

# Oracle® Database

## Database Installation Guide



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# Preface

Learn how to install and configure Oracle Database, perform postinstallation tasks, and how to remove the database software.

The following topics are covered:

## Audience

This guide is intended for anyone responsible for installing Oracle Database 19c.

To use this document, you need the following:

- A supported Microsoft Windows operating system installed and tested on your computer system
- Administrative privileges on the computer where you are installing the Oracle Database software
- Familiarity with object-relational database management concepts

Additional installation guides for Oracle Database, Oracle Real Application Clusters, Oracle Clusterware, Oracle Database Examples, and Oracle Enterprise Manager Cloud Control are available at the following URL:

<http://docs.oracle.com>

## Documentation Accessibility

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## Set Up Java Access Bridge to Implement Java Accessibility

Install Java Access Bridge so that assistive technologies on Microsoft Windows systems can use the Java Accessibility API.

Java Access Bridge is a technology that enables Java applications and applets that implement the Java Accessibility API to be visible to assistive technologies on Microsoft Windows systems.

Refer to *Java Platform, Standard Edition Accessibility Guide* for information about the minimum supported versions of assistive technologies required to use Java Access Bridge. Also refer to this guide to obtain installation and testing instructions, and instructions for how to use Java Access Bridge.

### Related Topics

- *Java Platform, Standard Edition Java Accessibility Guide*

## Related Documentation

For more information, see these Oracle resources:

- *Oracle Database Concepts*
- *Oracle Database Examples Installation Guide*
- *Oracle Real Application Clusters Installation Guide*
- *Oracle Grid Infrastructure Installation Guide*
- *Oracle Enterprise Manager Cloud Control Basic Installation Guide*
- *Oracle Database Upgrade Guide*
- *Oracle Database 2 Day DBA*
- *Oracle Database Administrator's Reference for Microsoft Windows*
- *Oracle Database Sample Schemas*
- *Oracle Database Error Messages*
- *Oracle Label Security Administrator's Guide*

Oracle error message documentation is available only in HTML. If you only have access to the Oracle Database 19c Online Documentation Library, you can browse the error messages by range. Once 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.

To download free release notes, installation documentation, white papers, or other collateral, please visit the following website:

<http://docs.oracle.com/en/database/database.html>

## Conventions

The following text conventions are used in this document:

Convention	Meaning
<b>boldface</b>	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.

<b>Convention</b>	<b>Meaning</b>
<code>monospace</code>	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

# Changes in this Release for Oracle Database Installation Guide

Changes in Oracle Database Installation Guide for Oracle Database 19c.

## Changes in Oracle Database 19c

New features, deprecated features, and desupported features in this release.

The following are changes in Oracle Database Installation Guide for Oracle Database 19c:

### New Features

Review new features available with Oracle Database installation in Oracle Database 19c.

### Simplified Image Based Oracle Database Client Installation

Starting with Oracle Database 19c, the Oracle Database Client software is available as an image file for download and installation. You must extract the image software into a directory where you want your Oracle home to be located, and then run the `runInstaller` script to start the Oracle Database Client installation. Oracle Database Client installation binaries continue to be available in the traditional format as non-image zip files.

As with Oracle Database and Oracle Grid Infrastructure image file installations, Oracle Database Client image installations simplify Oracle Database Client installations and ensure best practice deployments.

### Deprecated Features

Review features that are deprecated starting with Oracle Database 19c.

The following feature is deprecated in this release, and may be desupported in another release. For more information about deprecated and desupported features, parameters and views, refer to *Oracle Database Upgrade Guide*.

- Deprecation of `clone.pl`

The `clone.pl` script is deprecated in Oracle Database 19c. The functionality of performing a software-only installation, using the gold image, is available in the installer wizard.

The `clone.pl` script can be removed in a future release. Instead of using the `clone.pl` script, Oracle recommends that you install the extracted gold image as a home, using the installer wizard.



**Related Topics**

- *Oracle Database Upgrade Guide*

## Desupported Features for Oracle Database 19c

There are no desupported features at the time of release.

# 1

## Oracle Database Installation Checklist

Use checklists to review system requirements, and to plan and carry out Oracle Database installation.

Oracle recommends that you use checklists as part of your installation planning process. Using a checklist ensures that your server hardware and configuration meets minimum requirements for this release, and enables you to carry out a successful installation.

### Server Hardware Checklist for Oracle Database Installation

Use this checklist to check hardware requirements for Oracle Database.

**Table 1-1 Server Hardware Checklist for Oracle Database Installation**


Check	Task
Server Make and Architecture	Confirm that server make, model, core architecture, and host bus adaptors (HBA) or network interface controllers (NIC) are supported to run with Oracle Database and Oracle Grid Infrastructure. Ensure the server has a DVD drive, if you are installing from a DVD.
Minimum RAM	2 GB RAM recommended
Minimum network connectivity	Server is connected to a network
Video Adapter	256 colors
Server Display Cards	At least 1024 x 768 display resolution, which Oracle Universal Installer requires.

# Operating System Checklist for Oracle Database Installation on Microsoft Windows

Use this checklist to check minimum operating system requirements for Oracle Database.

**Table 1-2 Operating System General Checklist for Oracle Database on Microsoft Windows**

Item	Task
Operating system general requirements	<p>Oracle Database for Windows x64 is supported on the following operating system versions:</p> <ul style="list-style-type: none"><li>• Windows 8.1 x64 - Pro and Enterprise editions</li><li>• Windows 10 x64 - Pro, Enterprise, and Education editions</li><li>• Windows 11 x64 - Pro, Enterprise, and Education editions</li><li>• Windows Server 2012 R2 x64 - Standard, Datacenter, Essentials, and Foundation editions</li><li>• Windows Server 2016 x64 - Standard, Datacenter, and Essentials editions</li><li>• Windows Server 2019 x64 - Standard, Datacenter, and Essentials editions</li><li>• Windows Server 2022 x64 - Standard, Datacenter, and Essentials editions</li></ul>

 **Note:**

Windows 11 x64 - Pro, Enterprise, and Education editions and Windows Server 2022 x64 - Standard, Datacenter, and Essentials editions are supported starting with Oracle Database 19c Release Update (19.13) or later.

## Server Configuration Checklist for Oracle Database Installation

Use this checklist to check minimum server configuration requirements for Oracle Database installations.


**Table 1-3 Server Configuration Checklist for Oracle Database**

Check	Task
Disk space allocated to the temporary file system	At least 1 GB of space in the temporary directory. Oracle recommends 2 GB or more At least 4 GB of space in the temporary directory for Oracle Restart
Swap space allocation relative to RAM	<ul style="list-style-type: none"> <li>If physical memory is between 2 GB and 16 GB, then set virtual memory to 1 times the size of the RAM</li> <li>If physical memory is more than 16 GB, then set virtual memory to 16 GB</li> </ul>
Oracle Inventory and ORA_INSTALL Group Requirements	The Oracle Inventory directory is the central inventory of Oracle software installed on your system. You do not need to create the Oracle central inventory or the ORA_INSTALL group as Oracle Universal Installer creates it for you.
Groups and Users	Oracle recommends that you create groups and user accounts required for your security plans before starting installation. Installation owners have resource limits settings and other requirements. Group and user names must use only ASCII characters.
Mount point paths for the software binaries	Oracle recommends that you create an Optimal Flexible Architecture configuration as described in this guide.
Ensure that the Oracle home (the Oracle home path that you select for Oracle Database) uses only ASCII characters.	The ASCII character restriction includes installation owner user names, which are used as a default for some home paths, as well as other directory names you must select for paths.
Set locale (if needed)	Specify the language and the territory, or locale, in which you want to use Oracle components. A locale is a linguistic and cultural environment in which a system or program is running. National Language Support (NLS) parameters determine the locale-specific behavior on both servers and clients. 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.

## Storage Checklist for Oracle Database Installation

Use this checklist to review storage minimum requirements and assist with configuration planning.

**Table 1-4 Storage Checklist for Oracle Database**

Check	Task
Minimum local disk storage space for Oracle software	<p>At least 6.5 GB for Oracle Database Enterprise Edition</p> <p>At least 6.0 GB for Oracle Database Standard Edition 2</p> <p>At least 7.0 GB for an Oracle Restart installation</p>
	<div style="border: 1px solid #0070C0; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b></p> <p>Oracle recommends that you allocate approximately 100 GB to allow additional space for applying any future patches on top of the existing Oracle home. For specific patch-related disk space requirements, please refer to your patch documentation.</p> </div>
Recommended file system	<p>Ensure that you have one of the following storage options available:</p> <ul style="list-style-type: none"> <li>• Oracle ASM Cluster File System (Oracle ACFS)</li> <li>• Oracle Automatic Storage Management (Oracle ASM)</li> <li>• NTFS File System or Resilient File System (ReFS)</li> </ul> <p>The database files must be placed on Oracle ASM if you are using Oracle ACFS; otherwise they can be placed on NTFS or ReFS.</p>
Select Database File Storage Option	<p>Ensure that you have one of the following storage options available:</p> <ul style="list-style-type: none"> <li>• File System <ul style="list-style-type: none"> <li>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: <ul style="list-style-type: none"> <li>- A file system on a disk that is physically attached to the system</li> <li>- A file system on a logical volume manager (LVM) volume or a redundant array of independent disks (RAID) device</li> </ul> </li> </ul> </li> <li>• Oracle Automatic Storage Management (Oracle ASM) <ul style="list-style-type: none"> <li>Oracle ASM is installed as part of an 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.</li> </ul> </li> </ul>
Determine your recovery plan	<p>Review the storage configuration sections of this document for more information about configuring recovery.</p>

## Oracle User Environment Configuration Checklist for Oracle Database Installation

Use this checklist to plan operating system users, groups, and environments for Oracle Database management.

**Table 1-5 User Environment Configuration for Oracle Database**

Check	Task
Create operating system groups and users for standard or role-allocated system privileges	<p>Create operating system groups and users depending on your security requirements, as described in this install guide.</p> <p>Set resource limits settings and other requirements for Oracle software installation owners.</p> <p>Group and user names must use only ASCII characters.</p>
Unset Oracle Software Environment Variables	<p>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.</p>
Configure the Oracle Software Owner Environment	<p>Set the TEMP environment variable.</p>
Manage User Account Control	<p>If you have enabled the User Account Control security feature, then Oracle Universal Installer prompts you for either your consent or your credentials when installing Oracle Database. Provide either the consent or your Windows Administrator credentials as appropriate.</p>

## Installer Planning Checklist for Oracle Database Installation

Use the checklist to assist you to be prepared before starting Oracle Universal Installer.

**Table 1-6 Oracle Universal Installer Planning Checklist for Oracle Database Installation**

Check	Task
Review the Documentation	<ul style="list-style-type: none"> <li>Review the Oracle Database Release Notes, which is available at the following location: <i>Oracle Database Release Notes</i></li> <li>Be familiar with the installation steps for Oracle RAC software and creating an Oracle RAC database.</li> </ul>
Review the Licensing Information	<p>You are permitted to use only those components in the Oracle Database media pack for which you have purchased licenses. For more information about licenses, refer to the following URL: <i>Oracle Database Licensing Information</i></p>
Obtain your My Oracle Support account information.	<p>During installation, you require a My Oracle Support user name and password to configure security updates, download software updates, and other installation tasks. You can register for My Oracle Support at the following URL: <a href="https://support.oracle.com/">https://support.oracle.com/</a></p>

**Table 1-6 (Cont.) Oracle Universal Installer Planning Checklist for Oracle Database Installation**

Check	Task
Review Oracle Support Certification Matrix	<p>New platforms and operating system software versions can 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:</p> <p><a href="https://support.oracle.com/">https://support.oracle.com/</a></p> <p>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.</p>
Review online information to assist with installation	<ul style="list-style-type: none"> <li>• Log on to My Oracle Support to access certifications for your installation for your platform.</li> <li>• Refer to Oracle.com (<a href="http://www.oracle.com">http://www.oracle.com</a>) for additional resources about planning for specific implementation scenarios, best practices, and other information that can help you with your installation plan. In particular, refer to the Oracle Real Application Clusters pages on the Oracle Technology Network at <a href="http://www.oracle.com/goto/rac">http://www.oracle.com/goto/rac</a></li> </ul>
Run Oracle Universal Installer (OUI) with CVU and use fixup scripts	<p>Oracle Universal Installer is fully integrated with Cluster Verification Utility (CVU), automating many CVU prerequisite checks. Oracle Universal Installer runs all prerequisite checks and creates fixup scripts when you run the installer. You can run OUI up to the Summary screen without starting the installation.</p> <ul style="list-style-type: none"> <li>• Obtain the latest version of CVU at the following URL: <a href="http://www.oracle.com/technetwork/database/options/clustering/downloads/cvu-download-homepage-099973.html">http://www.oracle.com/technetwork/database/options/clustering/downloads/cvu-download-homepage-099973.html</a></li> <li>• You can also run CVU commands manually to check that your system is prepared for installation before you start an Oracle RAC installation. If you have vendors performing hardware or operating system configuration steps, then ask the vendors to complete the relevant CVU checks of the cluster after they complete their work to ensure that your system is configured correctly.</li> <li>• Run OUI and DBCA from a node where an Oracle RAC Oracle database instance is located.</li> <li>• In case of an upgrade failure, follow common industry standards for data recovery planning, including backing up your existing database.</li> </ul>

**Table 1-6 (Cont.) Oracle Universal Installer Planning Checklist for Oracle Database Installation**

Check	Task
Download and run Oracle ORAchk for runtime and upgrade checks, or runtime health checks	<p>The Oracle ORAchk utility provides system checks that can help to prevent issues before and after installation. These checks include kernel requirements, operating system resource allocations, and other system requirements.</p> <p>Use the Oracle ORAchk Upgrade Readiness Assessment to obtain an automated upgrade-specific system health check for upgrades to 11.2.0.3, 11.2.0.4, 12.1.0.1, 12.2, 18c, and 19c. For example:</p> <ul style="list-style-type: none"> <li>• Before you perform a fresh database installation: <pre data-bbox="721 653 1406 709">%ORACLE-HOME%\suptools\orachk&gt;orachk.bat -profile preinstall</pre> </li> <li>• To upgrade your existing database to a higher version or release: <pre data-bbox="721 804 1377 831">%ORACLE-HOME%\suptools\orachk&gt;orachk.bat -o pre</pre> </li> </ul> <p>The Oracle ORAchk Upgrade Readiness Assessment automates many of the manual pre- and post-upgrade checks described in Oracle upgrade documentation. Oracle ORAchk is supported on Windows 2008 and Windows 2012 on a Cygwin environment only. For more information refer to the following URL:</p> <p><a href="https://support.oracle.com/rs?type=doc&amp;id=1268927.1">https://support.oracle.com/rs?type=doc&amp;id=1268927.1</a></p>
Verify if Oracle Grid Infrastructure is installed	<ul style="list-style-type: none"> <li>• If you want to use Oracle ASM or Oracle Restart, then install Oracle Grid Infrastructure for a standalone server before you install and create the database. Otherwise, to use Oracle ASM, you must complete an Oracle Grid Infrastructure installation, and then manually register the database with Oracle Restart.</li> <li>• To install Oracle Real Applications Cluster (Oracle RAC), you must have Oracle Grid Infrastructure (Oracle Clusterware and Oracle ASM) installed on your cluster. The Oracle Clusterware version must be equal to or greater than the Oracle RAC version that you plan to install.</li> <li>• Currently, there are no supported clusterware products other than Oracle Clusterware for the Microsoft Windows platforms. If you intend to install Oracle RAC, then you must first install Oracle Grid Infrastructure for a cluster, which includes Oracle Clusterware.</li> </ul>
Check running Oracle processes, and shut down if necessary	<ul style="list-style-type: none"> <li>• On a standalone database not using Oracle ASM: You do not need to shut down the database while you install Oracle Grid Infrastructure.</li> <li>• On a standalone database using Oracle ASM: Stop the existing Oracle ASM instances. The Oracle ASM instances are restarted during installation.</li> <li>• On an Oracle RAC Database node: This installation requires an upgrade of Oracle Clusterware, as Oracle Clusterware is required to run Oracle RAC. As part of the upgrade, you must shut down the database one node at a time as the rolling upgrade proceeds from node to node.</li> </ul>



**Table 1-6 (Cont.) Oracle Universal Installer Planning Checklist for Oracle Database Installation**

Check	Task
Ensure Task Scheduler jobs do not run during installation	If the installer is running when daily scheduled jobs start, then you may encounter unexplained installation problems if your scheduled job is performing cleanup, and temporary files are deleted before the installation is finished. Oracle recommends that you complete installation before daily scheduled jobs are run, or disable daily scheduled jobs that perform cleanup until after the installation is completed.
Decide on an Oracle Database management tool	<p>By default, Oracle Database is managed by Oracle Enterprise Manager Database Express.</p> <p>If you have an existing Oracle Management Agent, and decide to use Oracle Enterprise Manager Cloud Control to centrally manage your database, then obtain the following information to enter during the database installation:</p> <ul style="list-style-type: none"> <li>• OMS host</li> <li>• OMS port</li> <li>• EM admin username</li> <li>• EM admin password</li> <li>• Specify password of ASMSNMP user</li> </ul> <p>You need a web browser to access documentation, to use Oracle Enterprise Manager Database Express, and to use Oracle Application Express. Web browsers must support JavaScript and the HTML 4.0 and Cascading Style Sheets (CSS) 1.0 standards.</p>
Review memory allocation and Automatic Memory Management feature	<p>You can enable automatic memory management either during, or after Oracle Database installation. If you enable automatic memory management after installation, then you must shut down and restart the database.</p> <p>With Automatic Memory Management, Oracle Database instances automatically manage and tune memory. You choose a memory target, and the instance automatically distributes memory between the system global area (SGA) and the instance program global area (instance PGA). As memory requirements change, the instance dynamically redistributes memory between the SGA and instance PGA.</p>

**Related Topics**

- *Oracle Grid Infrastructure Installation and Upgrade Guide for Microsoft Windows x64 (64-Bit)*

**Related Topics**

- *Oracle Enterprise Manager Cloud Control Administrator's Guide*

**Related Topics**

- *Oracle Database Administrator's Guide*

**Related Topics**

- *Oracle Clusterware Administration and Deployment Guide*

# 2

## Oracle Database Preinstallation Tasks

Review the preinstallation tasks before you start Oracle Universal Installer.

Learn about the information required to install Oracle Database 19c. Ensure that you review information related to the platform on which you intend to install Oracle Database 19c.

### Oracle Database Minimum Hardware Requirements

Learn about the hardware component and hard disk space requirements.

#### Hardware Component Requirements for Windows x64

The following table lists the hardware components that are required for Oracle Database on Windows x64.

**Table 2-1 Windows x64 Minimum Hardware Requirements**

Requirement	Value
System Architecture	Processor: AMD64 and Intel EM64T
Physical memory (RAM)	2 GB minimum
Virtual memory (swap)	<ul style="list-style-type: none"><li>• If physical memory is between 2 GB and 16 GB, then set virtual memory to 1 times the size of the RAM</li><li>• If physical memory is more than 16 GB, then set virtual memory to 16 GB</li></ul>
Disk space	<ul style="list-style-type: none"><li>• Typical Install Type total: 10 GB</li><li>• Advanced Install Types total: 10 GB</li></ul>
Video adapter	256 colors
Screen Resolution	1024 X 768 minimum

#### Hard Disk Space Requirements

Learn about the system requirements for Windows platforms that use the NT File System (NTFS).

Oracle strongly recommends that you install the Oracle database home (Oracle database binaries, trace files, and so on) on Oracle ACFS or NTFS.

The database files themselves must be placed on Oracle ASM if using Oracle ACFS; otherwise they can be placed on NTFS. Usage of Oracle ACFS and Oracle ASM or NTFS is recommended to ensure security of these files.

The NTFS system requirements are accurate than the hard disk values reported by the Oracle Universal Installer Summary window. The Summary window does not include accurate values for disk space, the space required to create a database, or the size of compressed files that are expanded on the hard drive.

The hard disk requirements for Oracle Database components include 32 MB to install Java Runtime Environment (JRE) and Oracle Universal Installer on the partition where the operating system is installed. If sufficient space is not detected, then the installation fails and an error message appears.

The following table lists the disk space requirements on NTFS for Windows x64. The starter database requires 720 MB of disk space.

The values in this table include the starter database.

**Table 2-2 Windows x64 Minimum Disk Space Requirements on NTFS**

Installation Type	TEMP Space	SYSTEM_DRIVE:\Program Files\Oracle\Inventory	Oracle Home	Data Files *	Total
Enterprise Edition	595 MB	53.00 MB	6.50 GB	4.38 GB **	10.88 GB **
Standard Edition 2	595 MB	53.00 MB	6.00 GB	4.24 GB **	10.24 GB **

\* Refers to the contents of the `admin`, `cfgtoollogs`, `flash_recovery_area`, and `oradata` directories in the `ORACLE_BASE` directory.

\*\* This size can be higher depending on the installation options selected, such as languages or additional components. If you choose to install Oracle Database with customized backups enabled, then include at least 2 GB extra for data file disk space.

## Verifying Hardware Requirements

Use this procedure to gather information about your server configuration.

To ensure that the system meets these requirements, follow these steps:

1. Determine the physical RAM size.

For example, on a computer running Windows Server 2012 R2, click **System and Security**, then click **System**.

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

2. Determine the size of the configured virtual memory (also known as paging file size).

For example, on a computer running Windows Server 2012 R2, click **System and Security**, then click **System**, click **Advanced System Settings**, click the **Advanced** tab on System Properties page, and then click **Settings** in the Performance section. Then select the **Advanced** tab on Performance Options page.

The virtual memory is listed in the Virtual Memory section.

If necessary, see your operating system documentation for information about how to configure additional virtual memory.

3. Determine the amount of free disk space on the system.

For example, on a computer running Windows Server 2012 R2, right-click **My Computer** and click **Open**.

- Determine the amount of disk space available in the `temp` directory. This is equivalent to the total amount of free disk space, minus what is required for the Oracle software to be installed.

On Windows x64, if there is less than 125 MB of disk space available in the `temp` directory, then delete all unnecessary files. If the temp disk space is still less than 125 MB, then set the `TEMP` or `TMP` environment variable to point to a different hard drive location.

For example, to change the environment variables on a computer running Windows Server 2012 R2, click **System and Security**, then click **System**, click **Advanced System Settings**, click the **Advanced** tab on System Properties page, and then click **Environment Variables**.

## Oracle Database Software Requirements

The following table lists the software requirements for Oracle Database on Windows x64:

**Table 2-3 Windows x64 Software Requirements**

Requirement	Value
Operating System	<p>Oracle Database for Windows x64 is supported on the following operating systems:</p> <ul style="list-style-type: none"> <li>Windows 8.1 x64 - Pro and Enterprise editions</li> <li>Windows 10 x64 - Pro, Enterprise, and Education editions</li> <li>Windows 11 x64 - Pro, Enterprise, and Education editions</li> <li>Windows Server 2012 R2 x64 - Standard, Datacenter, Essentials, and Foundation editions</li> <li>Windows Server 2016 x64 - Standard, Datacenter, and Essentials editions</li> <li>Windows Server 2019 x64 - Standard, Datacenter, and Essentials editions</li> <li>Windows Server 2022 x64 - Standard, Datacenter, and Essentials editions</li> </ul> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>Windows Multilingual User Interface Pack is supported.</li> <li>The Server Core option is not supported.</li> <li>Windows 11 x64 - Pro, Enterprise, and Education editions and Windows Server 2022 x64 - Standard, Datacenter, and Essentials editions are supported starting with Oracle Database 19c Release Update (19.13) or later.</li> </ul>
Virtualization	<p>Oracle certifies the following virtualization technologies with Oracle Database on Windows:</p> <ul style="list-style-type: none"> <li>Oracle VM Server</li> <li>Microsoft Hyper-V</li> </ul> <p>For more detailed information on certified Oracle VM Server combinations, check My Oracle Support note 464754.1. For more information on certified Hyper-V combinations, you can visit:</p> <p><a href="http://www.oracle.com/technetwork/database/virtualizationmatrix-172995.html">http://www.oracle.com/technetwork/database/virtualizationmatrix-172995.html</a></p>

**Table 2-3 (Cont.) Windows x64 Software Requirements**

Requirement	Value
Compiler and SDK	<p>The following component is supported only with Microsoft Visual C++ 2013 Update 5:</p> <ul style="list-style-type: none"> <li>Pro*C/C++: Use Microsoft Visual C++ 2013 to convert the Pro*C/C++ files into C/C++ files, and then use Microsoft Visual C++ 2017 Update 6 Version 15.6.3 or later to further build them.</li> </ul> <p>The following components are supported with the compilers based on Microsoft Visual C++ 2017 Update 6 or later and Intel C++ 17.0 Update 8, and Microsoft Visual C++ 2017 Update 6 or later SDK:</p> <ul style="list-style-type: none"> <li>Oracle Call Interface (OCI)</li> <li>External callouts</li> <li>Oracle XML Developer's Kit (XDK)</li> <li>Oracle C++ Call Interface (OCCI)</li> </ul> <p>Pro*COBOL supports:</p> <ul style="list-style-type: none"> <li>Micro Focus Visual COBOL Version 6</li> </ul>
Network Protocol	<p>The Oracle Net foundation layer uses Oracle protocol support to communicate with the following industry-standard network protocols:</p> <ul style="list-style-type: none"> <li>TCP/IP</li> <li>TCP/IP with SSL</li> <li>Named Pipes</li> </ul>
Oracle Database Client	<p>To connect to Oracle Database 19c, the following are required:</p> <ul style="list-style-type: none"> <li>Oracle Database Client is version 11.2.0.4 or later.</li> <li>If the earlier Oracle Database Client is running on the same computer as Oracle Database 19c, then you cannot use a bequeath connection.</li> </ul> <p>Oracle recommends upgrading Oracle Database Client to the latest patchset (11.2.0.4 or later). You can download the patchset from the Patches and Updates section of My Oracle Support at <a href="https://support.oracle.com">https://support.oracle.com</a></p>
Unzip utility	<p>Unzip 6.0 or later.</p> <p>Unzip is required to extract the image files for Oracle Database and Oracle Grid Infrastructure installations.</p>

## Windows Certification and Web Browser Support

Review the Windows Certification and Web Browser Support information.

### Remote Desktop Services

Oracle supports installing, configuring, and running Oracle Database through Remote Desktop Services on Windows.

To install Oracle Database, Oracle recommends that you start all configuration tools from the Remote Desktop console session of the server.

Platform-specific support information is as follows:

- Windows client operating systems: The Remote Desktop is only available in Single User Mode.

- Windows server operating systems: You can have multiple Remote Desktop sessions.

 **See Also:**

- The Microsoft website for more information about Remote Desktop Services  
<http://www.microsoft.com/>
- The My Oracle Support website for the latest Terminal Services and Remote Desktop Services information  
<https://support.oracle.com/>

## Microsoft Windows Servicing Options

On Microsoft Windows 10 systems, new servicing options are available.

Oracle Database supports the following servicing options:

- Semi-Annual Channel
- Long-Term Servicing Channel

Other servicing options, such as Semi-Annual Channel (Targeted) are not supported. Oracle previously supported the former Windows servicing options, such as the Current Branch for Business (CBB) and Long-Term Servicing Branch (LTSB).

 **Note:**

Oracle supports its database products on these channel releases that become generally available for as long as Microsoft supports the channel version. Once Microsoft support ends for a specific channel version, Oracle's support ends for that version as well. Oracle may recommend that customers wait until relevant Oracle patches have been released before upgrading to a particular channel version. Oracle may recommend or discourage the installation of a specific channel version if it significantly affects the operation of Oracle software, either positively or negatively. If such a statement is deemed necessary, Oracle will disseminate this statement on My Oracle Support.

## Installation Requirements for Web Browsers

Web browsers are required only if you intend to use Oracle Enterprise Manager Database Express and Oracle Enterprise Manager Cloud Control. Web browsers must support JavaScript, and the HTML 4.0 and CSS 1.0 standards.

<https://support.oracle.com>

### Related Topics

- *Oracle Enterprise Manager Cloud Control Basic Installation Guide*

## Default Share Configuration Requirement

The prerequisite checks during Oracle Database installation require that the system drive on your computer has default share configured on it.

Use the `net use` command to verify, for example:

```
C:\> net use \\hostname\c$  
The command completed successfully
```

Ensure that the current user, the user in the Administrator group, has all the privileges on the default share.

## 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.

## Confirming Host Name Resolution

Check to ensure that the host name for your server is resolvable.

