinstallation Tasks](#)" on page 5-1. Oracle recommends that you perform the tasks listed in "[Recommended Postinstallation Tasks](#)" on page 5-2 after all installations.

If you install and intend to use any of the products listed in "[Required Product-Specific Postinstallation Tasks](#)" on page 5-6, then you must perform the tasks listed in the product-specific sections.

Note: This chapter describes basic configuration only. See *Oracle Database Administrator's Guide*, *Oracle Database Administrator's Reference for Linux and UNIX-Based Operating Systems* and product-specific administration and tuning guides for more detailed configuration and tuning information.

See Also: "Post-installation Database Configuration" section in *Oracle Configuration Manager Installation and Administration Guide*

Required Postinstallation Tasks

Perform the following task after completing the Oracle Database installation:

Downloading and Installing Patches

Check the My Oracle Support website for required patch updates for your installation.

To download required patches:

1. Use a web browser to view the My Oracle Support website:
<https://support.oracle.com/>
2. Log in to My Oracle Support.

Note: If you are not a My Oracle Support registered user, click **Register here** and follow the registration instructions.

3. On the main My Oracle Support page, click the **Patches and Updates** tab.
4. In the Patch Search group, select **Product or Family (Advanced)**.
5. In the Product field, select **Oracle Database**.
6. In the Release field select the release number. For example, Oracle 11.2.0.3.1.
7. Click **Search**.
8. Any available patch updates are displayed in the Patch Search page.
9. Select the patch number and click **ReadMe**. The README page is displayed and contains information about the patch set and how to apply the patches to your installation.
10. Return to the Patch Search page, click **Download**, and save the file on your system.
11. Use the unzip utility provided with Oracle Database 11g release 1 (11.1) to uncompress the Oracle patch updates that you downloaded from My Oracle Support. The unzip utility is located in the `$ORACLE_HOME/bin` directory.

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](#)
- [Creating and Configuring Additional Operating System Accounts](#)
- [Setting the NLS_LANG Environment Variable](#)
- [Generating the Client Static Library](#)
- [Guidelines for Setting Semaphore Parameters](#)
- [Creating a Fast Recovery Area Disk Group](#)
- [Enabling and Disabling Database Options](#)
- [Running RACcheck Configuration Audit Tool](#)

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.

See Also: *Oracle Database Upgrade Guide*

To run the `utlrp.sql` script, follow these steps:

1. Switch the 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, provide the `SID` for the database.

3. Start SQL*Plus, as follows:

```
$ sqlplus / AS SYSDBA
```

4. Start the database in restricted mode and run the `utlrp.sql` script:

```
SQL> @?/rdms/admin/utlrp.sql
```

Creating and Configuring Additional Operating System Accounts

If required, create additional operating system accounts. Users must be members of the `OSDBA` or `OSOPER` groups to connect to the database with administrator privileges.

Configuring the Accounts of Oracle Users

Update the startup files of the `oracle` user and the operating system accounts of Oracle users, specifying the appropriate environment variables in the environment file.

For the Bourne, Bash, or Korn shell, add the environment variables to the `.profile` file, or the `.bash_profile` file for the Bash shell on Red Hat Enterprise Linux.

For the C shell, add the environment variables to the `.login` file.

Note: You can use the `oraenv` or `coraenv` script to ensure that Oracle user accounts are updated.

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 declares the character set of the client, which is the character set of data entered or displayed by an Oracle client program, such as SQL*Plus.

See Also: [Appendix F, "Configuring Oracle Database Globalization Support"](#) for more information about the `NLS_LANG` environment variable

Generating the Client Static Library

The client static library (`libclntst11.a`) is not generated during installation. To link the applications to the client static library, you must first generate it as follows:

1. Switch the 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/11.2.0/dbhome_1
$ export ORACLE_HOME
```

- C shell:

```
% setenv ORACLE_HOME /u01/app/oracle/product/11.2.0/dbhome_1
```

3. Enter the following command:

```
$ $ORACLE_HOME/bin/genclntst
```

Guidelines for Setting Semaphore Parameters

Use the following guidelines only if the default semaphore parameter values are too low to accommodate all Oracle processes:

Note: Oracle recommends that you see the operating system documentation for more information about setting semaphore parameters.

1. Calculate the minimum total semaphore requirements using the following formula:

$\text{sum (process parameters of all database instances on the system) + overhead for background processes + system and other application requirements}$

2. Set `semms` (total semaphores systemwide) to this total.
3. Set `semmsl` (semaphores per set) to 250.
4. Set `semmsl` (total semaphores sets) to `semms/semmsl` rounded up to the nearest multiple of 1024.

Creating a Fast Recovery Area Disk Group

During installation, by default you can create one disk group. If you plan to add an Oracle Database for a standalone server, then you should create the fast recovery area for database files.

About the Fast Recovery Area and the Fast Recovery Area Disk Group

The fast recovery area is a unified storage location for all Oracle Database files related to recovery. Database administrators can define the `DB_RECOVERY_FILE_DEST` parameter to the path for the fast recovery area to enable on-disk backups and rapid recovery of data. Enabling rapid backups for recent data can reduce requests to system administrators to retrieve backup tapes for recovery operations.

When you enable fast recovery in the `init.ora` file, Oracle Database writes all RMAN backups, archive logs, control file automatic backups, and database copies to the fast recovery area. RMAN automatically manages files in the fast recovery area by deleting obsolete backups and archiving files no longer required for recovery.

Oracle recommends that you create a fast recovery area disk group. Oracle Clusterware files and Oracle Database files can be placed on the same disk group, and you can also place fast recovery files in the same disk group. However, Oracle recommends that you create a separate fast recovery disk group to reduce storage device contention.

The fast recovery area is enabled by setting the `DB_RECOVERY_FILE_DEST` parameter. The size of the fast recovery area is set with `DB_RECOVERY_FILE_DEST_SIZE`. As a general rule, the larger the fast recovery area, the more useful it becomes. For ease of use, Oracle recommends that you create a fast recovery area disk group on storage devices that can contain at least three days of recovery information. Ideally, the fast recovery area is large enough to hold a copy of all of your data files and control files, the online redo logs, and the archived redo log files needed to recover your database using the data file backups kept under your retention policy.

Multiple databases can use the same fast recovery area. For example, assume you have created a fast recovery area disk group on disks with 150 GB of storage, shared by 3 different databases. You can set the size of the fast recovery for each database depending on the importance of each database. For example, if `database1` is your least important database, `database2` is of greater importance and `database3` is of greatest importance, then you can set different `DB_RECOVERY_FILE_DEST_SIZE` settings for each database to meet your retention target for each database: 30 GB for `database1`, 50 GB for `database2`, and 70 GB for `database3`.

Creating the Fast Recovery Area Disk Group

To create a fast recovery file disk group:

1. Go to the Grid home bin directory, and start ASM Configuration Assistant (ASMCA), for example:

```
$ cd /u01/grid/bin
$ ./asmca
```

2. ASMCA opens at the Disk Groups tab. Click **Create** to create a new disk group.
3. The Create Disk Groups window opens.

In the **Disk Group Name** field, enter a descriptive name for the fast recovery area group. For example: `FRA`.

In the Redundancy section, select the level of redundancy you want to use.

In the **Select Member Disks** field, select eligible disks to be added to the fast recovery area, and click **OK**.

4. The Diskgroup Creation window opens to inform you when disk group creation is complete. Click **OK**.
5. Click **Exit**.

See Also:

- "Setting the Fast Recovery Area Location and Initial Size" section in *Oracle Database Backup and Recovery User's Guide*
- *Oracle Automatic Storage Management Administrator's Guide*

Enabling and Disabling Database Options

When you install Oracle Database, some options are enabled and others are disabled. To enable or disable a particular database feature for an Oracle home, shut down the database and use the `chopt` tool. See [Example 5-1](#).

The `chopt` tool is a command-line utility that is located in the `ORACLE_HOME/bin` directory. The syntax for `chopt` is:

```
chopt [ enable | disable] db_option
```

The possible values for `db_option` are described in the following table:

Value	Description
dm	Oracle Data Mining RDBMS Files
dv	Oracle Database Vault
lbac	Oracle Label Security
olap	Oracle OLAP
partitioning	Oracle Partitioning
rat	Oracle Real Application Testing
ode_net	Oracle Database Extensions for .NET 1.x
ode_net_2	Oracle Database Extensions for .NET 2.0

Example 5-1 Complete Example of Running the Chopt Tool

To enable the Oracle Label Security option in your Oracle binary files, use the following command:

```
cd %ORACLE_HOME%
srvctl stop database -d myDb
chopt enable lbac
srvctl start database -d myDb
```

Running RACcheck Configuration Audit Tool

Oracle recommends that you run the Oracle Real Application Clusters (Oracle RAC) Configuration Audit Tool (RACcheck) to check your Oracle Database installation. RACcheck is an Oracle RAC auditing tool that checks various important configuration settings within Oracle Real Application Clusters, Oracle Clusterware, Oracle Automatic Storage Management, Oracle Database single instance, Oracle Restart and the Oracle Grid Infrastructure environment.

Oracle recommends that you download and run the latest version of RACcheck from My Oracle Support. For information about downloading, configuring and running RACcheck utility, refer to My Oracle Support note 1268927.1:

<https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&id=1268927.1>

See Also: *Oracle Real Application Clusters Administration and Deployment Guide*

Required Product-Specific Postinstallation Tasks

The following sections describe product-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](#)
- [Configuring Oracle Database Vault](#)
- [Configuring Oracle Messaging Gateway](#)
- [Configuring Oracle Precompilers](#)
- [Configuring Secure Sockets Layer](#)
- [Installing Oracle Text Supplied Knowledge Bases](#)
- [Configuring or Reinstalling Oracle XML DB](#)
- [Configuring and Using Direct NFS Client](#)

Note: You need only perform postinstallation tasks for products that you intend to use.

Configuring Oracle Net Services

If you have an earlier 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 earlier release to the corresponding files for the new release.

The following sections describe about how to configure the Oracle Net Services:

- [Modifying the listener.ora File](#)
- [Modifying the tnsnames.ora File](#)

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.

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.

If you have referenced the previous Oracle home directory names in the static listener information, then these directory names must be modified before the `listener.ora` file can be used in the 11.2 environment.

To use the listener from the current release, copy the 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 Services names and connect descriptors from the earlier 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

Configuring Oracle Database Vault

If you install Oracle Database Vault, then you must register it in a database. Ensure that you create the Database Vault Owner and, optionally, Database Vault Account Manager administrative accounts before you can use it.

See Also: *Oracle Database Vault Administrator's Guide* for information about registering Oracle Database Vault

Configuring Oracle Messaging Gateway

Oracle Messaging Gateway, an Oracle Database Advanced Queuing feature, requires additional configuration after you install Oracle Database if you plan to use Oracle Database Advanced Queuing.

See Also: *Oracle Streams Advanced Queuing User's Guide* to configure Oracle Messaging Gateway and for additional instructions about configuring the `listener.ora`, `tnsnames.ora`, and `mgw.ora` files

Configuring Oracle Precompilers

This section describes postinstallation tasks for Oracle precompilers:

- [Configuring Pro*C/C++](#)
- [Configuring Pro*FORTRAN](#)

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.

The following table shows the default directories and the appropriate command to verify the path setting of the compiler.

Table 5–1 C/C++ Compiler Directory

Path	Command
/usr/bin	\$ which gcc
/opt/intel_cce_80/bin/icc	\$ which icc

Configuring Pro*FORTRAN

Verify that the PATH environment variable setting includes the directory that contains the FORTRAN compiler executable. You can verify the path setting by using the `which xlf` command. The path for the FORTRAN executable is `/usr/bin`.

Configuring Secure Sockets Layer

Oracle recommends that you configure and use a Secure Sockets Layer (SSL) to ensure that passwords and other sensitive data are not transmitted in clear text in HTTP requests.

See Also: *Oracle Database Advanced Security Administrator's Guide* for more information about configuring and using SSL

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, then you can install two supplied knowledge bases (English and French).

See Also:

- *Oracle Database Examples Installation Guide*
- *Oracle Text Reference* for information about creating and extending knowledge bases, such as extending the supplied knowledge bases to accommodate your requirements, or creating your own knowledge bases in languages other than English and French

Configuring or Reinstalling Oracle XML DB

See *Oracle XML DB Developer's Guide* for more information about the following tasks:

- Reinstalling Oracle XML DB
- Configuring or customizing the Oracle XML DB tablespace
- Configuring FTP, HTTP/WebDAV port numbers

See Also: Appendix A of *Oracle XML DB Developer's Guide*

Configuring and Using Direct NFS Client

Many Oracle products and options must be configured before you use them for the first time. Before using individual Oracle products or options, see the appropriate guide in the product documentation library.

See Also:

- Chapter 4, "Configuration Tasks When Installing from the Database" in *Oracle Application Express Installation Guide*
- [Appendix C, "Using NAS Devices"](#)

Direct NFS Client

With Oracle Database 11g, instead of using the operating system kernel NFS client, you can configure Oracle Database to access NFS V3 servers directly using an Oracle internal Direct NFS Client. If Oracle Database cannot open an NFS server using Direct NFS Client, then Oracle Database uses the platform operating system kernel NFS client. In this case, the kernel NFS mount options must be set up as defined in "[Checking NFS Buffer Size Parameters](#)" on page 5-12. Additionally, an informational message is logged in the Oracle alert and trace files indicating that Direct NFS Client could not be established.

The Oracle files available on the NFS server that are served by the Direct NFS Client are also accessible through the operating system kernel NFS client. The usual considerations for maintaining integrity of the Oracle files apply in this situation.

Some NFS file servers require NFS clients to connect using reserved ports. If your filer is running with reserved port checking, then you must disable it for Direct NFS Client to operate. To disable reserved port checking, see your NFS file server documentation.

For NFS servers that restrict port range, you can use the `insecure` option to enable clients other than root to connect to the NFS server. Alternatively, you can disable Direct NFS Client as described in "[Disabling Direct NFS Client](#)" on page 5-12.

Direct NFS Client may require up to four network paths defined for an NFS server. The Direct NFS Client performs load balancing across all specified paths. If a specified path fails, then Direct NFS Client reissues I/O commands over any remaining paths.

The following sections elaborate on enabling, disabling, checking the buffer size for a Direct NFS Client:

- [Enabling a Direct NFS Client](#)
- [Disabling Direct NFS Client](#)
- [Enabling HCC on Direct NFS Client](#)
- [Checking NFS Buffer Size Parameters](#)

Enabling a Direct NFS Client By default Direct NFS Client serves mount entries found in `/etc/mtab`. No other configuration is required. You can use `oranfstab` to specify additional Oracle Database specific options to Direct NFS Client. For example, you can use `oranfstab` to specify additional paths for a mount point.

A new Oracle Database specific file `oranfstab` can be added to either `/etc` or to `$ORACLE_HOME/dbs`. When `oranfstab` is placed in `$ORACLE_HOME/dbs`, its entries are specific to a single database. However, when `oranfstab` is placed in `/etc`, then it is global to all Oracle databases, and hence can contain mount points for all Oracle databases.

Note: Direct NFS Client does not work and falls back to the traditional kernel NFS path if the back-end NFS server does not support a write size (`wtmax`) of 32768 or larger.

Direct NFS Client determines mount point settings to NFS storage devices based on the configurations in `/etc/mtab`. Direct NFS Client looks for the mount point entries in the following order:

1. `$(ORACLE_HOME)/dbs/oranfstab`
2. `/etc/oranfstab`
3. `/etc/mtab`

It uses the first matched entry as the mount point.

Oracle Database requires that mount points be mounted by the kernel NFS system even when served through Direct NFS Client.

Complete the following procedure to enable Direct NFS Client:

1. You can optionally create an `oranfstab` file with the following attributes for each NFS server to be accessed using Direct NFS Client:
 - **Server:** The NFS server name.
 - **Path:** Up to four network paths to the NFS server, specified either by IP address, or by name, as displayed using the `ifconfig` command on the filer.
 - **Local:** Up to four local paths on the database host, specified by IP address or by name, as displayed using the `ifconfig` command run on the database host.
 - **Export:** The exported path from the NFS server.
 - **Mount:** The corresponding local mount point for the exported volume.
 - **Dontroute:** Specifies that outgoing messages should not be routed by the operating system, but sent using the IP address they are bound to. Please note that this attribute does not work on Linux with multiple paths in the same subnet.
 - **mnt_timeout:** Specifies (in seconds) the time for which Direct NFS Client should wait for a successful mount before timing out. This parameter is optional and the default timeout is 10 minutes.
 - **management:** Enables Direct NFS Client to use the management interface for SNMP queries. You can use this parameter if SNMP is running on separate management interfaces on the NFS server. The default value is the server parameter value.
 - **community:** Specifies the community string for use in SNMP queries. The default value is `public`.

The following is an example of an `oranfstab` file with two NFS server entries:

