Oracle8*i* Client

Administrator's Guide

Release 2 (8.1.6) for Windows

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ORACLE

Oracle8*i* Client Administrator's Guide, Release 2 (8.1.6) for Windows

Part No. A73017-01

Primary Authors: Herbert Kelly III, Mark Kennedy, Tamar Rothenberg, and Helen Slattery.

Contributors: Server Technologies Division - NT Development

Contents

3 Multiple Oracle Homes and Optimal Flexible Architecture

5 Post-Installation Configuration Tasks

6 Developing Applications

A Directory Structures

B Oracle8i Configuration Parameters and the Registry

C Net8 Configuration

D Error Messages

Contact Us!

Oracle8*i* Client Administrator's Guide, Release 2 (8.1.6) for Windows

Part No. A73017-01

This document describes how to contact Oracle Corporation if you have issues with the documentation or software. It also provides a list of useful resources for Oracle partners and developers.

Read the section...	If you...
"How to Contact Oracle Technical Publications" on page x	Have issues with Documentation
"How to Contact Oracle Support Services" on page xi	Have issues with Software
"Resources for Oracle Partners and Developers" on page xv	Want to join an Oracle partner or application developer program

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How to Contact Oracle Support Services

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Oracle Support Services In...	Call...
United States of America	+ (650) 506-1500 for customers with support contracts. + (650) 506-5577 to obtain a support contract.
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All other locations	The telephone number for your country listed at the following Web site: `http://www.oracle.com/support/contact_us/sup_hot_phone.html` Oracle Support Services telephone numbers are also listed in the *Oracle Customer Support Guide* in your kit.

Please complete the following checklist before you call. If you have this information ready, your call can be processed much quicker.

❑ Your CPU Support Identification Number (CSI Number) if applicable.

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❑ The hardware name on which your application is running.

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- ❑ The operating system name and release number on which your application is running.
  - To verify the operating system version on Windows NT, enter the following at the MS-DOS command prompt:

    ```
    C:\> WINMSD
    ```

    The *Windows NT Diagnostics* dialog box displays the operating system and Service Pack version.

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- ❑ The release numbers of the Oracle Server and associated products involved in the current problem. For example, Oracle8*i* Client release 8.1.6.0.0 and Oracle Enterprise Manager release 2.1.0.0.0.
  - To verify the release number of the Oracle Server, connect to the database using a tool such as SQL*Plus. The release number is displayed. For example:

    ```
    Connected to:
    Oracle8i Enterprise Edition Release 8.1.6.0.0 - Production
    With the Partitioning and Java options
    PL/SQL Release 8.1.6.0.0 - Production
    ```

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- ❑ The third-party software version you are using.
  - To verify an application version, from the application's Help menu, select About...

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- ❑ The exact error codes and messages. Please write these down as they occur. They are critical in helping Oracle Support Services to quickly resolve your problem. Note whether there were no errors reported.

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- ❑ A description of the issue, including:
  - **What happened?** For example, the command used and its result.

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  - **When did it happen?** For example, during peak system load, or after a certain command, or after an operating system upgrade. In addition, what was happening when the problem occurred?

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  - **Where did it happen?** For example, on a particular system, or within a certain procedure or table.

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- **What is the extent of the problem?** For example, production system unavailable, or moderate impact but increasing with time, or minimal impact and stable.
- Did the problem affect one user, several users, or all users?
- Has anything changed? For example, if this is an operation that used to work and now fails, what is different? Can you undo any recent changes, to verify whether they are relevant to the issue?

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- **Can the problem be reproduced?** This is a critical question for support analysts. For example, did the problem recur on the same system, under the same circumstances? Can the problem be reproduced on another system? Additionally:
- Does installing a software component fail on all client machines, or just one?
- Do all clients fail to connect to the server, or just one?
- If you are able to restart the server or database, does restarting the database or rebooting the server or client machine (if applicable) make a difference?

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- ❑ Keep copies of the Oracle alert log, any trace files, core dumps, and redo log files recorded at or near the time of the incident. Oracle Support Services may need these to further investigate your problem.

  To help analyze problems:

  - Archive or delete old alert logs. When the database is started without an alert log, a new one is created. In some cases, if you force the problem to recur with a new alert log, the timestamps for the recorded events may indicate which events are relevant.
  - Archive or delete old trace files. To check whether the file was modified, right-click and select Properties. The *Properties* dialog box displays the modification date.
  - Check the operating system error logs, especially the System log and Application log. These files are relevant to the Oracle Server. To view these files, from the Start menu, choose Programs > Administrative Tools > Event Viewer, and choose System or Application from the Log main menu.

Resources for Oracle Partners and Developers

This section provides information on partner programs and resources for Oracle database administrators and application developers.

Information Source	Description
Oracle Corporation Home Page `http://www.oracle.com`	This Web site is the starting point for general information on Oracle Corporation.
Alliance Online `http://alliance.oracle.com`	Oracle provides leading-edge technology, education, and technical support that enables you to effectively integrate Oracle into your business. By joining the Oracle Partner Program, you demonstrate to customers that you are committed to delivering innovative Oracle-based solutions and services. The greater your commitment to Oracle, the more we can help you grow your business. It's that simple. The value you derive is associated directly with your level of commitment.

Information Source	Description
Oracle Education `http://education.oracle.com/`	Customers come to Oracle Education with a variety of needs. You may require a complete curriculum based on your job role to enable you to implement new technology. Or you may seek an understanding of technology related to your key area of responsibility to help you meet technical challenges. You may be looking for self-paced training that can be used as an ongoing resource for reference and hands-on practice. Or, you may be interested in an overview of a new product upgrade. Whatever your training need, Oracle Education has the solution.
Oracle Technology Network `http://technet.oracle.com/`	The Oracle Technology Network is your definitive source for Oracle technical information for developing for the Internet platform. You will be part of an online community with access to free software, Oracle Technology Network-sponsored Internet developer conferences, and discussion groups on up-to-date Oracle technology. Membership is free.
Oracle Store `http://oraclestore.oracle.com/`	This is Oracle's online shopping center. Come to this site to find special deals on Oracle software, documentation, publications, computer-based training products, and much more.
Oracle Support Services' Support Web Center `http://www.oracle.com/support/`	Oracle Support Services offers a range of programs so you can select the support services you need and access them in the way you prefer: by telephone, electronically, or face to face. These award-winning programs help you maintain your investment in Oracle technology and expertise. Here are some of the resources available in the Support Web Center:
Oracle*MetaLink* `http://www.oracle.com/support/elec_sup/index.html`	Oracle*MetaLink* is Oracle Support Services' premier Web support service. It is available to Oracle*metals* customers (Gold, Silver, Bronze), 24 hours a day, seven days a week.
Oracle*Lifecycle* `http://www.oracle.com/support/sup_serv/lifecycle/index.html`	Oracle*Lifecycle* is designed to deliver customized, industry-focused, full life-cycle support solutions that enable industry leaders to use Oracle technology to make smart business decisions, achieve operational excellence, and succeed in their markets.

Information Source	Description
Expert*ONLINE* `http://www.oracle.com/support/sup_serv/online/index.html`	Oracle Support Services has launched a new line of services called Expert*ONLINE*. These services provide online database administration for companies looking to supplement their existing DBA staff or fill a DBA role. Services range from Expert*DETECT*, a monitoring, diagnostic, and recommendation service, to Expert*DBA*, a full online database administration service.
Virtual Support Analyst (VSA) `http://www.oracle.com/support/sup_serv/vsa_start.html`	VSA is Oracle's Internet e-mail service; it is available to U.S. customers with an Oracle*metals* support agreement. With VSA, you can initiate a request for assistance through e-mail, bypassing the queues you may encounter when using telephone support. VSA also enables you to access Oracle's bug database.
Customer Service `http://www.oracle.com/support/cus_serv/index.html`	This site provides resources to make your interactions with Oracle as easy as possible. Among the things you can do are: ■ Learn what is a CPU Support Identification (CSI) number ■ Update your technical contact information ■ Find out whom to contact for invoice and collection issues ■ Request product update shipments ■ Access a glossary of Oracle Support Services terms
U.S. Customer Visit Program `http://www.oracle.com/support/cus_serv/cus_visit.html`	This U.S.-based program has been established to help our customers understand and obtain maximum benefit from the support services they have purchased. The visit typically offers a customized orientation presentation, a comprehensive overview and demonstration of Oracle's electronic services, and helpful tips on working more effectively with Oracle Support Services.
Support Web Center Library `http://www.oracle.com/support/library/index.html`	This site contains articles, guides, and other documentation to help you leverage the wealth of knowledge and reference material that Oracle Support Services produces.

Before You Begin

This guide is your primary source of introductory, post-installation, configuration, and administration information for using the Oracle8*i* Client products.

Specific topics discussed are:

- Prerequisites
- Intended Audience
- How This Guide Is Organized
- Documentation and Code Conventions

Prerequisites

This guide assumes that you are familiar with the following:

- Windows NT, 95, and 98, and have installed and tested them on your computer system
- Object-relational database management concepts

> **See Also:** *Oracle8i Concepts* if you are not familiar with object-relational database management concepts.

Intended Audience

This guide is necessary for anyone installing, configuring, or administering Oracle8*i* Client.

Note: This guide describes *only* the features of Oracle8*i* Client software that apply to the Windows NT, Windows 95, and Windows 98 operating systems. For information about Oracle8*i* Client that is applicable to *all* operating systems, see the other documentation included in your package, listed in Appendix E of *Oracle8i Client Installation Guide for Windows.*

How This Guide Is Organized

This guide is organized as follows:

Chapter 1, "Oracle8i Differences between Windows NT and UNIX"

Provides a list of differences between Oracle8*i* on Windows NT and on UNIX.

Chapter 2, "Database Tools Overview"

Provides a list of preferred and optional tools you can use to perform common database administration tasks.

Chapter 3, "Multiple Oracle Homes and Optimal Flexible Architecture"

Describes how to use multiple Oracle homes and an Optimal Flexible Architecture (OFA) configuration for placement of database files. Read this chapter *before* installing Oracle8*i* Client.

Chapter 4, "Using Oracle8i Client Directory Features with Active Directory"

Describes Oracle integration with the Active Directory.

Chapter 5, "Post-Installation Configuration Tasks"

Describes or references the configuration tasks you may need to perform before using such products as Oracle *inter*Media.

Chapter 6, "Developing Applications"

Describes Windows specific issues for application developers.

Appendix A, "Directory Structures"

Describes the default directory structures created when you install Oracle components.

Appendix B, "Oracle8i Configuration Parameters and the Registry"

Describes the use of the registry for various Oracle components. In addition, this chapter lists the recommended values and ranges for configuration parameters.

Appendix C, "Net8 Configuration"

Describes configuration for the Windows NT, Windows 95 or 98 platforms.

Appendix D, "Error Messages"

Provides a list of error messages, causes, and corrective actions.

Glossary

Provides brief descriptions of terms used throughout this guide.

Documentation and Code Conventions

The following conventions are used in this guide:

Convention	Example	Meaning
All uppercase plain	C:\ORACLE\ORA81	Indicates command names, SQL reserved words, and keywords, as in ALTER DATABASE. All uppercase plain is also used for directory names and file names.
Italic	■ Used to indicate a variable: *file name* ■ Used to indicate the title of a guide.	Indicates a value that you must provide. For example, if a command asks you to type *file name*, you must type the actual name of the file.
Square brackets [ ]	*X*:\[*PATHNAME*]\ORACLE*HOME_NAME*	Encloses optional items. For example, when you create an OFA-compliant Oracle home directory, you can place an optional pathname before the \ORACLE pathname. Square brackets also indicate a function key, for example [Enter].
Choose Start >	Choose Start > Programs > Oracle - *HOME_NAME* > Network Administration > Net8 Assistant	How to start a program. For example, to start Net8 Assistant, you must click the Start button on the taskbar and then choose Programs, Oracle - *HOME_NAME* > Network Administration > Net8 Assistant.
C:\>	C:\ORACLE\ORADATA>	Represents the Windows NT command prompt of the current hard disk drive. Your prompt reflects the subdirectory in which you are working. Referred to as the MS-DOS command prompt in this guide.
Backslash (\) before a directory name	\ORADATA	Indicates that the directory is a subdirectory of the root directory.