Typically, the computer on which you want to install Oracle Database is connected to a network. Ensure that the computer host name is resolvable, either 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
```

## Individual Component Requirements

Review the individual component requirements.

## Configuring Disk Storage for Oracle Data Files and Recovery Files

Learn about the storage options for storing Oracle data files and, optionally, Oracle database recovery files.

## 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. During the database installation, you must 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.

The storage option that you choose for recovery files can be the same as or different to the option you choose for the data files. The recovery files must be placed on Oracle ASM if using Oracle ACFS; otherwise they can be placed on NTFS.

## Creating Directories for Oracle Data Files or Recovery Files

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

### Guidelines for Placing Oracle Database Files on a File System or Logical Volume

Review the guidelines for placing Oracle Database files on a file system or logical volume.

- Oracle Universal Installer indicates that the default path 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 multiple physical devices and implement a stripe-and-mirror everything (SAME) storage policy.
  - 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 Oracle Optimal Flexible Architecture (OFA) guidelines. 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 running the Oracle Database installation must have write permissions to create the files in the path that you specify.

### Guidelines for Placing Oracle Recovery Files on a File System

Use the guidelines listed in this section to place Oracle recovery files on a file system.



 **Note:**

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

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

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

 **Note:**

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

- The file system that you choose must have at least 2 GB of free disk space.

The disk space requirement is the default disk quota configured for the fast recovery area (specified by the `DB_RECOVERY_FILE_DEST_SIZE` initialization parameter).

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

 **See Also:**

*Oracle Database Backup and Recovery User's Guide*

- Oracle Universal Installer suggests that the default location for the database file directory is a subdirectory of the Oracle base directory. However, this default location is not recommended for production databases.

## Creating Required Directories

Use this procedure to create the required directories.

 **Note:**

You must complete 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, follow these steps:

1. Use Windows Explorer to determine the free disk space on the file system.
2. From the display, identify the file systems to use:

File Type	File System Requirements
Data files	Select one of the following: <ul style="list-style-type: none"> <li>• A single file system with at least 950 MB of free disk space</li> <li>• Two or more file systems with at least 950 MB of free disk space in total</li> </ul>
Recovery files	Choose a file system with at least 2 GB of free disk space.

If you are using the same file system for multiple types of files, then add the disk space requirements for each type to determine the total disk space requirement.

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

## Oracle Database Security Strong Authentication Requirements

Ensure that you meet the hardware and software requirements so that you can use strong authentication (Kerberos, PKI) with Oracle Database.

## Oracle Enterprise Manager Requirements

All Oracle Enterprise Manager products must belong to the same release.

Older versions of Enterprise Manager are not supported with the new release.

Oracle Enterprise Manager products are released on the Enterprise Manager Cloud Control installation media. Oracle Enterprise Manager Database Express is built into Oracle Database without any need for special installation or management.

### See Also:

*Oracle Enterprise Manager Cloud Control Basic Installation Guide* and *Oracle Enterprise Manager Cloud Control Advanced Installation and Configuration Guide*

## Oracle-Managed Files Requirements

If you choose the Advanced database creation option, then you can use the Oracle-managed files feature with the new database.

If you use this feature, then specify only the database object name instead of file names when creating or deleting database files. You require configuration procedures to enable Oracle Managed Files.

### Related Topics

- *Oracle Database Administrator's Guide*

## Oracle Volume Shadow Copy Service (VSS) Writer

Oracle Volume Shadow Copy Service Writer is supported on Windows Server operating systems.

 **See Also:**

*Oracle Database Platform Guide for Microsoft Windows*

# 3

## Overview of Oracle Database Installation

Learn about the different installation types of Oracle Database and issues to consider before you install Oracle Database.

### Installation Considerations

Learn about the information that you must consider before deciding how to install this product.

### Oracle Base Directory

If you install Oracle Database 19c on a computer with no other Oracle software installed, Oracle Universal Installer creates an Oracle base directory for you.

If Oracle software is installed, then one or more Oracle base directories exist. In the latter case, Oracle Universal Installer offers you a choice of Oracle base directories to install Oracle Database.

The Oracle Home User has complete control over the Oracle base for a particular home. For security reasons, different Windows User Accounts used as Oracle Home Users for different Oracle homes are not allowed to share the same Oracle base. However, to support Oracle Database upgrade, Oracle supports the sharing of an Oracle base between a Windows Built-in Account and a Windows User Account. This means that if you choose to reuse an Oracle base from an earlier release of Oracle Database in Oracle Database 19c, then the Oracle Home User of Oracle Database 19c Oracle home has complete control over the Oracle base of the earlier release.



#### See Also:

*Oracle Database Platform Guide for Microsoft Windows*

In a default Windows installation, the Oracle base directory appears as follows:

```
DRIVE_LETTER:\app\username
```

where *username* is the Oracle Installation User if you choose Windows Built-in Account, else it is the Oracle Home User (standard Windows User Account).

 **Caution:**

After installing Oracle Database 19c with a Windows User Account used as the Oracle Home User, do not install older version of databases and share the same Oracle base directory. During the installation of older releases of Oracle Database, ACLs are reset corresponding to older releases. Thus Oracle Database 19c services may not be able to access the Oracle base directory and the files in it.

 **Note:**

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

## Oracle Home Directory

Learn about the Oracle Home directory.

## Contents of the Oracle Home Environment

The Oracle home directory is located under the Oracle base directory.

For example, in a default Windows installation, if you name the Oracle home directory `dbhome_1`, it appears in the Oracle base directory as follows:

```
DRIVE_LETTER:\app\username\product\19.0.0\dbhome_1
```

where *username* is the installation user if you choose a Windows Built-in Account, else it is the Oracle Home User specified.

An Oracle home corresponds to the environment in which the Oracle components run. This environment includes the following:

- Location of the installed component files
- `PATH` variable pointing to the binary files of the installed components
- Registry entries
- Service names
- Program groups

Oracle homes also have a name associated with them, which is automatically assigned by the installer.

## Multiple Oracle Home Components

You can install all Oracle components in multiple Oracle homes on the same computer.

However, some components can only support one active instance at a time. The current (latest) installation renders the previous one inactive. The component Oracle Provider for OLE DB supports one active instance at a time.

## Oracle Inventory Directory

The Oracle Inventory directory is the central inventory location for all Oracle software installed on a server.

By default, the location of the Oracle Inventory directory is `C:\Program Files\Oracle\Inventory`. This directory is created by default the first time you install Oracle software on a Windows server.

## Installing Oracle Database Vault in an Oracle Data Guard Environment

Starting with Oracle Database 12c, Oracle Database Vault is installed by default as part of the Oracle Database installation.

If you plan to use Oracle Data Guard with Oracle Database Vault, then see "Integrating Oracle Database Vault with Oracle Data Guard" in *Oracle Database Vault Administrator's Guide*.

## 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 the following:

- Database Vault database tables
- Information stored in Oracle Catalog (rollback segments, tablespaces, and so on)
- Use of system privileges
- Oracle Label Security configuration

When you install Oracle Database Vault, the security specific database initialization parameters are initialized with the default values.



### See Also:

*Oracle Database Vault Administrator's Guide*

## Consider Memory Allocation and Automatic Memory Management

During a Typical installation, you create your database with Database Configuration Assistant (DBCA), and automatic memory management is enabled. If you choose advanced installation, then you can either specify memory allocation manually, or enable automatic memory management.

With automatic memory management, the Oracle Database instances automatically manage and tune memory for you. With automatic memory management, you choose a memory target, and the instance automatically distributes memory between the system global area

(SGA) and the instance program global area (instance PGA). As memory requirements change, the instance dynamically redistributes memory between the SGA and instance PGA.

You can enable automatic memory management either during, or after the database installation. Enabling automatic memory management after installation involves a shutdown and restart of the database.



#### See Also:

*Oracle Database Administrator's Guide*

## Database Configuration Options

Review the different database configuration options.

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

## Creating a Database After Installation

You can create a database after installation by using Oracle Database Configuration Assistant (Oracle DBCA).

If you decide not to create a database during the installation, then you can use Oracle Database Configuration Assistant (Oracle DBCA) to create one after you have installed the software.

## Creating an Oracle Database on Direct NFS

Learn how to install and create an Oracle Database that uses Direct NFS (dNFS) for storage.

There are different configuration processes you must perform to use dNFS for your database file system. Following are the steps:

1. Perform a Software-Only Installation of Oracle Database

In a software-only installation, you install the Oracle Database software but do not create a database as part of the installation process. You can install only the database software by selecting the Install Database Software only option provided on the Select Installation Option screen.

2. Use Oracle Database Configuration Assistant to Create and Configure the Database

After the Prerequisite checks are complete, on the Summary screen, minimize the installation window. DO NOT click Finish at this point.

3. Enable the Direct NFS option.

Return to the DBCA window and click **Finish**.

4. Map a drive letter to a CIFS share on the NFS server that represents the location of the database files.

```
NET USE * \\filer\vol0\orcl
```

After you complete this step, both Oracle and the Windows operating system can access the location where the database files reside. Oracle is using DNFS, but the Windows OS uses CIFS to access the same location on the NFS server.

5. Verify that the Direct NFS is configured for the database.
  - a. Start SQL\*Plus.
  - b. Connect to the newly created database as a DBA user.
  - c. Run the following SQL command:

```
SELECT * FROM v$dnfs_servers;
```



# 4

## Configuring Users, Groups and Environments for Oracle Database

Learn about the users, groups, and environment settings to complete before you install Oracle Database and Grid Infrastructure for a standalone server.



### See Also:

*Oracle Database Administrator's Reference for Microsoft Windows*

## Creating Required Operating System Groups and Users

If you are installing Oracle software for the first time, then create operating system groups and users to grant Oracle Database system privileges.

You can choose to create one administrative user and use one group for operating system authentication for all system privileges on the storage and database tiers. For example, you can designate the `oracle` user to be the Oracle Installation user for all Oracle software and use only the `ORA_DBA` group for authentication. You can also create custom configuration groups and users based on job role separation that divide access privileges.

Log in as an Administrator user, and use the following instructions to create the Oracle Installation user for Oracle Database.



### See Also:

*Oracle Database Platform Guide for Microsoft Windows*

## About the Oracle Installation User

To install Oracle Restart or Oracle Database software, you must use either a local or a domain user that is also a member of the Administrators group.

This user is the Oracle Installation User. The Oracle Installation User can be either a local user or a domain user.

## Creating Oracle Home User

During Oracle Database installation, you can specify an optional Oracle home user associated with the Oracle home.

For example, assume that you use an Administrator user named `OraSys` to install the software (Oracle Installation user), then you can specify the `ORADOMAIN\OraDb` domain user

as the Oracle home user for this installation. The specified Oracle home domain user must exist before you install the Oracle Database software.

Oracle home user can be a Windows Built-in Account (LocalSystem for Server and LocalService for Client), Virtual Account, or a regular (not an administrator) Windows account. If you specify an existing user as the Oracle home user, then the Windows User Account you specify can either be a Windows Domain User or a Windows Local User.

A Windows User Account need not be created by the Administrator if a Virtual Account or a Windows Built-in Account is used during installation.

If you specify a non-existing user as the Oracle home user, then the Windows User Account you specify must be a Windows Local User. The installer creates this account automatically to run the Windows services for the Oracle home. Do not log in using this account to perform administrative tasks.

The Group Managed Services Account (gMSA) and Virtual Accounts enables you to install Oracle Database, create, and manage Database services without passwords. The gMSA is a domain level account that can be used by multiple servers in a domain to run the services using this account. Windows User Account can be a Windows Local User, Windows Domain User, Managed Services Account (MSA), or Group Managed Services Account (gMSA).

If you want to create a new user during installation, then it can only be a Windows Local User. It cannot be a Windows Domain User, an MSA, or a gMSA. The new user that is created is denied interactive logon privileges to the Windows computer. However, a Windows administrator can manage this account like any other Windows account. Oracle recommends that you use Virtual Account or a standard Windows User Account (instead of Windows Built-in Account) as the Oracle Home User for enhanced security.

 **Note:**

You cannot change the Oracle Home User after the installation is complete. If you must change the Oracle Home User, then you must reinstall the Oracle Database software.

When you specify an Oracle Home user, the installer configures that user as the Oracle Service user for all software services that run from the Oracle home. The Oracle Service user is the operating system user that the Oracle software services run as, or the user from which the services inherit privileges.

Silent installation is enhanced to support password prompt for the Oracle home user. So, customers and independent software vendors (ISV) can use response files without hard coding the password into the source code.

Oracle recommends using Virtual Account or a standard Windows User Account (not an Administrator account) as the Oracle Home User for typical installation, software-only installation, and cloning.

If an existing Windows User Account is used as the Oracle home user for software-only installation, then a password is not required. Thus, you can perform a silent, software-only installation using Windows User Account.

If you use a Windows User Account as the Oracle home user for cloning individual Oracle Database installations, then a password is not required.

Virtual Account is the Oracle home user for Oracle Database Single Instance database installation. The account enables you to install Oracle Database, create, and manage Database services without passwords. The gMSA is a domain level account that can be used by multiple servers in a domain to run the services using this account. The gMSA is a low privilege user account.

## Understanding the Oracle Inventory Directory and the Oracle Inventory Group

The Oracle Inventory directory is the central inventory location for all Oracle software installed on a server.

By default, the location of the Oracle Inventory directory is `C:\Program Files\Oracle\Inventory`.

When you install Oracle software on the system for the first time, Oracle Universal Installer creates the directories for the Oracle central inventory and the Oracle Inventory group, `ORA_INSTALL`. The `ORA_INSTALL` group contains all the Oracle Home Users for all Oracle homes on the server.

Whether you are performing the first installation of Oracle software on this server, or are performing an installation of additional Oracle software on the server, you do not need to create the Oracle central inventory or the `ORA_INSTALL` group; the Oracle Universal Installer creates them automatically. You cannot change the name of the Oracle Inventory group - it is always `ORA_INSTALL`.

## Operating System Groups Created During Oracle Database Installation

During installation, the user groups listed in the following table are created, if they do not already exist.

The `HOMENAME` variable refers to the generated `HOMENAME` for a software installation, which is of the form `OraprodctmajorVersionHomename`. For example, `OraDB19cHome1`.

**Table 4-1 User Groups Created During Oracle Database Installation**

Operating System Group Name	Related System Privilege	Description
<code>ORA_DBA</code>	<code>SYSDBA</code> system privileges for all Oracle Database installations on the server	A special OSDBA group for the Windows operating system. Members of this group are granted <code>SYSDBA</code> system privileges for all Oracle Databases installed on the server.

**Table 4-1 (Cont.) User Groups Created During Oracle Database Installation**

Operating System Group Name	Related System Privilege	Description
ORA_OPER	SYSOPER system privileges for all Oracle databases installed on the server	A special OSOPER group for the Windows operating system. Members of this group are granted SYSOPER system privileges all Oracle Databases installed on the server. This group does not have any members after installation, but you can manually add users to this group after the installation completes.
ORA_ASMADMIN	SYSASM system privileges for Oracle ASM administration	The OSASM group for the Oracle ASM instance. Using this group and the SYSASM system privileges enables the separation of SYSDBA database administration privileges from Oracle ASM storage administration privileges. Members of the OSASM group are authorized to connect using the SYSASM privilege and have full access to Oracle ASM, including administrative access to all disk groups that the Oracle ASM instance manages.
ORA_ASMDBA	SYSDBA system privileges on the Oracle ASM instance	The OSDBA group for the Oracle ASM instance. This group grants access for the database to connect to Oracle ASM. During installation, the Oracle Installation Users are configured as members of this group. After you create an Oracle Database, this group contains the Oracle Home Users of those database homes.
ORA_ASMOPER	SYSOPER for ASM system privileges	The OSOPER group for the Oracle ASM instance. Members of this group are granted SYSOPER system privileges on the Oracle ASM instance, which permits a user to perform operations such as startup, shutdown, mount, dismount, and check disk group. This group has a subset of the privileges of the OSASM group. Similar to the <i>ORA_HOMENAME_OPER</i> group, this group does not have any members after installation, but you can manually add users to this group after the installation completes.
ORA_HOMENAME_DBA	SYSDBA system privileges for all instances that run from the Oracle home with the name <i>HOMENAME</i>	An OSDBA group for a specific Oracle home with a name of <i>HOMENAME</i> . Members of this group can use operating system authentication to gain SYSDBA system privileges for any database that runs from the specific Oracle home. If you specified an Oracle Home User during installation, the user is added to this group during installation.

**Table 4-1 (Cont.) User Groups Created During Oracle Database Installation**

Operating System Group Name	Related System Privilege	Description
ORA_ <i>HOMENAME</i> _OPER	SYSOPER system privileges for all instances that run from the Oracle home with a name <i>HOMENAME</i>	An OSDBA group for the Oracle home with a name of <i>HOMENAME</i> . Members of this group can use operating system authentication to gain SYSOPER system privileges for any database that runs from the specific Oracle home. This group does not have any members after installation, but you can manually add users to this group after the installation completes.
ORA_ <i>HOMENAME</i> _SYSBACKUP	SYSBACKUP system privileges for all instances that run from the Oracle home with a name of <i>HOMENAME</i>	OSBACKUPDBA group for a specific Oracle home with a name of <i>HOMENAME</i> . Members of this group have privileges necessary for performing database backup and recovery tasks on all database instances that run from the specified Oracle home directory.
ORA_ <i>HOMENAME</i> _SYSDG	SYSDG system privileges for all instances that run from the Oracle home with a name of <i>HOMENAME</i>	OSDGDBA group for a specific Oracle home with a name of <i>HOMENAME</i> . Members of this group have privileges necessary for performing Data Guard administrative tasks on all database instances that run from the specified Oracle home directory.
ORA_ <i>HOMENAME</i> _SYSKM	SYSKM system privileges for all instances that run from the Oracle home with a name of <i>HOMENAME</i> .	OSKMDBA group for a specific Oracle home with a name of <i>HOMENAME</i> . Members of this group have privileges necessary for performing encryption key management tasks on all database instances that run from the specified Oracle home directory.
ORA_ <i>HOMENAME</i> _SYSRAC	SYSRAC system privileges for all instances that run from the Oracle home with a name of <i>HOMENAME</i> .	OSRACDBA group for a specific Oracle home with a name of <i>HOMENAME</i> . Members of this group have privileges necessary for performing a limited set of Oracle Real Application Clusters administrative tasks to create a separate group of operating system users.
ORA_ <i>HOMENAME</i> _SVCACCTS	Contains Virtual Accounts for all Oracle Database Windows Services that run from Oracle home with a name of <i>HOMENAME</i> .	SVCACCTS group specific to a Oracle home. It contains virtual accounts for all the services running under that virtual account based <i>HOMENAME</i> .

**Table 4-1 (Cont.) User Groups Created During Oracle Database Installation**

Operating System Group Name	Related System Privilege	Description
ORA_DBSVCACCTS	Contains Virtual Accounts for all Oracle Database Windows Services that run for all Virtual Accounts based Oracle homes.	DBSVACCTS system-wide group that contains virtual accounts for all the database services for all Virtual Accounts based Oracle homes.

During the installation of Oracle Database, all groups mentioned in the table are populated for proper operation of Oracle products. You must not remove any group member populated by Oracle. However, if you want to assign specific database privileges to new Windows operating system users, then you can manually add users to these groups after the installation completes.

Oracle creates other groups, such as, ORA\_INSTALL, ORA\_CLIENT\_LISTENERS, ORA\_GRID\_LISTENERS, ORA\_HOMENAME\_SVCSIDS, ORA\_HOMENAME\_SVCACCTS, and ORA\_DBSVCACCTS during installation and you must not change these groups, memberships, and ACLs associated with various Oracle created groups.

#### See Also:

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

## Operating System Groups and Users for Job Role Separation

A job role separation configuration of Oracle Database and Oracle ASM is a configuration with groups and users to provide separate groups for operating system authentication.

### About Job Role Separation Operating System Privileges Groups and Users

During the Oracle Database installation, the ORA\_DBA, ORA\_OPER, ORA\_HOMENAME\_DBA, ORA\_HOMENAME\_OPER, ORA\_HOMENAME\_SYSBACKUP, ORA\_HOMENAME\_SYSDG, ORA\_HOMENAME\_SYSKM, and ORA\_HOMENAME\_SYSRAC groups are created and users assigned to these groups.

Members of these groups are granted operating system authentication for the set of database system privileges each group authorizes. Oracle recommends that you use different operating system groups for each set of system privileges.

## Oracle Software Owner for Each Oracle Software Product

You can create a single user (for example, `oracle`) to own both Oracle Database, and Oracle Restart installations.

However, 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.

### 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.

## Standard Oracle Database Groups for Job Role Separation

Review the standard Oracle Database groups.

The following is a list of standard Oracle Database groups. These groups provide operating system authentication for database administration system privileges:

### Note:

All these groups are automatically created as a part of Oracle Database installation on Windows.

- The OSDBA group (`ORA_DBA`)

Use 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) for all database instances running on the server.

Members of the `ORA_DBA` group do not have `SYSASM` privileges on Oracle ASM instances, which are needed for mounting and dismounting disk groups.

- The OSOPER group for Oracle Database (`ORA_OPER`)

Use this group if you want a separate group of operating system users to have a limited set of database administrative privileges for starting up and shutting down the database (the `SYSOPER` privilege).

- The OSDBA group for a particular Oracle home (`ORA_HOMENAME_DBA`)

This group is created the first time you install Oracle Database software into a new Oracle home. This group identifies operating system user accounts that have database administrative privileges (the `SYSDBA` privilege) for the database instances that run from that Oracle home.

- The OSOPER group for a particular Oracle home (`ORA_HOMENAME_OPER`)  
Use this group if you want a separate group of operating system users to have a limited set of database administrative privileges for starting up and shutting down the database instances that run from a particular Oracle home (the SYSOPER privilege).

## Extended Oracle Database Groups for Job Role Separation

In addition to the SYSOPER privilege to start up and shut down the database, you can create new administrative privileges that are more task-specific and less privileged than the `ORA_DBA/SYSDBA` system privileges to support specific administrative privileges tasks required for everyday database operation.

Users granted these system privileges are also authenticated through operating system group membership.

During installation, you are prompted to provide operating system groups whose members are granted access to these system privileges. You can assign the same group to provide authentication for these privileges (for example, `ORA_DBA`), but Oracle recommends that you provide a unique group to designate each privilege.

The OSDBA subset job role separation privileges and groups consist of the following:

- The OSBACKUPDBA group for Oracle Database (`ORA_HOMENAME_SYSBACKUP`)  
Use this group if you want a separate group of operating system users to have a limited set of database backup and recovery related administrative privileges (the SYSBACKUP privilege).
- The OSDGDBA group for Oracle Data Guard (`ORA_HOMENAME_SYSDG`)  
Use this group if you want a separate group of operating system users to have a limited set of privileges to administer and monitor Oracle Data Guard (the SYSDG privilege).
- The OSKMDBA group for encryption key management (`ORA_HOMENAME_SYSKM`)  
Use this group if you want a separate group of operating system users to have a limited set of privileges for encryption key management such as Oracle Wallet Manager management (the SYSKM privilege).
- The OSRACDBA group for Oracle Real Application Clusters Administration (`ORA_HOMENAME_SYSRAC`)  
Use this group if you want a separate group of operating system users to have a limited set of Oracle Real Application Clusters (RAC) administrative privileges (the SYSRAC privilege). To use this privilege:
  - Add the Oracle Database installation owners as members of this group.

### Note:

All these groups, `ORA_HOMENAME_SYSBACKUP`, `ORA_HOMENAME_SYSDG`, `ORA_HOMENAME_SYSKM`, and `ORA_HOMENAME_SYSRAC` are applicable only to the database instances running from that particular Oracle home.



## Oracle Automatic Storage Management Groups for Job Role Separation

Review the operating system groups.

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

- The OSDBA group for Oracle ASM (`ORA_ASMDBA`)

This group grants access for the database to connect to Oracle ASM. During installation, the Oracle Installation Users are configured as members of this group. After you create an Oracle Database, this group contains the Oracle Home Users of those database homes. Any client of Oracle ASM that needs to access storage managed by Oracle ASM needs to be in this group.

- The OSASM group for Oracle ASM Administration (`ORA_ASMADMIN`)

Use this separate group to have separate administration privilege groups for Oracle ASM and Oracle Database administrators. Members of this group are granted the SYSASM system privilege to administer Oracle ASM. In Oracle documentation, the operating system group whose members are granted privileges is called the OSASM group. During installation, the Oracle Installation User for Oracle Grid Infrastructure and Oracle Database Service IDs are configured as members of this group. Membership in this group also grants database access to the Oracle ASM disks.

Members of the OSASM group can use SQL to connect to an Oracle ASM instance as SYSASM using operating system authentication. The SYSASM privilege permits mounting and dismounting disk groups, and other storage administration tasks. SYSASM system privileges do not grant access privileges on an Oracle Database instance.

- The OSOPER group for Oracle ASM (`ORA_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 ASM 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.

To use the Oracle ASM Operator group to create an Oracle ASM administrator with fewer privileges than those granted by the SYSASM system privilege you must assign the user to this group after installation.

### See Also:

- *Oracle Database Administrator's Guide*
- *Oracle Database Security Guide*

## Windows Group Managed Service Accounts and Virtual Accounts

Group Managed Services Account (gMSA) and Virtual Accounts are now supported and enable you to create and manage Database services without passwords.

## Microsoft Hyper-V Requirements

Microsoft Hyper-V enables you to create and manage a virtualized computing environment by running multiple operating systems simultaneously on a single computer and isolate operating systems from each other.

Microsoft Hyper-V enables built-in integration services for supported guest operating systems to improve the integration between a computer and a virtual machine.

Oracle Database supports Hyper-V Dynamic Memory.



### Note:

Microsoft Hyper-V for specific Oracle Database and Microsoft Hyper-V certified combinations

## Stopping Existing Oracle Services

Learn how to stop all processes, including the listener and database, running in the Oracle home.

Consider the following before you install Oracle Restart or Oracle Database:

- If you intend to use Oracle Restart, then you must install the Oracle Restart before you install and create the database. When you perform a database installation, the database must use the same listener created during the Oracle Restart 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.

- If you have an existing Oracle Database 19c running on Oracle ASM, then stop any existing Oracle ASM instances. After you finish installing Oracle Restart, start the Oracle ASM instance again.

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



### Caution:

If you are installing additional Oracle Database 19c products in an existing Oracle home, then stop *all* processes, including the listener and database, running in the Oracle home. You cannot install into an existing Oracle home other than 19c. You must complete this task to enable Oracle Universal Installer to relink certain executables and libraries.

## Configuring User Accounts

During installation, you can specify an Oracle Home User.

Before starting the installation, perform the following checks for the Oracle Installation users to ensure the installation succeeds:

## Configuring Environment Variables for the Software Installation Owner

Before starting the Oracle Database installation, ensure that the `TEMP` environment variable is set correctly.

## Managing User Accounts with User Account Control

To ensure that only trusted applications run on your computer, the Windows operating systems that support Oracle Database, provide User Account Control.

If you have enabled this security feature, then, depending on the configuration, Oracle Universal Installer prompts you for either your consent or your credentials when installing Oracle Database.

You must have Administrator privileges to run Oracle tools, such as Database Configuration Assistant, Net Configuration Assistant, and OPatch, or to run any tool or application that writes to any directory within the Oracle home. If User Account Control is enabled, and you are logged in as the local Administrator, then you can successfully run each of these commands. However, if you are logged in as a member of the Administrator group, then you must explicitly start these tasks with Windows Administrator privileges. All the Oracle shortcuts that require Administrator privileges start as Administrator by default when you click the shortcuts. However, if you run the above tools from a Windows command prompt, you must run them from an Administrator command prompt. OPatch does not have a shortcut and has to be run from an Administrator command prompt.

### See Also:

*Oracle Database Administrator's Reference for Microsoft Windows*

**To start a command prompt window with Windows Administrator privileges:**

1. On your desktop, create a shortcut for the command prompt window. An icon for that shortcut appears on the desktop.
2. Right-click the icon for the newly created shortcut, and specify **Run as administrator**.

When you open this window, the title bar reads Administrator: Command Prompt. Run commands from within this window using Administrator privileges.

## Creating Oracle Database Vault User Accounts

If you intend to use Oracle Database Vault by default, then you must create an Oracle Database Vault user account, and configure that user.

You must create the Database Vault Owner account before you can use Oracle Database Vault. You can also create a Database Vault Account Manager administrative account.

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.

### Related Topics

- *Oracle Database Vault Administrator's Guide*

# 5

## Configuring File System Storage for Oracle Database

Complete these procedures to use file system storage for Oracle Database.

For optimal database organization and performance, Oracle recommends that you install data files and the Oracle Database software in different disks.

If you plan to place storage on Network File System (NFS) protocol devices, then Oracle recommends that you use Oracle Direct NFS (dNFS) to take advantage of performance optimizations built into the Oracle Direct NFS client.

### Related Topics

- [My Oracle Support note 1496040.1](#)

## About Direct NFS Client Storage

With Oracle Database, you can store data files on a supported NFS system. You can configure Oracle Database to access NFS servers directly using an Oracle internal Direct NFS Client.

Direct NFS Client supports NFSv3, NFSv4, NFSv4.1, and pNFS protocols to access the NFS server. If Oracle Database cannot open an NFS server using Direct NFS Client, then an informational message is logged into the Oracle alert and trace files indicating that Direct NFS Client could not be established.

Starting with Oracle Database 12c Release 2, when you enable Direct NFS, you can access Direct NFS dispatcher. The Direct NFS dispatcher consolidates the number of TCP connections that are created from a database instance to the NFS server. In large database deployments, using Direct NFS dispatcher improves scalability and network performance. Parallel NFS deployments also require a large number of connections. Hence, the Direct NFS dispatcher is recommended with Parallel NFS deployments too.

Direct NFS Client supports Dispatcher or the Input/Output (I/O) infrastructure. Dispatcher enables database processes to use I/O slave processes to perform I/O operations. This limits the number of sockets and Transmission Control Protocol (TCP) connections that the Direct NFS Client requires to connect to the NFS server.

Starting with Oracle Database 12c Release 2 (12.2), Windows Direct NFS Client supports all widely accepted NFS path formats including UNIX-style NFS paths, NFS version 4, and NFS version 4.1 protocols.

The Oracle database files resident on the NFS server that are served by the Direct NFS Client can also be accessed through a third party NFS client. The volume must be mounted through CIFS or kernel NFS to enable regular windows utilities and commands, such as copy, and so on, access the database files in the remote location. Volumes mounted through CIFS cannot be used for database file storage without configuring Direct NFS Client. The atomic write requirements required for database access are not guaranteed by CIFS protocol. Consequently, CIFS can only be used for the operating system level commands, such as copy, move, and so on.

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, consult your NFS file server documentation.



#### See Also:

- *Oracle Database Reference*
- *Oracle Database Performance Tuning Guide*
- *Oracle Database Administrator's Guide*

## About the Oranfstab File for Direct NFS Client

To enable the Direct NFS Client, you must add an `oranfstab` file to `ORACLE_HOME\dbs`.

When `oranfstab` is placed in this directory, the entries in this file are specific to a single database.

## Mounting NFS Storage Devices with Direct NFS Client

Direct NFS Client determines the mount point settings for the NFS storage devices based on the configuration information in `oranfstab`.

Direct NFS Client looks for the mount point entries in `ORACLE_HOME\dbs\oranfstab`. It uses the first matched entry as the mount point.

## Specifying Network Paths for a NFS Server

Direct NFS Client can use up to four network paths defined in the `oranfstab` file 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.

Direct NFS Client requires an NFS server supporting NFS read/write buffers of at least 16384 bytes.

Direct NFS Client issues writes at `wtmax` granularity to the NFS server. Direct NFS Client does not serve an NFS server with a `wtmax` less than 16384. Oracle recommends that you use the value 32768.

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.

**Note:**

Use NFS servers supported for Oracle Database. See the My Oracle Support website for support information:

<https://support.oracle.com>

## Creating an oranfstab File for Direct NFS Client

Direct NFS uses a configuration file, `oranfstab`, to determine the available mount points.

Create an `oranfstab` file with the following attributes for each NFS server that you want to access using Direct NFS Client:

- `server`

The NFS server name.

For NFS setup with Kerberos authentication, the `server` attribute name must be the fully-qualified name of the NFS server. This `server` attribute name is used to create service principal for Ticket Granting Service (TGS) request from the Kerberos server. If you are configuring external storage snapshot cloning, then the NFS `server` name should be a valid host name. For all other scenarios, the NFS `server` name can be any unique name.

- `local`

Up to four paths on the database host, specified by IP address or by name, as displayed using the `ipconfig` command run on the database host.

- `path`

Up to four network paths to the NFS server, specified either by IP address, or by name, as displayed using the `ipconfig` command on the NFS server.

- `export`

The exported path from the NFS server. Use UNIX-style path.

- `mount`

The corresponding local mount point for the exported volume. Use WINDOWS-style path.

- `Dontroute`

Specifies that the outgoing messages must not be routed by the operating system, but sent using the IP address to which they are bound.

- `mnt_timeout`

Specifies (in seconds) the time Direct NFS Client should wait for a successful mount before timing out. This parameter is optional. The default timeout is 10 minutes (600).

- `uid` (Optional)

The UNIX user ID to be used by Direct NFS Client to access all NFS servers listed in `oranfstab`. The default value is `uid:65534`, which corresponds to `user:nobody` on the NFS server.

- `gid` (Optional)

The UNIX group ID to be used by Direct NFS Client to access all the NFS servers listed in `orafstab`. The default value is `gid:65534`, which corresponds to `group:nogroup` on the NFS server.

- `nfs_version`

Specifies the NFS protocol version used by Direct NFS Client. Possible values are NFSv3, NFSv4, NFSv4.1, and pNFS. The default version is NFSv3. If you select NFSv4.x, then you must configure the value in `orafstab` for `nfs_version`.

Specify `nfs_version` as `pNFS`, if you want to use Direct NFS with Parallel NFS. Direct NFS supports only the default `sys` security authentication with Parallel NFS. Direct NFS does not support Parallel NFS when combined with any of the Kerberos authentication parameters.

- `security_default` (Optional)

Specifies the default security mode applicable for all the exported NFS server paths for a server entry. The default value is `sys`. See the description of the `security` parameter for the supported security levels for the `security_default` parameter.

- `security` (Optional)

Specifies the security level, to enable security using Kerberos authentication protocol with Direct NFS Client. Specify `security` per export-mount pair. The supported security levels for the `security_default` and `security` parameters are:

`sys`: UNIX level security AUTH\_UNIX authentication based on user identifier (UID) and group identifier (GID) values. This is the default value for security parameters.

`krb5`: Direct NFS runs with plain Kerberos authentication. Server is authenticated as the real server which it claims to be.

`krb5i`: Direct NFS runs with Kerberos authentication and NFS integrity. Server is authenticated and each of the message transfers is checked for integrity.

`krb5p`: Direct NFS runs with Kerberos authentication and NFS privacy. Server is authenticated, and all data is completely encrypted.

The `security` parameter, if specified, takes precedence over the `security_default` parameter. If neither of these parameters are specified, then `sys` is the default authentication.

For NFS server Kerberos security setup, review the relevant NFS server documentation. For Kerberos client setup, review the relevant operating system documentation.

- `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. Default value is `public`.

The following examples show three possible NFS server entries in `orafstab`. A single `orafstab` can have multiple NFS server entries.



**Example 5-1 Using Local and Path NFS Server Entries**

The following example uses both local and path. Because they are in different subnets, you do not have to specify `dontroute`.