```
server: MyDataServer1
local: 145.34.45.12
path: 132.34.35.12
local: 132.34.45.13
path: 132.34.35.13
dontroute
export: /vol/oradata1 mount: /mnt/oradata1

server: MyDataServer2
local: LocalPath1
path: NfsPath1
local: LocalPath2
path: NfsPath2
local: LocalPath3
```

```
path: NfsPath3
local: LocalPath4
path: NfsPath4
dontroute
export: /vol/oradata2 mount: /mnt/oradata2
export: /vol/oradata3 mount: /mnt/oradata3
export: /vol/oradata4 mount: /mnt/oradata4
export: /vol/oradata5 mount: /mnt/oradata5
management: MgmtPath1
community: private
```

2. Oracle Database is not shipped with Direct NFS Client enabled by default. To enable Direct NFS Client, complete the following steps:

- a. Change the directory to `$ORACLE_HOME/rdbms/lib`.
- b. Enter the following command:

```
make -f ins_rdbms.mk dnfs_on
```

Disabling Direct NFS Client Complete the following steps to disable the Direct NFS Client:

1. Log in as the Oracle software installation owner, and disable Direct NFS Client using the following commands:

```
cd $ORACLE_HOME/rdbms/lib
make -f ins_rdbms.mk dnfs_off
```

2. Remove the `oranfstab` file.

Note: If you remove an NFS path that Oracle Database is using, then you must restart the database for the change to take effect.

Enabling HCC on Direct NFS Client To enable Hybrid Columnar Compression (HCC) on Direct NFS Client, perform the following steps:

1. Ensure that SNMP is enabled on the ZFS storage server. For example:

```
$ snmpget -v1 -c public server_name .1.3.6.1.4.1.42.2.225.1.4.2.0
SNMPv2-SMI::enterprises.42.2.225.1.4.2.0 = STRING: "Sun Storage 7410"
```

2. If SNMP is enabled on an interface other than the NFS server, then configure `oranfstab` using the `management` parameter.
3. If SNMP is configured using a community string other than `public`, then configure `oranfstab` file using the `community` parameter.
4. Ensure that `libnetsnmp.so` is installed by checking if `snmpget` is available.

Checking NFS Buffer Size Parameters If you are using NFS, then you must set the values for the NFS buffer size parameters `rsize` and `wsize` to at least 16384. Oracle recommends that you use the value 32768.

Direct NFS Client issues writes at `wtmax` granularity to the NFS server.

For example, to use `rsize` and `wsize` buffer settings with the value 32768, then update the `/etc/fstab` file on each node with an entry similar to the following:

```
nfs_server:/vol/DATA/oradata /home/oracle/netapp nfs\
rw,bg,hard,nointr,rsize=32768,wsize=32768,tcp,actimeo=0,vers=3,timeo=600
```

Note: If you use NFS servers that restrict port range, you may need to mount the file system using the `insecure` option:

```
(rw,no_root_squash, insecure)
```

Alternatively, see "[Disabling Direct NFS Client](#)".

Note: See your storage vendor documentation for additional information about mount options.

Postinstallation Tasks for SQL Developer

This section describes tasks that you must complete after you install the software:

- [Migrating User Settings from Release 1.0](#)
- [Migrating Information from Previous Releases](#)
- [Location of User-Related Information](#)

Migrating User Settings from Release 1.0

The first time you start SQL Developer after installing it or after adding any extensions, you are asked to migrate your user settings from a previous release. (This occurs regardless of whether there was a previous release on your system.)

Note: Migration of user settings is supported only from SQL Developer release 1.0 to release 1.1. It is *not* supported for migration from a prerelease version of 1.1 to release 1.1.

These settings refer to database connections, reports, and certain SQL Developer user preferences that you set in a previous version by clicking **Tools** and then **Preferences**. However, some user preferences are not saved, and you must provide them again using the new release.

To migrate your user settings from SQL Developer release 1.0:

1. Unzip the release 1.1 kit into an empty directory (folder). Do not delete or overwrite the directory into which you unzipped the release 1.0 kit.
2. When you start SQL Developer release 1.1, click **Yes** when prompted to migrate the settings from a previous release.
3. In the dialog box that is displayed, do *not* accept the default location for the settings. Instead, provide the location of your release 1.0 settings, which might be a folder whose path ends with `sqldeveloper/jdev/system`.

See Also: "[Migrating Information from Previous Releases](#)" on page 5-14 for more information

Migrating Information from Previous Releases

If you used a previous release of SQL Developer or a prerelease version of the current release, and you want to preserve the database connections that you were using, then save your existing database connections in an XML file. To save the connections, right-click the **Connections** node in the Connections Navigator and select **Export Connections**. After you complete the installation described in this guide, you can use those connections by right-clicking the **Connections** node in the Connections Navigator and selecting **Import Connections**.

To use any user-defined reports or the SQL history from a previous version, see "[Location of User-Related Information](#)" on page 5-14 for information about where these are located. To use any user-defined reports or the SQL history from release 1.0 with both releases 1.0 and 1.1, you must save them before using release 1.1, because release 1.1 modifies the files to a format that is incompatible with release 1.0.

SQL Developer preferences (specified by clicking **Tools** and then **Preferences**) from a prerelease version of the current release cannot currently be saved and reused; you must provide any desired preferences again.

Location of User-Related Information

SQL Developer stores user-related information in several places, with the specific location depending on the operating system and certain environment specifications. User-related information includes user-defined reports, user-defined code examples, SQL Worksheet history, and SQL Developer user preferences.

The user-related information is stored outside the SQL Developer installation directory hierarchy, so that it is preserved if you delete that directory and install a new version. This information is stored in or under the `SQLDEVELOPER_USER_DIR` location, if defined; otherwise as indicated in the following table.

[Table 5–2](#) shows the typical default locations (under a directory or in a file) for specific types of resources on different operating systems. Note the period in the name of any directory or folder named `.sqldeveloper`.

Table 5–2 Default Locations for User-Related Information

Resource Type	Linux
User-defined reports	<code>~/.sqldeveloper/UserReports.xml</code>
User-defined snippets	<code>~/.sqldeveloper/UserSnippets.xml</code>
SQL history	<code>~/.sqldeveloper/system/</code>
SQL Worksheet archive files	<code>~/.sqldeveloper/tmp/</code>
SQL Developer user preferences	<code>~/.sqldeveloper/system/</code>

SQL Worksheet archive files contain SQL statements that you have entered. These files begin with `sqldev` and then have a random number (for example, `sqldev14356.sql`). If you close SQL Developer with a SQL Worksheet open that contains statements, then you are prompted to save these files.

To specify a nondefault `SQLDEVELOPER_USER_DIR` location, do either of the following:

- Set the `SQLDEVELOPER_USER_DIR` environment variable to specify another directory path.

- Edit the *sqldeveloper_install\sqldeveloper\sqldeveloper\bin\sqldeveloper.conf* file and substitute the desired directory path for `SQLDEVELOPER_USER_DIR` in the following line:

```
SetUserHomeVariable SQLDEVELOPER_USER_DIR
```

To prevent other users from accessing your user-specific SQL Developer information, you must ensure that the appropriate permissions are set on the directory where that information is stored or on a directory preceding it in the path hierarchy. For example, you may want to ensure that the `~/.sqldeveloper` directory is not worldreadable.

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 Oracle Automatic Storage Management](#)
- [Accessing Oracle Database with SQL*Plus](#)
- [Accessing Oracle Database with SQL Developer](#)
- [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 using the following steps:

1. To start Oracle Universal Installer, run the following command:

```
$ ORACLE_HOME/oui/bin/runInstaller
```
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 **Close** to close the Inventory dialog box.
6. 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 (Database Control) during the installation, you can use it to manage the database. You can also use Oracle

Enterprise Manager Grid Control to manage the database. To display the Database Control:

1. First check the Database Control status using the following command:

```
emctl status dbconsole
```

2. Use a web browser to access the Database Control URL:

```
https://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:

```
https://mgmt42:1158/em
```

Oracle Enterprise Manager displays the Database Control login page.

3. Log in to the database using the user name `SYSTEM` and connect as `SYSDBA`. Oracle Enterprise Manager displays the Database Home page.

Use the password that you specified for the `SYSTEM` account during the installation.

Note: You can also log in to the Database Control using the `SYS`, `SYSTEM`, or `SYSMAN` accounts, or you can grant login privileges to other database users. If you log in as `SYS`, then you must connect as `SYSDBA`.

See Also: Chapter 3, "Getting Started with Database Administration" in *Oracle Database 2 Day DBA* for more information about Oracle Enterprise Manager Database Control

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 for more information

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 window.
6. In the **E-mail Address** field, provide one or more email addresses.
7. In the Administrator Privilege list, select either **View on all targets**, **Full on all targets**, or **Super Administrator**.
8. You can also select the **Grant SELECT_CATALOG_ROLE** option.
9. Enter the password for this user, and then click **Review**.
10. On the properties page, click **Finish**.

Oracle 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 Oracle Automatic Storage Management

This section provides information about managing an Oracle Automatic Storage Management (Oracle ASM) installation. It covers the following topics:

- [Starting and Stopping Oracle Automatic Storage Management](#)
- [Oracle Automatic Storage Management Utilities](#)

Starting and Stopping Oracle Automatic Storage Management

To start and stop Oracle ASM, see *Oracle Database Administrator's Reference for Linux and UNIX-Based Operating Systems*.

Oracle Automatic Storage Management Utilities

To manage Oracle ASM, you can use the following tools:

- **asmcmd**: This command-line tool enables you to manage Oracle ASM disk group files and directories.
- **ASMCA**: Oracle Automatic Storage Management Configuration Assistant (Oracle ASMCA) is an interactive utility that enables you to create an Oracle ASM instance or upgrade existing Oracle ASM instances.

It also enables you to create and configure disk groups, Oracle ASM volumes and Oracle Automatic Storage Management Cluster File System (Oracle ACFS).

- **Oracle Enterprise Manager Grid Control**: If you have Oracle Enterprise Manager installed, you can use Grid Control to manage Oracle ASM functions, such as migrating an existing database to Oracle ASM, checking the status of the Oracle ASM instance, checking the performance of the Oracle ASM disk groups, and creating or dropping Oracle ASM disk groups.
- **Oracle Enterprise Manager Database Control**: This utility enables you to perform functions similar to Grid Control.
- **SQL*Plus**: You can run commands that are specific to Oracle ASM from either of these tools. To connect to an Oracle ASM 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 6-1
- *Oracle Database Utilities* for more information about `asmcmd`
- *Oracle Automatic Storage Management Administrator's Guide* for more information about managing your storage with Oracle ASM

Accessing Oracle Database with SQL*Plus

To run the SQL and PL/SQL statements to access the Oracle Database, you can use SQL*Plus. This tool enables you to perform the same database management operations, and also to query, insert, update, or delete data directly in the database.

Note:

- Before you start SQL*Plus, ensure that all the environment variables, specially `ORACLE_HOME` and `ORACLE_SID`, are set. See, ["Configuring Oracle Software Owner Environment"](#) on page 2-61 for more information about setting environment variables.
 - In addition, it is advisable to set the `PATH` environment variable to include the `ORACLE_HOME/bin` directory.
-
-

Use the following statement to start SQL*Plus and log in as the `SYS` user, connecting as `SYSDBA`:

```
$ $ORACLE_HOME/bin/sqlplus
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

For example, to log on as `SYSTEM` enter:

```
$ $ORACLE_HOME/bin/sqlplus
SQL> CONNECT SYSTEM
Enter password: password
```

If you are logging on as `SYS`, you must connect as `SYSDBA`:

```
$ $ORACLE_HOME/bin/sqlplus
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

See Also:

- ["Connecting to the Database with SQL*Plus"](#) in *Oracle Database Administrator's Guide* for more information about accessing Oracle Database using SQL*Plus
- *SQL*Plus User's Guide and Reference*
- *SQL*Plus Quick Reference*

Accessing Oracle Database with SQL Developer

To run the SQL and PL/SQL statements to access Oracle Database, you can use SQL Developer. All SQL and PL/SQL statements are supported because they are passed directly from the SQL Worksheet to the Oracle Database.

Set Up the JDK Path for SQL Developer

Set the following environmental variables to ensure that the correct JDK is picked up:

- `$ORACLE_HOME`
- `$JAVA_HOME=$ORACLE_HOME/jdk`
- `$PATH=$JAVA_HOME/bin/:$PATH`

To start SQL Developer on which the Java SDK release 1.5 is installed, use the following commands:

- Change to `$ORACLE_HOME/sqldeveloper`.
- Run `$./sqldeveloper.sh`.
- Right-click **Connections**. In the dialog box, enter a connection name, username, password, and for the host string, the name of the database to which you want to connect, and click **Connect**.

After you are connected, you can view, create, modify, and delete the database objects using the Connection Navigator or issue any SQL or PL/SQL statement using a SQL Worksheet. From the **Tools** menu, select **SQL Worksheet**.

SQL*Plus statements have to be interpreted by the SQL Worksheet before being passed to the database. The SQL Worksheet currently supports many SQL*Plus statements. SQL*Plus statements which are not supported by the SQL Worksheet are ignored and are not sent to Oracle Database.

See Also:

"SQL*Plus Statements Supported and Not Supported in SQL Worksheet" in *Oracle SQL Developer User's Guide*

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 Database provides several other administrative accounts. Before using these accounts, you must unlock them and reset their passwords. [Table 6–1](#) describes these accounts and lists their user names and default passwords.

See Also: ["Unlocking and Resetting User Passwords"](#) on page 6-8

Note: Use the Oracle Enterprise Manager Database Control to view the complete list of database accounts.