Convention	Example	Meaning
ORACLE_HOME and *ORACLE_BASE*	Go to the *ORACLE_BASE**ORACLE_HOME*\RDBMS\ADMIN directory	In releases prior to 8.1, when you installed Oracle8*i* Client, all subdirectories were located under a top level Oracle home directory, that by default was: ■ C:\ORANT for Windows NT ■ C:\ORAWIN95 for Windows 95 ■ C:\ORAWIN98 for Windows 98 or whatever you may have called your Oracle home. In this Optimal Flexible Architecture (OFA)-compliant release, all subdirectories are no longer under a top level *ORACLE_HOME* directory. There is now a new top-level directory called *ORACLE_BASE* that by default is C:\ORACLE. If you install Oracle8*i* Client release 8.1.6 on a clean computer (that is, there is no other Oracle software on the computer), the default setting for the first Oracle home directory is C:\ORACLE\ORA81. If you run Oracle Universal Installer again and install release 8.2.*x*, the second Oracle home directory is called \ORA82. These Oracle home directories are located directly under *ORACLE_BASE*. All directory path examples in this guide follow OFA conventions.
%ORACLE_HOME%	SQL> @%ORACLE_HOME%\ADMIN\DB_NAME\ADHOC\CATALOG.SQL	In SQL*Plus commands, you may see %ORACLE_HOME%. SQL*Plus is able to locate your Oracle Home directory using the %ORACLE_HOME% variable. This convention can be used in Server Manager, SQL*Plus, Export Utility, and Import Utility.

Convention	Example	Meaning
HOME_NAME	Oracle*HOME_NAME*TNSListener	Represents the Oracle home name. The home name can be up to sixteen alphanumeric characters. The only special character allowed in the home name is the underscore.
HOME*ID*	HOME0, HOME1, HOME2	Represents a unique registry subkey for each Oracle home directory in which you install products. A new HOME*ID* is created and incremented each time you install products to a different Oracle home directory on one computer. Each HOME*ID* contains its own configuration parameter settings for installed Oracle products.
Symbols	period . comma , hyphen - semicolon ; colon : equal sign = backslash \ single quote ’ double quote " parentheses ()	Symbols other than brackets and vertical bars must be entered in commands exactly as shown.

1

Oracle8*i* Differences between Windows NT and UNIX

The following table lists the major differences between Oracle8*i* on Windows NT and on UNIX. For Oracle database administrators moving from a UNIX platform to Windows NT, this information may be helpful in understanding the Windows NT features that are relevant to Oracle.

Feature	On UNIX...	On Windows NT...
Services	UNIX daemons are similar to services on Windows NT.	Oracle registers a database instance as a service (OracleService*SID*). To connect to and use an Oracle instance, an Oracle service is created during the database creation process and associated with the Oracle database. Once a service is created with the Oracle database, the service can run even while no user is logged on. This feature enables server security while running the Oracle database. **To Access Services**: By default, services run under the SYSTEM account. **1.** Choose Start > Settings > Control Panel > Services to access the *Services* dialog box. OracleService*SID* and other Oracle services appear here.

Feature	On UNIX...	On Windows NT...
Processes and Threads **See:** Online Help for Oracle Administration Assistant for Windows NT	Each Oracle background process exists as a separate process, for example, ora_dbw0_V816.	All Oracle background, dedicated server, and client processes are threads of the master ORACLE process. All the threads of the ORACLE process share resources on Windows NT. This multithreaded architecture is highly efficient, allowing fast context switches with low overhead. **To View Processes:** Use the Oracle Administration Assistant for Windows NT to view processes or kill individual threads. 1. Choose Start > Programs > Oracle - *HOME_NAME* > Database Administration > Oracle Administration Assistant for Windows NT. 2. Right-click the *SID*, for example V816, and choose Process Information. **Note:** The Microsoft Management Console (MMC) is launched when the Oracle Administration Assistant for Windows NT is started on Windows NT 4.0. Oracle Corporation has integrated several database administration snap-ins into the MMC.

Feature	On UNIX...	On Windows NT...
File Sizes	UNIX file system (UFS) or journalled file system (JFS). Maximum file size supported by most vendors is now 32 GB. The Oracle block sizes vary between 2-8K.	Oracle can be installed on FAT and NTFS file systems. By default, Oracle runs under the SYSTEM account, which does not have access to NTFS volumes, unless it is granted. The maximum file size for FAT is 4 GB; for NTFS, 16 Exabytes (EB). The Oracle block size is 8K. The maximum number of blocks per data file is 4 million. The maximum number of data files per database depends on block size. When calculating database limits, the total maximum capacity of the database remains the same regardless of the way the bits are split up.
Initialization Parameters: Multiple Database Writers	You can specify more than one database writer process with the initialization parameter DB_WRITERS. Multiple database writers can help, for example, when a UNIX port does not support asynchronous I/O.	DB_WRITERS, which writes dirty buffers to disk, is not supported. Windows NT supplies its own I/O slaves and uses them to see if I/O is complete. Multiple DB_WRITERS might cause synchronization problems.
Direct Writes to Disk **See:** *Oracle8i Concepts* On both platforms, bypassing the file system buffer cache ensures the data is written to disk.	Oracle uses the O_SYNC flag to bypass the file system buffer cache. The flag name depends on the UNIX port.	Oracle bypasses the file system buffer cache completely.
Memory Resources **See:** *Oracle8i Concepts*	The resources provided by the default kernels are often inadequate for a medium or large Oracle database. The maximum size of a shared memory segment (SHMMAX) and maximum number of semaphores available (SEMMNS) may be too low for Oracle recommendations.	Fewer resources are needed for interprocess communication (IPC) because the operating system is thread-based and not process-based. These resources, including shared memory and semaphores, are not adjustable by the user.

Feature	On UNIX...	On Windows NT...
Install Accounts and Groups	Uses the concept of a DBA group. The root account cannot be used to install Oracle. A separate Oracle account must be created manually.	Oracle must be installed by a Windows NT user name in the Administrator's group. The user name is automatically added to the Windows NT local group ORA_DBA, which receives SYSDBA the privilege. This allows the user to log into the database with the INTERNAL account and not be prompted for a password. **Password Files:** Password files are located in the *ORACLE_BASE**ORACLE_HOME*\DATABASE directory and are named PWD*SID*.ORA, where *SID* identifies the Oracle8*i* database instance.
Dynamic Link Libraries (DLLs) **See:** *Oracle8i Concepts*	Shared libraries are similar to the shared DLLs on Windows NT. Object files and archive libraries are linked to generate the Oracle executables. Relinking is necessary after certain operations, such as installation of a patch.	Oracle DLLs form part of the executable at run time, and, therefore, are smaller. DLLs can be shared between multiple executables. Relinking by the user is not supported, but executable images can be modified using the ORASTACK utility. **Modifying Executable Images:** Modifying executable images on Windows NT reduces the chances of running out of virtual memory when using a large SGA or an SGA with thousands of connections. However, Oracle Corporation recommends doing this under the guidance of Oracle Support Services.
Installation **See:** *Oracle8i Client Installation Guide for Windows*	Many manual setup tasks required on UNIX are not required on Windows NT.	You *do not need* to manually: ■ set environment variables ■ create a DBA group for database administrators ■ create a group for users running Oracle Universal Installer ■ create an account dedicated to installing and upgrading Oracle components

Feature	On UNIX...	On Windows NT...
Multiple Oracle Homes and OFA Using multiple Oracle homes and Optimal Flexible Architecture (OFA) provides many advantages when administering large databases. OFA is implemented on Windows NT and UNIX in the same way. However, differences exist with regard to the following: ■ The top-level names of the OFA directory tree differ between Windows NT and UNIX. However, the main subdirectory and file names are the same on both operating systems. ■ *ORACLE_BASE* directory. ■ No support for symbolic links on Windows NT. **See:** Chapter 3, "Multiple Oracle Homes and Optimal Flexible Architecture"	Multiple Oracle homes on Windows NT is comparable to installation capabilities on UNIX. Environment variables can be set to specify Oracle homes. *ORACLE_BASE* is associated with a UNIX user's environment. **Symbolic Links** Symbolic links are supported. Although everything seems to be in one directory on the same hard drive, files can be on different hard drives if they are symbolically linked or have that directory as a mount point.	*ORACLE_HOME* directories can be located under a single *ORACLE_BASE* directory. *ORACLE_BASE* is defined in the registry (for example, in HKEY_LOCAL_MACHINE \SOFTWARE\ORACLE\HOME0). Do not set *ORACLE_HOME* in the environment (software run from another Oracle home will not work reliably). In fact, beginning in release 8.1.6, the Oracle Universal Installer will reset it. The goal of OFA is to place all Oracle software under one *ORACLE_BASE* directory and to spread the files across different physical drives as your databases increase in size. Oracle Corporation recommends that you use one logical drive to store your database administration files and that you place other files, as needed, on other logical drives in an ORADATA*DB_NAME* directory. For example, for a database named PROD, there are four logical drives: ■ C:\ contains an Oracle home and the database administration files. ■ F:\ contains the redo log files. (The F:\ drive could also represent two physical drives that have been striped to increase performance.) ■ G:\ contains one of the control files and all of the tablespace files. (The G:\ drive could also use a RAID Level-5 configuration to increase reliability.) ■ H:\ contains the second control file. **Symbolic Links** Symbolic links like those on UNIX are not supported, although Microsoft has announced the intention to support them in a near-future release.

Feature	On UNIX...	On Windows NT...
Automatic Startup/Shutdown	**Automatic Startup** Several files and scripts in different directories are used to start an instance automatically. **Automatic Shutdown** Scripts are run on computer shutdown, allowing applications such as Oracle to be shut down cleanly.	**Automatic Startup** Set the registry parameter ORA_*SID*_AUTOSTART to TRUE (the default) using an Oracle tool such as ORADIM. 1. Enter the following with parameters at the MS-DOS command prompt: `C:\> ORADIM` *PARAMETERS* 2. To start the listener automatically, set the service startup type to automatic. **Automatic Shutdown** 1. Set the registry parameters ORA_SHUTDOWN and ORA_*SID*_SHUTDOWN to stop the relevant OracleService*SID* and shut down. 2. Set the registry parameter ORA_*SID*_SHUTDOWNTYPE to control the shutdown mode (the default is I, or Immediate).

Feature	On UNIX...	On Windows NT...
Diagnostic and Tuning Utilities **See:** Chapter 2, "Database Tools Overview".	Performance utilities are not included with the operating system. Utilities such as sar and vmstat are used to monitor Oracle background and shadow processes. These utilities are not integrated with Oracle. Task Manager on Windows NT displays currently running processes and their resource usage, similar to the UNIX ps -ef command or OpenVMS SHOW SYSTEM. However, Task Manager is easier to interpret and the columns can be customized.	Performance utilities include Oracle Performance Monitor, Task Manager, Control Panel, Event Viewer, the registry, User Manager, and Microsoft Management Console (only included with Windows 2000). Oracle is integrated with several of these tools. For example: ■ Oracle Performance Monitor displays key Oracle database information. This tool is the same in appearance and operation as the Windows NT Performance Monitor, except it has been preloaded with Oracle8*i* database performance elements. ■ Event Viewer displays system alert messages, including Oracle startup / shutdown messages and the audit trail.