```
server: MyDataServer1
local: 192.0.2.0
path: 192.0.2.1
local: 192.0.100.0
path: 192.0.100.1
export: /vol/oradata1 mount: C:\APP\ORACLE\ORADATA\ORCL
```

**Example 5-2 Using Names in Place of IP Addresses, with Multiple Exports, management and community**

```
server: MyDataServer2
local: LocalPath1
path: NfsPath1
local: LocalPath2
path: NfsPath2
local: LocalPath3
path: NfsPath3
local: LocalPath4
path: NfsPath4
nfs_version: nfsv3
dontroute
export: /vol/oradata2 mount: C:\APP\ORACLE\ORADATA\ORCL2
export: /vol/oradata3 mount: C:\APP\ORACLE\ORADATA\ORCL3
export: /vol/oradata4 mount: C:\APP\ORACLE\ORADATA\ORCL4
export: /vol/oradata5 mount: C:\APP\ORACLE\ORADATA\ORCL5
management: MgmtPath1
community: private
```

**Example 5-3 Using Kerberos Authentication with Direct NFS Export**

The `security` parameter overrides `security_default`:

```
server: nfsserver
local: 192.0.2.0
path: 192.0.2.2
local: 192.0.2.3
path: 192.0.2.4
export: /vol/oradata2 mount: C:\APP\ORACLE\ORADATA\ORCL2 security: krb5
export: /vol/oradata3 mount: C:\APP\ORACLE\ORADATA\ORCL3 security: krb5p
export: /vol/oradata3 mount: C:\APP\ORACLE\ORADATA\ORCL4 security: sys
export: /vol/oradata3 mount: C:\APP\ORACLE\ORADATA\ORCL5
security_default: krb5i
```

## Performing Basic File Operations Using the ORADNFS Utility

ORADNFS is a utility which enables the database administrators to perform basic file operations over Direct NFS Client on Microsoft Windows platforms.

ORADNFS is a multi-call binary, a single binary that acts like several utilities. This allows ORADNFS to be smaller since all the built-in commands can leverage DNFS code for many common operations. ORADNFS is run by issuing a command as an argument on the command line.

For example, `C:\> ORADNFS help` causes ORADNFS to print a list of built-in commands, and `C:\> ORADNFS ls C:\ORACLE\ORADATA\ORCL` causes ORADNFS to behave as an `ls` command of `C:\ORACLE\ORADATA\ORCL` remote directory, where `C:\ORACLE\ORADATA` is a DNFS virtual mount point specified in the `oranfstab` configuration file.

### Note:

- A valid copy of the `oranfstab` configuration file must be present in `ORACLE_HOME\dfs` directory for ORADNFS to operate.
- The user must be a member of the local `ORA_DBA` group to execute ORADNFS.

## Monitoring Direct NFS Client Usage

Use the following views for Direct NFS Client management:

- **v\$dtnfs\_servers:** Shows a table of servers accessed using Direct NFS Client.
- **v\$dtnfs\_files:** Shows a table of files currently open using Direct NFS Client.
- **v\$dtnfs\_channels:** Shows a table of open network paths (or channels) to servers for which Direct NFS Client is providing files.
- **v\$dtnfs\_stats:** Shows a table of performance statistics for Direct NFS Client.

## Enabling Direct NFS Client

To enable Direct NFS Client, you must add an `oranfstab` file to the `Oracle_home\dfs` directory and modify the related DLL files used by the Oracle Database software.

1. Create an `oranfstab` file.
2. Replace the standard ODM library, `oraodm19.dll`, with the ODM NFS library  
Oracle Database uses the ODM library, `oranfsodm19.dll`, to enable Direct NFS Client. To replace the ODM library, complete the following steps:

- a. Change directory to `Oracle_home\bin`.
- b. Shut down the Oracle Database instance on a node using the Server Control Utility (SRVCTL).
- c. Enter the following commands:

```
copy oraodm19.dll oraodm19.dll.orig
copy /Y oranfsodm19.dll oraodm19.dll
```

- d. Restart the Oracle Database instance using SRVCTL.
- e. Repeat Step 2.a to Step 2.d for each node in the cluster.

## Disabling Direct NFS Client

Complete the following steps to disable the Direct NFS Client:

1. Log in as the Oracle Grid Infrastructure software owner.
2. Set `ORACLE_HOME` to Oracle home for which the Direct NFS Client must be disabled.
3. Change directory to `ORACLE_HOME\bin`.
4. Shut down the Oracle database.
5. Run the batch file, `disable_dnfs.bat` to delete `ORACLE_HOME\rdbms\lib\odm\oranfsodm18.dll`.
6. Remove the `oranfstab` file.

### Note:

If you remove an NFS path that an 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:

```
C:\>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 the `oranfstab` file using the `community` parameter.
4. Ensure that `wsnmp32.dll` and `snmpapi.dll` are installed by checking if `snmpget` is available.

# 6

## Installing and Configuring Oracle Grid Infrastructure for a Standalone Server

If you intend to use Oracle Automatic Storage Management (Oracle ASM), then you must install Oracle Restart before installing your database.

Oracle Grid Infrastructure for a standalone server is a version of Oracle Grid Infrastructure that supports single instance databases. This support includes volume management, file system, and automatic restart capabilities. Oracle Grid Infrastructure for a standalone server includes Oracle Restart and Oracle Automatic Storage Management. Oracle combined the two infrastructure products into a single set of binaries that is installed into an Oracle Restart home.

Oracle Restart is a feature provided as part of Oracle Grid Infrastructure. Oracle Restart monitors and can restart Oracle Database instances, Oracle Net Listeners, and Oracle ASM instances. Oracle Restart is currently restricted to manage single instance Oracle Databases and Oracle ASM instances only, and is subject to desupport in future releases. Oracle continues to provide Oracle ASM as part of the Oracle Grid Infrastructure installation for a standalone server and Cluster deployments.

Oracle Automatic Storage Management 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 Automatic Storage Management also supports a general purpose file system for your application needs, including Oracle Database binaries. Oracle Automatic Storage Management is Oracle's recommended storage management solution that provides an alternative to conventional volume managers and file systems.

Oracle Restart improves the availability of your Oracle database because of 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:**

- You can neither install Oracle Restart on an Oracle Grid Infrastructure cluster member node, nor add an Oracle Restart server to an Oracle Grid Infrastructure cluster member node. Oracle Restart supports single-instance databases on one server, while Oracle Grid Infrastructure for a Cluster supports single-instance or Oracle RAC databases on a cluster.
- If you install Oracle Grid Infrastructure for a standalone server on a host computer on which a database already exists, then you must manually add the database, the listener, the Oracle ASM instance, and other components to the Oracle Restart configuration before you are able to configure automatic database restarts.
- You can use the Oracle Restart implementation of Oracle Grid Infrastructure only in single-instance (nonclustered) environments. Use Oracle Grid Infrastructure with Oracle Clusterware for clustered environments.
- Oracle Grid Infrastructure for a standalone server can support multiple single-instance databases on a single host computer.

 **See Also:**

<https://support.oracle.com/rs?type=doc&id=1584742.1>

## Requirements for an Oracle Restart Installation

Before you install Oracle Restart, ensure that your system meets the following requirements:

### System Requirements

Oracle Restart has similar system requirements as Oracle Grid Infrastructure for a cluster, such as requiring 64-bit Windows server operating system.

Components included with Oracle Grid Infrastructure, such as Oracle ASM, have the same system requirements as Oracle Grid Infrastructure.

 **See Also:**

*Oracle Grid Infrastructure Installation and Upgrade Guide for Microsoft Windows x64 (64-Bit)*

### Memory Requirements

At least 1 GB of RAM for Oracle Restart installations, including installations where you plan to install Oracle Database.

## Disk Space Requirements

The disk space requirements for installing Oracle Restart are:

- At least 7 GB of disk space
- The amount of disk space available in the %TEMP% directory is equivalent to the total amount of free disk space, minus what is required to install Oracle Restart

If the free disk space is less than 1 GB in the %TEMP% directory, then:

- Delete unnecessary files from the %TEMP% directory to meet the disk space requirement.
- Set TEMP environment variable. Go to System Properties, then Environment Variables, "TEMP=C:\Temp\."

## Oracle ACFS and Oracle ADVM

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 ACFS communicates with Oracle ASM through the Oracle ADVM interface.

### Related Topics

- *Oracle Automatic Storage Management Administrator's Guide*

## Oracle ACFS and Oracle ADVM Support on Microsoft Windows

Oracle ACFS and Oracle ADVM are supported on Windows Server 2012 x64, Windows Server 2012 R2 x64, and Windows 2016 x64.

### See Also:

- My Oracle Support Note 1369107.1 for more information about platforms and releases that support Oracle ACFS and Oracle ADVM: <https://support.oracle.com/rs?type=doc&id=1369107.1>
- My Oracle Support Note 854428.1, Patch Set Updates for Oracle Products, for current release and support information: <https://support.oracle.com/epmos/faces/DocumentDisplay?id=854428.1>
- *Oracle Automatic Storage Management Administrator's Guide* for more information about Oracle ACFS and Oracle ADVM

## Restrictions and Guidelines for Oracle ACFS

Review these guidelines and restrictions as part of your storage plan for using Oracle ACFS for single instance and cluster configurations.

- Oracle Automatic Storage Management Cluster File System (Oracle ACFS) provides a general purpose file system.
- You can only use Oracle ACFS when Oracle ASM is configured.
- You must use a domain user when installing Oracle Grid Infrastructure if you plan to use Oracle ACFS.
- When creating Oracle ACFS file systems on Windows, log on as a Windows domain user. Also, when creating files in an Oracle ACFS file system on Windows, you should be logged in as a Windows domain user to ensure that the files are accessible by all nodes.

When using a file system across cluster nodes, the best practice is to mount the file system using a domain user, to ensure that the security identifier is the same across cluster nodes. Windows security identifiers, which are used in defining access rights to files and directories, use information which identifies the user. Local users are only known in the context of the local node. Oracle ACFS uses this information during the first file system mount to set the default access rights to the file system.

Note the following general guidelines and restrictions for placing Oracle Database and Oracle Grid Infrastructure files on Oracle ACFS:

- Starting with Oracle Grid Infrastructure 12c Release 1 (12.1) for a cluster, you can place Oracle Database binaries, data files, and administrative files (for example, trace files) on Oracle ACFS.
- Oracle ACFS does not support encryption or replication with Oracle Database data files, tablespace files, control files, redo logs, archive logs, RMAN backups, Data Pump dumpsets, and flashback files
- You can place Oracle Database homes on Oracle ACFS only if the database release is Oracle Database 11g release 2 or later. You cannot install earlier releases of Oracle Database on Oracle ACFS.
- For installations of Oracle Clusterware, you cannot place Oracle Clusterware files on Oracle ACFS.
- For policy-managed Oracle Flex Cluster databases, Oracle ACFS can run on any cluster node.

The following restrictions apply if you run Oracle ACFS in an Oracle Restart configuration:

- Starting with Oracle Database 18c, configuration assistants do not allow the creation of Oracle Database homes on Oracle ACFS in an Oracle Restart configuration.
- Oracle Restart does not support Oracle ACFS resources on all platforms.
- Starting with Oracle Database 12c, Oracle Restart configurations do not support the Oracle ACFS registry.
- You must manually load Oracle ACFS drivers after a system restart.
- You must manually mount an Oracle ACFS file system, and unmount it after the Oracle ASM instance has finished running.
- Creating Oracle data files on an Oracle ACFS file system is not supported in Oracle Restart configurations. Creating Oracle data files on an Oracle ACFS file system is supported on Oracle Grid Infrastructure for a cluster configurations.

# Oracle Automatic Storage Management Storage Configuration

Review the following sections for information on Oracle Automatic Storage Management (Oracle ASM) storage configuration:

## About 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 11g software with this release of Oracle Grid Infrastructure.

## Oracle Automatic Storage Management Installation Considerations

In previous releases, Oracle Automatic Storage Management (Oracle ASM) was installed as part of the Oracle Database installation. Starting with Oracle Database 11g Release 2 (11.2), Oracle Automatic Storage Management 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 Automatic Storage Management installation, then you must upgrade Oracle Automatic Storage Management by running an Oracle Grid Infrastructure upgrade (upgrades of existing Oracle Automatic Storage Management installations). If you do not have Oracle Automatic Storage Management installed and you want to use Oracle Automatic Storage Management as your storage option, then you must complete an Oracle Restart installation before you start your Oracle Database installation.

You must run Oracle Automatic Storage Management Configuration Assistant for installing and configuring Oracle ASM instances, disk groups, volumes, and Oracle Automatic Storage Management Cluster File System (Oracle ACFS). In addition, you can use the ASMCA command-line interface.

Apply the following guidelines when you install Oracle Automatic Storage Management:

- You must complete the steps listed under the *Configuring Storage for Oracle Automatic Storage Management* section to prepare a disk partition to use for the Oracle Automatic Storage Management disk groups.
- Ensure that at least one disk is configured appropriately in an Oracle ASM disk group before beginning the installation.
- When you install Oracle Automatic Storage Management, Oracle Automatic Storage Management Configuration Assistant creates a separate server parameter file (`SPFILE`)



and password file for the Oracle Automatic Storage Management instance. As soon as Oracle Automatic Storage Management is installed, `ASMSNMP` schema and user are created.

- The Oracle Automatic Storage Management instance that manages the existing disk group runs in the Oracle Grid Infrastructure home directory.

#### Related Topics

- Performance and Scalability Considerations for Disk Groups
- Password File Authentication for Oracle ASM

## Configuring Storage for Oracle Automatic Storage Management

Identify storage requirements and ASM disk group options.

### See Also:

*Oracle Automatic Storage Management Administrator's Guide*

## 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, follow these steps:

1. Determine whether you want to use Oracle ASM for Oracle Database files, recovery files, or both. Oracle Database files include data files, control files, redo log files, the server parameter file, and the password file.

During the database installation, you have the option to select either a file system or Oracle ASM as the storage mechanism for Oracle Database files. Similarly, you also have the option to select either a file system or Oracle ASM as the storage mechanism for your recovery files.

### Note:

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

If you select Oracle ASM as your storage option for Oracle Database files, then depending on your choice in the Specify Recovery Options screen, you have the following recovery options:

- If you select the Oracle ASM option for your recovery files, then Oracle Universal Installer provides you with only the option to use the same disk group for both Oracle Database files and recovery files.
- If you decide not to enable recovery during the database installation, then, after the database installation, you can modify the `DB_RECOVERY_FILE_DEST` parameter to enable the fast recovery area.

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.

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. On Oracle Exadata, Oracle recommends that you use high redundancy disk groups for added protection against failure.

- **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.

- **Flex redundancy**

A flex redundancy disk group is a new disk group type with features such as flexible file redundancy, mirror splitting, and redundancy change. A flex disk group can consolidate files with different redundancy requirements into a single disk group. It also provides the capability for databases to change the redundancy of its files.

For database data, you can choose no mirroring (unprotected), two-way mirroring (mirrored), or three-way mirroring (high). A flex redundancy disk group requires a minimum of three disk devices (or three failure groups).

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.

See, "Oracle ASM Disk Space Requirements" in *Oracle Database Installation Guide* for the Oracle ASM disk space requirements.

 **Note:**

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

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.

- Every Oracle ASM disk is divided into allocation units (AU). An allocation unit is the fundamental unit of allocation within a disk group. 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 4 MB for flex disk group and 1 MB for all other disk group types. On engineered systems, the default value is 4 MB.

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

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

To protect against failures of this type, use two HBAs, each with two disks, and define a failure group for the disks attached to each controller. This configuration enables the disk group to tolerate the failure of one HBA.

Consider the following guidelines while defining custom failure groups:

- Starting with release 12.2, you can specify custom failure groups in the **Create ASM Disk Group** screen during an Oracle Grid Infrastructure installation.
  - You can also define custom failure groups after installation, using the GUI tool ASMCA, the command line tool `asmcmd`, or SQL commands.
  - If you define custom failure groups, then for failure groups containing database files only, 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.

Use the following guidelines when identifying appropriate disk devices:

- The disk devices must be owned by the user performing the Oracle Grid Infrastructure installation.
- 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.

### Related Topics

- *Oracle Automatic Storage Management Administrator's Guide*

## Oracle ASM Disk Space Requirements

Determine the total amount of Oracle Automatic Storage Management (Oracle ASM) disk space that you require for the database files and recovery files.

**Table 6-1 Oracle ASM Disk Number and Minimum Space Requirements for an Oracle database (non-CDB)**

Redundancy Level	Minimum Number of Disks	Data Files	Recovery Files	Both File Types
External	1	2.7 GB	8.1 GB	10.8 GB
Normal or Flex with two-way mirroring	2	5.2 GB	15.6 GB	20.8 GB
High or Flex with three-way mirroring	3	7.8 GB	23.4 GB	31.2 GB

**Table 6-2 Oracle ASM Disk Number and Minimum Space Requirements for a multitenant container database (CDB) with one pluggable database (PDB)**

Redundancy Level	Minimum Number of Disks	Data Files	Recovery Files	Both File Types
External	1	4.4 GB	13.2 GB	17.6 GB
Normal or Flex with two-way mirroring	2	8.6 GB	25.8 GB	34.4 GB
High or Flex with three-way mirroring	3	12.9 GB	38.7 GB	51.6 GB

 **Note:**

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

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.

- Every Oracle ASM disk is divided into allocation units (AU). An allocation unit is the fundamental unit of allocation within a disk group. 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 4 MB for flex disk group and 1 MB for all other disk group types. On engineered systems, the default value is 4 MB.

## ASM Disk Group Options for Interactive and Noninteractive Installation

You can select new disk groups during interactive installations, but you must use existing disk groups for noninteractive installations.

Select from the following choices to store either database or recovery files in an existing Oracle ASM disk group, depending on installation method:

- Installation method that runs Database Configuration Assistant in an interactive mode (either during installation or after installation)
  - Select new Disk Group
  - Select existing Disk Group
- Installation method that runs Database Configuration Assistant in a noninteractive mode (either during installation or after installation)

Select an existing Disk Group only. You cannot create a disk group during noninteractive installations. You can add disk devices to an existing disk group if it has insufficient free space.

 **Note:**

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

## Step 1: Enabling Disk Automounting

Before you can configure partitions or logical drives on Windows, you must enable disk automounting. Enable disk automounting when using:

- Disk partitions on both single-instance and Oracle RAC installations
- Cluster file system for Oracle RAC
- Oracle Clusterware
- Raw partitions for a single-node database installation
- Primary or logical partitions for Oracle Automatic Storage Management

To enable automounting:

1. Enter the following commands at a command prompt:

```
DRIVE_LETTER:\> diskpart
DISKPART> automount enable
DISKPART> exit
```

2. Restart your computer.

## Step 2: Creating the Disk Partitions

To create disk partitions, use the disk administration tools provided by the operating system or third party vendors. The following administration tools are provided by the operating system:

- The graphical user interface Disk Management snap-in to manage disks.

To access this tool, type `diskmgmt.msc` at the command prompt. (Optional) From the **Start** menu, select **All Programs**, then **Administrative Tools**, then **Computer Management**. Then select the **Disk Management** node in the Storage tree.

Create primary partitions and logical drives in the extended partitions by selecting the **New Simple Volume** option. To create a raw device, assign a drive letter and remove the letter after the partition is created. You must select **Do not format this partition** to specify a raw partition. Do not use spanned volumes or striped volumes. These options convert the volume to a dynamic disk. Oracle Automatic Storage Management does not support dynamic disks.

For other Windows, create primary partitions by selecting the **New Partition** option. Create the logical drives by selecting the **New Logical Drive** option.

- The command-line tool `diskpart.exe`, which lets you create primary partitions, extended partitions, and logical drives.

To access this tool, enter `diskpart.exe` at the command prompt. The syntax for using `diskpart.exe` for the procedures in this section is as follows:

```
DRIVE_LETTER:\> diskpart
DISKPART> select disk diskn
DISKPART> create partition primary | extended | logical size=sizen
DISKPART>
```

where:

- `diskpart.exe` is the command-line tool for managing disks.
- `diskn` is the disk number where the partitions are created.

- *size*n is the size of the partition, for example 500 represents 500 MB.



### See Also:

The online help or documentation for the administration tool that you are using

You can enter the `diskpart.exe` commands directly at the command line. Alternatively, you can enter the commands in a text file, and then run `diskpart /s` using this file as a script.

You cannot create more than four primary disk partitions per disk. If you need more, you can get around this limitation by creating three primary partitions and then the fourth as an extended partition with as many logical partitions.

For example, to create the disk partitions on Disk 5 and assign them each a size:

```
DISKPART> select disk 5
DISKPART> create partition primary size=500
DISKPART> ...
DISKPART> create partition extended
DISKPART> create partition logical size=800
DISKPART> ...
DISKPART> create partition logical size=500
```

## Configuring Disks Manually for Oracle Automatic Storage Management

To use Oracle Automatic Storage Management with direct attached storage (DAS) or storage area network (SAN), the disks must be stamped with a header.

If you install Oracle Restart in an interactive mode, Oracle Universal Installer configures the headers of the disk during the installation process. However, if you intend to install Oracle Restart in a response file mode, then you must manually configure the disks before installation by using either `asmtoolg` (GUI version) or `asmtool` (command-line version). You can also use these tools to reconfigure the disks after installation. The `asmtoolg` and `asmtool` utilities work only on partitioned disks: you cannot use Oracle Automatic Storage Management on unpartitioned disks.

The `asmtoolg` and `asmtool` tools associate meaningful, persistent names with disks to facilitate using those disks with Oracle Automatic Storage Management. Oracle Automatic Storage Management uses disk strings to more easily operate on groups of disks at once, so the names that `asmtoolg` or `asmtool` creates make this easier than using Windows drive letters.

All disk names created by `asmtoolg` or `asmtool` begin with the prefix `ORCLDISK` followed by a user-defined prefix (the default is `DATA`) and a disk number for identification purposes.

### Using the `asmtoolg` Tool (Graphical User Interface)

The `asmtoolg` tool is a graphical interface for creating device names. Use `asmtoolg` to add, change, delete, and examine the devices available for use in Oracle Automatic Storage Management.

To add or change disk stamps:

1. In the installation media labeled Oracle Grid Infrastructure 19c, from the media root, go to `asmtool` directory and double-click `asmtoolg.exe`.

If Oracle Database is installed, go to `ORACLE_HOME\bin` and double-click `asmtoolg.exe`.

If User Account Control is enabled, then create a shortcut for the command prompt window on your desktop. An icon for that shortcut appears on the desktop. Right click the icon for the newly created shortcut, and specify "Run as administrator." When the command window opens, go to `ORACLE_HOME\bin`, and then type `asmtoolg`.