Table 6–1 Database Accounts

User Name	Description	See Also
ANONYMOUS	Enables HTTP access to Oracle XML DB.	<i>Oracle XML DB Developer's Guide</i>
APEX_030200	The account owns the Application Express schema and metadata.	<i>Oracle Application Express Application Builder User's Guide</i>
APEX_PUBLIC_USER	The minimally privileged account used for Application Express configuration with Oracle HTTP Server and mod_plsql.	<i>Oracle Application Express Application Builder User's Guide</i>
APPQOSSYS	Used for storing and managing all data and metadata required by Oracle Quality of Service Management.	None
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	The Oracle Text account.	<i>Oracle Text Reference</i>
DBSNMP	The account used by the Management Agent component of Oracle Enterprise Manager to monitor and manage the database.	<i>Oracle Enterprise Manager Grid Control Installation and Basic Configuration</i>
DIP	The account used by the Directory Integration Platform (DIP) to synchronize the changes in Oracle Internet Directory with the applications in the database.	None
DVSYs	<p>There are two roles associated with this account. The Database Vault owner role manages the Database Vault roles and configurations. The Database Vault Account Manager is used to manage database user accounts.</p> <p>Note: Part of Oracle Database Vault user interface text is stored in database tables in the DVSYs schema. By default, only the English language is loaded into these tables. You can use Oracle Database Vault Configuration Assistant to add more languages to Oracle Database Vault. For the necessary steps, see Appendix C in <i>Oracle Database Vault Administrator's Guide</i></p>	<i>Oracle Database Vault Administrator's Guide</i>
EXFSYS	The account owns the Expression Filter schema.	None
FLows_FILES	The account owns the Application Express uploaded files.	<i>Oracle Application Express Application Builder User's Guide</i>
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>

Table 6–1 (Cont.) Database Accounts

User Name	Description	See Also
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	The Oracle Label Security administrator account.	<i>Oracle Label Security Administrator's Guide</i>
MDDATA	The schema used by Oracle Spatial for storing geocoder and router data.	<i>Oracle Spatial Developer's Guide</i>
MDSYS	The Oracle Spatial and Oracle Multimedia Locator administrator account.	<i>Oracle Spatial Developer's Guide</i>
MGMT_VIEW	An account used by Oracle Enterprise Manager Database Control.	None
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>
ORDPLUGINS	The Oracle Multimedia user. Plug-ins supplied by Oracle and third-party plug-ins are installed in this schema.	<i>Oracle Multimedia Reference</i>
ORDSYS	The Oracle Multimedia administrator account.	<i>Oracle Multimedia Reference</i>
ORDDATA	This account contains the Oracle Multimedia DICOM data model.	<i>Oracle Multimedia DICOM Developer's Guide</i>
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>
ORACLE_OCM	This account contains the instrumentation for configuration collection used by the Oracle Configuration Manager.	<i>Oracle Configuration Manager Installation and Administration Guide</i>
OWBSYS	The account used by Oracle Warehouse Builder as its default repository. You must unlock this account after installing the Oracle Database and before launching the Warehouse Builder Repository Assistant.	<i>Oracle Warehouse Builder Installation and Administration Guide</i>
OWBSYS_AUDIT	This account is used by the Warehouse Builder Control Center Agent to access the heterogeneous execution audit tables in the OWBSYS schema.	<i>Oracle Warehouse Builder Installation and Administration Guide</i>
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	An account used by Oracle sample programs and examples.	<i>Oracle Database Administrator's Guide</i>

Table 6–1 (Cont.) Database Accounts

User Name	Description	See Also
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	The account that stores the information views for the SQL/MM Still Image Standard.	<i>Oracle Multimedia Reference</i>
SPATIAL_CSW_ADMIN_USR	The Catalog Services for the Web (CSW) account. It is used by the Oracle Spatial CSW cache manager to load all record type metadata, and record instances from the database into the main memory for the record types that are cached.	<i>Oracle Spatial Developer's Guide</i>
SPATIAL_WFS_ADMIN_USR	The Web Feature Service (WFS) account. It is used by the Oracle Spatial WFS cache manager to load all feature-type metadata, and feature instances from the database into main memory for the feature types that are cached.	<i>Oracle Spatial Developer's Guide</i>
SYS	The account used to perform database administration tasks.	<i>Oracle Database Administrator's Guide</i>
SYSMAN	The account used to perform Oracle Enterprise Manager database administration tasks.	<i>Oracle Enterprise Manager Grid Control Installation and Basic Configuration</i>
SYSTEM	Another account used to perform database administration tasks.	<i>Oracle Database Administrator's Guide</i>
WMSYS	The account used to store the metadata information for Oracle Workspace Manager.	<i>Oracle Database Workspace Manager Developer's Guide</i>
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, 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.

See Also: *Oracle Database Security Guide* for more information about how to create a password that is secure

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: ["Logging In to Oracle Enterprise Manager Database Control"](#) on page 6-1

2. Click **Server**.
3. In the Security section of the Server page, click **Users**.

Oracle Enterprise Manager displays a table listing all database accounts. The Account Status column indicates if the account is locked and if the password has expired.

4. Select the user account 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

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`:

```
$ $ORACLE_HOME/bin/sqlplus
SQL> CONNECT SYS as SYSDBA
Enter password: SYS_password
```

2. Enter a command similar to the following, where `account` is the user account to unlock and `password` is the new password:

```
SQL> ALTER USER account IDENTIFIED BY password ACCOUNT UNLOCK;
```

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.

See Also:

- *Oracle Database Security Guide* to learn how to add new users and change passwords
- *Oracle Database SQL Language Reference* for the `ALTER USER` statement syntax used for unlocking user accounts
- *Oracle Database Administrator's Guide* for information about the users `SYS` and `SYSTEM`

Identifying Databases

The Oracle Database 11g 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 equals 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.

The database name input field is used to set the `DB_NAME`, `DB_UNIQUE_NAME`, and `DB_DOMAIN` Oracle initialization parameter values.

For example:

```
sales_world.example.com
```

In this example:

- `sales_world` is the name of the database. The database name (`DB_UNIQUE_NAME`) portion is a string of no more than 30 characters that can contain alphanumeric characters, underscore (`_`), dollar sign (`$`), and pound sign (`#`) but must begin with an alphabetic character. No other special characters are permitted in a database name.
- `sales_wo` is the `DB_NAME`. The `DB_NAME` initialization parameter specifies a database identifier of up to eight characters.
- `example.com` is the database domain in which the database is located. In this example, the database domain equals 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 characters, underscore (`_`), and pound sign (`#`). The `DB_DOMAIN` initialization parameter specifies the database domain name.

However, the `DB_NAME` parameter need not necessarily be the first eight characters of `DB_UNIQUE_NAME`.

The `DB_UNIQUE_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` equals the database name portion of the global database name.

See Also: "`DB_UNIQUE_NAME`" and "`DB_NAME`" in *Oracle Database Reference*

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 Oracle ASM 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/initsid.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: ["Logging In to Oracle Enterprise Manager Database Control"](#) on page 6-1 for more information

2. Click **Server**.
3. In the Database Configuration section of the Server page, click **Initialization Parameters**.

Oracle Enterprise Manager displays a table listing the current value of each initialization parameter.

4. Select the **SPFile** tab.

Oracle 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 on top of the page.

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 11g databases.

[Table 6–2](#) describes the tablespaces provided by the default preconfigured database.

Table 6–2 *Tablespaces and Data Files*

Tablespace	Data File	Description
EXAMPLE	EXAMPLE01.DBF	Stores the sample schemas, if you included them.
SYSAUX	SYSAUX01.DBF	Acts 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 to reduce the load on the <code>SYSTEM</code> tablespace.
SYSTEM	SYSTEM01.DBF	Stores the data dictionary, including definitions of tables, views, and stored procedures needed by Oracle Database. Information in this area is maintained automatically.

Table 6–2 (Cont.) Tablespaces and Data Files

Tablespace	Data File	Description
TEMP	TEMP01.DBF	Stores temporary tables and indexes created during the processing of your SQL statement. If you run a SQL statement that involves a lot of sorting, such as the constructs GROUP BY, ORDER BY, or DISTINCT, then you may have to expand this tablespace.
UNDOTBS	UNDOTBS01.DBF	Stores undo information. The undo tablespace contains one or more undo segments that maintain transaction history that is used to roll back, or undo, changes to the database. All starter databases are configured to run in automatic undo management mode.
USERS	USERS01.DBF	Stores database objects created by database users.

See Also: *Oracle Database Concepts* and the *Oracle Database Administrator's Guide* for more information

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: "[Logging In to Oracle Enterprise Manager Database Control](#)" on page 6-1 for more information

2. Click **Server**.
3. In the Storage section of the Server page, click **Datafiles**.

Oracle Enterprise Manager displays a table listing each data file, and the tablespace with which it is associated.

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 11g 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 User's Guide* for more information about redo log files

To use the Oracle Enterprise Manager Database Control to view or modify the redo log files for the preconfigured database:

1. Log in to the Database Control.

See Also: "[Logging In to Oracle Enterprise Manager Database Control](#)" on page 6-1 for more information

2. Click **Server**.
3. In the Storage section of the Server page, click **Redo Log Groups**.

Oracle 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**.

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 two control files. Oracle recommends that you keep at least two 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 11g 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 the preconfigured database:

1. Log in to the Database Control.

See Also: ["Logging In to Oracle Enterprise Manager Database Control"](#) on page 6-1 for more information

2. Click **Server**.
3. In the Storage section of the Server page, click **Control Files**.

Oracle Enterprise Manager displays a table listing the control files used by the database.

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,

See Also: *Oracle Database Administrator's Guide* for more information about setting the `CONTROL_FILES` initialization parameter value

Removing Oracle Database Software

This chapter describes how to completely remove Oracle software and configuration files related to the specified Oracle home. It includes information about removing Oracle software using the deinstallation tool.

The `deinstall` command removes standalone Oracle Database installations, Oracle Clusterware and Oracle Automatic Storage Management (Oracle ASM) from your server, and also Oracle Real Application Clusters (Oracle RAC) and Oracle Database client installations.

Starting with Oracle Database 11g Release 2 (11.2), Oracle recommends that you use the deinstallation tool to remove the entire Oracle home associated with the Oracle Database, Oracle Clusterware, Oracle ASM, Oracle RAC, or Oracle Database client installation. Oracle does not support the removal of individual products or components.

The following sections describe the `deinstall` command, and provide information about additional options to use the command:

- [About the Deinstallation Tool](#)
- [Downloading the Deinstallation Tool for Use with Failed Installations](#)
- [Example of Running the Deinstall Command](#)
- [Deinstallation Parameter File Example for Oracle Database](#)
- [Deinstallation Parameter File Example for Oracle Grid Infrastructure](#)

Caution: If you have a standalone database on a node in a cluster and you have multiple databases with the same global database name (GDN), then you cannot use the deinstall tool to remove one database only.

See Also:

- *Oracle Grid Infrastructure Installation Guide* and *Oracle Real Application Clusters Installation Guide for Linux and UNIX* for information about removing an Oracle RAC installation
- The "Dropping Disk Groups" section in the *Oracle Automatic Storage Management Administrator's Guide* for information about removing an Oracle ASM disk group

About the Deinstallation Tool

The deinstallation tool (`deinstall`) is available in the installation media before installation, and is available in Oracle home directories after installation. It is located in the `$ORACLE_HOME/deinstall` directory.

The `deinstall` command uses the information you provide, plus information gathered from the software home to create a parameter file. You can alternatively supply a parameter file generated previously by the `deinstall` command using the `-checkonly` option, or by editing the response file template.

The deinstallation tool stops Oracle software, and removes Oracle software and configuration files on the operating system for a specific Oracle home. If you run the deinstallation tool to remove an Oracle Grid Infrastructure for a standalone server, then the deinstaller prompts you to run the `roothas.pl` script, as the root user, to deconfigure Oracle Restart.

Caution: When you run the `deinstall` command, if the central inventory (`oraInventory`) contains no other registered homes besides the home that you are deconfiguring and removing, then the `deinstall` command removes the following files and directory contents in the Oracle base directory of the Oracle Database installation owner:

- `admin`
- `cfgtoollogs`
- `checkpoints`
- `diag`
- `oradata`
- `fast_recovery_area`

Oracle strongly recommends that you configure your installations using an Optimal Flexible Architecture (OFA) configuration, and that you reserve Oracle base and Oracle home paths for exclusive use of Oracle software. If you have any user data in these locations in the Oracle base that is owned by the user account that owns the Oracle software, then the `deinstall` command deletes this data.

The deinstallation tool deletes Oracle Database configuration files, user data, and fast recovery area (FRA) files even if they are located outside of the Oracle base directory path.

The `deinstall` command uses the following syntax, where variable content is indicated in italics:

```
deinstall -home complete path of Oracle home [-silent] [-checkonly] [-local]
[-paramfile complete path of input parameter property file] [-params name1=value
name2=value . . .] [-o complete path of directory for saving files]
[-tmpdir complete path of temporary directory to use]
[-logdir complete path of log directory to use] [-help]
```

Oracle recommends that you run the deinstallation tool as the Oracle software installation owner. The default method for running the deinstallation tool is from the `deinstall` directory in the Oracle home as the installation owner:

```
$ $ORACLE_HOME/deinstall/deinstall
```

Provide information about your servers as prompted or accept the defaults.

The `deinstall` command stops Oracle software, and removes Oracle software and configuration files on the operating system.

Note: You must run the deinstallation tool from the same release to remove Oracle software. Do not run the deinstallation tool from a later release to remove Oracle software from an earlier release. For example, do not run the deinstallation tool from the 12.1.0.1 installation media to remove Oracle software from an existing 11.2.0.4 Oracle home.

In addition, you can run the deinstallation tool from other locations, or with a parameter file, or select other options to run the tool.

The options are:

- `-home`

Use this flag to indicate the home path of the Oracle home to check or deinstall. To deinstall Oracle software using the `deinstall` command in the Oracle home you plan to deinstall, provide a parameter file in another location, and do not use the `-home` flag.

If you run `deinstall` from the `$ORACLE_HOME/deinstall` path, then the `-home` flag is not required because the tool knows from which home it is being run. If you use the standalone version of the tool, then `-home` is mandatory.

- `-silent`

Use this flag to run the command in silent or response file mode. If you use the `-silent` flag, then you must use the `-paramfile` flag, and provide a parameter file that contains the configuration values for the Oracle home to deinstall or deconfigure.

You can generate a parameter file to use or modify by running `deinstall` with the `-checkonly` flag. The `deinstall` command then discovers information from the Oracle home to deinstall and deconfigure. It generates the `properties` file, which you can then use with the `-silent` option.

You can also modify the template file `deinstall.rsp.tmpl`, located in the `$ORACLE_HOME/deinstall/response` folder.

- `-checkonly`

Use this flag to check the status of the Oracle software home configuration. Running the `deinstall` command with the `-checkonly` flag does not remove the Oracle configuration. The `-checkonly` flag generates a parameter file which you can then use with the `deinstall` command and the `-silent` option.

- `-local`

Use this flag on a multinode environment to deinstall Oracle software in a cluster.

When you run `deinstall` with this flag, it deconfigures and deinstalls the Oracle software on the local node (the node where `deinstall` is run). On remote nodes, it deconfigures Oracle software, but does not deinstall the Oracle software.

- `-paramfile` *complete path of input parameter property file*

Use this flag to run `deinstall` with a parameter file in a location other than the default. When you use this flag, provide the complete path where the parameter file is located.

The default location of the parameter file depends on the location of `deinstall`:

- From the installation media or stage location: `$ORACLE_HOME/inventory/response`
- From a unzipped archive file from OTN: `/ziplocation/response`
- After installation from the installed Oracle home: `$ORACLE_HOME/deinstall/response`

- `-params [name1=value name 2=value name3=value ...]`

Use this flag with a parameter file to override one or more values to change in a parameter file you have created.

- `-o complete path of directory for saving response files`

Use this flag to provide a path other than the default location where the properties file (`deinstall.rsp.tmpl`) is saved.

The default location of the parameter file depends on the location of `deinstall`:

- From the installation media or stage location before installation: `$ORACLE_HOME/`
- From a unzipped archive file from OTN: `/ziplocation/response/`
- After installation from the installed Oracle home: `$ORACLE_HOME/deinstall/response`

- `-tmpdir complete path of temporary directory`

Use this flag to specify a non-default location where Oracle Deinstallation Tool writes the temporary files for the deinstallation.

- `-logdir complete path of temporary directory`

Use this flag to specify a non-default location where Oracle Deinstallation Tool writes the log files for the deinstallation.

- `-help`

Use the help option (`-help`) to get additional information about the command option flags.

Deinstalling Previous Release Grid Home

For upgrades from previous releases, if you want to deinstall the previous release Grid home, then as the `root` user, you must manually change the permissions of the previous release Grid home, and then run the `deinstall` command.

For example:

```
# chown -R grid:oinstall /u01/app/grid/11.2.0
# chmod -R 775 /u01/app/grid/11.2.0
```

In this example, `/u01/app/grid/11.2.0` is the previous release Grid home.

Downloading the Deinstallation Tool for Use with Failed Installations

If you require the deinstallation tool (`deinstall`) to remove failed or incomplete installations, then it is available as a separate download from the Oracle Technology Network (OTN) website.

To download the deinstallation tool:

1. Go to the following URL:

<http://www.oracle.com/technetwork/database/enterprise-edition/downloads/index.html>

2. Under **Oracle Database 11g Release 2**, click **See All** for the respective platform for which you want to download the deinstallation tool.

The deinstallation tool is available for download at the end of this web page.

Example of Running the Deinstall Command

As the `deinstall` command runs, you are prompted to provide the home directory of the Oracle software to remove from your system. Provide additional information as prompted.

Use the optional flag `-paramfile` to provide a path to a parameter file.