Feature	On UNIX...	On Windows NT...
Raw Partitions	Raw partitions are supported.	Data files for tablespaces can be stored on a file system, or on raw partitions. A raw partition is a portion of a physical disk that is accessed at the lowest possible level. Use the Windows NT Disk Administrator application to create an extended partition on a physical drive. An extended partition points to raw space on the disk that can be assigned multiple logical partitions for the database files. An extended partition avoids the four-partition limit on Windows NT by allowing you to define large numbers of logical partitions to accommodate applications using the Oracle8*i* database. Logical partitions can then be given symbolic link names to free up drive letters. **Oracle Parallel Server** Raw partitions are necessary for the shared data files in an Oracle Parallel Server (OPS) environment, available on both UNIX and Windows NT. OPS, in which Oracle instances run on all nodes simultaneously, provides clustering and high availability.

2

Database Tools Overview

Oracle8*i* Client includes various tools to perform database functions. This chapter describes the preferred tools to perform common database administration tasks.

Specific topics discussed are:

- Choosing a Database Tool
- Starting Database Tools
- Using SQL*Loader
- Using Windows NT Tools
- Optional Windows NT Diagnostic and Tuning Utilities

Choosing a Database Tool

Database tools is a collective term for tools, utilities, and assistants that you can use to perform database administration tasks. Some database tools perform similar tasks, though no one database tool performs all database administration tasks. The following sections indicate which database tools can be used on particular operating systems and the preferred tools to use for common database administration tasks.

Note: This chapter describes tasks that use SQL*Plus command line syntax. In this guide, all Server Manager text and examples have been replaced with SQL*Plus equivalents. Although Server Manager continues to ship with 8.1.*x* releases, Oracle Corporation strongly recommends that you migrate to SQL*Plus as soon as possible. See your SQL*Plus documentation for information on using SQL*Plus to perform database administration tasks.

Note that for all previous Oracle8 8.0.*x* releases, the Server Manager executable was SVRMGR30. For 8.1.6, the Server Manager executable is SVRMGRL. The "L" indicates line mode.

Tools and Operating System Compatibility

This table lists tools and the operating system(s) on which each can be used:

Tools	Windows NT and Windows 2000[1]	Windows 95 and Windows 98
Application Development		
SQL*Plus (SQLPLUS)[2]	Yes	Yes
Pro*C / C++	Yes	Yes
Pro*COBOL	Yes	Yes
Object Type Translator (OTT)	Yes	Yes
Oracle Web Publishing Assistant	Yes	No
Oracle Services for Microsoft Transaction Server	Yes	Yes
Oracle AppWizard for Microsoft Visual C++	Yes	Yes
Oracle Objects for OLE	Yes	Yes
Oracle Provider for OLE DB	Yes[3]	Yes[4]
Database Administration		
Oracle Enterprise Login Assistant (a feature of Oracle Advanced Security)[5]	Yes	Yes

Tools	Windows NT and Windows 2000[1]	Windows 95 and Windows 98
Oracle Enterprise Manager, Release 2.1		
Oracle DBA Management Pack (database tools and wizards)	Yes	Yes
Diagnostics Pack	Yes	Yes
Enterprise Manager: ■ Console	Yes	Yes
Diagnostics Pack	Yes	Yes
Extended Applications ■ Application Manager ■ Replication Manager	Yes	Yes
Extended Database Administration: ■ Distributed Access Manager, Beta ■ Enterprise Security Manager ■ Oracle *inter*Media Text Manager ■ Oracle Spatial Index Advisor, Beta	Yes	Yes
Migration Utilities		
Oracle Migration Workbench	Yes	Yes
Oracle Utilities from the MS-DOS Command Line		
Export Utility (EXP)	Yes	Yes
Import Utility (IMP)	Yes	Yes
Recovery Manager (RMAN)	Yes	Yes
SQL*Loader (SQLLDR)	Yes	Yes
TKPROF (TKPROF)	Yes	Yes
Network Administration		
Net8 Assistant	Yes	Yes
Net8 Configuration Assistant	Yes	Yes
Oracle Wallet Manager (a feature of Oracle Advanced Security)[6]	Yes	Yes

Tools	Windows NT and Windows 2000[1]	Windows 95 and Windows 98
Windows NT Tools		
Task Manager	Yes	Yes
Control Panel	Yes	Yes
Event Viewer	Yes	No
Registry	Yes	Yes
User Manager	Yes	No
Microsoft Management Console[7]	Yes	No

[1] Windows 2000 production versions were not available during the development and testing of Oracle8i release 8.1.6 products. Oracle Corporation has used the Release Candidate versions of Windows 2000 for development and testing. Refer to the READMEDOC.HTM file at the top level of the CD-ROM for the latest information on certification and support of release 8.1.6 products on Windows 2000.

[2] The ORADEBUG utility can be used through SQL*Plus to send debug commands to Oracle processes.

[3] Available only with Windows NT.

[4] Available only with Windows 98.

[5] Available only with Oracle8*i* Enterprise Edition, and not Oracle8*i*.

[6] Available only with Oracle8*i* Enterprise Edition, and not Oracle8*i*.

[7] Automatically included with Windows 2000. To use with Windows NT 4.0, you must obtain the Microsoft Management Console from Microsoft Corporation.

Preferred Database Tools

This table lists common database administration tasks and the various database tools you can use to perform them. Oracle Corporation recommends you use the tools listed in the "Preferred Database Tool" column of the table. After choosing a tool to perform a task, go to "Starting Database Tools" on page 2-7 for instructions on how to start the tool.

Database Administration Task	Preferred Database Tool	Other Database Tools
Export data	Export Wizard	Export Utility (EXP)
Import data	Import Wizard	Import Utility (IMP)
Load data	Load Wizard	SQL*Loader (SQLLDR)
Publish data to the Web	Oracle WebDB	Oracle Web Publishing Assistant
Authenticate database administrators and users	Security Manager	■ Oracle Enterprise Login Assistant ■ SQL*Plus ■ Windows NT operating system ■ Oracle Administration Assistant for Windows NT (OS authenticated users)
Grant database roles	Security Manager	■ User Manager ■ Oracle Administration Assistant for Windows NT (OS authenticated users)

Starting Database Tools

This section describes how to start each of the tools in the following categories:

- Starting Tools in Multiple Oracle Homes
- Starting Tools
- Starting Oracle Utilities from the Command Line
- Starting Oracle Enterprise Manager
- Starting Windows NT Tools

You will be referred back to this section for tool startup procedures as you use this guide.

Starting Tools in Multiple Oracle Homes

If you have multiple Oracle homes on your computer from previous releases, see "Multiple Oracle Home Functionality in Different Releases" on page 3-3 and "Multiple Oracle Home Environments" on page 3-5 for a description of the differences between pre-8.1.6 Oracle homes and release 8.1.6 and later Oracle homes.

Starting Tools from Release 8.0.4 and later 8.0.*x* Multiple Oracle Homes

If you are using multiple Oracle homes functionality, the command to start a tool includes a *HOME_NAME*, where *HOME_NAME* indicates the name of a different Oracle home. Note that *the first* Oracle home created on your computer does not have *HOME_NAME* appended to the group. For example:

To start SQL*PLUS from the first Oracle home, choose:

Start > Programs > Oracle > Application Development > SQL*PLUS

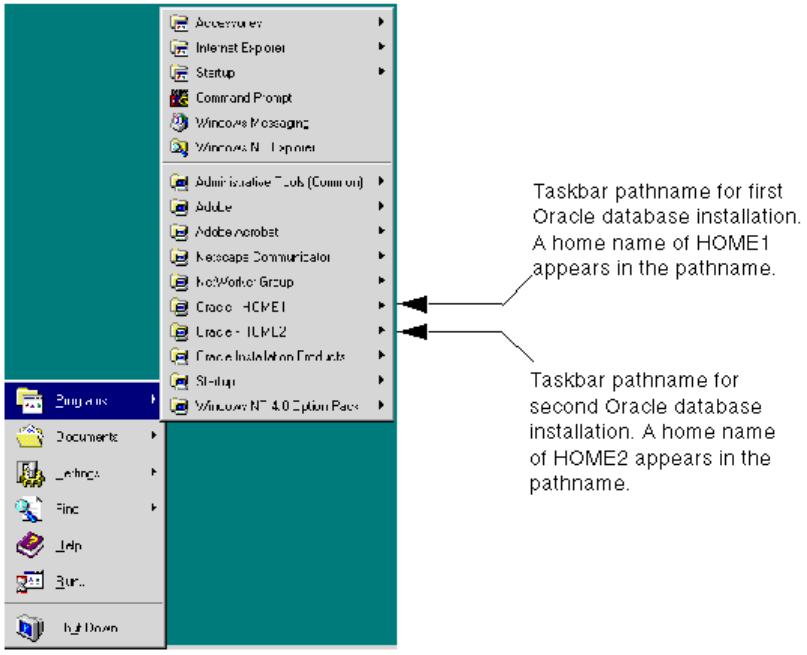
To start Oracle Database Assistant from an additional Oracle home, choose:

Start > Programs > Oracle - *HOME_NAME* > Application Development > SQL*PLUS

Starting Tools from Release 8.1.6 Multiple Oracle Homes

In release 8.1.6, all Oracle homes, including the first Oracle home you create on your computer, have a unique *HOME_NAME*. For example, the command to start Database Configuration Assistant is as follows:

Start > Programs > Oracle - *HOME_NAME* > Application Development > SQL*PLUS, where *HOME_NAME* is the name of the Oracle home. For example, either HOME1 or HOME2 in the following figure:



Starting Tools

This table describes how to start most tools, and where to go for further information on using these products[1]:

Tool	Choose Start > Programs > Oracle - *HOME_NAME* >	For More Information, See...
Oracle Migration Workbench	Migration Utilities > Migration Workbench	*Oracle Migration Workbench Release Notes* *Oracle Migration Workbench for MS SQL Server and Sybase Adaptive Server Reference Guide* *Oracle Migration Workbench for MS Access Reference Guide*
Net8 Assistant	Network Administration > Net8 Assistant	*Net8 Administrator's Guide*
Net8 Configuration Assistant	Network Administration > Net8 Configuration Assistant	*Net8 Administrator's Guide*
Oracle Wallet Manager	Network Administration > Wallet Manager	*Oracle Advanced Security Administrator's Guide*
Oracle Web Publishing Assistant	Application Development > Oracle Web Publishing Assistant	*Oracle Web Publishing Assistant Getting Started*
Oracle Enterprise Login Assistant	Network Administration > Enterprise Login Assistant	*Oracle Advanced Security Administrator's Guide*
OO4O	Application Development > OO4O	Online help available from the Start Menu.
Oracle Provider for OLE DB	Application Development > Oracle Provider for OLE DB	*Oracle Provider for OLE DB User's Guide*

[1]When you use an assistant, you must have read / write access to the directory where database files will be moved / created. Additionally, users must have administrative privileges to create an Oracle8*i* database. If the Oracle Database Configuration Assistant is run from an account that is not part of the Administrator's group, the tool exits without completing the operation.

Starting Oracle Utilities from the Command Line

This table describes how to start Oracle utilities from the MS-DOS command prompt, and where to go for further information on using these products:

Oracle Utilities	To Start...	For More Information, See...