2. Select the **Add or change label** option, then click **Next**.

The `asmtoolg` tool shows the devices available on the system. Unrecognized disks are labeled as "Candidate device", stamped Oracle Automatic Storage Management disks as "Stamped ASM disk", and unstamped Oracle Automatic Storage Management disks as "Unstamped ASM disks." The tool also shows disks that are recognized by Windows as a file system (such as NTFS). These are not available for use as disks and cannot be selected. In addition, Microsoft Dynamic disks are not available for use as Oracle Automatic Storage Management disks.

3. In the Stamp Disks window, select the disks to stamp.

Oracle Automatic Storage Management can generate unique stamps for all of the devices selected for a given prefix. The stamps are generated by concatenating a number with the prefix specified. For example, if the prefix is `DATA`, then the first Oracle Automatic Storage Management link name is `ORCLDISKDATA0`.

You can also specify the stamps of individual devices.

4. (Optional) Select a disk to edit the individual stamp (Oracle Automatic Storage Management link name).
5. Click **Next**.
6. Click **Finish**.

To delete disk stamps:

1. Select the **Delete labels** option, then click **Next**.

The delete option is only available if disks exist with stamps. The delete window shows all stamped Oracle Automatic Storage Management disks.

2. In the Delete Stamps window, select the disks to unstamp.
3. Click **Next**.
4. Click **Finish**.

### Example 6-1 Using the `asmtool` Utility (Command Line)

The `asmtool` utility is a command-line interface for stamping disks. If User Account Control is enabled, then you can create a shortcut for the command prompt window on your desktop. An icon for that shortcut appears on the desktop. Right-click the icon for the newly created shortcut, and select "Run as administrator." Then start `asmtool`.

It has the following options:



Option	Description
-add	<p>Adds or changes stamps. You must specify the hard disk, partition, and new stamp name. If the disk is a raw device or has an existing Oracle Automatic Storage Management stamp, then you must specify the <code>-force</code> option. Also sets Oracle Automatic Storage Management instances to rescan the available disks.</p> <p>Example:</p> <pre>asmtool -add [-force] \Device\Harddisk1\Partition1 ORCLDISKASM0 \Device\Harddisk2\Partition1 ORCLDISKASM2...</pre>
-addprefix	<p>Adds or changes stamps using a common prefix to generate stamps automatically. The stamps are generated by adding a number with the prefix specified. If the disk is a raw device or has an existing Oracle Automatic Storage Management stamp, then you must specify the <code>-force</code> option. Also sets Oracle Automatic Storage Management instances to rescan the available disks.</p> <p>Example:</p> <pre>asmtool -addprefix ORCLDISKASM [-force] \Device\Harddisk1\Partition1 \Device\Harddisk2\Partition1...</pre>
-list	<p>Lists available disks. The stamp, windows device name, and disk size in megabytes are shown. Some disks may be file systems, and cannot be stamped. If the disk is a raw device or has an existing Oracle Automatic Storage Management stamp, then you must specify the <code>-force</code> option.</p> <p>Example:</p> <pre>asmtool -list [-force]</pre>
-delete	<p>Removes existing stamps from disks. Also sets Oracle Automatic Storage Management instances to rescan the available disks.</p> <p>Example:</p> <pre>asmtool -delete ORCLDISKASM0 ORCLDISKASM1...</pre>

## About Upgrading Existing Oracle Automatic Storage Management Instances

Oracle Automatic Storage Management (Oracle ASM) upgrades are carried out during an Oracle Grid Infrastructure upgrade.

If you are upgrading from Oracle ASM 11g Release 2 (11.2.0.4) or later, then Oracle ASM is always upgraded with Oracle Grid Infrastructure as part of the upgrade, and Oracle Automatic Storage Management Configuration Assistant (Oracle ASMCA) is started by the root scripts during upgrade. Subsequently, you can use Oracle ASMCA (located in `Grid_home/bin`) to configure failure groups, Oracle ASM volumes, and Oracle Automatic Storage Management Cluster File System (Oracle ACFS).

Oracle ASMCA cannot perform a separate upgrade of Oracle ASM from a prior release to the current release.

Upgrades of Oracle ASM from releases prior to 11g Release 2 (11.2) are not supported.

#### Related Topics

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

## Configuring Oracle Automatic Storage Management Disk Groups Manually Using Oracle ASMCA

The Oracle Automatic Storage Management Configuration Assistant utility creates a new Oracle Automatic Storage Management instance if there is no Oracle Automatic Storage Management instance currently configured on this computer.

After installing Oracle Restart, you can also use Oracle Automatic Storage Management Configuration Assistant to create and configure disk groups, Oracle Automatic Storage Management Dynamic Volume Manager (Oracle ADVM), and Oracle Automatic Storage Management Cluster File System (Oracle ACFS).

If you want to create additional disk groups or manually configure Oracle Automatic Storage Management disks, then you can run the Oracle Automatic Storage Management Configuration Assistant as follows:

```
DRIVE_LETTER:\> cd ORACLE_HOME\bin  
DRIVE_LETTER:\> asmca.bat
```



#### See Also:

*Oracle Automatic Storage Management Administrator's Guide*

## About Image-Based Oracle Grid Infrastructure Installation

Starting with Oracle Grid Infrastructure 12c Release 2 (12.2), installation and configuration of Oracle Grid Infrastructure software is simplified with image-based installation.

To install Oracle Grid Infrastructure, create the new Grid home with the necessary user group permissions, and then extract the image file into the newly-created Grid home, and run the setup wizard to register the Oracle Grid Infrastructure product.

Using image-based installation, you can do the following:

- Configure Oracle Grid Infrastructure for a new cluster.
- Configure Oracle Grid Infrastructure for a standalone server (Oracle Restart).
- Upgrade Oracle Grid Infrastructure.
- Setup software only.
- Add or remove nodes from your existing cluster, if the Oracle Grid Infrastructure software is already installed or configured.

This installation feature streamlines the installation process and supports automation of large-scale custom deployments. You can also use this installation method for deployment of customized images, after you patch the base-release software with the necessary Release Updates (RUs) or Release Update Revisions (RURs).

 **Note:**

You must extract the image software into the directory where you want your Grid home to be located, and then run the `%ORACLE_HOME%\setup.exe` script to start the Oracle Grid Infrastructure Setup Wizard. Ensure that the Grid home directory path you create is in compliance with the Oracle Optimal Flexible Architecture recommendations.

## Setup Wizard Installation Options for Creating Images

Before you start the setup wizards for your Oracle Database or Oracle Grid Infrastructure installation, decide if you want to use any of the available image-creation options.

In image-based installations, you can start your Oracle Database installation or Oracle Grid Infrastructure installation by running the setup wizard `setup.exe`. This wizard comes with the following image-creation options:

 **Note:**

`setup.exe` is the recommended setup wizard for installing both Oracle Database and Oracle Grid Infrastructure.

**Table 6-3 Image-Creation Options for Setup Wizard**

Option	Description
<code>-createGoldImage</code>	Creates a gold image from the current Oracle home.
<code>-destinationLocation</code>	Specify the complete path, or location, where the gold image will be created.
<code>-exclFiles</code>	Specify the complete paths to the files to be excluded from the newly created gold image.
<code>-help</code>	Displays help for all the available options.

For example:

```
setup.exe -createGoldImage -destinationLocation c:\my_images
```

Where:

`c:\my_images` is the file location where the image zip file is created.

# Installing Oracle Grid Infrastructure for a Standalone Server with a New Database Installation

Complete these steps to install Oracle Restart and then create a database that is managed by Oracle Restart.

Install Oracle Restart, which installs Oracle Restart and Oracle ASM, and creates one disk group.

1. Log in as the Oracle Restart software owner user (`grid`).
2. Download the Oracle Grid Infrastructure installation image files, create the Grid home directory, and extract the image files in this Grid home directory.

For example:

```
C:\> mkdir \app\oracle\product\19.0.0\grid
C:\> icacls grid:oinstall \app\oracle\product\19.0.0\grid
C:\> cd \app\oracle\product\19.0.0\grid
C:\> unzip -q download_location\grid_home.zip
```

 **Note:**

Ensure that the Grid home directory path you create is in compliance with the Oracle Optimal Flexible Architecture recommendations. Also, unzip the installation image files only in this Grid home directory that you created.

3. Run `setup.exe` to start the Oracle Grid Infrastructure installation wizard.

```
C:> Grid_home\setup.exe
```

 **Note:**

You can use the `gridSetup.exe` command with the `-applyRU` and `-applyOneOffs` options to install Release Updates (RUs) and one-off patches during an Oracle Grid Infrastructure installation or upgrade.

4. In the Select Configuration Option screen, select the **Configure Oracle Restart** option to install and configure Oracle Restart and Oracle ASM. Click **Next**.
5. During installation, disk paths mounted on Oracle ASM and registered on Oracle ASMFD with the string `ORCL:*` are listed as default database storage candidate disks.
6. Configure Oracle ASM as needed with additional disk groups.
  - The default Disk Group Name is `DATA`. You can enter a new name for the disk group, or use the default name.
  - Any additional disk devices that you create must be owned by the user performing the grid installation.

7. Respond to the configuration prompts as needed to configure Oracle Grid Infrastructure. Click **Help** for information.
8. Provide information to automate root scripts, or run scripts as root when prompted by Oracle Universal Installer.

If you configure automation for running root scripts, and a root script fails, then you can fix the problem manually, and click **Retry** to run the root script again

9. Start the Oracle Database installation, and select Oracle ASM disk groups for Oracle Database files storage. For assistance during installation, click **Help** on the Oracle Universal Installer page where you need more information.

## Installing Oracle Grid Infrastructure for a Standalone Server 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 manage resources from the same release and releases up to one version lower than Oracle Restart. For this reason, you can install Oracle Restart to provide services only for Oracle Database 19c. However, previous release Oracle Databases can coexist on the same server without being managed by Oracle Restart.

To install Oracle Restart for a database that is already installed:

1. On the same host computer as the database, install Oracle Restart, and select **Configure Oracle Grid Infrastructure for a Standalone Server (Oracle Restart)** as the installation option. See, Installing Oracle Restart with a New Database Installation in *Oracle Database Installation Guide*.

The Oracle Restart components are installed in an Oracle Grid Infrastructure Oracle home (Grid home), which is in a different location from existing Oracle Database homes.

2. If you have an existing Oracle Database, then register it for High Availability with Oracle Restart using the `srvctl` command:
 

```
DRIVE_LETTER:\> cd
ORACLE_HOME\bin DRIVE_LETTER:\> srvctl add database -db dbname -o
oracle_home_path
```

## Installing Oracle Grid Infrastructure for a Standalone Server Using a Software-Only Installation

A software-only installation only installs the Oracle Restart binaries at the specified location. You must complete a few manual configuration steps to enable Oracle Grid Infrastructure 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 Restart software.

## Installing Software Binaries for Oracle Grid Infrastructure for a Standalone Server

Use this procedure to do a software-only installation of Oracle Grid Infrastructure for a standalone server.

1. Log in to Windows as an Administrator user.
2. Download the Oracle Grid Infrastructure installation image files, create the Grid home directory, and extract the image files in this Grid home directory.

For example:

```
C:\> mkdir \app\oracle\product\19.0.0\grid
C:\> cd \app\oracle\product\19.0.0\grid
C:\> unzip -q download_location\grid.zip
```

3. Verify that the server meets the installation requirements using the command `runcluvfy.bat stage -pre hacfg`. Ensure that you have completed all storage and server preinstallation requirements.

For Example:

```
C:\> app\oracle\product\19.0.0\grid\runcluvfy.bat
```

4. Log in as the Oracle Restart software owner user and run `setup.exe` to start the Oracle Grid Infrastructure installation wizard.

```
C:\> app\oracle\product\19.0.0\grid\setup.exe
```

5. In the Select Configuration Option screen, select the **Set Up Software Only** option to perform a software-only installation of Oracle Restart. Click **Next**.
6. Respond to the prompts as needed to set up Oracle Grid Infrastructure. Click **Help** for information.

## Configuring Software Binaries for Oracle Grid Infrastructure for a Standalone Server

Use this procedure to configure and activate a software-only Oracle Restart without Oracle Automatic Storage Management (Oracle ASM).

1. Log in as a member of the Administrators group and run the `roothas.bat` script from the `Grid_home`, using the following syntax:

```
C:\>DRIVE_LETTER:\Grid_home\crs\install\roothas.bat
```

For example, if your Grid home is `C:\app\oracle\product\19.0.0\grid`, then run the following script:

```
C:\>C:\app\oracle\product\19.0.0\grid\crs\install\roothas.bat
```

2. Change the home directory to the path of the Oracle Restart home as follows:  
`Grid_home\oui\bin`, where `Grid_home` is the path of the Oracle Restart home.
3. Enter the following command:

```
setup.exe -updateNodeList ORACLE_HOME=Grid_home  
CLUSTER_NODES= CRS=TRUE
```

For example:

```
C:\app\oracle\product\19.0.0\grid> setup.exe -updateNodeList  
ORACLE_HOME=C:\app\oracle\product\19.0.0\grid  
CLUSTER_NODES= CRS=TRUE
```

4. Use the `SRVCTL` utility along with Network Configuration Assistant and Oracle Automatic Storage Management Configuration Assistant to add the listener, the Oracle Automatic Storage Management instance, and all Oracle Automatic Storage Management disk groups to the Oracle Restart configuration.

 **See Also:**

- *Oracle Database Net Services Administrator's Guide*
- *Oracle Automatic Storage Management Administrator's Guide*
- *Oracle Database Administrator's Guide*

## Testing the Oracle Automatic Storage Management Installation

After installing Oracle Grid Infrastructure for a single instance, use the `ASMCMD` command-line utility to test the Oracle ASM installation.

To test the Oracle Automatic Storage Management installation:

1. Use `SQL*Plus` to connect to the Oracle Automatic Storage Management instance as the `SYS` user with `SYSASM` privilege and start the instance if necessary:

```
DRIVE_LETTER:\>sqlplus /nolog  
SQL> CONNECT SYS as SYSASM  
Enter password: SYS_password  
SQL> STARTUP
```

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

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

 **See Also:**

*Oracle Automatic Storage Management Administrator's Guide*

# Modifying Oracle Grid Infrastructure for a Standalone Server Binaries After Installation

After 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.

## 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 Restart home for modification using the following procedure:

1. Log in using a member of the Administrators group and go to the directory `Grid_home\bin`, where `Grid_home` is the path to the Oracle Restart home.
2. Shut down the Oracle Restart stack using the following command:

```
DRIVE_LETTER:\Grid_home\bin> crsctl stop has -f
```

Alternatively, you can use the `roothas.bat` script to stop Oracle Restart, as shown in the following example:

```
DRIVE_LETTER:\Grid_home\crs\install> roothas.bat -unlock
```

## Note:

Starting with Oracle Database 12c Release 1 (12.1.0.2), the `roothas.bat` script replaces the `roothas.pl` script in the Oracle Grid Infrastructure home.

The `roothas.bat` script stops Oracle Restart and then verifies that it is stopped.

3. After the Oracle Restart stack is completely shut down, perform the changes to the software installed in the Grid home.

Apply the patches using `opatch apply`.

4. Lock the Grid home:

```
DRIVE_LETTER:\Grid_home\crs\install>roothas.bat -lock
```

5. Use the following command to restart the Oracle Restart stack:

```
DRIVE_LETTER:\Grid_home\bin> crsctl start has
```

### Example 6-2 Enabling Oracle ACFS on Oracle Restart Configurations

To use Oracle ACFS on Oracle Restart configurations, you must first enable Administrator access for Oracle ACFS using the following command:



```
DRIVE_LETTER:\cd Grid_home\crs\install  
DRIVE_LETTER:\Grid_home\crs\install>roothas.bat -lockacfs
```

**See Also:**

*Oracle OPatch User's Guide for Windows and UNIX*

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## Installing Oracle Database

Oracle Database and Oracle Grid Infrastructure installation software is available as image-based zip files in multiple media, and can be installed using several options.

### Preinstallation Considerations for Installing Oracle Database

The Oracle Database software is available on the installation media or you can download it from the Oracle Technology Network (OTN) website.

In most cases, Oracle Universal Installer provides a graphical user interface (GUI) to install the software. However, you can also use Oracle Universal Installer without the GUI by supplying a response file with silent or response file mode.



#### Note:

Windows requires Administrator privileges at the command prompt.

### Installation Consideration on Windows

On Windows, open command prompts with the Administrator privileges.

### Performing Multiple Oracle Database Installations

To perform multiple installations of Oracle Database, use either of the following methods to install Oracle Database:

- **Response files:** At each node, you run Oracle Universal Installer from the command line using silent or response file mode and you supply a response file to provide information Oracle Universal Installer needs. The response file is a text file containing the settings you normally enter in the Oracle Universal Installer GUI dialog boxes.
- **Cloning the Oracle home of an existing Oracle Database installation:** With this method, install one instance of Oracle Database, and then clone its Oracle home for each additional installation.

### Installing on Systems That Already Have Oracle Components

Perform the following steps when other components exist on your computer:

1. Log on as a member of the Administrators group for the computer on which you want to install Oracle components.

If you are installing on a Primary Domain Controller (PDC) or a Backup Domain Controller (BDC), log on as a member of the Domain Administrators group.

2. Delete the `ORACLE_HOME` environment variable if it exists. See the Microsoft online help for more information about deleting environment variables.

 **Note:**

The `ORACLE_HOME` environment variable is automatically set in the registry. Manually setting this variable prevents installation.

3. Back up any databases you must upgrade.

 **See Also:**

*Oracle Real Application Clusters Installation Guide for Linux and UNIX*

## Installing with Minimum Memory Requirements

Installations of Oracle Database on computers with RAM and virtual memory lesser than the minimum required have the following limitations:

- Computers cannot run Oracle Database Upgrade Assistant, Oracle Database Configuration Assistant, or Oracle Net Services Configuration Assistant during an Oracle Universal Installer installation session.
- Depending on how many applications run on the computer, you must further increase the paging file size or reduce the size of the System Global Area (SGA) if you run out of virtual memory. If temporary files and the paging file are both stored on the same physical drive, the space requirements for one can limit the size of the other. If your system has limited free space, first install the Oracle Database software. After the installation is finished, create a database with Oracle Database Configuration Assistant.

 **Note:**

Do not install the database on computer systems that barely meet the minimum memory and virtual memory requirements of 1 GB.

You can install only the database software by selecting the Install Database Software only option provided on the Select Installation Option screen.

After installation, run the appropriate configuration assistant for your needs:

- To create a new database, run Oracle Database Configuration Assistant. From the **Start** menu, select **All Programs**, then **Oracle - *HOMENAME***, then **Configuration and Migration Tools**, then **Database Configuration Assistant**.
- To upgrade an existing database, run Oracle Database Upgrade Assistant. From the **Start** menu, select **All Programs**, then **Oracle - *HOMENAME***, then **Configuration and Migration Tools**, then **Database Upgrade Assistant**.

## Reviewing Component-Specific Installation Guidelines

Review the following guidelines before starting Oracle Universal Installer:

- Oracle Universal Installer  
Do not use Oracle Universal Installer from an earlier Oracle release to install components from this release.
- 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 Automatic Storage Management 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 Automatic Storage Management installation, then you must upgrade Oracle Automatic Storage Management by running an Oracle Grid Infrastructure upgrade. If you do not have Oracle Automatic Storage Management installed and you want to use Oracle Automatic Storage Management as your storage option, then you must complete an Oracle Grid Infrastructure for a standalone server installation before you start your Oracle Database installation.
- Installations on a cluster  
If Oracle Clusterware or Oracle RAC is installed on the system, then Oracle Universal Installer displays the Grid Installation Options page. You must select **Single instance database installation**, unless you want to install Oracle RAC. The other options on the page are Oracle Real Application Clusters database installation and Oracle RAC One Node database installation.

 **See Also:**

*Oracle Real Application Clusters Installation Guide for Linux and UNIX*

## Using an Oracle Automatic Storage Management Disk Group

Learn how to identify disk groups and determine the available free disk space.

You can store either database or recovery files in an existing Oracle Automatic Storage Management disk group that you created during the Oracle Grid Infrastructure for a standalone server installation.

 **Note:**

The Oracle Automatic Storage Management instance that manages the existing disk group runs in a different Oracle home directory.

1. In the **Services** Control Panel, ensure that the `OracleASMSERVICE+ASM` service has started.

2. Open command prompt and temporarily set the `ORACLE_SID` environment variable to specify the appropriate value for the Oracle Automatic Storage Management instance.

For example, if the Oracle Automatic Storage Management SID, which is named `+ASM`, is located in the `asm` directory, then enter the following setting:

```
DRIVE_LETTER:\>set ORACLE_SID=+ASM
```

3. Connect to the Oracle Automatic Storage Management instance as the `SYS` user with the `SYSASM` privilege and start the instance if necessary:

```
DRIVE_LETTER:\>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.

 **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.

## About Character Set Selection During Installation

Before you create the database, decide the character set that you want to use.

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 Database uses character sets for the following:

- Data stored in SQL character data types (`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.

Starting with Oracle Database 12c Release 2 (12.2), the default database character set of a database created from the General Purpose/Transaction Processing or the Data Warehousing template is Unicode `AL32UTF8`.

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 `WE8ISO8859P1` or `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. English data may require more space only if stored in `CLOB` (character large object) columns. Storage for non-character data types, such as `NUMBER` or `DATE`, does not depend on a character set. The universality and flexibility of Unicode usually outweighs these additional costs.

Consider legacy character sets only when the database needs to support a single group of languages and the use of a legacy character set is critical for fulfilling compatibility, storage, or performance requirements. The database character set to be selected in this case is the character set of most clients connecting to this database.

The database character set of a multitenant container database (CDB) determines which databases can be plugged in later. Ensure that the character set you choose for the CDB is compatible with the database character sets of the databases to be plugged into this CDB. If you use Unicode `AL32UTF8` as your CDB character set, then you can plug in a pluggable database (PDB) in any database character set supported by Oracle Database (with the exception of EBCDIC-based character sets).

#### See Also:

*Oracle Database Globalization Support Guide* for more information about choosing a database character set for a multitenant container database (CDB)

## Accessing the Installation Software

The Oracle software is available on the installation media or you can download it from the Oracle Technology Network website, or Oracle Software Delivery Cloud website.

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:

### 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.

Select the method that you want to use to download the software. Ensure that you review and understand the terms of the license. Most downloads include the development license.

### Downloading the Installation Archive Files from Oracle Technology Network

To download the installation archive files from Oracle Technology Network:

1. Use any browser to access the software download page from OTN.

2. Navigate 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 `OraDB19c`, 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 OTN.
8. Extract the files in each directory that you just created.

## 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 website:  
<http://edelivery.oracle.com/>
2. Complete the Export Validation process by entering information (name, company, e-mail 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. Once 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 to 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 website for more information about Media Packs

## Extracting the Installation File

Use this procedure to extract the installation archive file:

1. If necessary, change to the directory that contains the downloaded installation archive file.
2. Extract the zip file contents to a desired destination directory.

## Installing on Remote Computers Through Remote Access Software

If you want to install and run Oracle Database on a remote computer (that is, the remote computer has the hard drive and runs Oracle Database components), but you do not have physical access to the computer, you still can perform the installation on the remote computer if it is running remote access software such as VNC or Symantec pcAnywhere.

You also need the remote access software running on your local computer.

You can install Oracle Database on the remote computer in one of two ways:

- If you have copied the contents of the Oracle Database installation software to a hard drive, you can install the software from the hard drive.
- You can insert the Oracle Database DVD into a drive on your local computer, and install the software from the DVD.

## Installing on Remote Computers from a Hard Drive

If you have copied the contents of the Oracle Database installation software to a hard drive, you can install the software from the hard drive.

To install the software on a remote computer from a hard drive:

1. Ensure that the remote access software is installed and running on the remote and local computers.
2. Share the hard drive that contains the Oracle Database installation software.
3. On the remote computer, map a drive letter to the shared hard drive. You use the remote access software to do this on the remote computer.
4. Through the remote access software, run Oracle Universal Installer on the remote computer. You access Oracle Universal Installer from the shared hard drive.



## Installing on Remote Computers from a Remote DVD Drive

You can insert the DVD into a drive on your local computer, and install from the DVD.

To install the software on a remote computer from a remote DVD drive:

1. Ensure that the remote access software is installed and running on the remote and local computers.
2. On the local computer, share the DVD drive.

On the remote computer, map a drive letter to the shared DVD drive. You use the remote access software to do this on the remote computer.

3. Through the remote access software, run Oracle Universal Installer on the remote computer. You can access Oracle Universal Installer from the shared DVD drive.

## Installing from a Remote DVD Drive

If the computer where you want to install Oracle Database does not have a DVD drive, you can perform the installation from a remote DVD drive.

### Step 1: On the Remote Computer, Share the DVD Drive

The remote DVD drive must allow shared access.

To set this up, perform these steps on the remote computer that has the DVD drive:

1. Log in to the remote computer as an Administrator user.
2. Start Windows Explorer.
3. Right-click the DVD drive letter and select **Sharing** (or **Sharing and Security**).
4. Click the **Sharing** tab and do the following:
  - a. Select **Share this folder**.
  - b. In **Share name**, give it a share name such as `dvd`. You use this name when you map the DVD drive on the local computer in step 1.d of "Step 2: On the Local Computer, Map the DVD Drive".
  - c. Click **Permissions**. You need at least read permission for the user who accesses the drive to install Oracle Database.
  - d. Click **OK** when you are finished.
5. Insert the Oracle Database installation media into the DVD drive.

### Step 2: On the Local Computer, Map the DVD Drive

Perform these steps on the local computer to map a remote DVD drive and to run Oracle Universal Installer from the mapped drive.

1. Map the remote DVD drive.
  - a. Start Windows Explorer on the local computer.

- b. From the **Tools** menu, select **Map Network Drive** to display the Map Network Drive dialog box.
- c. Select a drive letter to use for the remote DVD drive.
- d. In **Folder**, enter the location of the remote DVD drive using the following format:

```
\\remote_hostname\share_name
```

where:

- *remote\_hostname* is the name of the remote computer with the DVD drive.
- *share\_name* is the share name that you entered in step 4 of the previous procedure. For example:

```
\\computer2\dvd
```

- e. If you must connect to the remote computer as a different user, click **different user name**, and enter the user name.
  - f. Click **Finish**.
2. Run Oracle Universal Installer from the mapped DVD drive.

## Copying the Oracle Database Software to a Hard Disk

To copy the contents of the installation media to a hard disk:

1. Create a directory on your hard drive. For example:

```
C:\> mkdir \install  
C:\> mkdir \install\database
```

2. Copy the contents of the installation media to the directory that you just created.

## Installing and Using Oracle Components in Different Languages

Learn about installing and using Oracle components in different languages.

### Configuring Oracle Components to Run in Different Languages

You can specify the language and the territory, or locale, in which you want to use the 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. Otherwise, the user interface is displayed in English.

## Determining the Operating System Locale

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.

Open the Control Panel from the Start menu to modify the operating system locale settings. In the classic view of the Control Panel on Windows, click **Regional and Language Options**. In the default view of the Control Panel on Windows, click **Change keyboards or other input methods**.

To set locale for the current operating system user on Windows, select the desired locale from the Current format pop-up list on the Formats tab.

Some of the locales may be unavailable until you install required operating system support files.

Some Oracle components, such as SQL\*Plus, require that the Windows System Locale is also set to the language in which the components are to be run. System Locale is called Language for non-Unicode programs on Windows. On Windows, click the **Change system locale** button on the Administrative tab, accept the use of administrative privileges, if User Account Control is active, and select the locale from the pop-up list in the opened dialog box.

 **Note:**

The operating system must be restarted after the System Locale is changed. See the operating system documentation for further information about Windows locale settings.

## Configuring Locale and Character Sets Using the NLS\_LANG Environment Variable

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 Windows ANSI Code Page as determined by the System Locale.

The `NLS_LANG` parameter on Windows can be set

- in Registry under the subkey corresponding to a given Oracle home,
- as an environment variable.

When you install Oracle Database components and the `NLS_LANG` parameter is not yet set in the Registry subkey of the target Oracle home, Oracle Universal Installer sets the `NLS_LANG` parameter to a default value derived from the operating system locale for the current user.

#### See Also:

- *Oracle Database Globalization Support Guide* for information about the `NLS_LANG` parameter and Globalization Support initialization parameters

For example:

- Arabic (U.A.E.) - ARABIC\_UNITED ARAB EMIRATES.AR8MSWIN1256
- Chinese (PRC) - SIMPLIFIED CHINESE\_CHINA.ZHS16GBK
- Chinese (Taiwan) - TRADITIONAL CHINESE\_TAIWAN.ZHT16MSWIN950
- English (United Kingdom) - ENGLISH\_UNITED KINGDOM.WE8MSWIN1252
- English (United States) - AMERICAN\_AMERICA.WE8MSWIN1252
- French (Canada) - CANADIAN FRENCH\_CANADA.WE8MSWIN1252
- French (France) - FRENCH\_FRANCE.WE8MSWIN1252
- German (Germany) - GERMAN\_GERMANY.WE8MSWIN1252
- Hebrew - HEBREW\_ISRAEL.IW8MSWIN1255
- Japanese - JAPANESE\_JAPAN.JA16SJISTILDE
- Russian - RUSSIAN\_RUSSIA.CL8MSWIN1251
- Spanish (Spain) - SPANISH\_SPAIN.WE8MSWIN1252
- Spanish (Mexico) - MEXICAN SPANISH\_MEXICO.WE8MSWIN1252
- Spanish (Venezuela) - LATIN AMERICAN SPANISH\_VENEZUELA.WE8MSWIN1252

## NLS\_LANG Settings in Console Mode and Batch Mode

Before you can use Oracle utilities such as SQL\*Plus, SQL Loader, Import, and Export from the command prompt, you may have to set the character set in the parameter `NLS_LANG` to a different value from the one used in the registry.

You may need to set a different character set for console mode utilities, because programs running in console mode use, with a few exceptions, a different code page (character set) from programs running in GUI mode. The default Oracle home `NLS_LANG` parameter in the Registry is always set to the appropriate GUI code page. If you do not set the `NLS_LANG` parameter for the console mode session correctly, incorrect character conversion can corrupt error messages and data.

For Japanese, Korean, Simplified Chinese, Traditional Chinese, Thai, and Vietnamese, the console (OEM) code page is identical to the GUI (ANSI) code page. In this case, you are not required to set the `NLS_LANG` parameter. For other languages, set the correct character set value of `NLS_LANG` by issuing a `SET NLS_LANG` command in the same Command Prompt window in which you want to start the affected utility.

Similarly, in batch mode, set the correct character set value of `NLS_LANG` by inserting a `SET NLS_LANG` command at the start of the batch procedure, according to the character set of the files to be processed in the procedure.

To find the current console code page, issue the `CHCP` command in the Command Prompt window. Use the reported code page number to look up the corresponding Oracle character set name in the following table:

**Table 7-1 Oracle Character Sets for Console Mode (OEM) Code Pages**

OEM Code Page	Oracle Character Set for Console Mode
437 (US)	US8PC437
737 (Greek)	EL8PC737
775 (Baltic)	BLT8PC775
850 (Multilingual Latin I)	WE8PC850
852 (Latin II)	EE8PC852
855 (Cyrillic)	RU8PC855
857 (Turkish)	TR8PC857
858 (Multilingual Latin I + Euro)	WE8PC858
866 (Russian)	RU8PC866
874 (Thai)	TH8TISASCII
932 (Japanese Shift-JIS)	JA16SJISTILDE
936 (Simplified Chinese GBK)	ZHS16GBK
949 (Korean)	KO16MSWIN949
950 (Traditional Chinese Big5)	ZHT16MSWIN950
1258 (Vietnam)	VN8MSWIN1258

## 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.

To install translation resources:

1. Start Oracle Universal Installer.
2. In the Select Installation Option screen, select the installation option and click **Next**.
3. In the System Class screen, select the type of system class for installing the database, and click **Next**.
4. In the Grid Installation Options screen, select the type of database installation you want to perform, and click **Next**.

### See Also:

*Oracle Database Vault Administrator's Guide*

## Running Oracle Universal Installer in Different Languages

Describes how to run Oracle Universal Installer in other languages.

Your operating system locale determines the language in which Oracle Universal Installer runs. You can run Oracle Universal Installer in one of these 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 a supported language, change the locale in which your operating system session is running before you start Oracle Universal Installer. If the selected

language is not one of the supported languages, then Oracle Universal Installer runs in English.

1. Change the locale for the operating system user and the System Locale.
2. Run Oracle Universal Installer.

## About Image-Based Oracle Database Installation

Starting with Oracle Database 18c, installation and configuration of Oracle Database software is simplified with image-based installation.

To install Oracle Database, create the new Oracle home, extract the image file into the newly-created Oracle home, and run the setup wizard to register the Oracle Database product.

Using image-based installation, you can install and upgrade Oracle Database for single-instance and cluster configurations.

This installation feature streamlines the installation process and supports automation of large-scale custom deployments. You can also use this installation method for deployment of customized images, after you patch the base-release software with the necessary Release Updates (Updates) or Release Update Revisions (Revisions).

### Note:

You must extract the image software (`db_home.zip`) into the directory where you want your Oracle Database home to be located, and then run the Oracle Database Setup Wizard to start the Oracle Database installation and configuration. Oracle recommends that the Oracle home directory path you create is in compliance with the Oracle Optimal Flexible Architecture recommendations.

## Setup Wizard Installation Options for Creating Images

Before you start the setup wizards for your Oracle Database or Oracle Grid Infrastructure installation, decide if you want to use any of the available image-creation options.

In image-based installations, you can start your Oracle Database installation or Oracle Grid Infrastructure installation by running the setup wizard `setup.exe`. This wizard comes with the following image-creation options:

### Note:

`setup.exe` is the recommended setup wizard for installing both Oracle Database and Oracle Grid Infrastructure.

**Table 7-2 Image-Creation Options for Setup Wizard**

Option	Description
-createGoldImage	Creates a gold image from the current Oracle home.
-destinationLocation	Specify the complete path, or location, where the gold image will be created.
-exclFiles	Specify the complete paths to the files to be excluded from the newly created gold image.
-help	Displays help for all the available options.

For example:

```
setup.exe -createGoldImage -destinationLocation c:\my_images
```

Where:

c:\my\_images is the file location where the image zip file is created.

## Installing the Oracle Database Software

This topic explains how to run Oracle Universal Installer to perform most database installations.

### Note:

- If you plan to use Oracle Restart or Oracle ASM, 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.
- You may have to shut down existing Oracle processes before you start the database installation.
- You can install Oracle Database by using the silent or response file installation method, without the GUI. This method is useful to perform multiple installations of Oracle Database.

1. Login as an `Administrator` user. Follow the Oracle Optimal Flexible Architecture (OFA) recommendations and specify the correct owner, group, and permissions for this directory.

```
C:\>md C:\app\oracle
C:\>icacls oracle:oinstall C:\app\oracle
```

If you are installing on a Primary Domain Controller (PDC) or a Backup Domain Controller (BDC), log on as a member of the Domain Administrators group.

2. If you are installing Oracle Database on a computer with multiple Network Interface Cards or multiple aliases, use **System** in the Control Panel to create the



ORACLE\_HOSTNAME system environment variable. Set this variable to point to the host name of the computer on which you are installing Oracle Database.

3. Log in to the Oracle Database server as the Oracle Database software owner user (oracle).
4. Download the Oracle Database 19c release 19.3 installation image file (db\_home.zip) from Oracle Software Delivery Cloud website to a directory of your choice.

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

5. Create an OFA-compliant Oracle home directory on the local file system and extract the image files that you have downloaded in to this Oracle home directory. For example:

```
C:\>md C:\app\oracle\product\19.0.0\dbhome_1
C:\>cd C:\app\oracle\product\19.0.0\dbhome_1
C:\app\oracle\product\19.0.0\dbhome_1> unzip \tmp\db_home.zip
```

6. From the Oracle home directory, run the setup.exe command to start the Oracle Database Setup Wizard.

```
C:\app\oracle\product\19.0.0\dbhome_1>setup.exe
```

 **Note:**

Run the setup.exe command from the Oracle home directory only. Do not use the setup.exe command that resides at %ORACLE\_HOME%\oui\bin\, or any other location, to install Oracle Database.

7. In the Select Configuration Option screen, select **Set Up Software Only**.
8. In the Select Database Installation Option screen, select **Single instance database installation**.
9. In the Select Database Edition screen, select **Enterprise Edition**.
10. Respond to the configuration prompts as needed.

 **Note:**

Click **Help** if you have any questions about the information you are asked to submit during installation.

11. When the Configuration Assistant tasks are complete, click **Finish**, click **Exit**, then click **Yes** to exit from Oracle Universal Installer.

## Installing Standard Edition High Availability

Learn how to Install high availability on Oracle Database Standard Edition 2.

## About Standard Edition High Availability

Starting with Oracle Database 19c Release Update (19.7), you can install Oracle Database Standard Edition 2 in high availability mode.

Standard Edition High Availability provides cluster-based failover for single-instance Standard Edition Oracle Databases using Oracle Clusterware.

Oracle Standard Edition High Availability benefits from the cluster capabilities and storage solutions that are already part of Oracle Grid Infrastructure, such as Oracle Clusterware, Oracle Automatic Storage Management (Oracle ASM) and Oracle ASM Cluster File System (Oracle ACFS).

Using integrated, shared, and concurrently mounted storage, such as Oracle ASM and Oracle ACFS for database files as well as for unstructured data, enables Oracle Grid Infrastructure to restart an Oracle Database on a failover node much faster than any cluster solution that relies on failing over and remounting volumes and file systems.

Standard Edition High Availability is supported on Linux x86-64, Oracle Solaris on SPARC (64-bit), and Microsoft Windows.

Starting with Oracle Database 19c Release Update (19.13), Standard Edition High Availability is supported on IBM AIX on POWER Systems (64-bit).

### Note:

This section is specific to Standard Edition High Availability, which provides cluster-based database failover for Standard Edition Oracle Databases 19c. For more information about high availability options for Oracle Database, see *Oracle Clusterware Administration and Deployment Guide*.

## Requirements for Installing Standard Edition High Availability

Review these requirements before you install and deploy the Standard Edition High Availability feature.

- You must configure Standard Edition High Availability using at least two nodes of a cluster running Oracle Grid Infrastructure 19.7 or later for Standalone Cluster.
- You must configure Standard Edition High Availability using an Oracle Database home of version 19.7 or later.

### Note:

When updating your Oracle Database home using Release Update (RU) 19.7 or later, ensure that you apply the Oracle Clusterware (OCW) RU of the same version to the Oracle Database home.

- Ensure that all cluster nodes on which you plan to install Oracle Database have the same operating system configuration, database users, database groups, and resource limits.
- You must store the Oracle Database binaries only on local storage or Oracle Automatic Storage Management Cluster File System (Oracle ACFS).

- You must store the Oracle Database data files only on Oracle ASM or Oracle ACFS.
- If you are using Oracle ACFS for storing data files, then you must register Oracle ACFS as a clusterware resource. The Oracle Database software owner user (`oracle`) must be the mount owner of the Oracle ACFS volume. When using an Oracle home on Oracle ACFS, Oracle recommends that you have Oracle base on the local file system.
- If you are using a local file system, then you must have the same single-instance Standard Edition 2 installation and updates on each node. You must also use the same Oracle base and Oracle home directory structure on each node.
- You must perform the same Oracle home operations on all the nodes.
- You must use an SPFILE for the database instance initialization parameters and a database password file stored for the database instance initialization parameters in Oracle ASM or Oracle ACFS. This approach ensures that the parameters are consistent across all nodes and the password file is available after a failover or a relocation.
- You must register the Standard Edition 2 single-instance database with SCAN listeners as remote listener and node listeners as local listener.

## Deploying Standard Edition High Availability

Learn the process and options to deploy high availability on Oracle Database Standard Edition 2.

After installing Oracle Clusterware, as described in *Oracle Grid Infrastructure Installation and Upgrade Guide* for your platform, install single instance Standard Edition 2 Oracle Database software on the cluster nodes on which you want to configure Standard Edition High Availability.

### Related Topics

- *Oracle Grid Infrastructure Installation and Upgrade Guide for Linux*

## Installing Standard Edition High Availability Database Software on Local File System

You can install Oracle Database software binaries on a local file system to enable the Oracle Database Standard Edition high availability feature.

Ensure that all the cluster nodes, on which you plan to configure Standard Edition High Availability, have the same operating system configuration, database users, database groups, resource limits, and SSH equivalence for the Oracle Database software owner user (`oracle`).

Before you start the installation, have all the information you need about users, groups, and storage paths. You should also be prepared to run root scripts or provide information to automate root scripts.

1. As the `Administrator` user, log into the first cluster node on which you want to configure Standard Edition High Availability and create the Oracle base directory on the local file system. Follow the Oracle Optimal Flexible Architecture (OFA)

recommendations and specify the correct owner, group, and permissions for this directory.

```
C:\>md C:\app\oracle
C:\>icacls oracle:oinstall C:\app\oracle
```

2. Log in to the first cluster node as the Oracle Database software owner user (`oracle`).
3. Download the Oracle Database 19c release 19.3 installation image file (`db_home.zip`) from Oracle Software Delivery Cloud website to a directory of your choice.

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

4. Download the Oracle Database Release Update 19.7 or later patch from My Oracle Support to a directory of your choice and unzip it.

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

5. Create an OFA-compliant Oracle home directory on the local file system and extract the image files that you have downloaded in to this Oracle home directory. For example:

```
C:\>md C:\app\oracle\product\19.0.0\dbhome_1
C:\>cd C:\app\oracle\product\19.0.0\dbhome_1
C:\app\oracle\product\19.0.0\dbhome_1> unzip \tmp\db_home.zip
```

6. From the Oracle home directory, run the `setup.exe` command to start the Oracle Database Setup Wizard.

```
C:\app\oracle\product\19.0.0\dbhome_1>setup.exe
```

 **Note:**

Run the `setup.exe` command from the Oracle home directory only. Do not use the `setup.exe` command that resides at `%ORACLE_HOME%\oui\bin\`, or any other location, to install Oracle Database.

7. In the Select Configuration Option screen, select **Set Up Software Only**.
8. In the Select Database Installation Option screen, select **Single instance database installation**.
9. In the Select Database Edition screen, select **Standard Edition 2**.
10. Respond to the configuration prompts as needed.

 **Note:**

Click **Help** if you have any questions about the information you are asked to submit during installation.

11. Apply the Oracle Database Release Update (RU) 19.7 or later patch. Review the patch documentation for instructions on how to apply the patch.

 **Note:**

Ensure that you apply the Oracle Clusterware (OCW) RU of the same version to the Oracle Database home.

12. Optional: As the `oracle` user, enable read-only Oracle home on the first cluster node.

```
cd C:\app\vladb22\product\19.0.0\dbhome_1\bin
C:\app\vladb22\product\19.0.0\dbhome_1\bin>roohctl.bat -enable
```

 **Note:**

Do not use the `-disable` flag with the `roohctl` command, as it is not supported.

13. As the Administrator user, create the Oracle base directory on all of the other cluster nodes on which you want to configure Standard Edition High Availability.

```
C:\>md C:\app\oracle
C:\>icacls oracle:oinstall C:\app\oracle
```

14. As the `oracle` user, run the `addnode.bat` script from the first node to perform the following operations on the other nodes on which you want to configure Standard Edition High Availability:

- Copy the Oracle home directory from the first node to the other nodes.
- Setup Oracle base, Oracle inventory directories, and Oracle DB registry keys on the other nodes.

```
C:\>%ORACLE_HOME%\addnode\addnode.bat -silent
CLUSTER_NEW_NODES=comma_separated_list_of_other_nodes
```

15. If you specify a non built-in and a non Administrator's user account while installing Oracle Database, then add the respective user's password to the CRS wallet using the following command:

```
crsctl add wallet -type OSUSER -user DB service user name -password
```

After the Oracle Database software installation is complete, use Oracle Database Configuration Assistant (Oracle DBCA), in either interactive or silent mode, to create a Standard Edition database on the first cluster node on which you installed the Oracle Database software.

For more information about the requirements for creating a database, and the procedure for enabling and configuring Standard Edition High Availability for Oracle Databases, refer to *Oracle Database Administrator's Guide*

### Related Topics

- *Oracle Grid Infrastructure Installation and Upgrade Guide for Linux*

- *Creating a Database with Oracle DBCA*

## Installing Standard Edition High Availability Database Software on Oracle ACFS

You can install Oracle Database software binaries on an Oracle ASM Cluster File System (Oracle ACFS) volume to enable the Oracle Database Standard Edition High Availability feature.

Ensure that all the cluster nodes, on which you plan to configure Standard Edition High Availability, have the same operating system configuration, database users, database groups, resource limits, and SSH equivalence for the Oracle Database software owner user (`oracle`) between the nodes.

Before you start the installation, have all the information you need about users groups, and storage paths. You should also be prepared to run root scripts or provide information to automate root scripts.

1. As the `Administrator` user, register Oracle ACFS as an Oracle Clusterware resource specifying the Oracle Database software owner user (`oracle`) as the mount owner.

```
C:\>Grid_home\bin\srvctl add filesystem -volume acfs_volume_name -
diskgroup diskgroup_name -path mount_point -fstype ACFS -autostart ALWAYS
-user oracle
```

 **Note:**

Mount Oracle ACFS to a mount point where you plan to create Oracle base and Oracle home directories for this installation. For example, `C:\app\oracle`.

2. Mount the Oracle ACFS file system on all of the cluster nodes on which you want to configure Standard Edition High Availability.

```
C:\>Grid_home\bin\srvctl start filesystem -volume acfs_volume_name -
diskgroup diskgroup_name
```

3. Create the Oracle base directory in an Oracle ACFS volume on the first cluster node on which you want to configure Standard Edition High Availability. Follow the Oracle Optimal Flexible Architecture (OFA) recommendations and specify the correct owner, group, and permissions for this directory.

```
C:\>md C:\app\oracle
C:\>icacls oracle:oinstall C:\app\oracle
```

4. Log in to the first cluster node as the `oracle` user.
5. Download the Oracle Database 19c release 19.3 installation image file (`db_home.zip`) from Oracle Software Delivery Cloud website to a directory of your choice.

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

6. Download the Oracle Database Release Update 19.7 or later patch from My Oracle Support to a directory of your choice and unzip it.

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

7. Create an OFA-compliant Oracle home directory in an Oracle ACFS volume and extract the image files that you have downloaded in to this Oracle home directory. For example:

```
C:\>md C:\app\oracle\product\19.0.0\dbhome_1
C:\>cd C:\app\oracle\product\19.0.0\dbhome_1
C:\app\oracle\product\19.0.0\dbhome_1> unzip \tmp\db_home.zip
```

8. From the Oracle home directory, run the `setup.exe` command to start the Oracle Database Setup Wizard.

```
C:\app\oracle\product\19.0.0\dbhome_1>setup.exe
```

 **Note:**

Run the `setup.exe` command from the Oracle home directory only. Do not use the `setup.exe` command that resides at `%ORACLE_HOME%\oui\bin\`, or any other location, to install Oracle Database.

9. In the Select Configuration Option screen, select **Set Up Software Only**.
10. In the Select Database Installation Option screen, select **Single instance database installation**.
11. In the Select Database Edition screen, select **Standard Edition 2**.
12. Respond to the configuration prompts as needed.

 **Note:**

Click **Help** if you have any questions about the information you are asked to submit during installation.

13. Apply the Oracle Database Release Update (RU) 19.7 or later patch. Review the patch documentation for instructions on how to apply the patch.

 **Note:**

Ensure that you apply the Oracle Clusterware (OCW) RU of the same version to the Oracle Database home.

14. Optional: As the `oracle` user, enable read-only Oracle home on the first cluster node.

```
cd C:\app\vladb22\product\19.0.0\dbhome_1\bin
C:\app\vladb22\product\19.0.0\dbhome_1\bin>roohctl.bat -enable
```

 **Note:**

Do not use the `-disable` flag with the `roohctl` command, as it is not supported.

15. Attach the Oracle home on the first node to the other cluster nodes on which you want to configure Standard Edition High Availability.

```
C:\>%ORACLE_HOME%\addnode\addnode.bat -silent
CLUSTER_NEW_NODES=comma_separated_list_of_other_nodes
```

16. If you specify a non built-in and a non Administrator's user account while installing Oracle Database, then add the respective user's password to the CRS wallet using the following command:

```
crsctl add wallet -type OSUSER -user DB service user name -password
```

After the Oracle Database software installation is complete, use Oracle Database Configuration Assistant (Oracle DBCA), in either interactive or silent mode, to create a Standard Edition database on the first cluster node on which you installed the Oracle Database software.

For more information about the requirements for creating a database, and the procedure for enabling and configuring Standard Edition High Availability for Oracle Databases, refer to *Oracle Database Administrator's Guide*

**Related Topics**

- *Oracle Grid Infrastructure Installation and Upgrade Guide for Linux*
- *Configuring Oracle Automatic Storage Management Cluster File System*
- *Creating a Database with Oracle DBCA*

## Cloning an Oracle Home

Follow these steps to clone an Oracle home.

 **Note:**

During cloning, Oracle Universal Installer (OUI) prompts you to run scripts that require root privileges.

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 following directory:

```
C:\Program Files\Oracle\Inventory\logs
```

If you have installed patches, you can check their status by running the following commands at a command prompt:

```
C:\ORACLE_HOME\OPatch> set ORACLE_HOME=ORACLE_HOME_using_patch
C:\ORACLE_HOME\OPatch> opatch lsinventory
```



2. Stop all processes related to the Oracle home. You can stop Oracle services by the following method:

**Microsoft Windows Services utility:** From the **Start** menu, select **Control Panel**, then **Administrative Tools**, then **Services**. Right-click any service that begins with **Oracle**, and then from the menu, select **Stop**.

3. Create a ZIP file with the Oracle home (but not Oracle base) directory.

For example, if the source Oracle installation is in `C:\app\username\product\19.0.0\dbhome_1` you zip the `dbhome_1` directory, leaving out the `admin`, `flash_recovery_area`, and `oradata` directories that are under `19.0.0`. These directories are created in the target installation later on when you create a new database there.

4. Copy the ZIP file to the root directory of the target computer. If you use File Transfer Protocol (FTP), then transfer the ZIP file in binary mode only.
5. Extract the ZIP file contents, selecting the **Use folder names** option.
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. In the source Oracle home, restart the services that you stopped in step 2.
8. On the target computer, `cd` to the unzipped Oracle home directory, and perform the following steps:

- a. Remove the `*.ora` files that are present in unzipped `ORACLE_HOME\network\admin` directory, such as `listener.ora`, `sqlnet.ora`, and `tnsnames.ora`.
- b. Delete unnecessary files from the unzipped Oracle home directory.

The unzipped Oracle home directory contains files that are relevant only to the source Oracle home. Remove the unnecessary files from the unzipped Oracle home in the `log`, `crs/init`, `crf`, and `cdata` directories. The following example shows how to remove these unnecessary files from the unzipped Oracle home directory:

```
[grid_home]# cd copy_path
[grid_home]# rm -rf host_name
[grid_home]# rm -rf log/host_name
[grid_home]# rm -rf gpnpp/host_name
[grid_home]# rm -rf find gpnpp -type f -exec rm -f {} \;
c:\<Gridhome> c:\mksnt\find gpnpp -type f and delete these files.
gpnpp/init/host_name
gpnpp/init/host_name.pid
  gpnpp/profiles/peer/profile.xml
gpnpp/profiles/peer/profile_orig.xml
gpnpp/host_name/profiles/peer/profile.old
gpnpp/host_name/profiles/peer/profile.xml
  gpnpp/host_name/profiles/peer/profile_orig.xml
gpnpp/host_name/wallets/pa/cwallet.sso
gpnpp/host_name/wallets/peer/cwallet.sso
gpnpp/host_name/wallets/prdr/cwallet.sso
gpnpp/host_name/wallets/root/ewallet.pl2
gpnpp/wallets/pa/cwallet.sso
gpnpp/wallets/peer/cwallet.sso
gpnpp/wallets/prdr/cwallet.sso
gpnpp/wallets/roor/ewallet.pl2

[grid_home]# find cfgtoollogs -type f -exec rm -f {} \;
```

```
[grid_home]# rm -rf crs/init/*
[grid_home]# rm -rf cdata/*
[grid_home]# rm -rf crf/*
[grid_home]# rm -rf network/admin/*.ora
```

- From the `ORACLE_HOME\clone\bin` directory, run `clone.pl` for the unzipped Oracle home.

Use the following syntax:

```
C:\ORACLE_HOME\clone\bin>target_home\perl\bin\perl.exe clone.pl
ORACLE_HOME="target location" ORACLE_BASE="target Base location"
ORACLE_HOME_USER="Windows User Account" OSDBA_GROUP=OSDBA_privileged_group
OSOPER_GROUP=OSOPER_privileged_group
OSBACKUPDBA_GROUP=OSBACKUPDBA_privileged_group
OSDGDBA_GROUP=OSDGDBA_privileged_group OSKMDBA_GROUP=OSKMDBA_privileged_group
OSRACDBA_GROUP=OSRACDBA_privileged_group -defaultHomeName
```

where `ORACLE_HOME_USER="Windows User Account"` is the Oracle Home User for the cloned home.

Windows Built-in Account is used as the Oracle Home User if the parameter for `ORACLE_HOME_USER` is not specified.

For example:

```
C:\ORACLE_HOME\clone\bin>target_home\perl\bin\perl.exe clone.pl

ORACLE_HOME="C:\app\username\product\19.0.0\dbhome_1"
ORACLE_BASE="C:\app\username"
ORACLE_HOME_USER="mydomain\username" -defaultHomeName
OSDBA_GROUP=dba OSOPER_GROUP=oper OSBACKUPDBA_GROUP=backupdba OSDGDBA_GROUP=dgdba
OSKMDBA_GROUP=kmdba OSRACDBAGROUP=racdba -defaultHomeName
```

Oracle Universal Installer starts, and then records the cloning actions in the `cloneActionstimestamp.log` file. This log file is normally located in `C:\Program Files\Oracle\Inventory\logs`.

#### Note:

- Run `\ORACLE_HOME\clone\bin>target_home\perl\bin\perl.exe clone.pl -help` command for more information about the command option flags.
- Oracle recommends that you use the software-only installation option, available in the database installer, instead of `clone.pl` to clone your database.

- To configure connection information for the new database, run Net Configuration Assistant.

To start Net Configuration Assistant, select **Start**, then **All Programs**, then **Oracle - HOMENAME**, then **Configuration and Migration Tools**, and then **Net Configuration Assistant**.

- To create a new database for the newly cloned Oracle home, run Oracle Database Configuration Assistant.

To start Oracle Database Configuration Assistant, select **Start**, then **All Programs**, then **Oracle - *HOMENAME***, then **Configuration and Migration Tools**, and then **Database Configuration Assistant**.



**See Also:**

*Oracle Database Administrator's Guide*

# 8

## Oracle Database Postinstallation Tasks

Complete configuration tasks after you install Oracle Database.

Oracle recommends that you complete additional tasks immediately after installation. You must also complete product-specific configuration tasks before you use those products.

### Downloading and Installing Release Update Patches

Download and install Release Updates (RU) and Release Update Revisions (RUR) patches for your Oracle software after you complete installation.

Starting with Oracle Database 18c, Oracle provides quarterly updates in the form of Release Updates (RU) and Release Update Revisions (RUR). Oracle no longer releases patch sets. For more information, see My Oracle Support Note 2285040.1.

Check the My Oracle Support website for required updates for your installation.

1. Use a web browser to view the My Oracle Support website:

<https://support.oracle.com>

2. Log in to My Oracle Support website.

 **Note:**

If you are not a My Oracle Support registered user, then click **Register for My Oracle Support** and register.

3. On the main My Oracle Support page, click **Patches & Updates**.
4. In the **Patch Search** region, select **Product or Family (Advanced)**.
5. On the **Product or Family (Advanced)** display, provide information about the product, release, and platform for which you want to obtain patches, and click **Search**.

The Patch Search pane opens, displaying the results of your search.

6. Select the patch number and click **ReadMe**.

The README page is displayed. It contains information about the patch and how to apply the patches to your installation.

7. Uncompress the Oracle patch updates that you downloaded from My Oracle Support.

#### Related Topics

- [My Oracle Support note 2285040.1](#)

## Requirements for Database Password

To secure your database, every password must satisfy the Oracle recommended password requirements, even the passwords for predefined user accounts.

Oracle Database provides a set of predefined user accounts. You must create passwords in a secure fashion. If you have default passwords, you must change these.

You can manage the security for Oracle Database users by enforcing restrictions on the passwords that are created, creating user profiles, and using user resource limits to further secure user accounts.



### See Also:

*Oracle Database Security Guide*

## About Installing Oracle Autonomous Health Framework

Install the latest version of Oracle Autonomous Health Framework to perform proactive health checks and collect diagnostics data for the Oracle software stack.

Oracle Autonomous Health Framework includes the functionality from Oracle ORAchk, Oracle EXAchk, and Oracle Trace File Analyzer (TFA). Oracle Autonomous Health Framework extends health check coverage to the entire Oracle software stack, based on critical and reoccurring problems. Oracle Autonomous Health Framework proactively scans for known problems with Oracle products and deployments, including the following:

- Standalone Oracle Database
- Oracle Grid Infrastructure
- Oracle Real Application Clusters
- Maximum Availability Architecture (MAA) Validation
- Upgrade Readiness Validations
- Oracle GoldenGate

Oracle Autonomous Health Framework is pre-installed with Oracle Database. However, Oracle recommends that you update to the latest version of Oracle Autonomous Health Framework by downloading and installing it from My Oracle Support Note 2550798.1.

<https://support.oracle.com/epmos/faces/DocContentDisplay?id=2550798.1&parent=DOCUMENTATION&sourceId=USERGUIDE>

## Recompiling Invalid Objects on Windows Systems

Run the `utlrbp.sql` script after you install, patch, or upgrade a database, to identify, and recompile invalid objects.

The `utlrbp.sql` script recompiles all invalid objects, including packages, procedures, and types. Run the script immediately after installation, to ensure that users do not encounter invalid objects.

1. Log in as an Administrator user, or as the Oracle Home user.
2. Start SQL\*Plus and log in as a SYSDBA user:
  - a. Click **Start**.
  - b. Select **Programs** (or **All Programs**).
  - c. Select **Oracle - HOME\_NAME**.
  - d. Select **Application Development**.
  - e. Select **SQL\*Plus**.
3. Run the `utlrbp.sql` script, where `Oracle_home` is the Oracle home path:

```
SQL> @Oracle_home\rdbms\admin\utlrbp.sql
```

The `utlrbp.sql` script automatically recompiles invalid objects in either serial or parallel recompilation, based on the number of invalid objects, and on the number of CPUs available. CPUs are calculated using the number of CPUs (`cpu_count`) multiplied by the number of threads for each CPU (`parallel_threads_per_cpu`). On Oracle Real Application Clusters (Oracle RAC), this number is added across all Oracle RAC nodes.

## Configuring the Secure Sockets Layer

Oracle highly 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 Security Guide*

## Configuring Oracle Components

Many Oracle products and options must be configured before you use them for the first time.

Before using individual Oracle products or options, refer to the appropriate manual in the product documentation library.



**Note:**

Perform postinstallation tasks only for the components that you intend to use.

## 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 Database Advanced Queuing User's Guide*

## Configuring the OraClrAgnt Service for Oracle Database Extensions for .NET

Oracle Database Extensions for .NET depends on a Windows service to operate properly. This service is called the OraClrAgnt service, which can be accessed through the Service Control Panel, as `OracleORACLE_HOMEClrAgent`, where `ORACLE_HOME` represents an Oracle home name.

In earlier versions of Oracle Database, the OraClrAgnt service was automatically created by the installer. Starting with Oracle Database 12c Release 2 (12.2), after installation you use the `OraClrCtl.exe` utility to create, start, stop, and delete the OraClrAgnt service. The OraClrAgnt service is configured by this tool using the Oracle Home User account specified during the Oracle Database installation.



**See Also:**

*Oracle Database Extensions for .NET Developer's Guide for Microsoft Windows*

## Configuring Oracle Net Services

Describes how to configure Oracle Net Services.

If you have a previous release of Oracle software installed on this system, you can copy information from the Oracle Net `tnsnames.ora` and `listener.ora` configuration files from the previous release to the corresponding files for the new release.

 **Note:**

The default location for the `tnsnames.ora` and `listener.ora` files is the `ORACLE_BASE\ORACLE_HOME\network\admin\` directory.

### 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 19c environment.

To use the listener from the current release, you must copy static service information from the `listener.ora` file from the previous release to the version of that file used by the new release.

For any database instances earlier than release 8.0.3, add static service information to the `listener.ora` file. Oracle Database releases later than release 8.0.3 do not require static service information.

### Modifying the tnsnames.ora File

Unless you are using a central `tnsnames.ora` file, copy Oracle Net service names and connect descriptors from the previous release `tnsnames.ora` file to the version of that file used by the new release.

If necessary, you can also add the connection information for additional database instances to the new file.

## Installing Oracle Text Supplied Knowledge Bases

An Oracle Text knowledge base is a hierarchical tree of concepts used for theme indexing, ABOUT queries, and deriving themes for document services.

If you plan to use any of these Oracle Text features, you can install two supplied knowledge bases (English and French) from the Oracle Database Examples media.

 **See Also:**

*Oracle Text Reference*

## Installing the Oracle Text Filtering Component

Oracle Text Filtering Technology requires the Visual C++ libraries included in the Visual C++ Redistributable Package provided by Microsoft.

You can download the 2005 SP1 Redistributable Package version at:

<http://www.microsoft.com/downloads>



Run the `vcredist_x64.exe` file.



**See Also:**

*Oracle Text Reference*

## Configuring or Reinstalling Oracle XML DB

Oracle XML DB is a component of the Oracle Database installation.

However, you must manually configure the FTP and HTTP ports for Oracle XML DB.

### Related Topics

- *Oracle XML DB Developer's Guide*

## Configuring PL/SQL External Procedures

Configuring PL/SQL depends on the network configuration files used.

In nearly all cases, configuration is automatic. However, if you are using pre-8.0.3 `tnsnames.ora` and `listener.ora` files with your 19c database, then you must manually configure them.

## Configuring Shared Server Support

The default setup for using the Shared Server mode depends on how the software has been installed.

If you install Oracle Database using Oracle Universal Installer, then shared support is not configured. If you created your database through Oracle Database Configuration Assistant, then you were offered a choice of shared or dedicated server support.

## Setting Credentials for the Job System to Work with Oracle Enterprise Manager

Windows systems require that you set the correct credentials for the Jobs system to work properly in Oracle Enterprise Manager.

By default, the Management Agent service is installed as a `LocalSystem` user. When submitting jobs, such as stopping or starting the database, the operating system user submitting the job must have the **Log on as a batch job** privilege enabled.

Perform the following steps to establish that privilege for any operating system user who must submit an Oracle Enterprise Manager job.

1. Under the Security Settings list, expand the list to **Local Policies**.
2. Under Local Policies, double-click **User Rights Assignment**.
3. Under Policy, search for the **Log on as a batch job** policy.

If the Management Agent service is installed as any other user (that is, not `LocalSystem`), then, in addition to granting the **Log on as a batch job** privilege, you must grant the Windows service user the following three privileges:

- **Act as part of the operating system**
- **Adjust memory quotas for a process**
- **Replace a process level token**

The service under the "Windows service" user runs at the operating system level.

4. With each policy, perform the following steps:
  - a. Double-click the policy name.
  - b. In the Properties dialog box, click **Add User or Group**.
  - c. In the Select Users or Groups dialog box, enter the name of the user (for example, `jsmith`, `administrator`, and so on.)

 **Note:**

On Windows Server 2008, the name of the dialog box is Select Users, Computers, or Groups.

- d. Click **Check Names** to check that you have entered the name correctly.
  - e. Click **OK**.
5. Click **OK** to exit the Properties dialog box, then exit Local Security Settings and Administrative Tools.
6. Restart your computer.

If a user exists locally and at the domain level, Windows gives the local user precedence. To use the domain user, qualify the user name with the domain name. For example, to use the user `joe` in the `ACCOUNTS` domain specify the user name as `ACCOUNTS\joe`.

## Configuring Oracle Database to Communicate with Oracle Automatic Storage Management

On Windows, Oracle Database installations that use Oracle Automatic Storage Management must use Windows native authentication.

By default, Windows native authentication is enabled. To ensure that Windows native authentication is enabled, check the `sqlnet.ora` file, which by default is located in `ORACLE_HOME\network\admin`, and ensure that it has NTS enabled. For example:

```
sqlnet.authentication_services=(NTS)
```

## 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 Database Examples
- Oracle JDBC Development Drivers

- Oracle Text Knowledge Base



**See Also:**

*Oracle Database Examples Installation Guide*

## Creating the OraMTS Service for Microsoft Transaction Server

Oracle Services for Microsoft Transaction Server (OraMTS) permit Oracle databases to be used as resource managers in Microsoft application coordinated transactions.

OraMTS acts as a proxy for the Oracle database to the Microsoft Distributed Transaction Coordinator (MSDTC). As a result, OraMTS provides client-side connection pooling and allows client components that leverage Oracle to participate in promotable and distributed transactions. In addition, OraMTS can operate with Oracle databases running on any operating system, given that the services themselves are run on Windows.

On releases before Oracle Database 12c, the OraMTS service was created as part of a software-only installation. Starting with Oracle Database 12c, you must use a configuration tool to create this service.

To create the OraMTS service after performing a software-only installation for Oracle Database, perform the following steps:

1. Open a command window.
2. Change directories to `ORACLE_HOME\bin`.
3. Run the `OraMTSctl` utility to create the OraMTS Service:

```
C:\ORACLE_HOME\bin> oramtsctl.exe -new
```



**See Also:**

*Oracle Services for Microsoft Transaction Server Developer's Guide for Microsoft Windows*

## Creating a Fast Recovery Area Disk Group

During installation, by default you can create multiple disk groups.

If you plan to add an Oracle Database for a standalone server, then you must 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. Enabling rapid backups for recent data can reduce requests to system administrators to retrieve backup tapes for recovery operations.

Database administrators can define the `DB_RECOVERY_FILE_DEST_SIZE` parameter to the path for the fast recovery area to enable on-disk backups, and rapid recovery of data.

When you enable fast recovery in the `init.ora` file, it 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 archive 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 `DB_RECOVERY_FILE_DEST_SIZE`. 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 must be 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 one fast recovery area disk group on disks with 150 GB of storage, shared by three 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

Use this procedure to create the fast recovery area disk group.

1. Navigate to the Grid home bin directory, and start ASM Configuration Assistant (ASMCA). For example:

```
DRIVE_LETTER:> cd \app\oracle\product\19.0.0\grid\bin
DRIVE_LETTER:> asmca
```

2. ASMCA opens at the Disk Groups tab. Click **Create** to create a 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 the eligible disks to be added to the fast recovery area, and click **OK**.

4. The Diskgroup Creation window opens to inform you when the disk group creation is complete. Click **OK**.
5. Click **Exit**.

 **See Also:**

- *Oracle Database Backup and Recovery User's Guide*
- *Oracle Automatic Storage Management Administrator's Guide*

## Enabling and Disabling Database Options After Installation

When you install Oracle Database, some options are enabled and the others disabled. You can view the enabled Oracle Database options by querying the `V$OPTION` view using SQL\*Plus.

 **See Also:**

*Oracle Database Administrator's Guide*

If you need to enable or disable a particular database feature for an Oracle home, then use the `chopt` tool. The `chopt` tool is a command-line utility that is located in the `ORACLE_HOME\bin` directory. The syntax for `chopt` is as follows:

```
chopt [ enable | disable] db_option
```

The possible values for `db_option` described in the following table.

**Table 8-1 Database Options for Chopt Tool Command**

Value	Description
oaa	Oracle Advanced Analytics
olap	Oracle OLAP
rat	Oracle Real Application Testing

### Example 8-1 Running the Chopt Tool

To enable the Oracle Data Mining RDBMS Files option in your Oracle binary files:

1. Shut down the database with `srvctl` or SQL\*Plus:

```
srvctl stop database -d myDb
```

2. Stop the database service, `OracleServiceSID`, using the Services program in Control Panel.
3. Run the following commands:

```
cd ORACLE_HOME/bin
chopt enable rat
```

4. Start the database service, `OracleServiceSID`, using the Services program in Control Panel.
5. Start up the database:

```
srvctl start database -d myDb
```

## Changing the Oracle Home User Password

Oracle Home User Control is a command-line utility that allows an administrator to update the password for an Oracle Home User.

This tool updates the password for Windows services in the Oracle home. The input password must match the password for the Windows User Account used as the Oracle Home User. So, first use the Windows operating system tools to change the Windows password and then use this tool to update the Windows services in the Oracle home to use the same password.



### Note:

You must have the Administrator privileges to run this Oracle Home User Control utility.

### Syntax Overview:

The following is the command syntax:

```
orahomeuserctl list | updpwd [-user username] [-host hostname1, hostname2, . . .] [-log logfile]
```

where:

- `orahomeuserctl` is used to display the Oracle Home User name associated with the current Oracle home or to update the Oracle Home User password.
- `list` displays the Oracle Home User name associated with the current Oracle home.
- `updpwd` prompts for the new password and updates the password for the named Oracle Service User. The following are the options for `updpwd`:

– `-user username`

This option determines the Oracle Home User name. If this option is not present, then the user name associated with the current Oracle home is used. If the named user, be it the `username` or user of the current Oracle home, is an MSA or Windows Built-in account, then an error message is displayed and the command is terminated.

– `-host hostname1, hostname2, . . .`

When this option is present, the utility updates the passwords for all the services belonging to the named Oracle Home User on the specified hosts. Otherwise, the Oracle Home User Control utility updates the passwords for all the services belonging to the named Oracle Home User on a specified host with single instance installation, or updates the passwords for all services belonging to the named Oracle Home User on all the specified hosts.

When the update completes, the utility displays the number of successful updates and any services that failed to update with the new password.

– `-log logfilename`

This option adds the password update operation results to a log file for every service name receiving the new password. By default, the log files are located in the `ORACLE_HOME\log` directory. If `logfilename` specifies only a file name, then the log is stored in the named file in the default directory. However, if the `logfilename` contains a path, then that path is used without modification.

# 9

## Getting Started with Oracle Database

Learn how to check the installed contents, start various tools, identify, and locate various files after completing Oracle Database installation.

### Checking the Installed Oracle Database Contents and Directory Location

Use Oracle Universal Installer to check the contents and directory location of your Oracle Database installation.

Follow these steps:

1. From the **Start** menu, select **All apps**, then **Oracle - HOMENAME**, then **Oracle Installation Products**, then **Universal Installer**.
2. In the Welcome window, click **Installed Products** to display the Inventory dialog box.
3. To check the installed contents, find the Oracle Database product in the list.  
To find additional information about an installed product, click **Details**.
4. To check the directory location of the installed contents, click the **Environment** tab.
5. Click **Close** to exit the Inventory dialog box.
6. Click **Cancel** to exit Oracle Universal Installer, then click **Yes** to confirm.

### Logging In to Oracle Enterprise Manager Database Express 19c

To start Oracle Enterprise Manager Database Express, use the EM Express URL provided by Oracle Database Configuration Assistant (Oracle DBCA) during the database installation and creation.

If Oracle DBCA did not provide the EM Express URL during the database installation and creation, or if you need to change the EM Express port later on, then see the following:

#### See Also:

- *Oracle Database 2 Day DBA* for information about “Starting EM Express”
- *Oracle Database 2 Day DBA* for information about “Accessing the Database Home Page”
- *Oracle Database 2 Day DBA* for information about “Configuring the HTTP Port for EM Express”



# Managing Oracle Automatic Storage Management

Describes about starting and stopping Oracle Automatic Storage Management.

## Starting and Stopping Oracle Automatic Storage Management

To start and stop Oracle Automatic Storage Management, in addition to using SQL\*Plus, you can use the `srvctl` utility.

To start Oracle Automatic Storage Management instance using the `srvctl` utility, run the following command:

```
srvctl start asm
```

To stop Oracle Automatic Storage Management instance using the `srvctl` utility, run the following command:

```
srvctl stop asm
```

### See Also:

*Oracle Automatic Storage Management Administrator's Guide*

## Oracle Automatic Storage Management Utilities

To manage Oracle Automatic Storage Management, you can use the following tools:

- `asmcmd`: This command-line tool lets you manage Oracle Automatic Storage Management disk group files and directories.
- `asmtool`: This command-line tool is required to stamp the disks to create or modify disk groups later on after the database installation.
- Oracle Automatic Storage Management Configuration Assistant: Oracle Automatic Storage Management Configuration Assistant (ASMCA) is an interactive utility that enables you to create an Oracle Automatic Storage Management instance or upgrade existing Oracle Automatic Storage Management instances. It also enables you to create and configure disk groups, Oracle Automatic Storage Management volumes and Oracle Automatic Storage Management File Systems (ASMFS).
- Oracle Enterprise Manager Cloud Control: If you have Oracle Enterprise Manager installed, you can use Cloud 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 Express 19c. This utility enables you to perform basic administrative tasks such as user, performance, memory, and space management.
- SQL\*Plus: You can use Oracle Automatic Storage Management-specific commands from this tool. To connect to the Oracle Automatic Storage Management instance, you use the same methods that you use to connect to an Oracle Database instance.



#### See Also:

*Oracle Automatic Storage Management Administrator's Guide*

## Starting and Stopping an Oracle Database

Describes about starting and stopping an Oracle database by using any of the following methods:

### Starting and Stopping the Database from the Microsoft Windows Services Utility

You can use SQL or `srvctl` utility to start or stop the database instance. SRVCTL starts the service automatically.

To use SQL to start the database instance, start the Windows services:

1. From the **Start** menu, select **All Programs**, then **Administrative Tools**, and then **Services**.
2. In the Services dialog box, locate the name of the database you want to start or stop.
3. Right-click the name of the database, and from the menu, select either **Start**, **Stop**, or **Pause**.

To set its startup properties, right-click **Properties**, and in the dialog box, select either **Automatic**, **Manual**, or **Disabled** from the Startup type list.

## Accessing Oracle Database with SQL\*Plus

You can use SQL\*Plus to issue SQL and PL/SQL statements to the Oracle Database.

This tool enables you to perform the same database management operations, and query, insert, update, or delete data directly in the database.

To start SQL\*Plus, from the Start menu, select **All Programs**, then **Oracle - HOMENAME**, then **Application Development**, and then **SQL Plus**.

Alternatively, at the command line, you can enter the following command at a Windows command prompt:

```
C:\> sqlplus /nolog
SQL> CONNECT user_name
Enter password: password
```

For example, to log on as SYSTEM using the password *password*, you enter:

```
C:\> sqlplus /nolog
SQL> CONNECT SYSTEM
Enter password: password
```

If you are logging on as SYS, you must connect as SYSDBA:

```
C:\> sqlplus /nolog
SQL> CONNECT SYS AS SYSDBA
Enter password: password
```

#### See Also:

- *SQL\*Plus User's Guide and Reference*
- *SQL\*Plus Quick Reference*
- *Oracle Database Administrator's Guide*

## Accessing Oracle Database with Oracle SQL Developer

You can use SQL Developer to issue SQL and PL/SQL statements. All SQL and PL/SQL commands are supported as they are passed directly from the SQL Worksheet to the Oracle Database.

All SQL and PL/SQL commands are supported as they are passed directly from the SQL Worksheet to the Oracle Database.

To start SQL Developer:

1. From the **Start** menu, select **All Programs**, then **Oracle - HOMENAME**, then **Application Development**, and then **SQL Developer**.
2. If you are prompted to enter the full path name for java.exe, click **Browse** and find `java.exe`. For example, `C:\Program Files\Java\jdk1.6.0_25\bin\java.exe`.
3. Once SQL Developer starts, perform the following steps:
  - Right-click **Connections**.
  - Select **New Connection**.
  - In the New/Select Database Connection dialog box, enter a Connection name, username, password, and for the host string, the name of the database to which you want to connect.
  - Click **Connect**.

Once connected, you can view, create, modify, and delete the database objects using the Connection Navigator or issue any SQL or PL/SQL command using a SQL Worksheet (From the **Tools** menu, select **SQL Worksheet**).

SQL\*Plus commands have to be interpreted by the SQL Worksheet before being passed to the database. The SQL Worksheet currently supports many SQL\*Plus commands. SQL\*Plus commands which are not supported by the SQL Worksheet are ignored and are not sent to the Oracle Database.

**See Also:***Oracle SQL Developer User's Guide*

## Reviewing User Accounts and Passwords

All databases created by the Oracle Database Configuration Assistant include the `SYS`, `SYSTEM`, and `DBSNMP` database accounts.

In addition, Oracle provides several other administrative accounts. Before using these other accounts, you must unlock them and reset their passwords.

Use Oracle EM Express to view the complete list of database accounts.

**See Also:***Oracle Database Administrator's Guide*

## Oracle Database System Privileges Accounts and Passwords

Review these system privileges accounts after installation in preparation for unlocking accounts and changing passwords.

All databases created by the Database Configuration Assistant (DBCA) include the `SYS`, `SYSTEM`, 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.

Starting with Oracle Database 12c Release 2 (12.2), only the HR sample schema is automatically installed after a database installation. All sample schemas, including HR, are distributed on GitHub:

<https://github.com/oracle/db-sample-schemas>

**Note:**

This list contains some of the important system privileges user accounts, but it is not complete. Use Oracle Enterprise Manager Database Express 12c to view the complete list of database accounts.

**Table 9-1 Partial List of Oracle Database System Privileges Accounts Locked After Installation**

User Name	Description	For More Information
ANONYMOUS	Enables HTTP access to Oracle XML DB.	<i>Oracle XML DB Developer's Guide</i>

**Table 9-1 (Cont.) Partial List of Oracle Database System Privileges Accounts Locked After Installation**

User Name	Description	For More Information
APEX_050100	The account that owns the Oracle Application Express schema and metadata.	<i>Oracle Application Express App Builder User's Guide</i>
APEX_PUBLIC_USER	The minimally privileged account used for Oracle Application Express configuration with Oracle Application Express Listener or Oracle HTTP Server and <code>mod_plsql</code> .	<i>Oracle Application Express App Builder User's Guide</i>
APPQOSSYS	Used for storing and managing all data and metadata required by Oracle Quality of Service Management.	None
AUDSYS	The account where the unified audit data trail resides.	<i>Oracle Database Security Guide</i>
CTXSYS	The Oracle Text account.	<i>Oracle Text Application Developer's Guide</i>
DBSFUSER	The account used to run the <code>DBMS_SFW_ACL_ADMIN</code> package.	<i>Oracle Database PL/SQL Packages and Types 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 Cloud Control Administrator's Guide</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
DVSY	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.  <b>Note:</b> Part of Oracle Database Vault user interface text is stored in database tables in the DVSY schema. By default, only the English language is loaded into these tables. You can use the <code>DVSY.DBMS_MACADM.ADD-NLS_DATA</code> procedure to add other languages to Oracle Database Vault.	<i>Oracle Database Vault Administrator's Guide</i>
DVF	The account owned by Database Vault that contains public functions to retrieve the Database Vault Factor values.	<i>Oracle Database Vault Administrator's Guide</i>
FLWS_FILES	The account owns the Oracle Application Express uploaded files.	<i>Oracle Application Express App Builder User's Guide</i>
GGSYS	The internal account used by Oracle GoldenGate. It should not be unlocked or used for a database login.	None
GSMADMIN_INTERNAL	The internal account that owns the Global Data Services schema. It should not be unlocked or used for a database login.	<i>Oracle Database Global Data Services Concepts and Administration Guide</i>

**Table 9-1 (Cont.) Partial List of Oracle Database System Privileges Accounts Locked After Installation**

User Name	Description	For More Information
GSMCATUSER	The account used by Global Service Manager to connect to the Global Data Services catalog.	<i>Oracle Database Global Data Services Concepts and Administration Guide</i>
GSMUSER	The account used by Global Service Manager to connect to the database.	<i>Oracle Database Global Data Services Concepts and Administration Guide</i>
HR	The account that owns the Human Resources schema included in the Oracle Sample Schemas.	<i>Oracle Database Sample Schemas</i>
LBACSYS	The Oracle Label Security administrator account. Starting with Oracle Database 18c, the LBACSYS user account is created as a schema-only account.	<i>Oracle Label Security Administrator's Guide</i>
MDDATA	The schema used by Oracle Spatial and Graph for storing geocoder and router data.	<i>Oracle Spatial and Graph Developer's Guide</i>
MDSYS	The Oracle Spatial and Graph administrator account.	<i>Oracle Spatial and Graph 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.	None
ORACLE_OCM	This account contains the instrumentation for configuration collection used by the Oracle Configuration Manager.	None
REMOTE_SCHEDULER_AGENT	The account to disable remote jobs on a database. This account is created during the remote scheduler agent configuration. You can disable the capability of a database to run remote jobs by dropping this user.	<i>Oracle Database Administrator's Guide</i>
SYS	The account used to perform database administration tasks.	<i>Oracle Database Administrator's Guide</i>
SYSTEM	Another account used to perform database administration tasks.	<i>Oracle Database Administrator's Guide</i>
SYSBACKUP	The account used to perform backup and recovery tasks.	<i>Oracle Database Administrator's Guide</i>
SYSKM	The account used to perform encryption key management.	<i>Oracle Database Administrator's Guide</i>
SYSDG	The account used to administer and monitor Oracle Data Guard.	<i>Oracle Database Administrator's Guide</i>
SYSRAC	The account used to administer Oracle Real Application Clusters (RAC).	<i>Oracle Database Administrator's Guide</i>
SYS\$UMF	The account used to administer Remote Management Framework, including the remote Automatic Workload Repository (AWR).	<i>Oracle Database Performance Tuning Guide</i>

**Table 9-1 (Cont.) Partial List of Oracle Database System Privileges Accounts Locked After Installation**

User Name	Description	For More Information
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>
XS\$NULL	The internal account that represents the absence of a database schema user in a session, and indicates an application user session is in use. XS\$NULL cannot be authenticated to a database, nor can it own any database schema objects, or possess any database privileges.	<i>Oracle Database Real Application Security Administrator's and Developer's Guide</i>

Except for the accounts provided with the Oracle Sample Schemas, most of these database accounts are locked by default and created without passwords as schema only. This prevents malicious users from logging into these accounts using the default password set during catalog creation. To find the status of an account, query the `AUTHENTICATION_TYPE` column of the `DBA_USERS` data dictionary view. If `AUTHENTICATION_TYPE` is `schema only`, then the status is `NONE`.

Many of these accounts are automatically created when you run standard scripts such as the various `cat*.sql` scripts. To find user accounts that are created and maintained by Oracle, query the `USERNAME` and `ORACLE_MAINTAINED` columns of the `ALL_USERS` data dictionary view. If the output for `ORACLE_MAINTAINED` is `Y`, then you must not modify the user account except by running the script that was used to create it.

**Related Topics**

- *Oracle Database Security Guide*
- *Oracle Database Sample Schemas*

## Unlocking and Resetting User Passwords

Passwords for all Oracle system administration accounts except `SYS`, `SYSTEM`, and `DBSNMP` 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 accounts required to use the database, then you must unlock and reset those accounts using these procedures.

Apply the following guidelines when specifying passwords:

- Passwords must be between 8 and 30 characters long.
- Passwords must not start with a numeral.
- Password cannot contain invalid characters: `! @ % ^ & * ( ) + = \ | ` ~ [ { } ; : ' " , < > ?`
- Passwords must not be the same as the user name.

- Passwords must not be Oracle reserved words.
- The `SYSTEM` account password cannot be `manager` (case-insensitive).
- The `SYSMAN` account password cannot be `sysman` (case-insensitive).
- The `DBSNMP` account password cannot be `dbsnmp` (case-insensitive).
- If you choose to use the same password for all the accounts, then that password cannot be `manager`, `sysman`, or `dbsnmp` (case-insensitive).
- Passwords must have at least one alphabetic, one numeric, and one special character.
- Passwords must not be simple or obvious words, such as `welcome`, `account`, `database`, and `user`.

 **Note:**

If you select the option to create the database as a multitenant container database, then you must provide the pluggable database administrator password.

If you created a starter database during the installation, but you did not unlock the required account, unlock the account using one of the following methods:

 **See Also:**

*Oracle Database Administrator's Guide*

## Using EM Express to Unlock Accounts and Reset Passwords

To unlock and reset user account passwords using Oracle Enterprise Manager Database Express, click Help in the Oracle Enterprise Manager Database Express 18c window for more information.

 **See Also:**

*Oracle Database 2 Day DBA*

## Using SQL\*Plus to Unlock and Change Passwords

Use this SQL\*Plus procedure to unlock and reset user account passwords.



To change a password after installation:

1. Start SQL\*Plus:

```
C:\> sqlplus /nolog
```

2. Connect as SYSDBA:

```
SQL> CONNECT SYS AS SYSDBA  
Enter password: SYS_password
```

3. 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;
```

 See Also:

- *Oracle Database Security Guide*
- *Oracle Database SQL Language Reference*
- *Oracle Database Administrator's Guide*

## Identifying Databases

The Oracle Database software identifies a database by its global database name.

A global database name consists of the database name and database domain. Usually, the database domain is the same as the network domain, but it need not be. The global database name uniquely distinguishes a database from any other database in the same network. You specify the global database name when you create a database during the installation, or when using Oracle 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 ASCII alphanumeric, underscore (`_`), dollar (`$`), and pound (`#`) characters 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 network domain in which the database is located. Together, the database name and the network domain make the global database name unique. The domain portion is a string of no more than 128 characters that can contain

alphanumeric, underscore (`_`), and pound (`#`) characters. The `DB_DOMAIN` initialization parameter specifies the 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.

For example, if the SID and database name for an Oracle database are `ORCL`, then each database file is located in the `ORACLE_BASE\oradata\orcl` directory, and the initialization response file is located in the `ORACLE_BASE\admin\orcl\pfile` directory.