In the following example, the `deinstall` command is in the path `/u01/app/oracle/product/11.2.0/dbhome_1/deinstall`, and it uses a parameter file in the software owner location `/home/usr/oracle`:

```
$ cd /u01/app/oracle/product/11.2.0/dbhome_1/deinstall
$ ./deinstall -paramfile /home/usr/oracle/my_db_paramfile.tmp1
```

For the Oracle Grid Infrastructure home, use the deinstallation script in the Oracle Grid Infrastructure for a standalone server home, which in this example is `/u01/app/oracle/product/11.2.0/grid`:

```
$ cd /u01/app/oracle/product/11.2.0/grid/deinstall
$ ./deinstall -paramfile /home/usr/oracle/my_grid_paramfile.tmp1
```

If you enter the `deinstall` command outside of the `$ORACLE_HOME/deinstall` folder, then help is displayed, unless you enter a `-home` flag and provide a path. If you run the `deinstall` command from the `$ORACLE_HOME/deinstall` folder, then deinstallation starts without prompting you for a home address.

Deinstallation Parameter File Example for Oracle Database

You can run the `deinstall` command on a standalone Oracle Database with the `-paramfile` option to use the values you specify in the parameter file. The following is an example of a parameter file, in which the Oracle Database binary owner is `oracle`, the Oracle Database home (Oracle home) is in the path `/u01/app/oracle/product/11.2.0/dbhome_1/`, the Oracle base (where other Oracle software is installed) is `/u01/app/oracle/`, the central Oracle Inventory home (`oraInventory`) is `/u01/app/oraInventory`, the virtual IP address (VIP) is `192.0.2.1`, the local node (the node where you run the deinstallation session from) is `myserver`, and the OSDBA group is `dba`:

```
#Copyright (c) 2005, 2006 Oracle Corporation. All rights reserved.
#Mon Feb 16 06:48:39 UTC 2009
DISK_GROUPS.sidb=
ASM_HOME=
```

```
ASM_LOCAL_SID=
LOGDIR=/u01/app/oracle/product/11.2.0/dbhome_1/oraInventory/logs/
ORACLE_BASE.sidb=/u01/app/oracle/
RECOVERY_LOC.sidb=
STORAGE_TYPE.sidb=FS
ORACLE_BASE=/u01/app/oracle/
INVENTORY_LOCATION=/u01/app/oraInventory
DB_TYPE.sidb=SI_DB
NODE_LIST.sidb=myserver
ARCHIVE_LOG_DESTINATION_LOC.sidb=
LOCAL_SID.sidb=sidb
DB_UNIQUE_NAME_LIST=sidb
ASM_FILES.sidb=
HOME_TYPE=SIDB
CRS_HOME=false
RAW_MAPPING_FILE.sidb=
SID_LIST.sidb=sidb
ORACLE_BINARY_OK=true
DATAFILE_LOC.sidb=/u01/app/oracle/oradata
local=false
LOCAL_NODE=myserver
CREATION_MODE.sidb=y
CONFIGFILE_LOC.sidb=
DIAG_DEST.sidb=/u01/app/oracle/
silent=false
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1/
SPFILE_LOC.sidb=
```

Deinstallation Parameter File Example for Oracle Grid Infrastructure

You can run the `deinstall` command on an Oracle Grid Infrastructure for a standalone server home with the `-paramfile` option to use the values you specify in the parameter file.

The following is an example of a parameter file, in which the Oracle Grid Infrastructure binary owner is `oracle`, the Oracle Grid Infrastructure home is in the path `/u01/app/oracle/product/11.2.0/grid`, the Oracle base (where other Oracle software is installed) is `/u01/app/oracle/`, the central Oracle Inventory home (`oraInventory`) is `/u01/app/oraInventory`, the local node (the node where you run the deinstallation session from) is `myserver`, and the OSDBA group is `dba`:

```
#Copyright (c) 2005, 2009 Oracle Corporation. All rights reserved.
#Thu Mar 05 11:36:03 PST 2009
LOCAL_NODE=myserver
HOME_TYPE=SIHA
ASM_REDUNDANCY=EXTERNAL
ORACLE_BASE=/u01/app/oracle/
SCAN_PORT=0
silent=false
ASM_UPGRADE=false
ORA_CRS_HOME=/u01/app/oracle/product/11.2.0/grid
GPNPCONFIGDIR=$ORACLE_HOME
LOGDIR=/home/oracle/tmp/deinstall/logs/
ASM_DISCOVERY_STRING=/u02/stor/asm*
GPNPGCONFIGDIR=$ORACLE_HOME
ORACLE_OWNER=oracle
ASM_DISKSTRING=
CRS_STORAGE_OPTION=0
ORACLE_BINARY_OK=true
```



```
OCR_VOTINGDISK_IN_ASM=false
ASM_ORACLE_BASE=/u01/app/oracle
NETCFGJAR_NAME=netcfg.jar
ORA_DBA_GROUP=dba
JREDIR=/u01/app/oracle/grid/jdk/jre/
ORA_ASM_GROUP=dba
LANGUAGE_ID='AMERICAN_AMERICA.WE8ISO8859P1'
CSS_LEASEDURATION=400
ASM_HOME=/u01/app/oracle/grid
SHAREJAR_NAME=share.jar
HELPJAR_NAME=help4.jar
SILENT=false
local=false
INVENTORY_LOCATION=/u01/app/oraInventory
GNS_CONF=false
JEWTJAR_NAME=jwt4.jar
EMBASEJAR_NAME=oemlt.jar
ASM_
DISKS=/u02/stor/asm/asm0,/u02/stor/asm/asm2,/u02/stor/asm/asm3,/u02/stor/asm/asm1,
/u02/stor/asm/asm4,/u02/stor/asm/asm5,/u02/stor/asm/asm6,
/u02/stor/asm/asm7,/u02/stor/asm/asm8
ORACLE_HOME=/u01/app/oracle/grid
CRS_HOME=true
ASM_IN_HOME=true
EWTJAR_NAME=ewt3.jar
ASM_DROP_DISKGROUPS=false
ASM_LOCAL_SID=+ASM
JLIBDIR=/u01/app/oracle/grid/jlib
VNDR_CLUSTER=false
ASM_DISK_GROUP=DATA
```

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:

- [How Response Files Work](#)
- [Preparing a Response File](#)
- [Running Oracle Universal Installer Using a Response File](#)
- [Running Net Configuration Assistant Using a Response File](#)
- [Running Database Configuration Assistant Using a Response File](#)
- [Postinstallation Configuration Using a Response File](#)

How Response Files Work

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. It includes information about the following topics:

- [Reasons for Using Silent Mode or Response File Mode](#)
- [Creating a Database Using Oracle Automatic Storage Management as the Storage Option for Database Files](#)
- [General Procedure for Using Response Files](#)

Typically, Oracle Universal Installer runs in interactive mode, which means that it prompts you to provide information in graphical user interface (GUI) screens. When you use response files to provide this information, you run Oracle Universal Installer at a command prompt using either of the following modes:

- Silent mode

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.

- Response file mode

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 response file mode. During a response file mode installation, Oracle Universal Installer displays all the screens, screens for which you specify information in the response file and also screens for which you did not specify the required information in the response file. The advantage is that you can validate the values in the screens for which you have provided the information in the response file and continue with the installation.

You define the settings for a silent or response file installation by entering values for the variables listed in the response file. For instance, to specify the Oracle home location, you would supply the appropriate value for the `ORACLE_HOME` variable, as follows:

```
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1
```

Another way of specifying the variable settings of the response file is to pass them as command line arguments when you run Oracle Universal Installer. For example:

```
-silent directory_path
```

In this command, *directory_path* is the path to the database directory on the installation media or on the hard drive.

See Also:

- *Oracle Universal Installer and OPatch User's Guide for Windows and UNIX* for more information about response file formats
- My Oracle Support website for more information about response files:

<https://support.oracle.com/>

Reasons for Using Silent Mode or Response File Mode

The following table describes several reasons why you might want to run Oracle Universal Installer in silent mode or response file mode.

Mode	Uses
Silent	<p>Use silent mode to:</p> <ul style="list-style-type: none"> ■ Complete an unattended installation, which you might schedule using operating system utilities such as <code>cron</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>
Response File	<p>Use response file mode to complete similar Oracle software installations on multiple systems, providing default answers to some, but not all of Oracle Universal Installer prompts.</p> <p>In response file mode, all the installer screens are displayed, but defaults for the fields in these screens are provided by the response file. You must provide information for the fields in screens where you have not provided values in the response file.</p>

Creating a Database Using Oracle Automatic Storage Management as the Storage Option for Database Files

Before you create a database that uses Oracle Automatic Storage Management (Oracle ASM), you must run the `root.sh` script. For this reason, you cannot create a database using Oracle ASM as the storage option for database files during a silent-mode installation. Instead, you can complete a software-only installation using silent mode, and then run Oracle Net Configuration Assistant and Database Configuration Assistant in silent mode after you complete the software-only installation and run the `root.sh` script.

Note: This limitation applies only to databases that use Oracle ASM as the storage option for database files. You can create a database that uses the file system option during a silent mode installation.

General Procedure for Using Response Files

The following are the general steps to install and configure Oracle products using Oracle Universal Installer in silent or response file mode:

Note: You must complete all required preinstallation tasks on a system before running Oracle Universal Installer in silent or response file mode.

1. Prepare a response file.
2. Run Oracle Universal Installer in silent or response file mode.
3. Run the root scripts as prompted by Oracle Universal Installer.
4. If you completed a software-only installation, then run Net Configuration Assistant and Database Configuration Assistant in silent or response file mode, if required.

These steps are described in the following sections.

Preparing a Response File

This section describes the following methods to prepare a response file for use during silent mode or response file mode installations:

- [Editing a Response File Template](#)
- [Saving 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 `database/response` directory on the installation media.

Note: If you copied the software to a hard disk, the response files are located in the `database/response` directory.

[Table A-1](#) lists the response files provided with Oracle Database.

Table A-1 Response Files

Response File	Description
db_install.rsp	Silent installation of Oracle Database 11g
grid_install.rsp	Silent installation of Oracle Grid Infrastructure
dbca.rsp	Silent installation of Database Configuration Assistant
netca.rsp	Silent installation of Oracle Net Configuration Assistant

To copy and modify 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 database directory on the installation media. If you copy the software to a hard drive, then edit the file in the response directory.

2. Open the response file in a text editor:

```
$ vi /local_dir/response_file.rsp
```

See Also: *Oracle Universal Installer and OPatch User's Guide for Windows and UNIX* for detailed information about creating response files

3. Follow the instructions in the file to edit it.

Note: The installer or configuration assistants fail if you do not correctly configure the response file. See the "[Silent-Mode Response File Error Handling](#)" section on page G-6 for more information about troubleshooting a failed response file mode installation.

4. Change the permissions on the file to 700:

```
$ chmod 700 /local_dir/response_file.rsp
```

Note: A fully specified response file for an Oracle Database installation contains the passwords for database administrative accounts and for a user who 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.

Saving a Response File

You can use Oracle Universal Installer in interactive mode to save a response file, which you can then edit and use to complete silent mode or response file mode installations.

Starting with Oracle Database 11g Release 2 (11.2), you can save all the installation steps into a response file during installation. You can click the **Save Response File** button on the Summary page to do this. Later, this file can be used for a silent installation.

When you save 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.

If you save a response file during a silent installation, then Oracle Universal Installer saves the variable values that were specified in the original source response file into the new response file.

Note: Oracle Universal Installer does not save passwords in the response file.

To save a response file:

1. Complete the preinstallation tasks listed in [Chapter 2](#).

When you run Oracle Universal Installer to save 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 save the response file while completing an installation.

2. Ensure that the Oracle software owner user has permissions to create or write to the Oracle home path that you specify when you run Oracle Universal Installer.
3. On each Oracle Universal Installer screen, provide the required information.

See Also: "[Running Oracle Universal Installer](#)" on page 4-10 for information about the installation process

4. When Oracle Universal Installer displays the Summary screen, perform the following:
 - a. Click **Save Response File** and provide a file name and location for the response file. Then, click **Save** to save the values to the file.
 - b. Click **Finish** to continue with the installation.

Click **Cancel** if you do not want to continue with the installation. The installation stops, but the saved response file is retained.
5. Before you use the saved response file on another system, edit the file and make any required changes.

Use the instructions in the file as a guide when editing it.

Running Oracle Universal Installer Using a Response File

Now, you are ready to run Oracle Universal Installer at the command line, specifying the response file you created, to perform the installation. The Oracle Universal Installer executable, `runInstaller`, provides several options. For help information about the full set of these options, run the `runInstaller` command with the `-help` option, for example:

```
$ directory_path/runInstaller -help
```

The help information appears in a window after some time.

To run Oracle Universal Installer using a response file:

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 response file 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 response file mode, enter a command similar to the following:

```
$ /directory_path/runInstaller [-silent] [-noconfig] \  
-responseFile responsefilename
```

Note: Do not specify a relative path to the response file. If you specify a relative path, then Oracle Universal Installer fails.

In this example:

- `directory_path` is the path of the database directory on the DVD or on the hard drive.
 - `-silent` runs Oracle Universal Installer in silent mode.
See "[Silent-Mode Response File Error Handling](#)" on page G-6
 - `-noconfig` suppresses running the configuration assistants during installation, and a software-only installation is performed instead.
 - `responsefilename` is the full path and file name of the installation response file that you configured.
5. When the installation completes, log in as the `root` user and run the `root.sh` script:

```
$ sudo sh  
password:  
# /oracle_home_path/root.sh
```

6. If this is the first time you are installing Oracle software on your system, then Oracle Universal Installer prompts you to run the `oraInstRoot.sh` script. Log in as the `root` user and run the `oraInstRoot.sh` script:

```
$ sudo sh  
password:  
# /oracle_home_path/oraInstRoot.sh
```

Note: You do not have to manually create the `oraInst.loc` file. Running the `oraInstRoot.sh` script is sufficient as it specifies the location of the Oracle Inventory directory.

Running Net Configuration Assistant Using a Response File

You can run Net Configuration Assistant 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 Net Configuration Assistant in silent mode, you must copy and edit a response file template. Oracle provides a response file template named `netca.rsp` in the `response` directory in the `database/response` directory on the DVD.

Note: If you copied the software to a hard disk, then the response file template is located in the `database/response` directory.

To run Net Configuration Assistant using a response file:

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 database directory on the DVD. If you cope 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. Follow the instructions in the file to edit it.

Note: Net Configuration Assistant fails if you do not correctly configure the response file.

4. Log in as the Oracle software owner user, and set the `ORACLE_HOME` environment variable to specify the correct Oracle home directory.
5. Enter a command similar to the following to run Net Configuration Assistant in silent mode:

```
$ $ORACLE_HOME/bin/netca -silent -responsefile /local_dir/netca.rsp
```

In this command:

- The `-silent` option runs Net Configuration Assistant 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 Using a Response File

You can run Database Configuration Assistant in response file or silent mode to configure and start an Oracle database on the system. To run Database Configuration Assistant in response file or silent mode, you must copy and edit a response file template. Oracle provides a response file template named `dbca.rsp` in the `database/response` directory on the DVD.

Note: If you copied the software to a hard disk, then the response file template is located in the `database/response` directory.

To run Database Configuration Assistant in response file mode, you must use the `-responseFile` flag in combination with either the `-silent` or `-progressOnly` flag. To run Database Configuration Assistant in response file mode, you must use a graphical display and set the `DISPLAY` environment variable.

See Also: "Oracle ASM Configuration Assistant Command-Line Interface" section in *Oracle Automatic Storage Management Administrator's Guide* for information about running Oracle ASMCA in noninteractive mode

This section contains the following topics:

- [Using Database Configuration Assistant in Progress Only Mode](#)
- [Using Database Configuration Assistant in Silent Mode](#)
- [Running Database Configuration Assistant in Response File Mode](#)

Using Database Configuration Assistant in Silent Mode

Use `-silent` flag in combination with the `-responseFile` flag to set the mode to silent. In the silent mode, Database Configuration Assistant uses values that you specify, in the response file or as command-line options, to create a database. No window or user interface is displayed in the silent mode.