Export Utility (EXP)	Enter the following at the MS-DOS command prompt followed by your user name and password:
	`C:\> EXP`
	EXP starts and prompts you for parameters. To obtain a list of these parameters, enter the following at the MS-DOS command prompt:
	`C:\> EXP HELP=Y`
	Note: When running the Export Utility, the default values for the following parameters under Windows NT are:
	BUFFER 4 KB
	RECORDLENGTH 2 KB
	Note: To export an entire database, you must use the user name SYSTEM. Do not use INTERNAL or SYS.
		Oracle8i Utilities, which describes how to use the Export Utility
		Oracle8i Error Messages for information on error messages

Import Utility (IMP)	Enter the following at the MS-DOS command prompt followed by your user name and password:
	`C:\> IMP`
	IMP starts and prompts you for parameters. To obtain a list of these parameters, enter the following at the MS-DOS command prompt:
	`C:\> IMP HELP=Y`
	Note: When running the Import Utility, the default values for the following parameters under Windows NT are:
	BUFFER 4 KB
	RECORDLENGTH 2 KB
		Oracle8i Utilities, which describes how to use the Import Utility
		Oracle8i Error Messages for information on error messages

Recovery Manager (RMAN)	Enter the following at the MS-DOS command prompt: `C:\> RMAN` *`PARAMETERS`*	*Oracle8i Backup and Recovery Guide* for instructions on using this tool
SQL*Plus (SQLPLUS)	Enter the following at the MS-DOS command prompt: `C:\> SQLPLUS`	*SQL*Plus User's Guide and Reference*

Oracle Utilities	To Start...	For More Information, See...
SQL*Loader (SQLLDR)	Invoke SQL*Loader at the MS-DOS command prompt followed by certain keywords. Enter the following and SQL*Loader displays a Help screen with the available keywords and default values: `C:\> SQLLDR`	*Oracle8i Utilities,* which describes how to use SQL*Loader *Oracle8i Error Messages* for information on error messages "Starting Windows NT Tools" on page 2-15
TKPROF (TKPROF)	Enter the following at the MS-DOS command prompt: `C:\> TKPROF`	*Oracle8i Tuning*

Starting Oracle Enterprise Manager

Applications in the DBA Management Pack can be launched through the Oracle Enterprise Manager console or launched separately as standalone applications. All database applications can also be launched from the console within a web browser.

When an application is launched through the console, it is connected to the Oracle Management Server and is used in the Oracle Enterprise Manager repository. When an application is launched separately, the user has the option to connect to either a specific database or to a Management Server. When connected to an Oracle Management Server, the DBA Management Pack application has access to all the databases in that Oracle Enterprise Manager repository.

To start an Oracle Enterprise Manager tool as a standalone application:

1. Choose Start > Programs > Oracle - *HOME_NAME* > DBA Management Pack > *tool*.

   For example, choose Start > Program > Oracle - HOME1 > DBA Management Pack > Schema Manager.

   After launching a DBA application, the *Oracle Enterprise Manager Login* dialog box appears, giving you the option to connect to either the Oracle Management Server or directly to a single database.

2. Choose the login method for the database administration application and enter the appropriate connect information.

   - Login to the Oracle Management Server.

     When a database administration application is connected to the Oracle Management Server, the DBA application can access all the databases on discovered nodes in that repository, and all of these databases appear in the client's tree list of managed objects. The Oracle Management Server must be running for a DBA application to connect to it.

   - Connect directly to a single database.

     When connected to a single database, the Oracle Management Server does not need to be running, and that database is the only database that shows in the client's tree list. Your TNSNAMES.ORA file must have an entry for the database. You can also enter the host:port:sid connect string for your service.

     See Also: *Oracle Enterprise Manager Configuration Guide* for information on configuration tasks you must perform before using Oracle Enterprise Manager and information on how to connect to an Oracle database.

To start an Oracle Enterprise Manager tool from the Console:

1. Choose Start > Programs > Oracle - *HOME_NAME* > Enterprise Manager > Console.

   The *Login Information* dialog box appears.

2. Log on when prompted.

3. You can now either:

   - Select the database you want to administer in the Navigator tree or in the Map window, then choose the tool from the Console Tools menu or in the Launch Palette.
   - Select the database you want to administer in the Navigator tree, then choose the tool from the Related Tools menu of the context-sensitive menu.
   - Choose the application from the Console Tools menu or from the Launch Palette, then enter the connect information in the *Login Information* dialog box.

   Note: When you select a database before starting a tool, you are connected to the database according to the preferred credentials that have been set up for the database or the credentials you used to log on to the Console. If connection to the database fails for any reason, the *Login Information* dialog box reappears.

To start an Oracle Enterprise Manager tool from a Web browser:

See Also: *Oracle Enterprise Manager Configuration Guide* for information on installing the Oracle Enterprise Manager Web Site, and installing and configuring the Web server.

1. Launch your Web browser and enter the following URL regardless of which Web server you have installed.

   ```
   http://<webserver hostname>:<port number>/
   oem_webstage/EMWebSite.html
   ```

   For example:

   ```
   http://jfox-sun:3339/oem_webstage/EMWebSite.html
   ```

   Note: The Oracle Application Server Listener port number is 3339.

An index page appears, allowing you to launch various products, documentation, and Web sites.

2. Enter the machine name for the Management Server to which you want to connect and click the application icon or name of the application you want to launch.

3. If you are logging in to Oracle Enterprise Manager for the first time, type in the default credentials (administrator name and password).

   Administrator = `sysman`

   Password = `oem_temp`

   These credentials are for the default super administrator account. The first time you start Enterprise Manager, you must log in as the super administrator. After other administrator accounts have been created using the super administrator account, you can log in as a different administrator.

Starting Windows NT Tools

This table describes how to start each Windows NT tool, and where to go for more information on using these products:

Windows NT Tools	To Start...	For More Information, See...
Control Panel	Choose Start > Settings > Control Panel	"Control Panel" on page 2-17 Your Microsoft Windows NT documentation
Event Viewer	Choose Start > Programs > Administrative Tools > Event Viewer	"Event Viewer" on page 2-18 Your Microsoft Windows NT documentation
Oracle Performance Monitor for Windows NT	Choose Database Administration > Oracle for Windows NT Performance Monitor	"Registry" on page 2-20 Your Microsoft Windows NT documentation

Registry	■ Enter the following at the MS-DOS command prompt on Windows NT:
	`C:\> REGEDT32`
	The registry editor window appears.
	■ Enter the following at the MS-DOS command prompt on Windows 95 or Windows 98:
	`C:\> REGEDIT`
	The registry editor window appears.
		"Registry" on page 2-20
		Appendix B, "Oracle8i Configuration Parameters and the Registry"
		Your Microsoft Windows NT documentation

User Manager	Choose Start > Programs > Administrative Tools > User Manager	"User Manager" on page 2-21 Your Microsoft operating system documentation
Microsoft Management Console (MMC)	Start > Programs > Oracle - *HOME_NAME* > Database Administration > Oracle Administration Assistant for Windows NT **Note**: MMC is launched when the Oracle Administration Assistant for Windows NT is started.	Your Microsoft operating system documentation
Task Manager	Right-click on the Task Bar.	Your Microsoft operating system documentation

Using SQL*Loader

This section describes Windows NT-specific information for using SQL*Loader (SQLLDR).

Windows NT Processing Options

These are the possible values for the Operating System Dependent (OSD) file processing specifications string option, referred to in the "SQL*Loader Control File Reference" chapter of *Oracle8i Utilities*.

Processing Option	Description
""[1]	Stream record format in which each record is terminated by a newline character. The maximum record size is 48 KB.
"FIX n"	Fixed record format in which each record is exactly *n* bytes long. If the record is terminated by a newline character, the newline character must be the *n*th byte. Note that the *Oracle8i Utilities* guide refers to this control file option as "RECSIZE".
"VAR xxxx"	Load variable length records. Specify the OSD "VAR *recsizehint*" in the control file for this option to take effect. The *xxxx* gives an estimate of the average record size to SQL*Loader so that it can approximate buffer sizes accurately and not waste memory. The default length is eighty characters. The *xxxx* does *not* specify how many leading bytes of length are included in each record. It only acts as a hint to SQL*Loader. Each record must always be preceded by five ASCII bytes containing the length of the remainder of the record. For example, a record must look like the following: `00024This is a 24 byte string` Any whitespace, carriage returns, or linefeeds at the end of the record are ignored unless specifically included in the byte count in the length field.

[1] Two double quote characters with no space in between.

Direct Path Option

SQL*Loader includes a direct path option that bypasses redo log and data verification features, thereby decreasing loading time. Use the direct path option with data files known to be error free.

Control File Conventions

When preparing a SQL*Loader control file (.CTL), you must follow certain syntax and notational conventions. When specifying datatypes in the SQL*Loader control file, note that the default sizes of native datatypes are specific to Windows NT. You cannot override these defaults in the control file.

Native Datatypes	Default Field Length
DOUBLE	8
FLOAT	4
INTEGER	4
SMALLINT	2

See Also: *Oracle8i Utilities* for a complete list of options and instructions on using SQL*Loader.

Using Windows NT Tools

The following Windows NT tools can be used to administer an Oracle database:

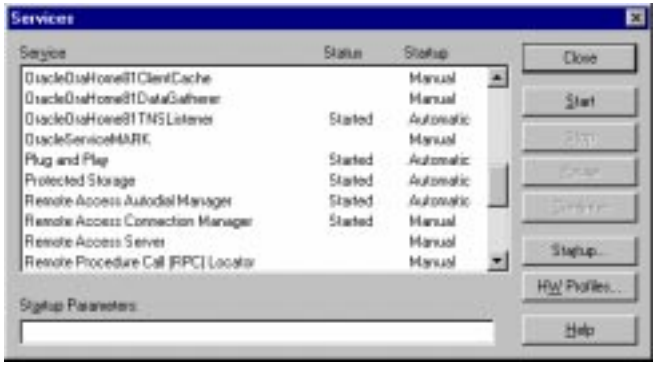
- Control Panel
- Event Viewer
- Registry
- User Manager

Control Panel

The Control Panel enables you to modify system options such as computer services. A service is an executable process registered in the registry and administered by Windows NT. The registry automatically tracks and records security information for each service you create.

Which Oracle Services Appear in the Control Panel?

When you install the Oracle database and other products, Oracle services are created and displayed in the *Services* dialog box:



Use the *Services* dialog box to start, stop, pause, or continue each of the Oracle services available on the computer.

Oracle uses services to provide support for its operations, similarly to Windows NT services. In order to create, connect to and use an Oracle instance, an Oracle service is created during the database creation process and associated with the Oracle database.

Once a service is created with your Oracle database, the service can run even while no user is logged on. This is because your Oracle database starts each instance as a service.

> **Additional Information:** You can have multiple, active Oracle home directories on a single computer. This affects the naming conventions for Oracle services. See "Multiple Oracle Home Environments" on page 3-5 for additional information.

Event Viewer

Event Viewer is included with the Windows NT operating system, along with the other built-in Windows NT diagnostic and tuning utilities. These include:

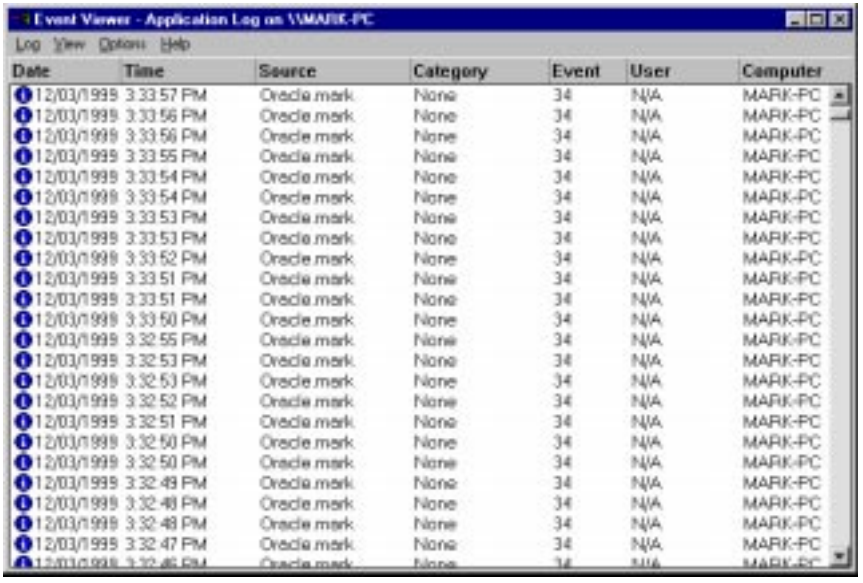
Event Viewer enables you to monitor events in your system. An event is an important occurrence in the system or application (such as your Oracle database) that requires user notification. While messages for major events can display on-screen as you work at your computer, events not requiring your immediate attention are recorded by Windows NT in the Event Viewer log file. You can then view this information at your convenience.