#### See Also:

*Oracle Database Reference*

## Locating the Server Parameter File

The starter database contains one database initialization response file. The initialization response file, `init.ora.xxxxx`, must exist for an instance to start.

A response file is a text file that contains a list of instance configuration parameters. The starter database `init.ora` file has preconfigured parameters. You must not edit this file to use the starter database.

The server parameter file (SPFILE) is created from the initialization response file, then the initialization response file is renamed. The SPFILE file name is `spfileSID.ora` and is located in the `ORACLE_HOME\database` directory.

To use EM Express to view the location of the server parameter file and list the initialization parameters, see the "Viewing and Modifying Initialization Parameters" section in *Oracle Database 2 Day DBA*.



#### See Also:

*Oracle Database 2 Day DBA*

## 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. A data file can be associated with only one tablespace and database.

The following table lists the tablespaces and data files in the Oracle Database. By default, the data files are located in the `ORACLE_BASE\oradata\DB_NAME` directory:

**Table 9-2 Tablespaces and Data Files**

Tablespace	Data File	Description
EXAMPLE	EXAMPLE01.DBF	Stores the Sample Schemas, if you included them.
SYSAUX	SYSAUX01.DBF	Serves as an auxiliary tablespace to the SYSTEM tablespace. Some products and options that previously used the SYSTEM tablespace now use the SYSAUX tablespace to reduce the load on the SYSTEM tablespace.
SYSTEM	SYSTEM01.DBF	Stores the data dictionary, including definitions of tables, views, and stored procedures needed by the Oracle Database. Information in this area is maintained automatically.
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 must expand this tablespace.
UNDOTBS	UNDOTBS01.DBF	Stores undo information. This 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*
- *Oracle Database Administrator's Guide*
- *Oracle Database 2 Day DBA*

## 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 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 2 Day DBA about Viewing Online Redo Log File Information*
- *Oracle Database 2 Day DBA about Viewing Archived Redo Log File Information*
- *Oracle Database 2 Day DBA*
- *Oracle Database Backup and Recovery User's Guide*

## Locating Control Files

The preconfigured database contains two control files located in the `ORACLE_BASE\oradata\DB_NAME` directory.

The preconfigured database contains two control files located in the `ORACLE_BASE\oradata\DB_NAME` directory. Oracle recommends that you keep at least two control files (on separate physical drives) for each database, and set the `CONTROL_FILES` initialization parameter to list each control file.

A control file is an administrative file. Oracle Database 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.

 **See Also:**

*Oracle Database Administrator's Guide*

For more information about using Oracle Enterprise Manager Database Express to perform various tasks related to tablespaces and data files, redo log files, and control files, click **Help** in the Oracle Enterprise Manager Database Express window.

 **See Also:**

- *Oracle Database Administrator's Guide*
- *Oracle Database 2 Day DBA* for information about “Viewing Control File”

## Understanding Oracle Database Services on Windows

The following Oracle services are automatically started after installation when you create a database:

- `OracleServiceSID` (Oracle Database service)
- `OracleHOMENAMETNSListener` (Oracle Database listener service)

If you configured Oracle Automatic Storage Management, then the `OracleOHService` and `OracleASMSERVICE+ASM` services are listed as well. However, other services for networking or other individual components may not automatically start.

# 10

## Removing Oracle Database Software

These topics describe how to remove Oracle software and configuration files.

Use the `deinstall` command that is included in Oracle homes to remove Oracle software. Oracle does not support the removal of individual products or components.

### **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 deinstallation tool to remove one database only.

### **See Also:**

- *Oracle Grid Infrastructure Installation and Upgrade Guide for Microsoft Windows x64 (64-Bit)*
- *Oracle Real Application Clusters Installation Guide for Microsoft Windows x64 (64-Bit)*
- *Oracle Automatic Storage Management Administrator's Guide*

## About Oracle Deinstallation Options

The `deinstall.bat` command stops Oracle software, and removes Oracle software and configuration files on the operating system.

You can remove the following software using `deinstall`:

- Oracle Database
- Oracle Grid Infrastructure, which includes Oracle Clusterware and Oracle Automatic Storage Management (Oracle ASM)
- Oracle Real Application Clusters (Oracle RAC)
- Oracle Database Client

The `deinstall` command is available in Oracle home directories after installation. It is located in the `ORACLE_HOME\deinstall` directory.

The deinstallation tool uses the information you provide, plus information gathered from the software home to create a response file. You can alternatively supply a response file generated previously by the `deinstall` command using the `-checkonly` option, or by editing the response file template.

 **Note:**

- You must run the `deinstall` command from the same release to remove Oracle software. Do not run the `deinstall` command from a later release to remove Oracle software from an earlier release. For example, do not run the `deinstall` command from the 19c Oracle home to remove Oracle software from an existing 12.2 Oracle home
- Starting with Oracle Database 12c Release 1 (12.1.0.2), the `roothas.bat` script replaces the `roothas.pl` script in the Oracle Grid Infrastructure home for Oracle Restart, and the `rootcrs.bat` script replaces the `rootcrs.pl` script in the Grid home for Oracle Grid Infrastructure for a cluster.

If the software in the Oracle home is not running (for example, after an unsuccessful installation), then the deinstallation tool cannot determine the configuration, and you must provide all the configuration details either interactively or in a response file.

In addition, before you run `deinstall` for Oracle Grid Infrastructure installations:

- Dismount Oracle Automatic Storage Management Cluster File System (Oracle ACFS) and disable Oracle Automatic Storage Management Dynamic Volume Manager (Oracle ADVM).
- If Grid Naming Service (GNS) is in use, then notify your DNS administrator to delete the subdomain entry from the DNS.

 **See Also:**

*Oracle Real Application Clusters Installation Guide for Microsoft Windows x64 (64-Bit)* for information about the `-local` option

## Files Deleted by the `deinstall` Command

The `deinstall` command removes Oracle software and files from your system.

When you run `deinstall`, if the central inventory (`Inventory`) contains no other registered homes besides the home that you are deconfiguring and removing, then the `deinstall` 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 `deinstall` deletes this data.

**▲ Caution:**

The `deinstall` command 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.

## Deinstallation Examples for Oracle Database

Use these examples to help you understand how to run the `deinstall` command.

Run `deinstall` from the `ORACLE_HOME\deinstall` directory. The deinstallation starts without prompting you for the Oracle home path.

You can generate a deinstallation response file by running `deinstall` with the `-checkonly` flag. Alternatively, you can use the response file template located at `DRIVE_LETTER:> ORACLE_HOME/deinstall/response/deinstall.rsp.tmpl`.

In the following example, the `deinstall` command is in the path `C:\app\oracle\product\19.0.0\dbhome_1\deinstall`, and it uses a response file in the software owner location `C:\Documents and Settings\oracle\`:

```
DRIVE_LETTER:> cd \app\oracle\product\19.0.0\dbhome_1\deinstall\  
DRIVE_LETTER:> deinstall.bat -paramfile %HOMEPATH%\my_db_paramfile.tmpl
```

For the grid infrastructure home, use (`deinstall.bat`) in the Oracle Grid Infrastructure home. In this example, the Oracle Grid Infrastructure home is

```
C:\app\oracle\product\19.0.0\grid
```

```
DRIVE_LETTER:> cd \app\oracle\product\19.0.0\grid\deinstall\  
DRIVE_LETTER:> deinstall.bat -paramfile %HOMEPATH%\my_grid_paramfile.tmpl
```

## Downgrading Oracle Restart

Use this procedure to deconfigure and downgrade Oracle Restart, or to troubleshoot Oracle Restart installation errors.

Running `roothas.bat` with the command flags `-deconfig -force` enables you to deconfigure Oracle Restart without removing the installed binaries. This feature is useful if you encounter an error during an Oracle Grid Infrastructure for a standalone server installation. For example, when you run the `root.sh` command, and find a missing operating system package. By running `roothas.bat -deconfig -force`, you can deconfigure Oracle Restart, correct the cause of the error, and then run `root.sh` again.

1. As the `oracle` user, create a backup of the SPFILE to a PFILE.

```
CREATE PFILE='C:\app\oracle\product\19.0.0\dbhome_1\dbs\test_init.ora'  
FROM SPFILE='C:\oracle\dbs\test_spfile.ora';
```



2. List all the Oracle databases on the server with their version, unique name of the database, and Oracle home information.

```
C:\> srvctl config database -home
```

3. Downgrade Oracle Database. Refer to *Oracle Database Upgrade Guide* for more information about required pre-downgrade tasks, downgrade tasks, post-downgrade tasks, and compatibility information.

 **Note:**

Downgrade Oracle Database only if the Oracle Database version is higher than the Oracle Restart version to which you are downgrading Oracle Restart.

4. As the `oracle` user, downgrade the Oracle Restart resources if you have downgraded your Oracle Database.

```
C:\> srvctl downgrade database -d db_unique_name -oraclehome  
%ORACLE_HOME% -t to_version
```

5. Inspect the Oracle Restart configuration of each database, service, and listener.

```
C:\> srvctl config database -db db_unique_name  
C:\> srvctl config service -db db_unique_name  
C:\> srvctl config listener -listener listener_name
```

Make a note of the configuration information and use this information when adding the components back to Oracle Restart.

6. Stop all databases and listeners that are running before you deconfigure or downgrade Oracle Restart.

```
C:\> srvctl stop database -db db_unique_name  
C:\> srvctl stop listener [-listener listener_name]
```

7. As the `root` user, run `roothas.bat` with the `-deconfig -force` flags to deconfigure Oracle Restart.

```
C:\> C:\app\oracle\product\19.0.0\grid\crs\install\roothas.bat -  
deconfig -force
```

8. As the `grid` user, update the Oracle central inventory (oraInventory).

```
C:\> C:\app\oracle\product\19.0.0\grid\oui\bin\gridSetup.bat -  
updateNodeList -silent ORACLE_HOME=upgraded_Grid_home -local  
CRS=false
```

9. As the `root` user, run `roothas.bat` with the `-unlock` flag to unlock the previous release Oracle Restart home.

```
C:\> C:\app\oracle\product\18.0.0\grid\crs\install\roothas.bat -unlock -
dstcrshome previous_release_Grid_home
```

10. As the `grid` user, reconfigure the previous release Oracle Restart home using the `gridSetup.bat` command.

```
C:\> C:\app\oracle\product\18.0.0\grid\gridSetup.bat
```

11. As the `oracle` user, add the components back to Oracle Restart with the same attributes that you noted down before deconfiguring Oracle Restart.

- a. Add Oracle Database to the Oracle Restart configuration.

```
C:\> srvctl add database -db db_unique_name -oraclehome Oracle_home
```

- b. Add the listener to the Oracle Restart configuration.

```
C:\> srvctl add listener -listener listener_name -oraclehome
Oracle_home
```

For the `-oraclehome` parameter, provide the Oracle home path from which the listener was running before the downgrade.

- c. Add each service to the database, using the `srvctl add service` command.

```
C:\> srvctl add service -db db_unique_name -service service_name_list
```

### Related Topics

- *Oracle Database Upgrade Guide*

# A

## Installing Java Access Bridge

Learn how to install Java Access Bridge 2.0.2. Java Access Bridge 2.0.2 enables use of a screen reader with Oracle components:

### Overview of Java Access Bridge 2.0.2

Java Access Bridge 2.0.2 enables assistive technologies to read Java applications running on the Windows platform.

Assistive technologies can read Java-based interfaces, such as Oracle Universal Installer and Oracle Enterprise Manager Database Express.

For a list of supported system configurations, including supported versions of Microsoft Windows and Java SE, see section "Supported System Configuration" available at the following link location:

<http://docs.oracle.com>

During installation, Oracle Universal Installer uses the Java Runtime Environment (JRE) 1.8 contained in an Oracle Database installation media. The JRE enables the use of Java Access Bridge during installation.

### Setting Up Java Access Bridge 2.0.2

Learn how to install and configure Java Access Bridge 2.0.2 for Windows after installing Oracle components.

To set up Java Access Bridge 2.0.2 on a Windows 64-bit operating system, follow these steps:

1. Go to Java Standard Edition 2 (Java SE) Downloads page to download the latest build of JDK 8:

<http://docs.oracle.com>

2. Install JDK 8 after accepting the Oracle license agreement.

 **Note:**

You must have administrator privileges to install JDK on Windows.

3. Download and install screen reader, JAWS:

<http://www.freedomscientific.com/downloads/jaws/JAWS-downloads.asp>

4. Press Windows key+U to open the Ease of Access Center, and select **Use the computer without a display**.

5. Select **Enable Accessbridge** check box. Click **Save** to save the changes.
6. Download Java Access Bridge 2.0.2:  
<http://docs.oracle.com>  
Download the `accessbridge-2_0_2-fcs-bin-b06.zip` file, after accepting the Oracle license agreement.
7. Extract `accessbridge-2.0.2` to a directory on your system where you plan to install Java Access Bridge. For example, name the directory as follows:  
`AB_HOME`
8. Copy `AB_HOME\WindowsAccessBridge-64.dll` to `c:\windows\system32` and start the screen reader.
9. Open the command prompt and navigate to `setup.exe` file.
10. Run the following command once you are in the `Disk1` directory:  
`setup.exe`  
Oracle Universal Installer starts and JAWS is able to read all prompts and controls on the screen.
11. Once you click the **Install** button, you must open Windows Explorer to see the directory where the database is installed  
(`DRIVE_LETTER:\app\username\product\19.0.0\dbhome_1`), until the JDK folder is created. Once the JDK folder is created, you must copy the files from the Java Access Bridge source location to the JDK destination folder. Copying these files enables accessibility for both the Oracle Database Configuration Assistant and Oracle Net Configuration Assistant.

**Table A-1 Copy Files to JDK Directory on Windows 64-Bit**

Copy	To
<code>AB_HOME\JavaAccessBridge-64.dll</code>	<code>dbhome_1\jdk\jre\bin</code>
<code>AB_HOME\JAWTAccessBridge-64.dll</code>	<code>dbhome_1\jdk\jre\bin</code>
<code>AB_HOME\Accessibility.properties</code>	<code>dbhome_1\jdk\jre\lib</code>
<code>AB_HOME\Access-bridge-64.jar</code>	<code>dbhome_1\jdk\jre\lib\ext</code>
<code>AB_HOME\jaccess.jar</code>	<code>dbhome_1\jdk\jre\lib\ext</code>

# B

## Optimal Flexible Architecture

Oracle Optimal Flexible Architecture (OFA) rules are a set of configuration guidelines created to ensure well-organized Oracle installations, which simplifies administration, support and maintenance.

### About the Optimal Flexible Architecture Standard

Oracle Optimal Flexible Architecture (OFA) rules help you to organize database software and configure databases to allow multiple databases, of different versions, owned by different users to coexist.

In earlier Oracle Database releases, the OFA rules provided optimal system performance by isolating fragmentation and minimizing contention. In current releases, OFA rules provide consistency in database management and support, and simplifies expanding or adding databases, or adding additional hardware.

By default, Oracle Universal Installer places Oracle Database components in directory locations and with permissions in compliance with OFA rules. Oracle recommends that you configure all Oracle components on the installation media in accordance with OFA guidelines.

Oracle recommends that you accept the OFA default. Following OFA rules is especially of value if the database is large, or if you plan to have multiple databases.



#### Note:

OFA assists in identification of an ORACLE\_BASE with its Automatic Diagnostic Repository (ADR) diagnostic data to properly collect incidents.

### About Multiple Oracle Homes Support

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

Careful selection of mount point names can make Oracle software easier to administer. Configuring multiple Oracle homes in compliance with Optimal Flexible Architecture (OFA) rules provides the following advantages:

- You can install this release, or earlier releases of the software, more than once on the same system, in different Oracle home directories. However, 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 19c software into an existing Oracle 18c Oracle home directory.
- Multiple databases, of different versions, owned by different users can coexist concurrently.

- You must install a new Oracle Database release in a new Oracle home that is separate from earlier releases of Oracle Database.  
You cannot install multiple releases in one Oracle home. Oracle recommends that you create a separate Oracle Database Oracle home for each release, in accordance with the Optimal Flexible Architecture (OFA) guidelines.
- In production, the Oracle Database server software release must be the same as the Oracle Database dictionary release through the first four digits (the major, maintenance, and patch release number).
- Later Oracle Database releases can access earlier Oracle Database releases. However, this access is only for upgrades. For example, Oracle Database 19c can access an Oracle Database 18c if the 18c database is started up in upgrade mode.
- Oracle Database Client can be installed in the same Oracle Database home if both products are at the same release level. For example, you can install Oracle Database Client 12.2.0.1 into an existing Oracle Database 12.2.0.1 home but you cannot install Oracle Database Client 12.2.0.1 into an existing Oracle Database 12.1.0.2 home. If you apply a patch set before installing the client, then you must apply the patch set again.
- Structured organization of directories and files, and consistent naming for database files simplify database administration.
- Login home directories are not at risk when database administrators add, move, or delete Oracle home directories.
- You can test software upgrades in an Oracle home in a separate directory from the Oracle home where your production database is located.

## Oracle Base Directory Naming Convention

This section describes what the Oracle base is, and how it functions.

The Oracle Base directory is the database home directory for Oracle Database installation owners and the log file location for Oracle Grid Infrastructure owners. You should name Oracle base directories using the syntax `\pm\h\u`, where *pm* is a string mount point name, *h* is selected from a small set of standard directory names, and *u* is the name of the owner of the directory.

You can use the same Oracle base directory for multiple installations. If different operating system users install Oracle software on the same system, then you must create a separate Oracle base directory for each installation owner. For ease of administration, Oracle recommends that you create a unique owner for each Oracle software installation owner, to separate log files.

Because all Oracle installation owners write to the central Oracle inventory file, and that file mount point is in the same mount point path as the initial Oracle installation, Oracle recommends that you use the same `\pm\h` path for all Oracle installation owners.

**Table B-1 Examples of OFA-Compliant Oracle Base Directory Names**

Example	Description
C:\app\oracle	Oracle base directory for Oracle Database , where the Oracle Database software installation owner name is <code>oracle</code> . The Oracle Database binary home is located underneath the Oracle base path.
C:\app\grid	Oracle base directory for Oracle Grid Infrastructure, where the Oracle Grid Infrastructure software installation owner name is <code>grid</code> .

**⚠ Caution:**

The Oracle Grid Infrastructure Oracle base should not contain the Oracle Grid Infrastructure binaries for an Oracle Grid Infrastructure for a cluster installation. Permissions for the file path to the Oracle Grid Infrastructure binary home is changed to `LocalSystem` or the Oracle Home User, if specified, during installation.

## Oracle Home Directory Naming Convention

By default, Oracle Universal Installer configures Oracle home directories using these Oracle Optimal Flexible Architecture conventions.

The directory pattern syntax for Oracle homes is `\pm\s\u\product\v\type_[n]`. The following table describes the variables used in this syntax:

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 ( <code>dbhome</code> ), Client ( <code>client</code> ), or Oracle Grid Infrastructure ( <code>grid</code> )
<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: Database 1 and Database 2 ( <code>dbhome_1</code> , <code>dbhome_2</code> )

For example, the following path is typical for the first installation of Oracle Database on this system:

C:\app\oracle\product\19.0.0\dbhome\_1

## Optimal Flexible Architecture File Path Examples

This topic shows examples of hierarchical file mappings of an Optimal Flexible Architecture-compliant installation.

D:\E:\F:\

 **Note:**

- The Grid homes are examples of Grid homes used for an Oracle Grid Infrastructure for a standalone server deployment (Oracle Restart), or a Grid home used for an Oracle Grid Infrastructure for a cluster deployment (Oracle Clusterware). You can have either an Oracle Restart deployment, or an Oracle Clusterware deployment. You cannot have both options deployed at the same time.
- Oracle Automatic Storage Management (Oracle ASM) is included as part of an Oracle Grid Infrastructure installation. Oracle recommends that you use Oracle ASM to provide greater redundancy and throughput.

**Table B-2 Optimal Flexible Architecture Hierarchical File Path Examples**

Directory	Description
C:\	System directory
C:\app\	Subtree for application software
C:\app\oraInventory	Central OraInventory directory, which maintains information about Oracle installations on a server. Members of the group designated as the OINSTALL group have permissions to write to the central inventory. All Oracle software installation owners must have the OINSTALL group as their primary group, and be able to write to this group.
C:\app\oracle\	Oracle base directory for user <code>oracle</code> . There can be many Oracle Database installations on a server, and many Oracle Database software installation owners. Oracle software homes that an Oracle installation owner owns should be located in the Oracle base directory for the Oracle software installation owner, unless that Oracle software is Oracle Grid Infrastructure deployed for a cluster.
C:\app\grid\username	Oracle base directory for the Oracle Grid Infrastructure software, where <i>username</i> is the name of the user that performed the software installation. The Oracle home (Grid home) for Oracle Grid Infrastructure for a cluster installation is located outside of the Grid user. There can be only one Grid home on a server, and only one Grid software installation owner.
e	The Grid home contains log files and other administrative files.



**Table B-2 (Cont.) Optimal Flexible Architecture Hierarchical File Path Examples**

Directory	Description
C:\app\oracle\admin\ \	Subtree for database administration files
C:\app\oracle\admin\ \TAR	Subtree for support log files
C:\app\oracle\admin\ \db_sales\ \	admin subtree for database named "sales"
C:\app\oracle\admin\ \db_dwh\ \	admin subtree for database named "dwh"
C:\app\oracle\fast_ recovery_area\ \	Subtree for recovery files
C:\app\oracle\fast_ recovery_area\ db_sales\ \	Recovery files for database named "sales"
C:\app\oracle\fast_ recovery_area\ db_dwh\ \	Recovery files for database named "dwh"
D:\app\oracle\oradata E:\app\oracle\oradata F:\app\oracle\oradata	Oracle data file directories
C:\app\oracle\product\ \	Common path for Oracle software products other than Oracle Grid Infrastructure for a cluster.

**Table B-2 (Cont.) Optimal Flexible Architecture Hierarchical File Path Examples**

Directory	Description
C:\app\oracle\product\19.0.0\dbhome_1	Oracle home directory for Oracle Database 1, owned by Oracle Database installation owner account <code>oracle</code> .
C:\app\oracle\product\19.0.0\dbhome_2	Oracle home directory for Oracle Database 2, owned by Oracle Database installation owner account <code>oracle</code>
C:\app\oradbowner\product\19.0.0\dbhome_2	Oracle home directory for Oracle Database 2, owned by Oracle Database installation owner account <code>oradbowner</code> .
C:\app\oracle\product\19.0.0\grid	Oracle home directory for Oracle Grid Infrastructure for a standalone server, owned by Oracle Database and Oracle Grid Infrastructure installation owner <code>oracle</code> .
C:\app\19.0.0\grid	Oracle home directory for Oracle Grid Infrastructure for a cluster (Grid home), owned by user <code>grid</code> before installation, and owned by <code>root</code> after installation.
C:\app\grid\username\diag\crs\hostname\crs\trace	Oracle Clusterware log files

# C

## Installing and Configuring Oracle Database Using Response Files

Learn how to install and configure Oracle products using response files.

### How Response Files Work

Response files can assist you with installing an Oracle product multiple times on multiple computers.

When you start Oracle Universal Installer (OUI), you can use a response file to automate the installation and configuration of Oracle software, either fully or partially. OUI uses the values contained in the response file to provide answers to some or all installation prompts.

Typically, the installer runs in an interactive mode, which means that it prompts you to provide information on the graphical user interface (GUI). 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 the installer, then it runs in the silent mode. During a silent mode installation, the 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 the installer runs in the response file mode. During a response file mode installation, the installer displays all the screens. The screens for which you specify information in the response file, and for those which you did not specify the required information in the response file. To use the response file mode, run `setup.exe` without the `-silent` parameter, but include the response file or any other parameters that apply.

You define the settings for a silent or a response file installation by entering values for the variables listed in the response file. For instance, to specify the Oracle home, provide the appropriate value for the `ORACLE_HOME` variable, as in the following example:

```
ORACLE_HOME="C:\app\product"
```

Another way of specifying the response file variable settings is to pass them as command-line arguments when you run Oracle Universal Installer. For example:

```
DRIVE_LETTER:\setup.exe_location> setup -silent "ORACLE_HOME=C:\app\product" ...
```

This method supports only the Oracle Home User passwords.

# Reasons for Using Silent Mode or Response File Mode

## Using Response Files

Review this information to use response files.

Use the following general steps to install and configure Oracle products using the installer in silent or response file mode:

1. If you plan to use Oracle Automatic Storage Management and configure new disks, then you must perform the following steps:
  - a. Create partitions for DAS or SAN disks.
  - b. Manually configure the disks using the `asmtoolg` or `asmtool` utility.
2. Customize or create a response file for the installation settings that you need.

You can create the response file by using one of the following methods:

- Modify one of the sample response files that is provided with the installation.
  - Run Oracle Universal Installer at a command prompt and save the inputs by selecting the **Save Response File** option.
3. Run Oracle Universal Installer from a command prompt, specifying the response file, using either silent or response file mode.

### Note:

Windows requires Administrator privileges at the command prompt.

## Preparing a Response File

Learn about the methods that you can use to prepare a response file for use during silent-mode or response file-mode installations.

## Editing a Response File Template

Oracle provides response file templates for each product and the installation type, and for each configuration tool. These files are located in the `ORACLE_BASE\ORACLE_HOME\assistants` directory, and the `database\response` directory on the Oracle Database installation media.

### Note:

If you copied the software to a hard disk, the response files are located in the `stage_area\database\response` directory.

The following table lists the available sample response files:

All response file templates contain comment entries, sample formats, examples, and other useful instructions. Read the response file instructions to understand how to specify values for the response file variables, so that you can customize your installation.

**Table C-1 Response Files**

Response File Name	Description
db_install.rsp	Silent installation of Oracle Database
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

 **Caution:**

When you modify a response file template and save a file for use, the response file may contain plain text passwords. Ownership of the response file must be given to the Oracle software installation owner only. Oracle strongly recommends that database administrators or other administrators delete or secure response files when they are not in use.

To copy and modify a response file:

1. Copy the appropriate response files from the `database\response` directory on the Oracle Database media to your hard drive.
2. Modify the response files with a text file editor.
3. Run the response file.

## Saving a Response File

You can use the Oracle Universal Installer in an interactive mode to save a response file, which you can edit and then use to complete a silent mode or a response file mode installation.

Starting with Oracle Database 11g Release 2 (11.2), you can save all the installation steps into a response file during installation by clicking **Save Response File** on the Summary page. You can use the generated response file for a silent installation later.

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.

 **Note:**

Oracle Universal Installer does not save passwords in the response file.

To save a response file:

1. Ensure that the computer on which you are creating the response file has met the requirements described in Oracle Database Preinstallation Tasks.

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. At the command prompt, use the `cd` command to change to the directory that contains the Oracle Universal Installer `setup.exe` executable.

 **Note:**

Windows requires the Administrator privileges at the command prompt.

On the installation DVD, `setup.exe` is located in the `database` directory. Alternatively, navigate to the directory where you downloaded or copied the installation files.

3. Run `setup.exe`.
4. After Oracle Universal Installer starts, enter the installation settings, to save the response file.
5. When the installer displays the Summary screen, perform the following:
  - a. Click **Save Response File** and specify 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.
6. 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 the Response File

At this stage, you are ready to run Oracle Universal Installer at the command line, specifying the response file you created, to perform the installation.

On Windows, open the command prompt with Administrator privileges. The Oracle Universal Installer executable, `setup.exe`, provides several options. For help information about the full set of these options, run `setup.exe` with the `-help` option, for example:

```
DRIVE_LETTER:\setup.exe_location setup -help
```

A new command window with the "Preparing to launch..." message appears.

To run Oracle Universal Installer, and specify a response file:

1. Place the response file on the computer where you want to install Oracle Database.
2. At a command prompt, run Oracle Universal Installer with the appropriate response file. On Windows, you must open command prompt with the Administrator privileges. For example:

```
DRIVE_LETTER:\setup.exe_location setup [-silent] "variable=setting" [-nowelcome]
[-noconfig] [-nowait] -responseFile
filename
```

where:

- *filename*: Identifies the full path of the response file.
- *setup.exe\_location*: Indicates the location of `setup.exe`.
- `-silent`: Runs Oracle Universal Installer in silent mode and suppresses the Welcome window.
- `"variable=setting"` refers to a variable within the response file that you may prefer to run at the command line rather than set in the response file. Enclose the variable and its setting in quotes.
- `-noconfig`: Suppresses running the configuration assistants during installation, performing a software-only installation instead.
- `-nowait`: Closes the console window when the silent installation completes.

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.

## Running Net Configuration Assistant Using a Response File

When you run Net Configuration Assistant with a response file, you run it in a silent mode.

This lets you configure and start an Oracle Net listener on the system, configure naming methods, and configure Oracle Net service names. To run NetCA in a silent mode, use the `netca.rsp` response file in the `ORACLE_BASE\ORACLE_HOME\assistants\netca` directory, and the `response` directory in the `database\response` directory on the DVD.