Using Database Configuration Assistant in Progress Only Mode

Use the `-progressOnly` flag in combination with the `-responseFile` flag to set the mode to progress only. As it configures and starts the database, Database Configuration Assistant displays a window that contains status messages and a progress bar. This window is similar to the window that is displayed when you choose to create a preconfigured database during an Enterprise Edition or Standard Edition installation.

In this mode, Database Configuration Assistant uses values that you specify in the response file or as command line options to create the database.

Running Database Configuration Assistant in Response File Mode

To run Database Configuration Assistant in response file mode, that is, silent mode or progress only mode:

Note: Instead of editing the response file template, you can 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 database directory on the DVD. If you copy 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, and set the `ORACLE_HOME` environment variable to specify the correct Oracle home directory.
5. If you intend running Database Configuration Assistant in response file mode, set the `DISPLAY` environment variable.
6. Enter a command similar to the following to run Database Configuration Assistant in response file or silent mode with a response file:

```
$ORACLE_HOME/bin/dbca {-progressOnly | -silent} -responseFile \  
/local_dir/dbca.rsp
```

In this example:

- The `-silent` option runs Database Configuration Assistant in silent mode.
- The `-progressOnly` option runs Database Configuration Assistant in response file mode.
- `local_dir` is the full path of the directory where you copied the `dbca.rsp` response file template.

Postinstallation Configuration Using a Response File

Use the following sections to create and run a response file configuration after installing the Oracle software.

About the Postinstallation Configuration File

When you run a silent or response file installation, you provide information about your servers in a response file that you would otherwise provide manually during a graphical user interface installation. However, the response file does not contain passwords for user accounts that configuration assistants require after the software installation is complete. The configuration assistants are started with a script called `configToolAllCommands`. You can run this script in response file mode by using a password response file. The script uses the passwords to run the configuration tools in succession to complete the configuration.

If you keep the password file to use for clone installations, then Oracle recommends that you store it in a secure location. In addition, if you must stop an installation to fix an error, you can run the configuration assistants using `configToolAllCommands` and a password response file.

The `configToolAllCommands` password response file consists of the following syntax options:

- *internal_component_name* is the name of the component that the configuration assistant configures
- *variable_name* is the name of the configuration file variable

- *value* is the desired value to use for the configuration

The command syntax is as follows:

```
internal_component_name|variable_name=value
```

For example:

```
oracle.assistants.asm|S_ASMPASSWORD=welcome
```

Oracle recommends that you maintain security with a password response file:

- Set the permissions on the response file to 600.
- The response file owner must be the installation owner user, with the group set to the central inventory (oraInventory) group.

Running Postinstallation Configuration Using a Response File

To run configuration assistants with the `configToolAllCommands` script:

1. Create a response file using the syntax *filename.properties*. For example:

```
$ touch cfgrsp.properties
```

2. Open the file with a text editor, and cut and paste the password template, modifying it as needed.

Example A-1 Password response file for Oracle Grid Infrastructure for a standalone server

Oracle Grid Infrastructure requires passwords for Automatic Storage Management Configuration Assistant (Oracle ASMCA) and for Intelligent Platform Management Interface Configuration Assistant (IPMICA) if you have a BMC card and you want to enable this feature. Provide the following response file:

```
oracle.assistants.asm|S_ASMPASSWORD=password
oracle.assistants.asm|S_ASMMONITORPASSWORD=password
```

Example A-2 Password response file for Oracle Database

Oracle Database configuration requires the `SYS`, `SYSTEM`, `SYSMAN`, and `DBSNMP` passwords for use with Database Configuration Assistant (DBCA). The `S_ASMSNMPPASSWORD` password is necessary only if the database is using Oracle ASM for storage. Also, if you selected to configure Oracle Enterprise Manager, then you must provide the password for the Oracle software installation owner for the `S_HOSTUSERPASSWORD` password, similar to the following example:

```
oracle.assistants.server|S_SYSPASSWORD=password
oracle.assistants.server|S_SYSTEMPASSWORD=password
oracle.assistants.server|S_SYSMANPASSWORD=password
oracle.assistants.server|S_DBSNMPPASSWORD=password
oracle.assistants.server|S_HOSTUSERPASSWORD=password
oracle.assistants.server|S_ASMSNMPPASSWORD=password
```

If you do not want to enable Oracle Enterprise Manager or Oracle ASM, then leave those password fields blank

3. Change permissions to secure the file. For example:

```
$ ls -al cfgrsp.properties
-rw----- 1 oracle oinstall 0 Apr 30 17:30 cfgrsp.properties
```

4. Change the directory to `$ORACLE_HOME/cfgtoollogs`

Run the configuration script using the following syntax:

```
configToolAllCommands RESPONSE_FILE=/path/name.properties
```

for example:

```
$ ./configToolAllCommands RESPONSE_FILE=/home/oracle/cfgrsp.properties
```

Cloning an Oracle Home

Cloning an Oracle home involves creating a copy of the Oracle home and then configuring it for a new environment. If you are performing multiple Oracle Database installations, then you may want to use this method to create each Oracle home, because copying files from an existing Oracle Database installation takes less time than creating a new version of them. This method is also useful if the Oracle home that you are cloning has had patches applied to it. When you clone the Oracle home, the new Oracle home has the patch updates.

When you clone Oracle homes using release 11.2 Database Control, you must update the exclude file list. This file list specifies files that need not be included when the source Oracle home is archived because these files are not required for the cloning operation. Do not include the following files in the archive:

- sqlnet.ora
- tnsnames.ora
- listener.ora
- oratab

Note: In addition to cloning an Oracle home, you can clone individual Oracle Database installations by using Oracle Enterprise Manager Database Control. *Oracle Database Administrator's Guide* provides detailed information about cloning Oracle Database installations and Oracle homes.

This appendix includes information about the following topics:

- [Cloning an Oracle Home](#)
- [Configuring Oracle Configuration Manager in a Cloned Oracle Home](#)

Cloning an Oracle Home

Perform the following to clone an Oracle home:

1. Verify that the installation of Oracle Database to clone is successful.

You can do this by reviewing the `installActionsdate_time.log` file for the installation session, which is typically located in the `/orainventory_location/logs` directory.

If you install patches, then check their status using the following:

```
$ cd $ORACLE_HOME/OPatch
```

```
Include $ORACLE_HOME/OPatch in $PATH
```

```
$ opatch lsinventory
```

2. Stop all processes related to the Oracle home. See ["Stopping Existing Oracle Processes"](#) on page 2-59 for more information about stopping the processes for an Oracle home.

3. Create a ZIP file with the Oracle home (but not the Oracle base) directory.

For example, if the source Oracle installation is in the `/u01/app/oracle/product/11.2.0/dbhome_1`, then you zip the `dbhome_1` directory by using the following command:

```
# zip -r dbhome_1.zip /u01/app/oracle/product/11.2.0/dbhome_1
```

Do not include the `admin`, `fast_recovery_area`, and `oradata` directories that are under the Oracle base directory. These directories are created in the target installation later, when you create a new database there.

4. Copy the ZIP file to the root directory of the target computer.
5. Extract the ZIP file contents by using the following command:

```
# unzip -d / dbhome_1.zip
```
6. Repeat steps 4 and 5 for each computer where you want to clone the Oracle home, unless the Oracle home is on a shared storage device.
7. On the target computer, change the directory to the unzipped Oracle home directory, and remove all the `.ora` (`*.ora`) files present in the unzipped `$ORACLE_HOME/network/admin` directory.
8. From the `$ORACLE_HOME/clone/bin` directory, run the `clone.pl` file for the unzipped Oracle home. Use the following syntax:

```
$ORACLE_HOME/perl/bin/perl clone.pl ORACLE_BASE="target_oracle_base" ORACLE_
HOME="target_oracle_home"
OSDBA_GROUP=OSDBA_privileged_group OSOPER_GROUP=OSOPER_privileged_group
-defaultHomeName
```

For example:

```
$ORACLE_HOME/perl/bin/perl clone.pl ORACLE_BASE="/u01/app/oracle/" ORACLE_
HOME="/u01/app/oracle/product/11.2.0/dbhome_1"
OSDBA_GROUP=dba OSOPER_GROUP=oper -defaultHomeName
```

Oracle Universal Installer starts, and then records the cloning actions in the `cloneActionstimestamp.log` file. This log file is typically located in `/orainventory_location/logs` directory.

9. To configure the connection information for the new database, run Net Configuration Assistant:

```
$ cd $ORACLE_HOME/bin
$ ./netca
```

10. To create a new database for the newly cloned Oracle home, run Database Configuration Assistant:

```
$ cd $ORACLE_HOME/bin
$ ./dbca
```


See Also:

- *Oracle Universal Installer and OPatch User's Guide for Windows and UNIX* for detailed information about using Oracle Universal Installer to clone an Oracle Database home
- *Oracle Database Administrator's Guide* for information about cloning Oracle databases and cloning an Oracle Database home

Configuring Oracle Configuration Manager in a Cloned Oracle Home

Perform the following to configure Oracle Configuration Manager for a cloned Oracle home:

1. Run the following command from `$ORACLE_HOME/ccr/state`:

```
$ rm -rf *.ll*
```

2. Run the following command from `$ORACLE_HOME/ccr/inventory`:

```
$ cp core.jar pending
```

3. Run the following commands from `$ORACLE_HOME/ccr/bin`:

```
$ ./emSnapshotEnv
```

```
$ ./deployPackages
```

4. Run the following command from `$ORACLE_HOME/ccr/bin` and provide the proper credentials:

```
$ ./configCCR
```

If Oracle Configuration Manager was manually configured using `setupCCR`, then perform the following in the cloned Oracle home:

1. Delete all the subdirectories of the `$ORACLE_HOME/ccr/hosts` directory to remove previously configured hosts.
2. Run the following command from `$ORACLE_HOME/ccr/bin`:

```
$ ./configCCR -a
```

If you installed Oracle Configuration Manager in the original Oracle home but have not configured it, then run the following command in the cloned Oracle home:

```
$ setupCCR
```

Using NAS Devices

This appendix provides guidelines for using a network attached storage (NAS) device for Oracle software and database files. It includes information about the following:

- [General Configuration Guidelines for NAS Devices](#)
- [NFS Feature Description](#)
- [Choosing Mount Points](#)
- [Creating Files on a NAS Device for Use with Oracle Automatic Storage Management](#)
- [NFS Mount Options](#)

See Also:

- ["Configuring and Using Direct NFS Client"](#) on page 5-9
- *Oracle Grid Infrastructure Installation Guide* for information about using NAS devices on Oracle Real Application Clusters

General Configuration Guidelines for NAS Devices

See the documentation provided with the NAS device for specific information about how to configure it. In addition, use the following guidelines to ensure the performance of the Oracle software:

- Before using the NAS device for the installation, verify that it is certified.

Note: For certification information refer to note 359515.1 on the My Oracle Support website:

<https://support.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 database installations, Oracle recommends that you 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.

NFS Feature Description

The following are the features of Network File Storage (NFS):

- The Oracle kernel handles the best possible configuration to perform optimal I/O using available resources to enable better configuration management.
- An NFS available across different platforms.
- Oracle uses the Oracle Disk Manager (ODM) to control NFS. ODM NFS helps standardize all the configuration parameters that can be tuned.
- ODM NFS has a stable NFS client that does not affect kernel performance. It optimizes the I/O path when making NFS operations. This ensures higher stability.
- NFS provides better diagnostics in case of errors.

See Also: *Oracle Real Application Clusters Installation Guide for Linux and UNIX* for information on ODM

Choosing Mount Points

This section provides guidelines on how to choose the mount points for the file systems to use for the Oracle software and database files. The guidelines contained in the following sections follow the Optimal Flexible Architecture recommendations:

- [Choosing Mount Points for Oracle Software Files](#)
- [Choosing Mount Points for Oracle Database and Recovery Files](#)

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

The Oracle base directory is a top-level directory for Oracle software installations and is identified by the `ORACLE_BASE` environment variable. 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 (or)</code> <code>/u01/app/oraInventory</code>
Oracle home	<code>\$ORACLE_BASE/product/12.1.0/dbhome_1</code>

For subsequent installations, you can 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, then the Oracle Inventory directory continues to be `/u01/app/oraInventory`.

To enable you to effectively maintain the Oracle software on a particular system, Oracle recommends that you keep 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 multiple systems from writing to the same inventory directory.

See Also: ["Identifying Required Software Directories"](#) on page 2-50

Directory-Specific Guidelines

You can use any of the following directories as mount points for NFS 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 or one of its parents as a mount point, then the default location for all Oracle software and database files is on that file system. During the installation, 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, for example:

```
u01/app/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/fast_recovery_area`)

Oracle recommends that you use different file systems for database and recovery files.

If you use this mount point, then all Oracle installations that use this Oracle base directory use the NFS.

- The product directory (`oracle_base/product`)

By default, only software files are located on the NFS. 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/dbhome_1
/u01/app/oracle/product/11.2.0/dbhome_1
```

- The release directory (`oracle_base/product/11.2.0`)

By default, only software files are located on the NFS. You can also use this mount point to install different products from the same release, for example:

```
/u01/app/oracle/product/11.2.0/dbhome_1
/u01/app/oracle/product/11.2.0/client_1
```

- The Oracle home directory (`oracle_base/product/11.2.0/dbhome_1`)

By default, only software files are 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/11.2.0/dbhome_1`

See Also: ["Optimal Flexible Architecture File Mapping"](#) on page D-7

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 multiple databases:

- Use the NFS for files from multiple databases

To store the database files or recovery files from multiple databases on the same NFS, use paths or mount points similar to the following:

File Type	Path or Mount Point
Database files	<code>/u02/oradata</code>
Recovery files	<code>/u03/fast_recovery_area</code>

When Oracle Universal Installer prompts you for the data file and the recovery file directories, specify these paths. Database Configuration Assistant and Oracle 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/fast_recovery_area/db_name1
```

- Use the NFS for files from only one database

To store the database files or recovery files for only one database in the NFS, you can create mount points similar to the following, where `orcl` is the name of the database:

```
/u02/oradata/orcl
/u03/fast_recovery_area/orcl
```

Specify the directory `/u02/oradata` when Oracle Universal Installer prompts you for the data file directory and specify the directory `/u03/fast_recovery_area` when Oracle Universal Installer prompts you for the recovery file location. The `orcl` directory is used automatically either by Database Configuration Assistant or by Oracle Enterprise Manager.

Creating Files on a NAS Device for Use with Oracle Automatic Storage Management

If you have a certified NAS device, then you can create zero-padded files in an NFS mounted directory and use those files as disk devices in an Oracle Automatic Storage Management (Oracle ASM) disk group. To create these files, follow these steps:

Note: To use files as disk devices in an Oracle ASM 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.

See the NAS device documentation for more information about completing this step.

2. Switch the user to root:

```
$ sudo sh
password:
```

3. Create a mount point directory on the local system:

```
# mkdir -p /mnt/oracleasm
```

4. To ensure that NFS is mounted when the system restarts, add an entry for the file system in the `/etc/mtab` mount file.

For more information about editing the mount file for the operating system, see the man pages. For more information about recommended mount options, see "[NFS Mount Options](#)" section on page C-5.

5. Enter a command similar to the following to mount the NFS on the local system:

```
# mount /mnt/oracleasm
```

6. Choose a name for the disk group 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
oflag=direct
```

This example creates 1 GB files on the NFS. You must create one, two, or three files respectively to create an external, normal, or high redundancy disk group.

Note: Creating multiple zero-padded files on the same NAS device does not guard against NAS failure. Instead, create one file for each NAS device and mirror them using the Oracle ASM technology.

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 Oracle ASM 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 the NAS

vendor used when certifying the device. See the device documentation or contact the vendor for information about recommended mount-point options.

Optimal Flexible Architecture

This appendix describes the Optimal Flexible Architecture (OFA) standard. This standard is a set of configuration guidelines created to ensure well organized Oracle installations that are easier to maintain. It includes information about the following topics:

- [Overview of the Optimal Flexible Architecture Standard](#)
- [Implementing Optimal Flexible Architecture](#)

Overview of the Optimal Flexible Architecture Standard

The Optimal Flexible Architecture standard helps you to organize database software and configure databases to allow multiple databases, of different versions, owned by different users to coexist. Optimal Flexible Architecture assists in identification of `ORACLE_BASE` with its Automatic Diagnostic Repository (ADR) diagnostic data to properly collect incidents.