What Oracle Database Events Are Monitored?

Event Viewer can be used to monitor Oracle database events, such as:

- initialization of the System Global Area (SGA) for the active instance
- initialization of the Program Global Area (PGA) for the background processes of the active instance
- connection to the Oracle database with the CONNECT INTERNAL command

In addition, the operating system audit trail is logged to Event Viewer. The following figure shows Event Viewer displaying Oracle database events. Double-click an entry to find out specific information about an event.



Registry

The Oracle database stores its configuration information in a structure known as the registry. You can view and modify this configuration information through the registry editor. The registry contains configuration information for your computer, and must not be accessible for editing by inexperienced users. Only experienced administrators should view and change this information.

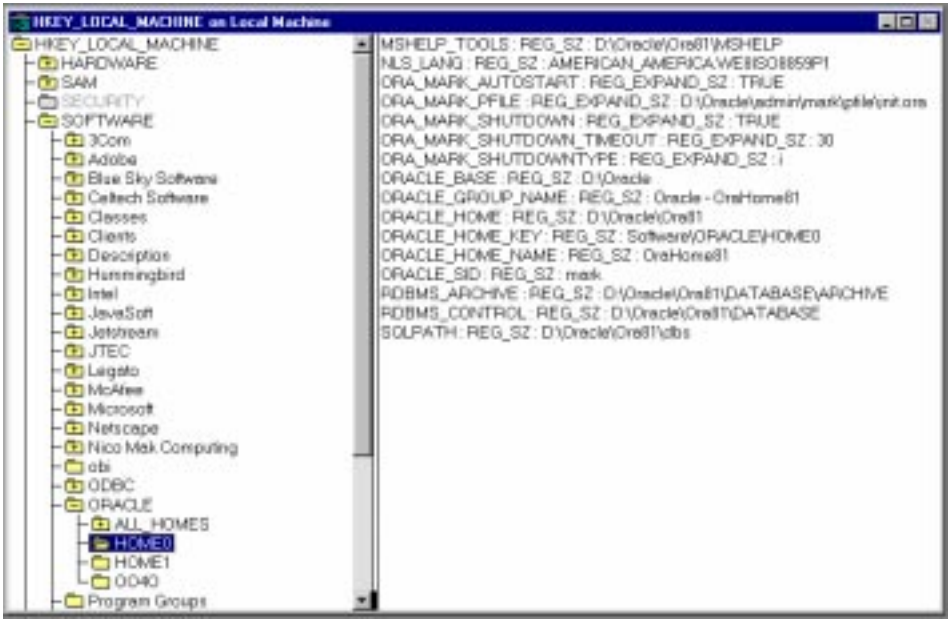
The registry editor displays configuration information in a tree-like format consisting of four keys (or folders). These keys are shown in the tree view in the left-hand window. In the right-hand window, the parameters and values assigned to that key are displayed.

What Database Parameters Are Configured?

When you install products from your CD-ROM, configuration parameters are automatically entered in the registry. These parameters are read each time your Windows NT computer is restarted and whenever an Oracle product is launched. These parameters include settings for:

- Oracle home directory
- Language
- Company name
- Oracle home subdirectories for individual products
- Individual products such as SQL*Plus
- Services

The following figure shows some of the Oracle database configuration parameters in the registry:



See Also: Appendix B, "Oracle8i Configuration Parameters and the Registry" for definitions of Oracle database configuration parameters and specific instructions on using the registry to modify Oracle database configuration parameters.

User Manager

User Manager enables you to manage Windows NT computer security and create user accounts.

What Oracle8*i* Database Tasks Can User Manager Perform?

With User Manager, you can:

- Grant Oracle database roles.
- Use operating system authentication for user accounts. For example, grant DBA access to an NT user.
- Create an NT user account that enables you to make secure client connections to the Oracle8*i* database without a password.

Optional Windows NT Diagnostic and Tuning Utilities

The following tools are supplied with the Windows NT Resource Kit:

- **QuickSlice**

  Provides a quick, GUI overview of what is occurring on the system. It has the following benefits:

  - Distinguishes between time spent in user mode and kernel mode
  - Low overhead on the system (unlike Performance Monitor)
  - Shows a continuous display, rather than just a snapshot
  - You can double-click on a process to open a window with more details

- **Process Viewer**

  Summarizes resource usage by a process.

- **Process Explode**

  Provides a detailed display of resource usage by a process.

- **Task List**

  Resource usage and other details of a process may be displayed by giving its PID or process name as an argument to Task List. This tool also displays a list of executables and DLLs associated with a process.

See Also:

- Appendix B, "Oracle8i Configuration Parameters and the Registry".
- *Oracle8i Client Installation Guide for Windows*, Chapter 1, "Introducing Oracle8*i* Client for Windows" for the components available for installation.

3

Multiple Oracle Homes and Optimal Flexible Architecture

This chapter describes the concepts of multiple Oracle homes and Optimal Flexible Architecture (OFA) for Oracle8*i* Client.

Specific topics discussed are:

- Introduction to Multiple Oracle Homes and OFA
- Multiple Oracle Homes Overview
- Which Products Are Multiple Oracle Home-Enabled?
- Changing the Value of PATH
- Exiting Oracle Universal Installer After Entering Name and PATH
- Setting Variables in the Environment or the Registry
- Optimal Flexible Architecture Overview
- Differences Between Directory Trees by Release
- Directory Tree of a Sample OFA-Compliant Database
- OFA Directory Naming Conventions
- OFA and Multiple Oracle Home Configurations
- Increasing Reliability and Performance
- Comparison Between OFA on Windows NT and UNIX

Introduction to Multiple Oracle Homes and OFA

When you install an Oracle database, you are installing one of the largest applications that your computer can support. Using multiple Oracle homes and OFA provides many advantages when administering large databases. The following advantages are the most important:

- Databases are easier to administer because of the structured organization of directories and files, and the consistent naming used for database files.
- A reduction of performance bottlenecks and improved safeguards against disk failures, because input/output (I/O) can be distributed across a number of disks.
- Software upgrades can be tested in an Oracle home in a separate directory from the Oracle home where your production database is located.

Multiple Oracle Homes Overview

This section provides an overview of multiple Oracle homes. It includes the following topics:

- What Is an Oracle Home?
- Benefits of Using Multiple Oracle Homes
- Multiple Oracle Home Functionality in Different Releases
- One-Listener Support of Multiple Oracle Homes
- Multiple Oracle Home Environments

What Is an Oracle Home?

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

- Location of installed product files (for example, C:\ORANT or C:\ORACLE\ORA81)
- PATH variable pointing to the products' binary files
- Registry entries
- Service names
- Program groups

Oracle homes also have a name associated with them, which you specify along with their location during installation.

Benefits of Using Multiple Oracle Homes

The main benefit of using multiple Oracle homes is that you can run multiple releases of the same products concurrently. For example, you can test a release 8.*x*.*x* database patch before you run your production database release 8.*x*.*x* against it.

Multiple Oracle Home Functionality in Different Releases

Modifications to multiple Oracle home functionality have occurred since it was introduced in release 8.0.4. This table helps you determine the capabilities of your Oracle home depending on the release you are using.

Release	Oracle Home Functionality
Before 8.0.4	Releases of Oracle Client prior to release 8.0.4 only supported single Oracle homes, allowing you to install and run Oracle products in a single Oracle home. Different releases of Oracle products could be installed in the same Oracle home *provided* they had different first or second-digit release numbers. For example, you could install release 7.2 products and release 7.3 products and release 7.*x* and 8.*x* products in the same Oracle home. However, you could not install multiple third-digit releases of the same products. For example, you could not install release 7.3.2 and release 7.3.3 of the same Oracle products on the same computer; one installation would overwrite the other.
8.0.4 to 8.0.6	You can install one or more releases of Oracle products in multiple Oracle homes. For example, with multiple Oracle homes, you can install releases 8.0.*x* and 8.1.3 products or 7.x and 8.0.*x* products in different Oracle homes on the same computer. You can also install different releases of Oracle products in the same Oracle home *provided* they have different first or second-digit release numbers. For example, you can install release 7.2 products and release 8.0.*x* products in the same Oracle home.
8.1.3 to 8.1.6	Releases 8.1.3, 8.1.4, 8.1.5, and 8.1.6 have the same multiple Oracle home functionality as release 8.0.4 and later, but with these restrictions: ■ You cannot install releases 8.1.3, 8.1.4, 8.1.5, or 8.1.6 into an Oracle home that was created using the old Installer. (The old Installer was called Oracle Installer and was used for pre-8.1.3 installations; the new Java-based Installer is called Oracle Universal Installer.) ■ You cannot install releases of Oracle prior to release 8.1.3 into an Oracle home that was created by release 8.1.3, 8.1.4, 8.1.5, or 8.1.6. ■ Releases 8.1.3, 8.1.4, 8.1.5, and 8.1.6 must be installed in separate Oracle homes. You cannot have more than one release per Oracle home.
8.1.5 to 8.1.6	You can use a release 8.1.6 listener to spawn a connection to a release 8.1.*x*, 8.0.*x*, or 7.3.*x* database. However, in a mixed environment, you cannot enable the use of shared sockets. Some restrictions exist in using 8.1.6 listeners to spawn connections to earlier versions of the database. These include: ■ You should enable process mode external procedures for release 8.1.6 if you want to spawn a connection to a release 8.0.3 databases. ■ You must install the release 8.0.4.0.3 (or later) patch for Net8. ■ You cannot enable shared sockets.

WARNING: Multiple Oracle homes functionality only works with releases 8.0.4 and later. For example, if you have release 7.3.3 products already installed on your computer, it does not work. You cannot install release 7.3.4 products in a separate Oracle home.

One-Listener Support of Multiple Oracle Homes

You can use one listener for spawning connections to databases for multiple Oracle homes. You only need to add all the System Identifiers (SIDs) to the SID_LIST section in the *ORACLE_BASE**ORACLE_HOME*\NETWORK\ADMIN\LISTENER.ORA file.

Because the SID is unique to a system across different Oracle homes, the listener can spawn the database thread for a specific SID in the correct Oracle home, and the *ORACLE_HOME* parameter (used in UNIX environments only) is not needed in the LISTENER.ORA.

Note: There may be multiple LISTENER.ORA files on your computer, one for each Oracle home. To ensure that you use the correct LISTENER.ORA file, check the Oracle home name in the listener service.

Multiple Oracle Home Environments

This section describes the differences among multiple Oracle home environments since multiple Oracle homes were first introduced in release 8.0.4.