### Note:

If you copied the software to a hard disk, the response files are located in the `stage_area\database\response` directory.

On Windows, you must open command prompt with the Administrator privileges.

To create a Net Configuration Assistant response file:

1. Copy the `netca.rsp` response file template from the response file directory to a directory on your system.

The `netca.rsp` is located in the `database\response` directory on the Oracle Database installation media.

2. Open the response file in a text editor.

3. Edit the file, following the instructions in the file.

Net Configuration Assistant fails if you do not correctly configure the `netca.rsp` response file.

To run Net Configuration Assistant using the response file you just created, run Net Configuration Assistant in silent mode as follows, replacing `local_dir` with the directory where you placed your version of the `netca.rsp` response file:

```
C:\ORACLE_HOME\bin> netca /silent /responsefile local_dir\netca.rsp
```

For example:

```
C:\ORACLE_HOME\bin> netca /silent /responsefile  
C:\oracle_response_files\mynetca.rsp
```

## Running Oracle Database Configuration Assistant Using a Response File

You can run Oracle Database Configuration Assistant (Oracle DBCA) in a silent or a response file mode to configure and start an Oracle database on your system.

To run Oracle Database Configuration Assistant in silent or response file mode, use the `dbca.rsp` response file in the `ORACLE_BASE\ORACLE_HOME\assistants\netca` directory, and the `response` directory in the `database\response` directory on the DVD.

### Note:

If you copied the software to a hard disk, the response files are located in the `stage_area\database\response` directory.

To run Oracle DBCA in a response file mode, you must use the `-responseFile` flag with the `-silent` flag. To run Oracle DBCA in response file mode, you must use a graphical display and set the `DISPLAY` environment variable.

On Windows, you must open the command prompt with Administrator privileges.

### See Also:

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

## Silent Mode of Database Configuration Assistant

Use the `-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.

## Running Oracle Database Configuration Assistant in Response File Mode

Use this procedure to run Oracle Database Configuration Assistant (Oracle DBCA) in response file mode.

To create an Oracle DBCA response file:

1. Copy the `dbca.rsp` response file template from the response file directory to a directory on your system.

The `dbca.rsp` response file is located in the `database\response` directory on the Oracle Database installation media.

2. Open the `dbca.rsp` response file in a text editor.
3. Edit the `dbca.rsp` file, following the instructions in the file.

Oracle DBCA fails if you do not correctly configure the `dbca.rsp` response file.

To run the Oracle DBCA using the response file you just created, run Oracle DBCA in a silent or a response file mode using the following syntax:

```
C:\> %ORACLE_HOME%\bin\dbca [-silent] -createDatabase -responseFile local_dir/dbca.rsp
```

where:

- `-createDatabase` creates Oracle Database.
- `-silent` runs Oracle Database Configuration Assistant in the silent mode.
- `local_dir` is the full path of the directory where you copied the `dbca.rsp` response file template.

For example:

```
C:\> %ORACLE_HOME%\bin\dbca -createDatabase -responseFile  
C:\oracle_response_files\mydbca.rsp
```

As an alternative to creating a database using a response file, you can run `dbca` at the command line by specifying all the required information as command line options. Database Configuration Assistant writes progress messages to `stdout`. For information about the list of options supported, enter the following command:

```
C:\ORACLE_HOME\bin\dbca -help
```

## Postinstallation Configuration Using Response File Created During Installation

To run a response file configuration after installing Oracle software:

## About the Postinstallation Configuration File

When you run a silent or a response file installation, you provide information about your servers in a response file that you 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 software installation is complete. The configuration assistants are started with a script called `configToolAllCommands`. You can run this script in the 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 strongly 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 of the configuration.

The command syntax is as follows:

```
internal_component_name|variable_name=value
```

For example:

```
oracle.crs|S_ASMPASSWORD=PassWord
```

Oracle strongly recommends that you maintain security with a password response file:

- Permissions on the response file must be set to 600.
- The owner of the response file must be the installation owner user, with the group set to the central inventory (oraInventory) group.

## Running Postinstallation Configuration Using Response File

Use this procedure to run postinstallation configuration using response file.

To run configuration assistants with the `executeConfigTools` script:

1. Create a response file using the syntax *filename.properties*. For example:

```
C:\> copy nul c McGrsp.properties
```
2. Open the file with a text editor, and cut and paste the password template, modifying as needed.
3. Secure the `c McGrsp.properties` file by changing permissions in Properties page. Right-click the file to open the Properties page. Select the **Security** tab, click the **Edit** button, select a group or user, then select **Deny** check box against Read permissions to remove read access for unwanted users.

4. Change directory to `ORACLE_HOME\cfgtoollogs`
5. Before running `configToolAllCommands`, rename it using the following command:

```
copy configToolAllCommands configToolAllCommands.bat
```

6. Run the configuration script using the following syntax:

```
configToolAllCommands.bat RESPONSE_FILE=\path\name.properties
```

for example:

```
C:\> configToolAllCommands.bat RESPONSE_FILE=C:\oracle\cfggrsp.properties
```

### Example C-1 Password response file for Oracle Grid Infrastructure for a Standalone Server

Oracle Grid Infrastructure requires passwords for Oracle Automatic Storage Management Configuration Assistant (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.crs|S_ASMPASSWORD=password  
oracle.crs|S_ASMMONITORPASSWORD=password  
oracle.crs|S_OMSPASSWORD=password  
oracle.crs|S_BMCPASSWORD=password  
oracle.crs|S_WINSERVICEUSERPASSWORD=password
```

### Example C-2 Password response file for Oracle Database

Oracle Database configuration requires the `SYS`, `SYSTEM`, 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. Similarly, the `S_PDBADMINPASSWORD` password is necessary only if you create a multitenant container database (CDB) with one or more pluggable databases (PDBs). Also, if you select configure Oracle Enterprise Manager, then provide the password for the Oracle software installation owner for the `S_EMADMINPASSWORD` password.

```
oracle.server|S_SYSPASSWORD=password  
oracle.server|S_SYSTEMPASSWORD=password  
oracle.server|S_DBSNMPPASSWORD=password  
oracle.server|S_PDBADMINPASSWORD=password  
oracle.server|S_EMADMINPASSWORD=password  
oracle.server|S_ASMSNMPPASSWORD=password
```

If you do not want to enable Oracle Enterprise Manager or Oracle ASM, then leave those password fields blank.

## Postinstallation Configuration Using the ConfigToolAllCommands Script

You can create and run a response file configuration after installing Oracle software. The `configToolAllCommands` script requires users to create a second response file, of a different format than the one used for installing the product.

Starting with Oracle Database 12c Release 2 (12.2), the `configToolAllCommands` script is deprecated and may be desupported in a future release.

## Using the Installation Response File for Postinstallation Configuration

Starting with Oracle Database 12c release 2 (12.2), you can use the response file created during installation to also complete postinstallation configuration.

Run the installer with the `-executeConfigTools` option to configure configuration assistants after installing Oracle Grid Infrastructure or Oracle Database. You can use the response file located at `%ORACLE_HOME%\install\response\grid_timestamp.rsp` to obtain the passwords required to run the configuration tools. You must update the response file with the required passwords before running the `-executeConfigTools` command.

Oracle strongly recommends that you maintain security with a password response file. The owner of the response file must be the installation owner user.

### Example C-3 Response File Passwords for Oracle Grid Infrastructure

```
oracle.install.crs.config.ipmi.bmcPassword=password
oracle.install.asm.SYSASMPassword=GRID_HOME\gridSetup.bat -
executeConfigTools -responseFile %ORACLE_HOME%
\install\response\grid_time_stamp.rsporacle.install.asm.monitorPassword
=password
oracle.install.config.emAdminPassword=password
oracle.install.OracleHomeUserPassword=password
```

If you do not have a BMC card, or you do not want to enable IPMI, then leave the `ipmi.bmcPassword` input field blank.

If you do not want to enable Oracle Enterprise Manager for management, then leave the `emAdminPassword` password field blank.

If you did not specify an Oracle Home user for the Oracle Grid Infrastructure installation, then leave the `OracleHomeUserPassword` field blank.

### Example C-4 Response File Passwords for Oracle Grid Infrastructure for a Standalone Server (Oracle Restart)

```
oracle.install.asm.SYSASMPassword=password
oracle.install.asm.monitorPassword=password
oracle.install.config.emAdminPassword=password
oracle.install.OracleHomeUserPassword=password
```

If you do not want to enable Oracle Enterprise Manager for management, then leave the `emAdminPassword` password field blank.

If you did not specify an Oracle Home user for the Oracle Grid Infrastructure for a Standalone Server (Oracle Restart) installation, then leave the `OracleHomeUserPassword` field blank.

### Example C-5 Response File Passwords for Oracle Database

This example illustrates the passwords to specify for use with the database configuration assistants.

```
oracle.install.db.config.starterdb.password.SYS=password
oracle.install.db.config.starterdb.password.SYSTEM=password
oracle.install.db.config.starterdb.password.DBSNMP=password
oracle.install.db.config.starterdb.password.PDBADMIN=password
oracle.install.db.config.starterdb.emAdminPassword=password
oracle.install.db.config.asm.ASMSNMPPassword=password
oracle.install.OracleHomeUserPassword=password
```

You can also specify `oracle.install.db.config.starterdb.password.ALL=password` to use the same password for all database users.

Oracle Database configuration assistants require the SYS, SYSTEM, and DBSNMP passwords for use with Oracle Database Configuration Assistant (DBCA). Specify the following passwords, depending on your system configuration:

- If the database uses Oracle ASM for storage, then you must specify a password for the `ASMSNMPPassword` variable. If you are not using Oracle ASM, then leave the value for this password variable blank.
- If you create a multitenant container database (CDB) with one or more pluggable databases (PDBs), then you must specify a password for the `PDBADMIN` variable. If you are not using Oracle ASM, then leave the value for this password variable blank.
- If you did not specify an Oracle Home user for the Oracle Database installation, then leave the `OracleHomeUserPassword` field blank.

# D

## Configuring Read-Only Oracle Homes

Understand how read-only Oracle homes work and how you can configure read-only Oracle homes.

### Evolution of Oracle Homes

Learn about read-only Oracle home concepts like `ORACLE_BASE_HOME` and `ORACLE_BASE_CONFIG`.

### About Read-Only Oracle Homes

Starting with Oracle Database 18c, you can configure an Oracle home in read-only mode.

A read-only Oracle home simplifies provisioning by implementing separation of installation and configuration.

In a read-only Oracle home, all the configuration data and log files reside outside of the read-only Oracle home. This feature allows you to use the read-only Oracle home as a software image that can be distributed across multiple servers.

Apart from the traditional `ORACLE_BASE` and `ORACLE_HOME` directories, the following directories contain files that used to be in `ORACLE_HOME`:

- `ORACLE_BASE_HOME`
- `ORACLE_BASE_CONFIG`



#### Note:

This feature does not affect how database administrators monitor, diagnose, and tune their system performance.

### About Oracle Base Homes

Both, in a read-only `ORACLE_HOME` and read/write `ORACLE_HOME`, the user-specific files, instance-specific files, and log files reside in a location known as the `ORACLE_BASE_HOME`.

In a read/write `ORACLE_HOME`, the `ORACLE_BASE_HOME` path is the same as the `ORACLE_HOME` directory. However, in a read-only `ORACLE_HOME`, the `ORACLE_BASE_HOME` directory is not co-located with `ORACLE_HOME` but is located at `ORACLE_BASE\homes\HOME_NAME`.

Where, `HOME_NAME` is the internal name for `ORACLE_HOME`.

For example, the networking directories `network\admin`, `network\trace`, and `network\log` are located in the `ORACLE_BASE_HOME` directory. In a read/write

ORACLE\_HOME the networking directories appear to be in ORACLE\_HOME because ORACLE\_BASE\_HOME is co-located with ORACLE\_HOME, whereas in a read-only ORACLE\_HOME the networking directories are located in ORACLE\_BASE\homes\HOME\_NAME.

To print the ORACLE\_BASE\_HOME path, run the `orabasehome` command from the `%ORACLE_HOME%\bin` directory:

```
set ORACLE_HOME C:\app\oracle\product\19.0.0\dbhome_1
cd %ORACLE_HOME%\bin
orabasehome
```

For example:

```
orabasehome
C:\app\oracle\homes\OraDB19Home1
```

Where, `C:\app\oracle` is ORACLE\_BASE and `OraDB19Home1` is HOME\_NAME

## About Oracle Base Config

Both, in a read-only ORACLE\_HOME and read/write ORACLE\_HOME, the configuration files reside in a location known as ORACLE\_BASE\_CONFIG.

In a read/write ORACLE\_HOME, the ORACLE\_BASE\_CONFIG path is the same as the ORACLE\_HOME path because it is located at ORACLE\_HOME. However, in a read-only ORACLE\_HOME, the ORACLE\_BASE\_CONFIG path is the same as ORACLE\_BASE.

ORACLE\_BASE\_CONFIG\dbms contains the configuration files for ORACLE\_HOME. Each file in the dbms directory contains ORACLE\_SID so that the directory can be shared by many different ORACLE\_SIDs.

To print the ORACLE\_BASE\_CONFIG path, run the `orabaseconfig` command from the `%ORACLE_HOME%\bin` directory:

```
C:\> set ORACLE_HOME C:\app\oracle\product\19.0.0\dbhome_1
C:\> cd %ORACLE_HOME%\bin
orabaseconfig
```

For example:

```
orabaseconfig
C:\> C:\app\oracle
```

Where, `C:\app\oracle` is ORACLE\_BASE.

## Enabling a Read-Only Oracle Home

Configure your Oracle home as a read-only Oracle home after you have performed a software-only Oracle Database installation.

To enable a read-only Oracle home:

1. Perform a software-only Oracle Database installation.
2. Run the `roohctl -enable` script.

 **Note:**

Do not use the `-disable` flag with the `roohctl` command, as it is not supported.

3. Run Oracle Database Configuration Assistant (Oracle DBCA) to create a database.

### Software-Only Database Installation

1. Log in as the Oracle installation owner user account (`oracle`) that you want to own the software binaries.
2. Download the Oracle Database installation image files (`db_home.zip`) to a directory of your choice. For example, you can download the image files to the `\tmp` directory.
3. Create the Oracle home directory and extract the image files that you have downloaded into this Oracle home directory.

 **Note:**

Ensure that the Oracle home directory path you create is in compliance with the Oracle Optimal Flexible Architecture recommendations. Also, unzip the installation image files only in this Oracle home directory that you created.

4. From the Oracle home directory, run the `setup.exe` command to start the Oracle Database installer.
5. In the Select Configuration Option screen, select **Set Up Software Only**.
6. Select your installation type. Installation screens vary depending on the installation option you select. Respond to the configuration prompts as needed.

 **Note:**

Click **Help** if you have any questions about the information you are asked to submit during installation.



### Run the roohctl Script

1. Go to the `bin` directory

```
cd C:\app\oracle\product\19.0.0\dbhome_1\bin
```

2. Run the `roohctl` script to enable read-only Oracle home.

```
roohctl.bat -enable
```

### Run Oracle Database Configuration Assistant

1. Ensure that you are still in the `bin` directory and run Oracle DBCA.

```
dbca
```

2. In the Select Database Operation screen, select **Create a Database**.
3. The configuration screens vary depending on the options you select. Respond to the prompts as needed.



#### Note:

Click **Help** if you have any questions about the information you are asked to submit during database creation.

### Related Topics

- *Oracle Database 2 Day DBA*

## Determining if an Oracle Home is Read-Only

You can use the Registry Editor to determine if your Oracle home is a read/write or read-only Oracle home.

Start Registry Editor and navigate to the `ORACLE_HOME_READONLY` entry in the `HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OracleHomeName` Windows Registry key.

The default value for the `ORACLE_HOME_READONLY` parameter appears as `N`. The `ORACLE_HOME_READONLY` parameter value appears as `Y` if your Oracle home is in a read-only mode. Do not modify this value.

## File Path and Directory Changes in Read-Only Oracle Homes

Examples of hierarchical file mappings in a read-only Oracle home as compared to a read/write Oracle home.

This example shows an Optimal Flexible Architecture-compliant Oracle Database installation, for the user `oracle`, with the `ORACLE_HOME`, `ORACLE_BASE`,

ORACLE\_BASE\_HOME, and ORACLE\_BASE\_CONFIG logical locations. The database files are under `oraclebase\oradata`.

This example also shows the changes in the Oracle Database software defined paths of configuration files, log files, and other directories in a read-only Oracle home when compared to a read/write Oracle home.

**Table D-1 read/write and Read-Only Oracle Home File Path Examples**

Directory	Read/Write Oracle Home File Path	Read-Only Oracle Home File Path
ORACLE_HOME	C:\app\oracle\product\19.0.0\dbhome_1	C:\app\oracle\product\19.0.0\dbhome_1
ORACLE_BASE	C:\app\oracle\	C:\app\oracle\
ORACLE_BASE_HOME	ORACLE_HOME (or) C:\app\oracle\product\19.0.0\dbhome_1	ORACLE_BASE\homes\HOME_NAME. (or) C:\app\oracle\homes\Oradb19Home1
ORACLE_BASE_CONFIG	ORACLE_HOME (or) C:\app\oracle\product\19.0.0\dbhome_1	ORACLE_BASE (or) C:\app\oracle\
network	ORACLE_HOME\network (or) C:\app\oracle\product\19.0.0\dbhome_1\network	ORACLE_BASE_HOME\network (or) C:\app\oracle\homes\Oradb19Home1\network
database	ORACLE_HOME\database (or) C:\app\oracle\product\19.0.0\dbhome_1\database	ORACLE_BASE\database (or) C:\app\oracle\database

# E

## Configuring Networks for Oracle Database

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

Configuring networks for Oracle Database describes how to install Oracle Database on computers that do not meet the typical scenario.

### Installing Oracle Database on Computers with Multiple IP Addresses

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

Clients must be able to access the computer using its host name, or using aliases for its host name. To check access, ping the host name from the client computers using the short name (host name only) and the fully qualified domain name (FQDN, host name and domain name). Both must work.

1. Display **System** in the Windows Control Panel.
2. In the System Properties dialog box, click **Advanced**.
3. In the **Advanced** tab, click **Environment Variables**.
4. In the Environment Variables dialog box, under System Variables, click **New**.
5. In the New System Variable dialog box, enter the following information:
  - **Variable name:** `ORACLE_HOSTNAME`
  - **Variable value:** The host name of the computer to use.
6. Click **OK**, then in the Environment Variables dialog box, click **OK**.
7. Click **OK** in the Environment Variables dialog box, then in the System Properties dialog box, click **OK**.

### Installing Oracle Database on Computers with Multiple Aliases

A computer with multiple aliases is registered with the naming service under a single IP address 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 Oracle Database on Nonnetworked Computers

You can install Oracle Database on non-networked computers.

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.

Perform these steps before you install Oracle Database on the non-networked computer:

1. Install a loopback adapter on the computer.

The loopback adapter and the local IP address simulate a networked computer. If you connect the computer to the network, Oracle Database still uses the local IP address and host name.

2. Ping the computer from itself, using only the host name and using the fully qualified name, which is in the `DRIVE_LETTER:\system32\drivers\etc\hosts` file.

For example, if you installed a loopback adapter on a computer called `mycomputer` on the `us.example.com` domain, check the following:

```
DRIVE_LETTER:\>ping mycomputer           Ping itself using just the
hostname.

Reply from 10.10.10.10                     Returns local IP.
DRIVE_LETTER:\>ping mycomputer.us.example.com Ping using a fully qualified
name.
Reply from 10.10.10.10                     Returns local IP.
```

## Note:

When you ping a computer from itself, the `ping` command must return the local IP address (the IP address of the loopback adapter).

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

If you connect the computer to a network after installation, the Oracle Database instance on your computer can work with other instances on the network. Remember that you must have installed a loopback adapter on your computer. Your computer can use a static IP or DHCP, depending on the network to which you are connected.

## Installing a Loopback Adapter

A loopback adapter is required if you are installing on a non-networked computer to connect the computer to a network after the installation.

## About Using Loopback Adapters with Oracle Database

Learn how to use Loopback Adapters with Oracle Database on a non-networked computer to connect the computer to a network after the installation.

When you install a loopback adapter, the loopback adapter assigns a local IP address for your computer. After the loopback adapter is installed, there are at least two

network adapters on your computer: your own network adapter and the loopback adapter. To run Oracle Database on Windows, set the loopback adapter as the primary adapter.

You can change the bind order for the adapters without reinstalling the loopback adapter. The bind order of the adapters to the protocol indicates the order in which the adapters are used. When the loopback adapter is used first for the TCP/IP protocol, all programs that access TCP/IP first probe the loopback adapter. The local address is used for tools, such as Oracle Enterprise Manager. Applications that use a different Ethernet segment are routed to the network card.

### Related Topics

- [Installing Oracle Database on Nonnetworked Computers](#)

## Checking if a Loopback Adapter is Installed on Your Computer

Review this section to verify if a loopback adapter is installed on your computer by running the `ipconfig /all` command.

To check if a loopback adapter is installed on your computer, run the `ipconfig /all` command:

```
DRIVE_LETTER:\>ipconfig /all
```



### Note:

Loopback Adapter installed on the computer must be the Primary Network Adapter.

If there is a loopback adapter installed, you see a section that lists the values for the loopback adapter. For example:

```
Ethernet adapter Local Area Connection 2:
Connection-specific DNS Suffix . . . :
Description . . . . . : Microsoft Loopback Adapter
Physical Address. . . . . : 02-00-4C-4F-4F-50
DHCP Enabled. . . . . : No
IP Address. . . . . : 10.10.10.10
Subnet Mask . . . . . : 255.255.0.0
```

## Installing a Loopback Adapter

Use this procedure to install a Loopback Adapter or a Microsoft KM-TEST Loopback Adapter on different Windows versions.

The Microsoft Loopback Adapter in Microsoft Windows 7 is renamed to Microsoft KM-TEST Loopback Adapter in Microsoft Windows 8.1 and later releases.

To install a Loopback Adapter on Microsoft Windows 7 or to install Microsoft KM-Test Loopback Adapter on Microsoft Windows 8.1, Microsoft Windows Server 2012, Microsoft Windows Server 2012 R2, and Microsoft Windows Server 2016 perform the following steps:

1. Click **Start** and enter `hdwwiz` in the Search box. Click **hdwwiz** to start the Add Hardware wizard.

For Microsoft Windows 8.1 and later releases, open the Windows Control Panel and double-click **Add Hardware** to start the Add Hardware wizard.

2. In the Welcome window, click **Next**.
3. In the The wizard can help you install other hardware window, select **Install the hardware that I manually select from a list**, and click **Next**.
4. From the list of hardware types, select the type of hardware you are installing, select **Network adapters**, and click **Next**.
5. In the Select Network Adapter window, make the following selections:
  - **Manufacturer:** Select **Microsoft**.
  - **Network Adapter:** Select **Microsoft Loopback Adapter** for Microsoft Windows 7 and **Microsoft KM-TEST Loopback Adapter** for Microsoft Windows Server 8.1 and later releases.
6. Click **Next**.
7. In the The wizard is ready to install your hardware window, click **Next**.
8. In the Completing the Add Hardware Wizard window, click **Finish**.
9. Click **Manage Network Connections**. This displays the Network Connections Control Panel item.
10. Right-click the connection that was just created. This is usually named "Local Area Connection 2". Choose **Properties**.
11. On the **General** tab, select **Internet Protocol (TCP/IP)**, and click **Properties**.
12. In the Properties dialog box, click **Use the following IP address** and do the following:
  - a. **IP Address:** Enter a non-routable IP for the loopback adapter. Oracle recommends the following non-routable addresses:
    - 192.168.x.x (x is any value between 0 and 255)
    - 10.10.10.10
  - b. **Subnet mask:** Enter 255.255.255.0.
  - c. Record the values you entered, which you need later in this procedure.
  - d. Leave all other fields empty.
  - e. Click **OK**.
13. Click **Close**.
14. Close **Network Connections**.
15. Restart the computer.
16. Add a line to the *DRIVE\_LETTER*: \WINDOWS\system32\drivers\etc\hosts file with the following format, after the localhost line:

```
IP_address hostname.domainname hostname
```

where:

- *IP\_address* is the non-routable IP address.
- *hostname* is the name of the computer.
- *domainname* is the name of the domain.

For example:

```
10.10.10.10    mycomputer.us.example.com    mycomputer
```

17. Check the network configuration:
  - a. Open **System** in the Control Panel, and verify that **Full computer name** displays the host name and the domain name, for example, `sales.us.example.com`.
  - b. Click **Change**. In **Computer name**, you must see the host name, and in **Full computer name**, you must see the host name and domain name. Using the previous example, the host name must be `sales` and the domain must be `us.example.com`.
  - c. Click **More**. In **Primary DNS suffix of this computer**, you must see the domain name, for example, `us.example.com`.

## Removing a Loopback Adapter

Use this procedure to remove a Loopback Adapter or a Microsoft KM-TEST Loopback Adapter on different Windows versions.

To remove a Loopback Adapter on Microsoft Windows 7 or to remove Microsoft KM-Test Loopback Adapter on Microsoft Windows 8.1, Microsoft Windows Server 2012, Microsoft Windows Server 2012 R2, and Microsoft Windows Server 2016, perform the following steps:

1. Display **System** in the Windows Control Panel.
2. In the Hardware tab, click **Device Manager**.
3. For Microsoft Windows 7, in the Device Manager window, expand **Network adapters**. You must see **Microsoft Loopback Adapter**. For Microsoft Windows 8.1 and later releases, you must see **Microsoft KM-TEST Loopback Adapter**.
4. For Microsoft Windows 7, right-click **Microsoft Loopback Adapter** and select **Uninstall**. For Microsoft Windows 8.1 and later releases, right-click **Microsoft KM-TEST Loopback Adapter** and select **Uninstall**.
5. Click **OK**.
6. Restart the computer.
7. Remove the line from the `DRIVE_LETTER:\WINDOWS\system32\drivers\etc\hosts` file, added after the localhost line while installing the loopback adapter on other Windows operating systems.

# F

## Managing Oracle Database Port Numbers

Review default port numbers.

If needed, use these steps to change assigned ports after installation.

### About Managing Ports

During installation, Oracle Universal Installer assigns port numbers to the 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.

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, then Oracle Database moves to the next highest port in the allotted port range, and continues checking until it finds a free port.

### Oracle Database Component Port Numbers and Protocols

This table lists the port numbers and protocols configured for Oracle Database components during a single-instance installation.

By default, the first port in the range is assigned to the component, if it is available.



**Table F-1 Ports Used in Oracle Components**

Component and Description	Default Port Number	Port Range	Protocol
<p>Oracle Net Listener</p> <p>Enables Oracle client connections to the database by using Oracle Net services. You can configure this port number during installation. To reconfigure this port, use Net Configuration Assistant.</p>	1521	Port number changes to the next available port.  Modifiable manually to any available port.	TCP
<p>Oracle Connection Manager</p> <p>Listening port for Oracle client connections. It is not configured during installation, but can be configured manually by editing the cman.ora parameter file. You can find the file under <code>/network/admin</code> directory.</p>	1630	1630	TCP
<p>Oracle XML DB</p> <p>The Oracle XML DB HTTP port is used if web-based applications need to access an Oracle database from an HTTP listener. It is configured during installation, but you cannot view it afterward.</p> <p><b>See Also:</b> <i>Oracle XML DB Developer's Guide</i></p>	0	Configured Manually	HTTP
<p>Oracle XML DB Developer's Guide</p> <p>The Oracle XML DB FTP is used when applications need to access an Oracle database from an FTP listener. It is configured during installation, but you cannot view it afterward.</p> <p><b>See Also:</b> <i>Oracle XML DB Developer's Guide</i></p>	0	Configured Manually	FTP
<p>Oracle Services for Microsoft Transaction Server</p> <p>The port number for Microsoft Transaction Server is configured when you enter its value in the Oracle Universal Installer the first time you install the software on a particular server. If you install the software in multiple Oracle homes on the same server, then Oracle Universal Installer uses the same port number that you specified during the first installation.</p> <p>In most cases, you do not have to reconfigure the port number.</p>	Dynamic	49152-65535	TCP

 **See Also:**

- *Oracle Enterprise Manager Cloud Control Advanced Installation and Configuration Guide* for information on Oracle Management Agent ports
- *Oracle Real Application Clusters Installation Guide for Microsoft Windows x64 (64-Bit)* for a list of clusterware ports used in Oracle components

## Changing the Oracle Services for Microsoft Transaction Server Port

In most cases, you need not reconfigure the port number.

If you must, then you can use the Registry Editor to edit its value in the `HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\OracleMTSRecoveryService\Protid_0` Registry Editor key to any available port within the range 1024 to 65535.

During installation, Oracle Universal Installer takes the value for the port from the key, if it exists. Otherwise, a free port ranging from 49152 to 65535 is chosen.

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