All Oracle components on the installation media are compliant with Optimal Flexible Architecture. Oracle Universal Installer places Oracle Database components in directory locations, assigning the default permissions that follow Optimal Flexible Architecture guidelines.

Oracle recommends that you use Optimal Flexible Architecture, especially if the database is huge, or if you plan to have multiple databases.

Advantages of Multiple Oracle Homes and OFA

When you install Oracle database, you are installing a large application that your computer can support. Using multiple Oracle homes and Optimal Flexible Architecture provides many advantages when administering large databases. The following advantages are important:

- Structured organization of directories and files, and consistent naming for database files simplify database administration.
- Distribution of I/O across multiple disks prevents performance bottlenecks caused by multiple read or write commands issued simultaneously to a single drive.
- Distribution of applications across multiple disks safeguards against database failures.
- Login home directories are not at risk when database administrators add, move, or delete Oracle home directories.
- Multiple databases, of different versions, owned by different users can coexist concurrently.

- Software upgrades can be tested in an Oracle home in a separate directory from the Oracle home where your production database is located.

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](#)
- [Exploiting the Optimal Flexible Architecture Structure for Oracle Files](#)
- [Optimal Flexible Architecture File Mapping](#)

File Systems

The following sections describe the conventions for mount points:

- [Number of File Systems](#)
- [Naming Conventions](#)

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 Directories

The following sections describe the naming conventions for directories that are compliant with the Optimal Flexible Architecture standard:

- [Oracle Base Directory Naming Convention](#)
- [Naming Mount Points for Very Large Databases \(VLDBs\)](#)
- [Referring to Path Names](#)
- [Oracle Home Directory Naming Convention](#)
- [Naming Subdirectories](#)

Note: Ensure that the paths you select for Oracle software, such as the Oracle home path and the Oracle base path, use only ASCII characters. Because installation owner names are used by default for some paths, this ASCII character restriction applies to user names, file names, and directory names.

Oracle Base Directory Naming Convention

The Oracle Base directory is the top level directory that you can use to install the various Oracle software products. You can use the same Oracle base directory for multiple installations. If different operating system users install Oracle software on the same system, then each user must create a separate Oracle base directory.

Name Oracle base directories using the syntax `/pm/s/u`. [Table D-1](#) describes the variables used in this syntax.

Table D-1 Syntax for Naming Oracle Base Directories

Variable	Description
<i>pm</i>	A mount point name
<i>s</i>	A standard directory name
<i>u</i>	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/appmgr` is an Oracle base directory created by the `appmgr` 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/*`.

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 `/h/q/d` for naming mount points. [Table D-2](#) describes the variables used in this syntax.

Table D-2 Syntax for Naming Mount Points for Very Large Databases

Variable	Description
<i>h</i>	Oracle base directory
<i>q</i>	A string denoting that Oracle data is stored in this directory, for example, <code>oradata</code>
<i>d</i>	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/app/oracle/oradata/test` and `/u02/app/oracle/oradata/test`.

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/s/u/product/v/type_[n]`.

[Table D-3](#) describes the variables used in this syntax.

Table D–3 Syntax for Naming Oracle Home Directories

Variable	Description
<i>pm</i>	A mount point name
<i>s</i>	A standard directory name
<i>u</i>	The name of the owner of the directory
<i>v</i>	The version of the software
<i>type</i>	The type of installation, for example Database (<i>dbhome_1</i>), Client (<i>client</i>), or Oracle Grid Infrastructure (<i>grid</i>)
<i>n</i>	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/11.2.0/dbhome_1` indicates the Oracle home directory for the first installation of Oracle Database on this system.

The `ORACLE_HOME` environment variable is set to 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 D–4](#) describes the database administration file subdirectories.

Table D–4 Subdirectories for Database Administration Files

Subdirectory	Description
<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>create</code>	Contains database creation log files and scripts used to create the database.
<code>dpdump</code>	Default directory for data pump operations. Contains the data pump file <code>dp.log</code> .
<code>exp</code>	Database export files
<code>logbook</code>	Files recording the status and history of the database
<code>pfile</code>	Instance parameter files
<code>scripts</code>	Ad hoc SQL scripts

For example, `/u01/app/oracle/admin/orcl/scripts/` is the `scripts` subdirectory associated with the database named `orcl`.

In Oracle Database 11g, Automatic Diagnostic Repository (ADR) directories replace the `bdump`, `cdump`, and `udump` directories. The ADR diagnostic data goes into the `/h/diag/rdbms/d/i/` directory by default.

where

h is Oracle Base

d is the database name

i is the instance name.

The ADR home has the trace, alert, and incident sub-directories. [Table D-5](#) describes the ADR directories.

Table D-5 Locations for Diagnostic Traces

Diagnostic Data	10g Location	11g Location
Foreground Process traces	user_dump_dest	ADR_HOME/trace/
Background Process traces	background_dump_dest	ADR_HOME/trace/
Alert Log Data	background_dump_dest	ADR_HOME/alert/
Core Dump	core_dump_dest	ADR_HOME/incident/In/
Incident Dumps	user_dump_dest or background_dump_dest depending on the process	ADR_HOME/incident/In/

Naming Database Files

The following table lists the recommended file naming conventions for database files:

Note: Oracle Managed Files (OMF) and files stored in Oracle Automatic Storage Management disk groups use different naming conventions. For more information about these naming conventions, refer to *Oracle Database Administrator's Guide*

File Type	File Naming Convention
Control files	/h/q/d/control.ct1
Redo log files	/h/q/d/redon.log
Data files	/h/q/d/tn.dbf

The following table describes this syntax:

Variable	Description
<i>h</i>	Oracle base directory
<i>q</i>	A string (typically oradata) distinguishing Oracle data from all other files
<i>d</i>	The value of the DB_NAME initialization parameter (typically, the same as the instance SID for single-instance databases)
<i>t</i>	An Oracle tablespace name
<i>n</i>	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 /h/q/d.

Using this convention, it is easy to determine the database to which the /u01/app/oracle/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 D-6](#) 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 D-6 *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.

See Also: "[Reviewing Tablespaces and Data Files, Redo Log Files, and Control Files](#)" on page 6-11 for information about redo log, and control files

Exploiting the Optimal Flexible Architecture Structure for Oracle Files

[Table D-7](#) describes the syntax used for identifying classes of files.

Table D-7 *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/11.2.0	Oracle software subtree for release 11g products
/app/oracle/product/11.2.0/db	Oracle home directories for Oracle Database 11g
/app/oracle/product/11.2.0/grid	Oracle home directory for Oracle Grid Infrastructure 11g for a standalone server, for user oracle
*/app/oracle/admin/orcl	orcl database administrative subtrees
/app/oracle/admin/orcl/arch/	orcl database archived log files
*/app/oracle/oradata	Oracle data directories

Table D–7 (Cont.) Directory Structure Syntax for Identifying Classes of Files

Directory Structure Syntax	Description
/app/oracle/oradata/orcl/	orcl database files
/app/oracle/oradata/orcl/.log	orcl database redo log files

Optimal Flexible Architecture File Mapping

Table D–8 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.

Note: Oracle recommends that you use Oracle ASM to provide greater redundancy and throughput.

Table D–8 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/fast_recovery_area/	Subtree for recovery files
/u01/app/oracle/fast_recovery_area/db_name1	Recovery files for db_name1 database
/u01/app/oracle/fast_recovery_area/db_name2	Recovery files for db_name2 database
/u02/app/oracle/oradata	
/u03/app/oracle/oradata	Oracle data directory
/u04/app/oracle/oradata	
/u01/app/oracle/product/	Distribution files
/u01/app/oracle/product/11.2.0/dbhome_1	Oracle home directory for Oracle Database, for user oracle
/u01/app/oracle/product/11.2.0/grid	Oracle home directory for Oracle Grid Infrastructure for a standalone server, for user oracle
/u01/app/kjff/	Oracle base directory for user kjff
/u01/app/edm/	Oracle base directory for user edm

Table D–9 shows a hierarchical file mapping for log files of a sample Optimal Flexible Architecture-compliant installation in the orcl database

Table D–9 Hierarchical File Mapping for Log Files in an Optimal Flexible Architecture Installation

Directory	Description
/u01/app/oracle/admin/TAR	Subtree for support log files
/u01/app/oracle/admin/orcl/arch/*	Archived log files
/u01/app/oracle/admin/orcl/create/	Contains the database creation log files
/u01/app/oracle/oradata/orcl/*.log	Redo log files
/u01/app/oracle/admin/orcl/dpdump/	Contains the data pump file dp.log
/u01/app/oracle/diag	Contains all database, listener, sqlnet and other diagnostic logs
/u01/app/oracle/audit	Contains all audit logs
/u01/app/oracle/cfgtoollogs	Contains logs for configuration assistants such as Oracle Database Configuration Assistant, Database Upgrade Assistant, and Oracle Net Configuration Assistant

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](#)

About Managing Ports

During installation, Oracle Universal Installer assigns port numbers to components from a set of default port numbers. 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 ensure that the same port number is not used by two services on your host. Enter the following command to identify the ports currently used on your computer:

```
$/bin/netstat -a
```

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` file?

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 find or 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 a single instance database installation. By default, the first port in the range is assigned to the component, if it is available.

Table E-1 Ports Used in Oracle Components

Component and Description	Default Port Number	Port Range	Protocol
Oracle Net Services Listener Enables Oracle client connections to the database over the Oracle Net Services protocol. You can configure it during installation. To reconfigure this port, use Net Configuration Assistant.	1521	Port number changes to the next available port. Modifiable manually to any available port.	TCP
Connection Manager Listening port for Oracle client connections to Oracle Connection Manager. It is not configured during installation, but can be configured manually by editing the <code>cman.ora</code> parameter file. You can find the file under <code>/network/admin</code> directory.	1630	1630	TCP
Oracle Enterprise Manager Database Control HTTP port for Enterprise Manager Database Control. It is configured during installation. "Changing the Oracle Enterprise Manager Database Control Ports" on page E-3 explains how to modify its port number.	1158	5500–5519	HTTP
Oracle Enterprise Manager Database Control RMI port for Enterprise Manager Database Control. It is configured during installation. "Changing the Oracle Enterprise Manager Database Control Ports" on page E-3 explains how to modify its port number.	5520	5520–5539	TCP
Oracle Enterprise Manager Database Control JMS port for Enterprise Manager Database Control. It is configured during installation. "Changing the Oracle Enterprise Manager Database Control Ports" on page E-3 explains how to modify its port number.	5540	5540–5559	TCP
Enterprise Manager Database Control Agent HTTP port for Enterprise Management Agent. It is configured during installation. "Changing the Oracle Enterprise Management Agent Port" on page E-3 explains how to modify its port number.	3938	1830–1849	HTTP

Table E-1 (Cont.) Ports Used in Oracle Components

Component and Description	Default Port Number	Port Range	Protocol
<p>Oracle XML DB</p> <p>The Oracle XML DB HTTP port is used if web-based applications must access an Oracle database from an HTTP listener. It is configured during installation, but you cannot view it afterward.</p> <p>See Also: "Using HTTP(S) on a Standard Port Instead of an Oracle XML DB Default Port" in <i>Oracle XML DB Developer's Guide</i></p>	0	Configured Manually	HTTP
<p>Oracle XML DB</p> <p>The Oracle XML DB FTP is used when applications must access an Oracle database from an FTP listener. It is configured during installation, but you cannot view it afterward.</p> <p>See Also: "Using FTP on the Standard Port Instead of the Oracle XML DB Default Port" in <i>Oracle XML DB Developer's Guide</i></p>	0	Configured Manually	FTP
<p>Cluster Synchronization Service (CSS)</p> <p>CSS daemon internode connection for the GM layer. The port number is assigned automatically. You cannot view or modify it. This port is used exclusively with the cluster interconnect, which is private network that is physically separated from the public network.</p>	42424	Dynamic	UDP
<p>Oracle Cluster Registry</p> <p>The port number is assigned automatically during installation. You cannot view or modify it afterward.</p>	Dynamic	Dynamic	UDP

See Also: *Oracle Real Application Clusters Installation Guide for Linux and UNIX* for a list of clusterware ports used in Oracle components

Changing the Oracle Enterprise Management Agent Port

To find the current setting for the Oracle Management Agent port, search for `EMD_URL` in the `$ORACLE_HOME/host_sid/sysman/config/emd.properties` file.

To change the Oracle 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
```

Configuring Oracle Database Globalization Support

This appendix describes the following Globalization Support topics:

- [Installing and Using Oracle Components in Different Languages](#)
- [Running Oracle Universal Installer in Different Languages](#)

See Also: *Oracle Database Globalization Support Guide* for an overview of globalization support for Oracle Database

Installing and Using Oracle Components in Different Languages

This section describes the following procedures:

- [Configuring Oracle Components to Run in Different Languages](#)
- [Installing Translation Resources](#)

Configuring Oracle Components to Run in Different Languages

You can specify the language and the territory, or locale, in which you want to use Oracle components. The locale setting of a component determines the language of the user interface of the component and the globalization behavior, such as date and number formatting. Depending on the Oracle component, the locale of the component is either inherited from the operating system session that started the component, or is defined by the `NLS_LANG` environment variable.

The operating system locale usually influences Oracle components that are based on Java technology. The `NLS_LANG` environment variable usually influences Oracle components that use Oracle Client libraries such as OCI.

Note: The user interface of an Oracle component is displayed in a selected language only if the appropriate translation is available and has been installed. Else, the user interface is displayed in English.

This section describes the following procedures:

- [Determining the Operating System Locale by Using the LANG Environment Variable](#)
- [Configuring Locale and Character Sets Using NLS_LANG](#)

Determining the Operating System Locale by Using the LANG Environment Variable

The locale setting of your operating system session determines the language of the user interface and the globalization behavior for components such as Oracle Universal Installer, Oracle Net Configuration Assistant, and Oracle Database Configuration Assistant. It also determines the globalization behavior of Oracle Database sessions created by a user application through Oracle JDBC driver, unless overridden by the application.

The operating system locale is determined by the value of the `LANG` environment variable. Depending on your desktop environment, such as KDE, GNOME, or telnet, you can select a default session locale on a login screen, in a configuration panel, or in a configuration file.

Note: Refer to the operating system documentation on how to select a locale for the operating system session in your desktop environment.

You can modify the `LANG` variable in the environment of your shell to start an Oracle component in a selected language. For example, to start Oracle Database Configuration Assistant in German, enter one of the following commands:

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

```
$ LANG=de_DE.iso88591 dbca
```

- C shell (csh):

```
% (setenv LANG de_DE.iso88591; dbca)
```

Note: The `LC_ALL` environment variable overrides the value of the `LANG` environment variable. For the commands listed in this section to work, either ensure that the `LC_ALL` environment variable is not set in the environment, or substitute `LC_ALL` for `LANG`.

To modify the operating system locale for all Oracle components started by the given shell, modify the `LANG` variable using one of the following commands:

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

```
$ LANG=de_DE.iso88591; export LANG  
$ ...
```

- C shell (csh):

```
% setenv LANG de_DE.iso88591  
$ ...
```

The value of the `LANG` environment variable must be a valid operating system locale. To see the list of valid locales, enter the following command:

```
$ locale -a
```

Note: Refer to the operating system documentation for a mapping between values of the `LANG` environment variable and the languages and territories that they represent.

Configuring Locale and Character Sets Using NLS_LANG

The `NLS_LANG` environment variable determines the language of the user interface and the globalization behavior for components such as SQL*Plus, exp, and imp. It sets the language and territory used by the client application and the database user session. It also declares the character set for entering and displaying data by the client application.

The `NLS_LANG` environment variable uses the following format:

```
NLS_LANG=language_territory.characterset
```

In this format:

- *language* specifies the language used for displaying Oracle messages, sorting, day names, and month names
- *territory* specifies the conventions for default date, monetary, and numeric formats
- *characterset* specifies the encoding used by the client application

In most cases, this is 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 value of `NLS_LANG` environment variable is `AMERICAN_AMERICA.AL32UTF8`.

See Also: *Oracle Database Globalization Support Guide* for information about the `NLS_LANG` parameter and Globalization Support initialization parameters

The following examples illustrate some valid values for the `NLS_LANG` environment variable.

Note: Refer to the operating system 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

Installing Translation Resources

To view the user interface of Oracle components in different languages, you must install the appropriate language translations along with the component.

Note: Part of Oracle Database Vault user interface text is stored in database tables in the DVSYS schema. By default, only the English language is loaded into these tables. You can use Oracle Database Vault Configuration Assistant to add more languages to Oracle Database Vault. For the necessary steps, refer to Appendix C in *Oracle Database Vault Administrator's Guide*.

To install the translation resources:

1. Start Oracle Universal Installer.
2. In the Configure Security Updates screen enter the relevant information and click **Next**.
3. In the Download Software Updates and Apply Software Updates screens, enter the relevant information and click **Next**.
4. In the Select Installation Option screen, select the installation option and click **Next**.
5. In the System Class screen, select the type of system class for installing the database, and click **Next**.
6. In the Grid Installation Options screen, select the type of database installation you want to perform, and click **Next**.
7. In the Select Product Languages screen, select the language in which you want to use Oracle components from the Available Languages field.

Note: The Available Languages field lists all languages supported by Oracle globalization libraries. The set of languages for which a translation is actually available is usually smaller and depends on a particular component. The scope of translation for a given component may differ between languages. For example, some translations may include all user interface text, while others may include only error messages and no help files.

8. Use the > arrow to move the selected language to the Selected Languages field, and then click **Next**.

Note: Oracle Universal Installer ignores languages in the Selected Languages field for which no translation is available.

Running Oracle Universal Installer in Different Languages

Your operating system locale determines the language in which Oracle Universal Installer runs. Oracle Universal Installer may run in one of the following languages:

- Brazilian Portuguese (pt_BR)
- French (fr)
- German (de)
- Italian (it)
- Japanese (ja)

- Korean (ko)
- Simplified Chinese (zh_CN)
- Spanish (es)
- Traditional Chinese (zh_TW)

To run Oracle Universal Installer in an available language, change the locale in which your operating system session is running before you start Oracle Universal Installer with the `./runInstaller` command. If the selected language is not one of those that were listed earlier, Oracle Universal Installer runs in English.

You must ensure that the selected value for the `LANG` environment variable starts with the appropriate language abbreviation. In the aforementioned list of languages, in which Oracle Universal Installer can run, the required abbreviation appears in parentheses beside the language name. For example, `fr_FR` and `fr_CA` are valid values to run the Oracle Universal Installer in French.

Troubleshooting

This appendix contains information about troubleshooting. It includes information about the following topics:

- [Verify Requirements](#)
- [X Window Display Errors](#)
- [Remote Terminal Installation Error](#)
- [What to Do If an Installation Error Occurs?](#)
- [Reviewing the Log of an Installation Session](#)
- [Troubleshooting and Deconfiguring Oracle Restart](#)
- [Troubleshooting Host Name Changes and CSS](#)
- [Troubleshooting Configuration Assistants](#)
- [Troubleshooting Inventory Issues](#)
- [Troubleshooting Screen Display Issues](#)
- [Silent-Mode Response File Error Handling](#)
- [Cleaning Up After a Failed Installation](#)

See Also: Chapter 6, "Troubleshooting Oracle Configuration Manager" in *Oracle Configuration Manager Installation and Administration Guide* for information about some errors that may occur while using Oracle Configuration Manager and tips to troubleshoot these errors

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 11g DVD. The latest version of the release notes is also available at:

<http://docs.oracle.com/>

X Window Display Errors

If you run 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 any 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, contact your X server vendor, system administrator, or 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.example.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 if an X Window application displays 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.

See Also: PC-X Server or operating system vendor documents for further assistance

Remote Terminal Installation Error

If you run the installation from a remote terminal, or if you use an `su` command to change users you might receive an error similar to the following:

```
Could not execute auto check for display colors using command  
/usr/X11R6/bin/xdpyinfo
```

This can occur if the `DISPLAY` variable is not set, or the user running the installation is not authorized to open an X window. For instance, if you use an `su` command to change from a user that is authorized to open an X window to a user account that is not authorized to open an X window on the display, such as a lower-privileged user opening windows on the `root` user's console display.

To troubleshoot this issue, run the command `echo $DISPLAY` to ensure that the display variable is set to the correct visual or to the correct host. If the display variable is set correctly then either ensure that you are logged in as the user authorized to open an X window, or run the command `xhost +` to allow any user to open an X window.

What to Do If an Installation Error Occurs?

If you encounter an error during installation:

- Do not exit Oracle Universal Installer.
- If you click **Next** after you enter incorrect information on one of the installation screens, click **Back** to return to the screen and correct the information.
- If you encounter errors while Oracle Universal Installer (OUI) is copying or linking files, then review the installation logs for more information.

For copy file errors review:

```
/u01/app/oraInventory/logs/timestamp for date of install.log
/u01/app/oraInventory/logs/timestamp for date of install.err
/u01/app/oraInventory/logs/timestamp for date of install.out
```

For errors during linking review:

```
$ORACLE_HOME/install/make.log
```

If you encounter errors when you run the OUI, then rerun the OUI with the `-debug` option:

```
$/runInstaller -debug
```

Check the log file for details. Refer to "[Reviewing the Log of an Installation Session](#)" section on page G-3.

- If you encounter an error while a configuration assistant is running, refer to "[Troubleshooting Configuration Assistants](#)" section on page G-5.
- 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 G-7.

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
```

Run these commands to list 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 the time when the installation started:

```
installActionsdate_time.log
oraInstalldate_time.err
oraInstalldate_time.out
```

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 and Deconfiguring Oracle Restart

Running the `roothas.pl` command flags `-deconfig -force` enables you to deconfigure Oracle Restart without removing installed binaries. This feature is useful if you encounter an error during an Oracle Grid Infrastructure for a standalone server installation, when running the `root.sh` command, such as a missing operating system package. By running `roothas.pl -deconfig -force` you can deconfigure Oracle Restart, correct the cause of the error, and then run `root.sh` again.

Note: Stop any databases, services, and listeners that may be installed and running before deconfiguring Oracle Restart.

To deconfigure Oracle Restart:

1. Log in as the root user.
2. Go to the `Grid_home/crs/install` directory. For example:

```
# cd /u01/app/11.2.0/grid/crs/install
```

3. Run `roothas.pl` with the `-deconfig -force` flags. For example:

```
# roothas.pl -deconfig -force
```

Troubleshooting Host Name Changes and CSS

If you change the host name for Oracle Automatic Storage Management (Oracle ASM), then the Oracle CSS daemon does not start. To solve this issue, perform the following steps:

1. Login as the root user

2. Run `roothas.pl` to deconfigure CSS:

```
# cd /u01/app/oracle/product/12.1.0/grid/crs/install
# perl roothas.pl -deconfig -force
```

This removes any configuration on the system that referenced the old host name.

3. Run `root.sh` to reconfigure CSS using the new host name:

```
# cd /u01/app/oracle/product/12.1.0/grid
# ./root.sh
```

4. Go to the grid home's bin directory.

Use the `srvctl add database` command with the `-c SINGLE` flag to add the database in an Oracle Restart configuration. Also use the `srvctl add` command to add the listener, the Oracle ASM instance, all Oracle ASM disk groups, and any database services to the Oracle Restart configuration.

See Also: "srvctl add" in *Oracle Database Administrator's Guide*

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 G-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 "[Irrecoverable Errors](#)" on page G-6 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 canceled	-1

Irrecoverable Errors

If you receive a irrecoverable 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 G-7.
2. Correct the cause of the irrecoverable error.
3. Reinstall the Oracle software.

Troubleshooting Inventory Issues

If you face any of the following situations for Oracle home, then run the `opatch lsinventory -detail` command to list the contents of the inventory and see section "Recovering from inventory corruption" in the *Oracle Universal Installer and OPatch User's Guide for Windows and UNIX* for information about fixing the issue.

- Oracle home is cloned without completing the inventory steps.
- There is bad inventory.
- Inventory is not available but it is created when the Oracle Enterprise Manager Agent is installed in a separate Oracle home.

Troubleshooting Screen Display Issues

If you connect to Oracle database with a screen resolution of 640X480 or 800X600, then the Next button in the GUI is not visible as it hides behind the Taskbar. To fix this problem, perform one of the following:

- Hide the Taskbar.
- Move the Oracle Universal Installer screen up.
- Set the screen resolution to 1024X768 or higher.

Silent-Mode Response File Error Handling

To determine if 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.

Cleaning Up After a Failed Installation

If an installation fails, you must remove files that Oracle Universal Installer created during the attempted installation using the Deinstallation Tool.

For more information about how to run the Deinstallation Tool see [Chapter 7, "Removing Oracle Database Software"](#) and ["Troubleshooting and Deconfiguring Oracle Restart"](#) on page G-4

Frequently Asked Questions About Installation

Use the following guidelines to decide how to install Oracle Database components:

- [Installing Oracle Database](#)
- [Installing Oracle Database Tools](#)
- [Installing Oracle Database with Oracle Applications](#)
- [Installing Oracle Database Heterogeneous Connectivity Tools \(Gateways\)](#)

Note: Some Oracle Database components may not be available on all platforms. Consult your platform-specific installation guide or release notes.

Installing Oracle Database

The following are frequently asked questions about installing 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. How do I install Oracle Database for these situations?](#)
- [How can I create an Oracle database that can handle transaction-heavy or data warehousing applications?](#)
- [What's the best way to install multiple Oracle databases?](#)
- [How do I configure client connections to an Oracle database?](#)
- [What is the best way to install Oracle Client if my client nodes have limited disk space?](#)
- [How do I upgrade Oracle Database?](#)
- [The computers at my site have been configured to run as a cluster. How should I install Oracle Database?](#)
- [How do I 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. How do I install Oracle Database for these situations?

- If you want a quick installation using the default installation settings, then refer to the platform-specific *Oracle Database Quick Installation Guide*.

- If your site has special requirements, then refer to this guide for more information.

How can I create an Oracle database that can handle 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 this guide for more details. 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, in the Select Database Edition screen, select **Enterprise Edition**. Click the **Select Options** button, and from the Choose Components screen, select **Oracle OLAP**.

See Also:

- *Oracle OLAP User's Guide*
- *Oracle OLAP DML Reference*
- *Oracle OLAP Java API Reference*

What's the best way to install multiple Oracle databases?

Use this guide to install Oracle Database using either of the following methods:

- **Installing with response files:** This method lets you run Oracle Universal Installer at a command line using a response file that contains settings specific to each computer.
- **Cloning a Database:** Install Oracle Database on one computer using interactive mode. You can also clone databases. Instructions for cloning databases are described in *Oracle Database Administrator's Guide*.

How do I configure client connections to an Oracle database?

1. Install Oracle Database on a server by using this guide for more information.
2. Use *Oracle Database Client Installation Guide* to install Oracle Client on each client node, and select the Instant Client installation type.

If you have many client nodes, consider staging the software centrally, mapping the drive, and running Oracle Universal Installer in the silent or response file mode.

If the client nodes only require a default installation into a new Oracle home directory, consider using this guide for more information.

What is the best way to install Oracle Client if my client nodes have limited disk space?

1. Install Oracle Database onto a server by using this guide for more details.
2. Use *Oracle Database Client Installation Guide* to install Oracle 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 silent or response file mode.

How do I upgrade Oracle Database?

Refer to *Oracle Database Upgrade Guide*.

See Also: *Oracle Database Administrator's Guide* to use software cloning to upgrade Oracle Database

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 Grid Infrastructure and use Oracle Automatic Storage Management (Oracle ASM) to manage this storage. Afterward, install Oracle Database (which can be either a single instance database or Real Application Clusters).
- If you plan to use Oracle Real Application Clusters, first install Oracle Grid Infrastructure, and then install Oracle Real Application Clusters.

Refer to platform-specific *Oracle Grid Infrastructure Installation Guide* and *Oracle Real Application Clusters Installation Guide for Linux and UNIX* for the platform to install Oracle Grid Infrastructure or Oracle Real Application Clusters. See this guide for information about how to install Oracle ASM and 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 to act as a single system. This is 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, if they are defined within the Oracle Clusterware environment using the High Availability API.

How do I migrate my non-Oracle databases to Oracle Database?

Use Oracle SQL Developer to migrate your non-Oracle databases and applications to Oracle. Oracle SQL Developer software and documentation is available at:

<http://www.oracle.com/technetwork/developer-tools/sql-developer/overview/index.html>

Installing Oracle Database Tools

The following are frequently asked questions about installing Oracle database tools:

- [How do I install Oracle WebLogic Server?](#)
- [How can I administer and monitor my Oracle Database products?](#)
- [How do I manage security for my Oracle Database products?](#)
- [How do I use Oracle Database to manage my XML data?](#)
- [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?](#)

- [Is Oracle Workflow included with Oracle Database 11g?](#)
- [Is there a migration plan for customers that have built solutions using Oracle Workflow?](#)

How do I install Oracle WebLogic Server?

Refer to *Oracle Fusion Middleware Installation Guide for Oracle WebLogic Server*.

For more information on Oracle WebLogic Server refer to the product documentation at:

<http://www.oracle.com/technetwork/middleware/weblogic/documentation/index.html>

How can I 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 this guide 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 requires an agent which is not installed by default.

Oracle Enterprise Manager Grid Control includes the Oracle Management Agent, Oracle Management Service, and Oracle Management Repository, and also 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

Documentation available at:

<http://docs.oracle.com/>

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 this guide to install Oracle Database.

If you plan to use Oracle Real Application Clusters, then install Oracle Database by using the platform-specific *Oracle Grid Infrastructure Installation Guide* and *Oracle Real Application Clusters Installation Guide for Linux and UNIX*.

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*. Refer to documentation available on the Enterprise Manager Grid Control installation media, or at:

<http://docs.oracle.com/>

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 WebLogic 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 with 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, see *Oracle Fusion Middleware Installation Guide for Oracle Identity and Access Management*, and the Oracle Identity Management documentation at:

<http://www.oracle.com/technetwork/middleware/id-mgmt/overview/index.html>

See Also:

- *Oracle Database Security Guide*
- *Oracle Database Enterprise User Security Administrator's Guide*
- *Oracle Label Security Administrator's Guide*
- Oracle Technology Network topics on database security:
<http://www.oracle.com/technetwork/topics/security/whatsnew/index.html>

How do I use Oracle Database to manage my XML data?

Use Oracle XML DB, which is installed as part of Oracle Database. Oracle XML DB enables you to efficiently store, generate, retrieve, query, and manage XML data on your site. Oracle XML DB provides all the advantages of a relational database, for example, allowing you to control the referential integrity of XML data with constraints and triggers. It works well with large amounts of XML data by storing it in a parsed, relational form, which improves access performance.

Oracle XML DB supports XML Type, which is a native data type for XML data, for which you can choose various storage options depending on your needs. In addition, Oracle XML DB supports XML Schema processing, structured and unstructured storage, a content repository that you can access by using common protocols (FTP, HTTP(S), and WebDAV), and SQL/XML, which is a standard for SQL with XML. For Oracle Database 11g Release 1 (11.1), Oracle XML DB introduced support for the XQuery language for querying, transforming, and constructing XML; the ability for users to define their own metadata for schema-based XML; a set of new SQL functions for DML operations on XML data; and more.

You can use Oracle XML DB with Oracle XML Developer's Kit (XDK) to build applications that run on either Oracle Database or Oracle WebLogic Server.

See Also:

- *Oracle XML DB Developer's Guide*
- *Oracle XML Developer's Kit Programmer's Guide*

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:

- When you run Oracle Universal Installer, in the Select Database Edition screen, select **Enterprise Edition**. Click the **Select Options** button, and from the Choose Components screen, select **Oracle OLAP**.

See Also:

- *Oracle OLAP User's Guide*
 - *Oracle OLAP DML Reference*
 - *Oracle OLAP 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, you must have an Enterprise Edition licence for the database installation. 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 this guide to install Oracle Data Mining:

1. When you run Oracle Universal Installer, select the **Enterprise Edition** installation type.
2. In the Select Database Configuration screen, select the **General Purpose/Transaction Processing** configuration.