Release 8.0.4 and Later 8.0.*x* Oracle Home Environments

If you have release 8.0.4 or later 8.0.*x* Oracle homes on your computer, note these differences between the first Oracle home you installed and more recent Oracle homes you may install:

Element	First Oracle Home	Each Additional Oracle Home
Service Names	OracleTNSListener80	Includes the Oracle home name in service names. For example: Oracle*HOME_NAME*TNSListener80
Program Groups	Oracle for Windows NT Oracle home name is not appended to the group.	Appends the Oracle home name to the program group. For example: Oracle for Windows NT - *HOME_NAME*
Registry Entries	Located in HKEY_LOCAL_ MACHINE\SOFTWARE\ORACLE	Subkeys for each Oracle home are added below the HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE subkey (HOME0, HOME1, HOME2, and so on). For more information on the registry keys and subkeys, see Appendix B, "Oracle8i Configuration Parameters and the Registry".
System Identifier (SID) name for starter database	Automatically named ORCL	Only the first starter database on your computer is called ORCL. Additional starter databases use the naming convention ORC*x* or OR*xx* where *x* is a number appended to ensure the SID is unique.

Release 8.1 Oracle Home Environment

Release 8.1 Oracle homes are slightly different from pre-8.1 Oracle homes.

Element	First Oracle Home	Each Additional Oracle Home
Service Names	Oracle*HOME_NAME*TNSListener	Oracle*HOME_NAME*TNSListener
Program Groups	Oracle - *HOME_NAME*	Oracle - *HOME_NAME*
Registry Entries	Located in HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME0	Subkeys for each Oracle home are added in the HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE subkey. For example, the next subkeys after HOME0 are HOME1, HOME2, HOME3, and so on. For more information on the registry keys and subkeys, see Appendix B, "Oracle8i Configuration Parameters and the Registry".
System Identifier (SID)[1] name and DB_NAME	Automatically named ORCL.	For 8.1.3 and 8.1.4, the first starter database on your computer was automatically called ORCL. The second database you created on your computer had a SID of ORCL0. For 8.1.5 and 8.1.6, you must type in the global database name and SID name of your choice when prompted during installation.

[1] For releases 8.1.3 through 8.1.6, the SID can be a maximum of 64 alphanumeric characters in length. For all releases prior to 8.1.3, the SID was a maximum of 4 alphanumeric characters.

Which Products Are Multiple Oracle Home-Enabled?

You can install all products on the CD-ROM into your first Oracle home on a "clean" computer (that is, there is no other Oracle software on the computer) without any conflict.

If you create more Oracle homes, and install the same products that you installed into the first Oracle home, conflicts can arise that cause your original database to function incorrectly if the products are not multiple Oracle home-enabled (multiple Oracle home products.)

To avoid such problems, check the following product classifications before installing multiple versions of the same product on your computer. Oracle products are classified as follows:

- Products Supporting Multiple Oracle Homes
- Products Supporting a Single Oracle Home
- Products Not Supporting Multiple Oracle Homes
- Products Not Associated with an Oracle Home

Products Supporting Multiple Oracle Homes

You can install multiple Oracle home products *multiple times in different Oracle homes.* All products are multiple Oracle home products unless they are listed in:

- "Products Supporting a Single Oracle Home" on page 3-7 or
- "Products Not Supporting Multiple Oracle Homes" on page 3-8

Products Supporting a Single Oracle Home

You can install single Oracle home products into any Oracle home, but *only once per computer.* When installing groups of products, if any of the products in the following list are included in the group and already exist on the computer, do not install them a second time:

- Oracle Performance Monitor for Windows NT
- Oracle Objects for OLE
- Oracle Open Database Connectivity (ODBC) Driver
- Oracle Parallel Server
- Oracle Enterprise Manager
- Oracle SNMP Agent
- All products that depend on any of these products

Products Not Supporting Multiple Oracle Homes

All Oracle7 products and all release 8.0.3 products are non multiple Oracle home products. You can only install these products into an old-style Oracle home (pre-8.0.4 Oracle home is an old-style Oracle home).

Products Not Associated with an Oracle Home

Products not associated with an Oracle home have no restrictions into how many Oracle homes you install them. They include the following:

- Oracle snap-in common files
- Oracle Universal Installer
- Java Runtime Environment
- Oracle Remote Configuration Assistant

When you install these products, Oracle Universal Installer requires that you install them into any Oracle home. However, these files are actually installed in the directory *X*:/PROGRAM FILES/ORACLE, where *X:* is the hard drive where Windows NT is installed.

Changing the Value of PATH

Unless you specify otherwise at installation time, the Oracle home in which you installed products most recently is the first directory listed in your PATH (primary home). As such, it has priority over the other Oracle home entries in your PATH.

If you invoke a product from the MS-DOS command prompt, the release of the product invoked is the one in the Oracle home listed first in your path, unless you specifically invoke a different release of the product by one of the following methods:

- Specifying the full directory path name to the release of the product you want to use at the MS-DOS command prompt.
- Changing to the directory that contains the executable you want to use.
- Changing your PATH so that the first entry points to the binary files for the product release you want to use.

You can change the value of PATH by using one of the following methods:

- Using Oracle Home Selector
- At the System Level

  You can assign a new value at the system level. The new value exists until you change the value of PATH again.
- At the MS-DOS Command Prompt

  You can assign a new value at the MS-DOS command prompt. The new value reverts to its previous value when you quit the session.

Note: The first two methods of changing the value of PATH are only valid if you are a member of the Administrators group. After you have changed the value of PATH, you must open a new MS-DOS window to make it active. The change is not reflected in already-opened MS-DOS windows.

Using Oracle Home Selector

Oracle Home Selector is a graphical user interface (GUI) tool that enables you to edit your environment path to make an appropriate Oracle home directory your primary home. This tool can only be used when you have multiple, active Oracle home directories on a single computer.

To change the value of PATH using Oracle Home Selector:

1. Choose Start > Programs > Oracle Installation Products > Home Selector.

   The *Oracle Home Selector* window appears.

2. Select the Oracle home that you want as the primary Oracle home from the drop-down list.

3. Click OK.

At the System Level

To change the value of PATH at the system level:

On Windows NT

1. Choose Start > Settings > Control Panel.

   The *Control Panel* window appears.

2. Double-click the System icon.

   The *System Properties* window appears.

3. Click the *Environment* tab.

   The system variables appear.

4. Edit the value of PATH in the Value field and click Set.

5. Click OK.

On Windows 95 and Windows 98

1. Open the AUTOEXEC.BAT file.

2. Edit the value of the PATH statement.

3. Reboot your computer.

At the MS-DOS Command Prompt

To change the value of PATH at the MS-DOS command prompt:

At the MS-DOS command prompt, enter:

```
C:\> SET PATH=PATHNAME;%PATH%
```

where *PATHNAME* is the full path to the binary files for the products you want to use. This change is valid for the current session only. If you want to change the value of your PATH more permanently, use Oracle Home Selector or change the value of PATH at the system level. Both methods are described above.

Exiting Oracle Universal Installer After Entering Name and PATH

If you have to exit Oracle Universal Installer unexpectedly after you have entered the name and path for an Oracle home (for example, because there is no more disk space in the path you specified), you cannot specify a different path until you delete the HOME*ID* key and the ID*x* key corresponding to that Oracle home from the registry. To do this:

1. Read the value of the ORACLE_HOME_NAME parameter for each HOME*ID* subkey in the HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE key until you find the value that matches the name of the Oracle home you need to delete.
2. Delete the HOME*ID* subkey you just located.
3. Delete the appropriate ID*x* subkey in the HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\ALL_HOMES key, where *x* has the same value as the *ID* in HOME*ID*. For example, if the HOME*ID* subkey for the home name you want to delete is HOME1, then the appropriate *IDx* subkey is ID1.

> **See Also:** Appendix B, "Oracle8i Configuration Parameters and the Registry" for more information on the registry keys and subkeys.

Setting Variables in the Environment or the Registry

Variables set in the environment always override the value of equivalent variables set in the registry. The following section describes the consequences of setting two of the most commonly-used environment variables, ORACLE_HOME and TNS_ADMIN.

ORACLE_HOME

Oracle Corporation recommends that you *never set* the ORACLE_HOME environment variable because it is not required for Oracle products to function properly. If you set the ORACLE_HOME environment variable, Oracle Universal Installer will unset it for you. Oracle products find the value of ORACLE_HOME at the location specified by the *ORACLE_BASE**ORACLE_HOME*\BIN\ORACLE.KEY file. If there is a need to set ORACLE_HOME in the environment for another reason, care must be taken to only run software from that Oracle home when the variable is set.

When you run an Oracle program from the MS-DOS command prompt, the first executable by that name found in the directory path runs. For example, C:\> SQLPLUS. Alternately, if you specify a full directory path, the specified program runs. For example, C:\ORACLE\ORA81> SQLPLUS.

If you modify the value of PATH using any of the three methods described in the previous section, "Using Oracle Home Selector", "At the System Level", or "At the MS-DOS Command Prompt", you can change the choice of which version of a program is run from the MS-DOS command prompt. In sum, modifying the value of PATH indicates from which Oracle home to run executables, at the MS-DOS command prompt, when no full directory path is specified.

Once an Oracle program starts, it looks for all environment variables in the following order:

1. In the current environment
2. In the registry key for the Oracle home from which the program is running.

   The program knows where it's running from by calling Window NT to obtain the executable's path name, and then parsing the path name to get the directory from which it's running. In the *ORACLE_BASE**ORACLE_HOME*\BIN directory where the executable resides, there is a file called ORACLE.KEY. This file specifies where in the registry to look for variables when programs from that particular Oracle home are run.

For example, if you run C:\ORACLE\ORA81\BIN\SQLPLUS.EXE, SQLPLUS.EXE looks in C:\ORACLE\ORA81\BIN\ORACLE.KEY to find out where to look for its registry variables. If the ORACLE.KEY file does not exist (for version 7.*x* and some version 8.0 Oracle homes), Oracle uses HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE to locate the registry variables.

In a typical case, there are no Oracle variables (that is, ORACLE_HOME) set in the environment. Any programs run from a release 8.0.5 Oracle home look in the ORACLE.KEY file in that Oracle home and find their variables (including ORACLE_HOME) in the correct registry key. Likewise for release 8.1.6, the Oracle home that gets priority depends on the PATH, but regardless of the PATH setting, all the software works correctly.

Consequences of Setting ORACLE_HOME

If you set ORACLE_HOME in the environment, then software run from another Oracle home will not work reliably. The conflict occurs when you set ORACLE_HOME to point to one Oracle home directory, then attempt to run programs from a second Oracle home. These programs first check for any environment variable settings (such as ORACLE_HOME), before checking the registry through the ORACLE.KEY file. Since ORACLE_HOME is set, the programs in the second Oracle home attempt to use files in the first Oracle home, causing a conflict.

For example, assume you have release 8.0.5 installed in C:\ORANT, and release 8.1.6 installed in C:\ORACLE\ORA81, and ORACLE_HOME is set to C:\ORANT in the environment. If you run a program from C:\ORACLE\ORA81\BIN, that program first looks in the environment for all variables *before* looking at its ORACLE.KEY file. So, a program run from your release 8.1.6 Oracle home runs with ORACLE_HOME=C:\ORANT. Therefore, anything that the program uses ORACLE_HOME for will be looked for in C:\ORANT, where it may not exist. Examples include message files (*.MSB), SQL scripts (.SQL), and any other files opened by the program and based off ORACLE_HOME.

Note that the same behavior occurs on UNIX. If you run a program from Oracle home number 1 with ORACLE_HOME=OracleHome number 2 in the environment, then the same behavior can be observed.

TNS_ADMIN

Oracle software looks for TNS_ADMIN in one location in the registry (depending upon the type of Oracle home installed). If you installed software into the default Oracle home, then any software running from that Oracle home will look in HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE. If you installed a new-style (8.0.4 or later) multiple Oracle home, then the Oracle software looks in HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME*ID*. The ALL_HOMES key is used by the installer and plays no role when translating variables.