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)

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 User's Guide*
- *Oracle Database Backup and Recovery Reference*

Is Oracle Workflow included with Oracle Database 11g?

Starting with Oracle Database 11g, Oracle Workflow is no longer released with the database. Oracle Workflow is available with the Oracle E-Business Suite releases.

See Also: Oracle Workflow statement of direction:

<http://www.oracle.com/technetwork/middleware/ias/overview/index.html>

Is there a migration plan for customers that have built solutions using Oracle Workflow?

Starting January 2006, customers are encouraged to re-create and implement workflows using Oracle BPEL Process Manager. Oracle is in the process of creating a technical migration guide to provide detailed recommendations for migrating Oracle Workflow processes to Oracle BPEL Process Manager.

See Also: Oracle Workflow statement of direction:

<http://www.oracle.com/technetwork/middleware/ias/overview/index.html>

Installing Oracle Database with Oracle Applications

The following are frequently asked questions about installing Oracle database with Oracle applications:

- [How do I install my Oracle applications with Oracle Database?](#)
- [How can I create web applications that communicate with Oracle Database?](#)
- [Which web server can my Oracle applications use?](#)
- [How can I 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 must implement your applications with Oracle Real Applications Clusters databases, refer to *Oracle Real Application Clusters Installation Guide for Linux and UNIX* and *Oracle Grid Infrastructure Installation Guide* for more information.

How can I create web applications that communicate with Oracle Database?

Install Oracle Application Express and a web server.

Use this guide to install Oracle Database. Oracle Application Express is automatically installed, when you install Oracle database.

See Also: *Oracle Application Express Installation Guide*

Which web server can my Oracle applications use?

Install Oracle HTTP Server, which ships on separate media, or use the XML DB HTTP Protocol Server and the embedded PL/SQL Gateway that installs with Oracle Database 11g Release 2.

How can I migrate my non-Oracle applications to Oracle?

Use Oracle SQL Developer to migrate your non-Oracle applications to Oracle. Oracle SQL Developer software and documentation is available at:

<http://www.oracle.com/technetwork/developer-tools/sql-developer/overview/index.html>

Installing Oracle Database Heterogeneous Connectivity Tools (Gateways)

The following section discusses the Gateway products:

[How can my Oracle applications access data in a non-Oracle database system?](#)

How can my Oracle applications access data in a non-Oracle database system?

You can use Oracle Database Gateway as the connectivity tool to enable Oracle applications to access data in non-Oracle databases. The following are the functions of Oracle Database Gateway:

- Integrates a non-Oracle database into your Oracle Database environment.
- 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 an UNIX computer.
- The Oracle application is installed on a Microsoft Windows computer and accesses data from the Oracle database on the UNIX computer.
- The Oracle application must join data in a DB2 database on Oracle Solaris and an Oracle Database on UNIX.

You have the option of installing the Database Gateway for DRDA on the Oracle Solaris computer where DB2 is running, on UNIX where Oracle is running, or on a third computer.

[Table H-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 H-1 Oracle Gateway Products

Non-Oracle Database	Oracle Gateway Products and Documentation
IBM DB2 Universal Database (UDB)	Oracle Database Gateway for DRDA. Use <i>Oracle Database Gateway Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64</i> and <i>Oracle Database Gateway for DRDA User's Guide</i> .
IBM DB2 z/OS	Oracle Database Gateway for DRDA. Use <i>Oracle Database Gateway Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64</i> and <i>Oracle Database Gateway for DRDA User's Guide</i> .
IBM DB2/400	Oracle Database Gateway for DRDA. Use <i>Oracle Database Gateway Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64</i> and <i>Oracle Database Gateway for DRDA User's Guide</i> .
WebSphere MQ	Oracle Database Gateway for WebSphere MQ. <i>Oracle Database Gateway for WebSphere MQ Installation and User's Guide</i> .
CICS/TS IMSTM	Oracle Database Gateway for APPC. Use <i>Oracle Database Gateway for APPC Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64</i> . Use <i>Oracle Database Gateway for APPC User's Guide</i>
SQL Server	Oracle Database Gateway for SQL Server. Use <i>Oracle Database Gateway Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64</i> and <i>Oracle Database Gateway for SQL Server User's Guide</i> .
Sybase Adaptive Server	Oracle Database Gateway for Sybase. Use <i>Oracle Database Gateway Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64</i> and <i>Oracle Database Gateway for Sybase User's Guide</i> .
Teradata	Oracle Database Gateway for Teradata. Use <i>Oracle Database Gateway Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64</i> and <i>Oracle Database Gateway for Teradata User's Guide</i> .
Informix Server	Oracle Database Gateway for Informix. Use <i>Oracle Database Gateway Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64</i> and <i>Oracle Database Gateway for Informix User's Guide</i> .

Table H-1 (Cont.) Oracle Gateway Products

Non-Oracle Database	Oracle Gateway Products and Documentation
IMS	<p>Oracle Database Gateway for IMS.</p> <p>Use <i>Oracle Database Gateway for IMS, VSAM, and Adabas Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64, Oracle Database Gateway for IMS User's Guide</i> and <i>Oracle Connect for IMS, VSAM, and Adabas Gateways Installation and Configuration Guide for IBM z/OS</i>.</p>
VSAM	<p>Oracle Database Gateway for VSAM.</p> <p>Use <i>Oracle Database Gateway for IMS, VSAM, and Adabas Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64, Oracle Database Gateway for VSAM User's Guide</i> and <i>Oracle Connect for IMS, VSAM, and Adabas Gateways Installation and Configuration Guide for IBM z/OS</i>.</p>
Adabas	<p>Oracle Database Gateway for Adabas.</p> <p>Use <i>Oracle Database Gateway for IMS, VSAM, and Adabas Installation and Configuration Guide for AIX 5L Based Systems (64-Bit), HP-UX Itanium, Solaris Operating System (SPARC 64-Bit), Linux x86, and Linux x86-64, Oracle Database Gateway for Adabas User's Guide</i> and <i>Oracle Connect for IMS, VSAM, and Adabas Gateways Installation and Configuration Guide for IBM z/OS</i>.</p>

Glossary

Oracle Automatic Storage Management disk group

A set of disk devices that **Oracle Automatic Storage Management** (Oracle ASM) manages as a 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. You can create the Oracle ASM disk group when you create the **Oracle Automatic Storage Management instance**, or with Oracle Database Configuration Assistant.

Oracle Automatic Storage Management instance

The Oracle instance that manages an **Oracle Automatic Storage Management disk group**. It is created automatically when you install and configure **Oracle Automatic Storage Management**. See also Oracle system identifier (**SID**).

Oracle Automatic Storage Management

Enables creation of a single disk group from a collection of individual disk devices. It balances I/O to the disk group across all of the devices in the disk group. It also implements striping and mirroring to improve I/O performance and data reliability.

automatic undo management mode

A mode of Oracle Database in which undo data is stored in a dedicated **undo tablespace**. Unlike in **manual undo management mode**, the only undo management that you must perform is the creation of the undo tablespace. All other undo management is performed automatically.

connect descriptor

A specially formatted description of the destination for a network connection. A connect descriptor contains destination service and network route information.

The destination service is indicated by using its service name for the Oracle Database or its Oracle system identifier (**SID**) for Oracle release 11.2 databases. The network route provides, at a minimum, the location of the **listener** through use of a network address.

connect identifier

A name, net service name, or service name that resolves to a connect descriptor. Users initiate a connect request by passing a user name and password along with a connect identifier in a connect string for the service to which they want to connect, for example:

```
SQL> CONNECT user_name@connect_identifier
Enter password: password
```

control files

Files that record the physical structure of a database and contain the database name, the names and locations of associated datafiles and online **undo tablespace**, the time stamp of the database creation, the current log sequence number, and checkpoint information.

default domain

The network domain within which most client requests take place. It can be the domain where the client resides, or a domain from which the client often requests network services. The default domain is also the client configuration parameter that determines what domain to append to unqualified network name requests. A name request is unqualified if it does not have a "." character within it.

directory naming

A **naming method** that specifies a directory server to resolve a net service name into a connect descriptor. The net service name is stored centrally in a directory server.

directory server

A Lightweight Directory Access Protocol (LDAP)-compliant directory server. A directory can provide centralized storage and retrieval of database network components, user and corporate policies preferences, user authentication, and security information, replacing client-side and server-side localized files.

external procedures

Procedure or function written in the C programming language and stored in a shared library. An Oracle server can call external procedures or functions using PL/SQL routines. For Oracle Database to connect to external procedures, the server must be configured with a net service name and the **listener** must be configured with protocol address and service information.

global database name

The full database name that uniquely distinguishes it from any other database in your network domain.

For example:

```
sales.us.example.com
```

where `sales` is the name you want to call your database and `us.example.com` is the network domain in which the database is located.

initialization parameter file

An ASCII text file that contains information needed to initialize a database and **instance**.

instance

Process associated with a running Oracle Database instance. When a database is started on a database server (regardless of the type of computer), Oracle Database allocates a memory area called the **System Global Area** and starts one or more Oracle Database processes. This combination of the System Global Area and Oracle Database processes is called an instance. The memory and processes of an instance manage the associated database's data efficiently and serve the users of the database.

installation type

A predefined component set that automatically selects which components to install. See "Oracle Database Editions" on page 1-6 for a list of installation types available with each top-level component.

Interprocess Communication (IPC)

A protocol that client applications use that resides on the same node as the **listener** to communicate with the database. IPC can provide a faster local connection than TCP/IP.

listener

A process that resides on the server and whose responsibility is to listen for incoming client connection requests and manage the traffic to the server.

When a client requests a network session with a database server, a listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the database server.

listener.ora file

A configuration file for the listener that identifies the:

- Listener name
- Protocol addresses on which it is accepting connection requests
- Services for which it is listening

The `listener.ora` file resides in the `$ORACLE_HOME/network/admin` directory.

An Oracle Database 11g Release 2 (11.2) does not require identification of the database service because of service registration. However, static service configuration is required for an Oracle Database 11g Release 2 (11.2) if you plan to use Oracle Enterprise Manager.

local naming

A **naming method** that resolves a net service name into a connect descriptor. This name is configured and stored in the **tnsnames.ora file** on each individual client.

manual undo management mode

A mode of the database in which undo blocks are stored in user-managed rollback segments.

naming method

A resolution method used by a client application to resolve a connect identifier to a network address when attempting to connect to a database service. Oracle Net Services supports the following naming methods:

- Local naming
- Directory naming
- Host naming
- External naming

net service name

A simple name for a service that resolves to a connect descriptor. Users initiate a connect request by passing a user name and password along with a net service name in a connect string for the service to which they want to connect:

```
SQL> CONNECT user_name@net_service_name
Enter password: password
```

Depending on your needs, net service names can be stored in a variety of places, including:

- Local configuration file, `tnsnames.ora`, on each client
- Directory server
- External naming service, such as Network Information Service (NIS) or Cell Directory Service (CDS)

OPSS\$

Acronym for operating system specific. The initialization file parameter `OS_AUTHENT_PREFIX` enables users to specify a prefix that Oracle uses to authenticate users attempting to connect to the database. Oracle concatenates the value of this parameter to the beginning of the user's operating system account name. When a connection request is attempted, Oracle compares the prefixed user name with Oracle user names in the database.

The default value of this parameter is "" (a null string), thereby eliminating the addition of any prefix to operating system account names. In earlier releases, `OPSS$` was the default setting.

ORACLE_BASE

`ORACLE_BASE` is the root of the Oracle Database directory tree. The Oracle Base directory is the top level directory that you can use to install the various Oracle software products. You can use the same Oracle base directory for multiple installations. For example, `/u01/app/oracle` is an Oracle base directory created by the Oracle user.

ORACLE_HOME

Corresponds to the environment in which Oracle Database products run. If you install an OFA-compliant database, using Oracle Universal Installer defaults, Oracle home (known as `$ORACLE_HOME` in this guide) is located beneath `$ORACLE_BASE`. The default Oracle home is `db_n` where `n` is the Oracle home number. It contains subdirectories for Oracle Database software executables and network files. See also [Oracle home](#).

Oracle home

The directory path to install Oracle components (for example, `/u01/app/oracle/product/11.2.0/db_n`). You are prompted to enter an Oracle home in the Path field of the Specify File Locations window. See also [ORACLE_HOME](#).

Oracle schema

A set of rules that determine what can be stored in an LDAP-compliant directory server. Oracle has its own schema that is applied to many types of Oracle entries, including Oracle Net Services entries. The Oracle schema for Oracle Net Services entries includes the attributes the entries may contain.

Oracle Net foundation layer

A networking communication layer that establishes and maintains the connection between the client application and server, and also exchanging messages between them.

protocol address

An address that identifies the network address of a network object.

When a connection is made, the client and the receiver of the request, such as the **listener**, or Oracle Connection Manager, are configured with identical protocol addresses. The client uses this address to send the connection request to a particular network object location, and the recipient "listens" for requests on this address. It is important to install the same protocols for the client and the connection recipient, and to configure the same addresses.

raw partitions

Portions of a physical disk that are accessed at the lowest possible disk (block) level.

redo log files

Files that contain a record of all changes made to data in the database buffer cache. If an instance failure occurs, then an administrator can use the redo log files to recover the modified data that was in memory.

repository

A set of tables located in any Oracle database accessible to the Oracle Management Server. Oracle Management Server uses a repository to store all system data and application data, information about the state of managed nodes distributed throughout the environment, and information about the separately licensable management packs.

service registration

A feature by which the PMON process (an instance background process) automatically registers information with a **listener**. Because this information is registered with the listener, the **listener.ora file** does not have to be configured with this static information.

Service registration provides the listener with the following information:

- Service names for each running instance of the database
- Instance names of the database
- Service handlers (dispatchers and dedicated servers) available for each instance to enable the listener to direct a client's request appropriately.
- Dispatcher, instance, and node load information

To enable the listener to determine which dispatcher can best handle a client connection's request. If all dispatchers are blocked, the listener can spawn a dedicated server for the connection.

This information enables the listener to determine how best to service a client connection request.

SID

The Oracle system identifier that distinguishes the database from all other databases on your computer. The SID automatically defaults to the database name portion of the global database name (`sales` in the example `sales.us.example.com`) until you reach eight characters or enter a period. You can accept or change the default value.

The SID can also refer to an Oracle ASM instance SID, available when you install **Oracle Automatic Storage Management**.

sqlnet.ora file

A configuration file for the client or server that specifies the:

- Client domain to append to unqualified service names or net service names
- Order of naming methods for the client to use when resolving a name
- Logging and tracing features to use
- Route of connections
- External naming parameters
- Oracle Advanced Security parameters

The `sqlnet.ora` file resides in `$ORACLE_HOME/network/admin`.

Secure Sockets Layer (SSL)

An industry standard protocol designed by Netscape Communications Corporation for securing network connections. SSL provides authentication, encryption, and data integrity using public key infrastructure (PKI).

SSL

See [Secure Sockets Layer \(SSL\)](#).

System Global Area

A group of shared memory structures that contain data and control information for an Oracle Database [instance](#).

system identifier

See [SID](#).

tablespace

A logical storage unit within a database. Tablespaces are divided into logical units of storage called segments, which are further divided into extents.

tnsnames.ora file

A configuration file that contains net service names mapped to connect descriptors. This file is used for the local naming method. The `tnsnames.ora` file resides in `$ORACLE_BASE/network/admin`.

undo tablespace

A tablespace that contains one or more undo segments. The creation of any other types of segment (for example, tables, indexes) in undo tablespaces is not allowed.

In the automatic mode, each Oracle instance is assigned one and only one undo tablespace. Each undo tablespace is composed of a set of undo files. Undo blocks are grouped in extents. At any point in time, an extent is either allocated to (and used by) a transaction table, or is free.

Blocks in undo tablespaces are grouped into the following categories:

- File control blocks, bitmap blocks, and so forth used for space management
- Undo segments containing transaction table blocks, undo blocks, and extent-map blocks used for transaction management
- Free blocks that are unallocated to file control or undo segments

unqualified name

A net service name that does not contain a network domain.

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