The environment always overrides the registry, so if TNS_ADMIN is set in the environment, that takes precedence over the TNS_ADMIN setting in the registry. No variables should be set in the environment by the Oracle Home Selector except for the PATH.

Optimal Flexible Architecture Overview

The Oracle Optimal Flexible Architecture (OFA) is a set of file naming and placement guidelines for Oracle software and databases. It can also be thought of as a set of *good habits* to adopt when organizing Oracle directories and files on your computer. All Oracle products on the CD-ROM are OFA-compliant; that is, Oracle Universal Installer places Oracle products in directory locations that follow the OFA guidelines. Although using OFA is not a requirement, Oracle Corporation recommends that you use it if your database will grow in size, or if you plan to have multiple databases.

The aim of OFA is to prevent an entire class of problems that can occur when you have different versions of Oracle software and multiple, growing databases on your computer. OFA is designed to provide significant benefits in the following areas:

- Ease of maintenance of Oracle software and databases through standard file organization
- Reliability through data spanning multiple physical drives
- Performance through decreased I/O contention for disks

For example, one of the many benefits of OFA is that Oracle Universal Installer separates Oracle software executables from database files. Previously, database files were placed in *ORACLE_HOME*\DATABASE, a subdirectory of the Oracle home directory that also contained Oracle software. Using OFA, Oracle Universal Installer puts Oracle software in *ORACLE_BASE**ORACLE_HOME* and database files in *ORACLE_BASE*\ORADATA.

Putting database files in a subdirectory of the Oracle home directory that also contained Oracle software made upgrades unnecessarily difficult. Separating software from data is essential, because over time, when you upgrade a database to the latest release, the new Oracle software executables will be placed in a different Oracle home directory. After the upgrade is judged to have been successful, you can easily remove the old Oracle home directory and reclaim space because the database does not reside there.

Benefits of an OFA-Compliant Database

An OFA-compliant database has the following benefits:

- **Easier database administration and management of database growth**

  The file system is organized to simplify the following tasks:

  - Locating specific database files
  - Adding database files as the database grows

- **Fewer performance bottlenecks**

  Disk contention decreases, because Oracle administration files, binary files, and data files that used to be on one disk can now reside in separate directories or in separate directories on separate disks.

- **Safeguards against disk failures**

  By spreading files across more than one disk, disk failures impact as little data as possible.

- **Support for concurrent execution of application software**

  You can run multiple versions of application software simultaneously, enabling you to test and use a new release of an application before abandoning the previous version. Transferring to a new version after an upgrade is simple for the database administrator and transparent for the user.

Characteristics of an OFA-Compliant Database

An OFA-compliant database has the following characteristics:

- **Independent subdirectories**

  Categories of files are separated into independent subdirectories so that files in one category are minimally affected by operations on files in other categories.

- **Consistent naming conventions for database files**

  Database files are named to realize the following advantages:

  - Database files are easily distinguishable from all other files
  - Files of one database are easily distinguishable from files of another database
  - Control files, redo log files, and data files are easily identifiable
  - Clearly indicated association of data files to tablespaces

- **Integrity of Oracle home directories**

  You can add, move, or delete Oracle home directories without having to revise programs that refer to them.

- **Distinguishes administrative information for each database**

  The ability to separate administrative information about one database from that of another ensures a reasonable structure for the organization and storage of administrative data.

- **Separation of tablespace contents**

  Tablespace contents are separated to realize the following advantages:

  - Minimize tablespace-free space fragmentation
  - Minimize I/O request contention
  - Maximize administrative flexibility

- **Tuning I/O loads across all disks**

  I/O loads are tuned across all disks, including disks storing Oracle data in raw devices, if needed.

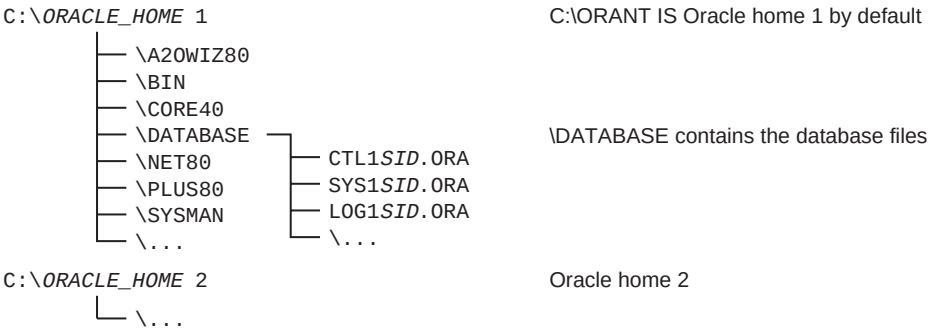
Differences Between Directory Trees by Release

OFA has necessitated changes to the Oracle database directory tree. This table lists the differences:

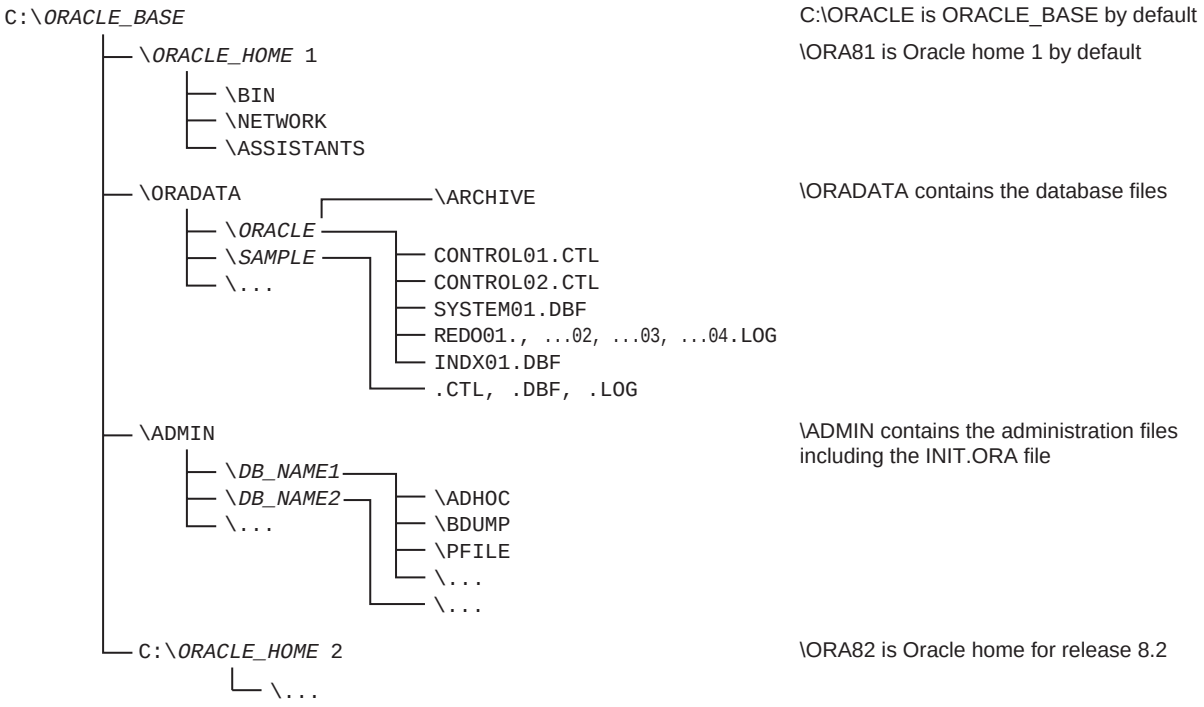
Element	Pre-8.1.3 non-OFA-Compliant	Post-8.1.3 OFA-Compliant
Name of the top-level directory where Oracle is installed.	When you install a pre-8.1.3 release, all subdirectories are located under a top-level *ORACLE_HOME* directory that by default is C:\ORANT. See the following figure on page 3-18 for a depiction of the pre-8.1.3 non-OFA-compliant directory tree.	When you install a post-8.1.3 release, all subdirectories are no longer under a top-level *ORACLE_HOME* directory. There is now a new top-level directory called *ORACLE_BASE* that is of the form *X*:\ORACLE where *X* is any hard drive. If you install an OFA-compliant database using Oracle Universal Installer defaults, *ORACLE_BASE* is C:\ORACLE. *ORACLE_HOME* directories are located under *ORACLE_BASE*. The \ORADATA and \ADMIN directories, which contain the database files and database administration files, are also located under *ORACLE_BASE*. See the following figure on page 3-18 for a depiction of the 8.1.4, 8.1.5, and 8.1.6 OFA-compliant directory tree.
Database file names	Database files have the SID in the database file name. For example, the first control file is named CTL1*SID*.ORA.	Database files no longer have the SID in the database file name. For example, the first control file is named CONTROL01.CTL. There is no need for the presence of the *SID* in the file name because all the database files for a particular database are placed in \ORADATA under a directory called *DB_NAME* that is named for that database.
Database file name extensions	All database files have the same .ORA extension.	The convention of having .ORA as the file name extension for database files is no longer used. Database file names now have more meaningful extensions. These are .CTL for control files, .LOG for log files, and .DBF for data files.

The following figure provides a top-level overview of the old and new database directory trees:

Pre-8.1.3 non-OFA-Compliant Oracle on Windows NT Directory Tree



8.1.4, 8.1.5, and 8.1.6 OFA-Compliant Oracle on Windows NT Directory Tree



Directory Tree of a Sample OFA-Compliant Database

The following is the complete hierarchical directory tree of a sample OFA-compliant database:

X:\ORACLE_BASE				C:\ORACLE is the default *ORACLE_BASE* directory
	ORACLE_HOME1			\ORA81 is the name of the first Oracle home by default
		\BIN		Subtree for Oracle binaries
		\NETWORK		Subtree for Net8
		\ASSISTANTS		Configuration assistants
	\ORADATA			Subtree for Oracle database files
		DB_NAME1		Subtree for *DB_NAME1* database files
			CONTROL01.CTL	Control file 1
			CONTROL02.CTL	Control file 2
			CONTROL03.CTL	Control file 3
			DRO1.DBF	*inter*Media related objects
			SYSTEM01.DBF	System tablespace data file
			RBS01.DBF	Rollback tablespace data file
			INDX01.DBF	Index tablespace data file
			TEMP01.DBF	Temporary tablespace data file
			USERS01.DBF	Users tablespace data file
			REDO01.LOG	Redo log file group 1, member 1
			REDO02.LOG	Redo log file group 2, member 1
			REDO03.LOG	Redo log file group 3, member 1
		DB_NAME2		Subtree for *DB_NAME2* database files
			CTL DBF LOG	Control, data, and redo log files
		DB_NAME3		Subtree for *DB_NAME3* database files
			CTL DBF LOG	Control, data, and redo log files
	\ADMIN			Subtree for database administration files
		DB_NAME1		Subtree for *DB_NAME1* database administration files
			\ADHOC	Ad hoc SQL scripts
			\ADUMP	Audit files
			\ARCH	Archived redo log files
			\BDUMP	Background process trace files
			\CDUMP	Core dump files
			\CREATE	Database creation files
			\EXP	Database export files
			\PFILE	Initialization parameter file
			\UDUMP	User SQL trace files
		DB_NAME2		Subtree for *DB_NAME2* database administration files
			...	
		DB_NAME3		Subtree for *DB_NAME3* database administration files
			...	

ORACLE_HOME2	Second Oracle home
\...	
ORACLE_HOME3	Third Oracle home
\...	

Note: The directory tree for multiple instance databases (Oracle Parallel Server installations) has additional subdirectories and files. See *Oracle Parallel Server Administrator's Guide* for more information.

OFA Directory Naming Conventions

OFA uses directory naming conventions that make it easy to identify the precise Oracle home and database name that is associated with a set of files. This section describes the naming conventions used for the top-level directories of an OFA-compliant database directory tree:

- ORACLE_BASE Directory
- ORACLE_HOME Directory
- ADMIN Directory
- ORADATA Directory
- DB_NAME Directory

ORACLE_BASE Directory

ORACLE_BASE is the root of the Oracle directory tree. If you install an OFA-compliant database using Oracle Universal Installer defaults, *ORACLE_BASE* is *X*:\ORACLE where *X* is any hard drive. For example, C:\ORACLE.

If you are installing Oracle8*i* Client on a clean computer, you may want to change *ORACLE_BASE* to an appropriate value before running Oracle Universal Installer. Most users will not need or want to do this.

Before you run Oracle Universal Installer for the first time, change the value of *ORACLE_BASE* at the system level. Only change the value of *ORACLE_BASE* before you run Oracle Universal Installer for the first time because if there is an existing *ORACLE_BASE*, and you change it, there will be a conflict of Oracle base directories. If you create another *ORACLE_BASE* when the original *ORACLE_BASE* already exists, certain tools and the database will not be able to find previously created files because they will look for them in the new *ORACLE_BASE* instead of the original *ORACLE_BASE*.

To change the value of *ORACLE_BASE* at the system level:

On Windows NT:

1. Choose Start > Settings > Control Panel.

   The *Control Panel* window appears.

2. Double-click the System icon.

   The *System Properties* window appears.

3. Click the *Environment* tab.

   The System Variables appear.

4. Type a new value for *ORACLE_BASE* in the Value text box, then click OK to exit.

On Windows 95 and Windows 98:

1. Open the AUTOEXEC.BAT file, using a text editor.
2. Edit the value of the ORACLE_BASE statement.
3. Reboot your computer.

Note: An ORACLE_BASE registry key exists for every Oracle home. Ideally, the value of the ORACLE_BASE registry key will be identical for each Oracle home.

ORACLE_HOME Directory

\ORACLE_HOME is located beneath *X:\ORACLE_BASE* and contains subdirectories for Oracle software executables and network files.

If you install Oracle8*i* for Windows NT on a clean computer and use the default settings, the first Oracle home directory that you create is called \ORA81.

ADMIN Directory

Database administration files are stored in subdirectories of *ORACLE_BASE*\ADMIN*DB_NAME*.

The following table describes the subdirectories for database administration files:

Subdirectories of \ADMIN*DB_NAME*	Contain...
\ADHOC	Ad hoc SQL scripts for a given database
\BDUMP	Background process trace files
\CDUMP	Core dump files
\CREATE	Database creation files
\EXP	Database export files
\PFILE	Initialization parameter files
\UDUMP	User process trace files

ORADATA Directory

Database files are stored in *ORACLE_BASE*\ORADATA*DB_NAME*.

The following table describes the database files:

Files in \ORADATA*DB_NAME*	Description
CONTROL01.CTL	Control file 1
CONTROL02.CTL	Control file 2
CONTROL02.CTL	Control file 3
OEMREP03.DBF	Oracle Enterprise Manager repository tablespace data file
SYSTEM01.DBF	SYSTEM tablespace data file
RBS01.DBF	RBS tablespace data file
INDX01.DBF	INDX tablespace data file
TEMP01.DBF	TEMP tablespace data file
USERS01.DBF	USERS tablespace data file
REDO01.LOG	Redo log file group one, member one
REDO02.LOG	Redo log file group two, member one
REDO03.LOG	Redo log file group three, member one

Note: This directory structure only allows for disk striping on UNIX platforms. See "Support for Symbolic Links on Windows NT" on page 3-32.

DB_NAME Directory

DB_NAME is the unique name for a particular database and has the same value as the DB_NAME parameter in the initialization parameter file. When you create a database, DB_NAME can be no more than eight characters long and can contain only the following characters:

- Alphabetic characters
- Numbers
- Underscores (_)
- Pound sign (#)
- Dollar sign ($)

OFA and Multiple Oracle Home Configurations

The following sections describe various OFA and multiple Oracle home configurations.

Specifying an *ORACLE_HOME* Directory

To install an OFA-compliant database, you must specify an Oracle home directory in the *Path:* field of Oracle Universal Installer of the form:

X:\[*PATHNAME*]*ORACLE**HOME_NAME*

where:

X:\	is any hard drive. For example, C:\.
[*PATHNAME*]	is an optional directory pathname.
ORACLE	is a mandatory directory pathname unless you have changed the value of the ORACLE_BASE registry key before performing the installation. See "ORACLE_BASE Directory" on page 3-20 for information on how to change the *ORACLE_BASE* from the default value ORACLE.
HOME_NAME	is the name of the Oracle home.

The following are examples of OFA-compliant Oracle home directories:

- C:\TEST\ORACLE\ORA81
- D:\ORACLE\ORA81

Default OFA Database

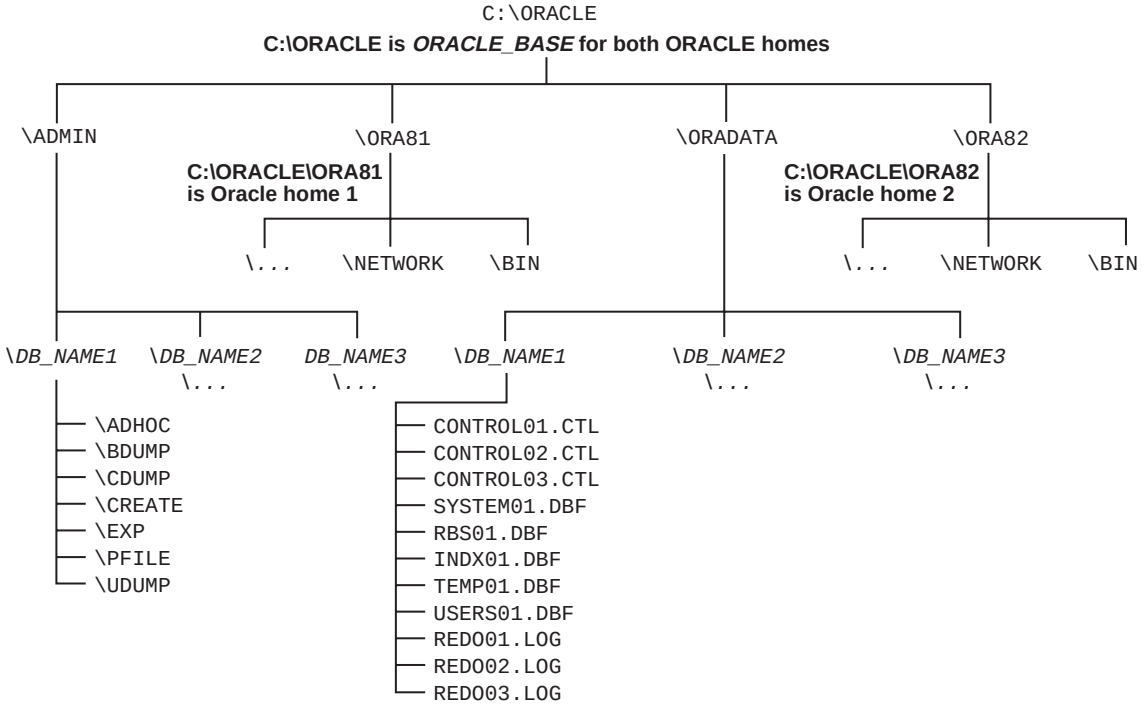
To install a default OFA database:

1. Install Oracle8*i* for Windows NT release 8.1.6 on a clean computer (one with no other Oracle software on the computer), and accept the default Oracle Universal Installer settings for the first Oracle home (C:\ORACLE\ORA81) in the *Path:* field.
2. Complete the installation.
3. Run Oracle Universal Installer again and the same release a second time or release 8.2.*x* (when it is available). Accept the default Oracle Universal Installer settings for the first Oracle home (C:\ORACLE\ORA82) in the *Path:* field.

The default OFA database settings are as follows:

Setting	Value
ORACLE_BASE	is C:\ORACLE and is the same for all Oracle homes
Oracle home 1	is C:\ORACLE\ORA81
Oracle home 2	is C:\ORACLE\ORA82

This figure below illustrates the directory tree:



Non-Default OFA Database, Case 1

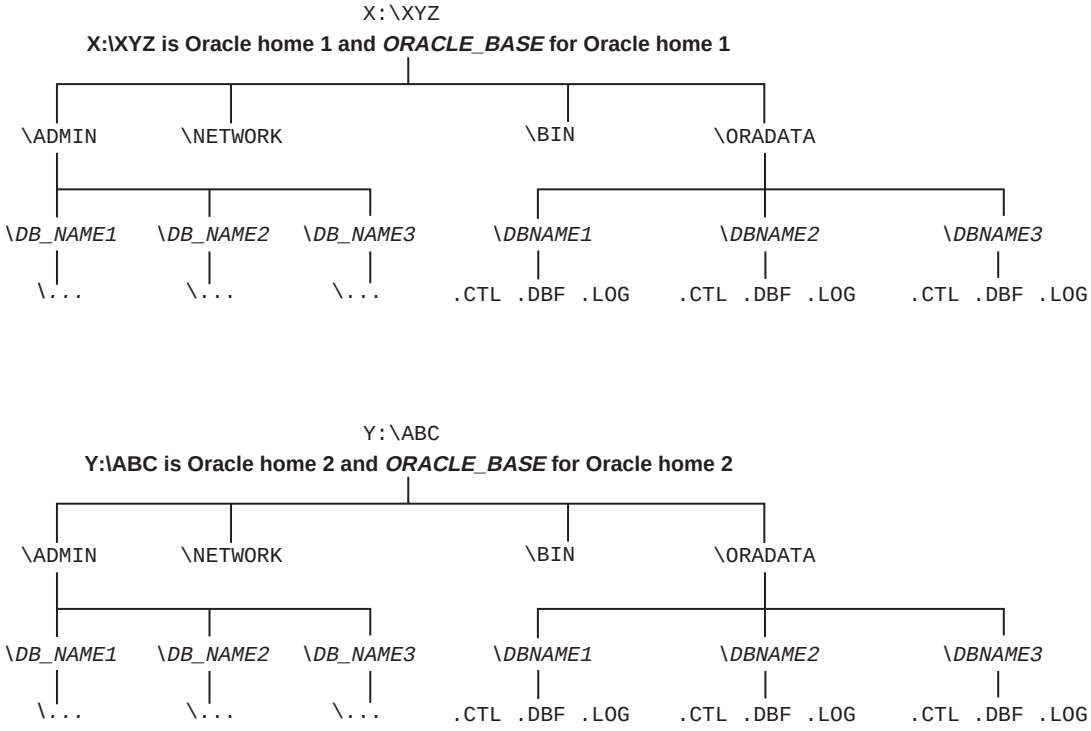
To install a non-default OFA database, case 1:

1. Install Oracle8*i* for Windows NT release 8.1.6 and change the default Oracle Universal Installer settings for the first Oracle home from C:\ORACLE\ORA81 in the *Path:* field to X:\XYZ.
2. Complete the installation.
3. Run Oracle Universal Installer again and change the default Oracle Universal Installer settings for the second Oracle home from C:\ORACLE\ORA82 in the *Path:* field to Y:\ABC.

For case 1, the non-default OFA database settings are as follows:

Setting	Value
ORACLE_BASE	is X:\XYZ for the first Oracle home and is Y:\ABC for the second Oracle home
Oracle home 1	is X:\XYZ
Oracle home 2	is Y:\ABC

This figure illustrates the resulting directory trees:



Non-Default OFA Database, Case 2

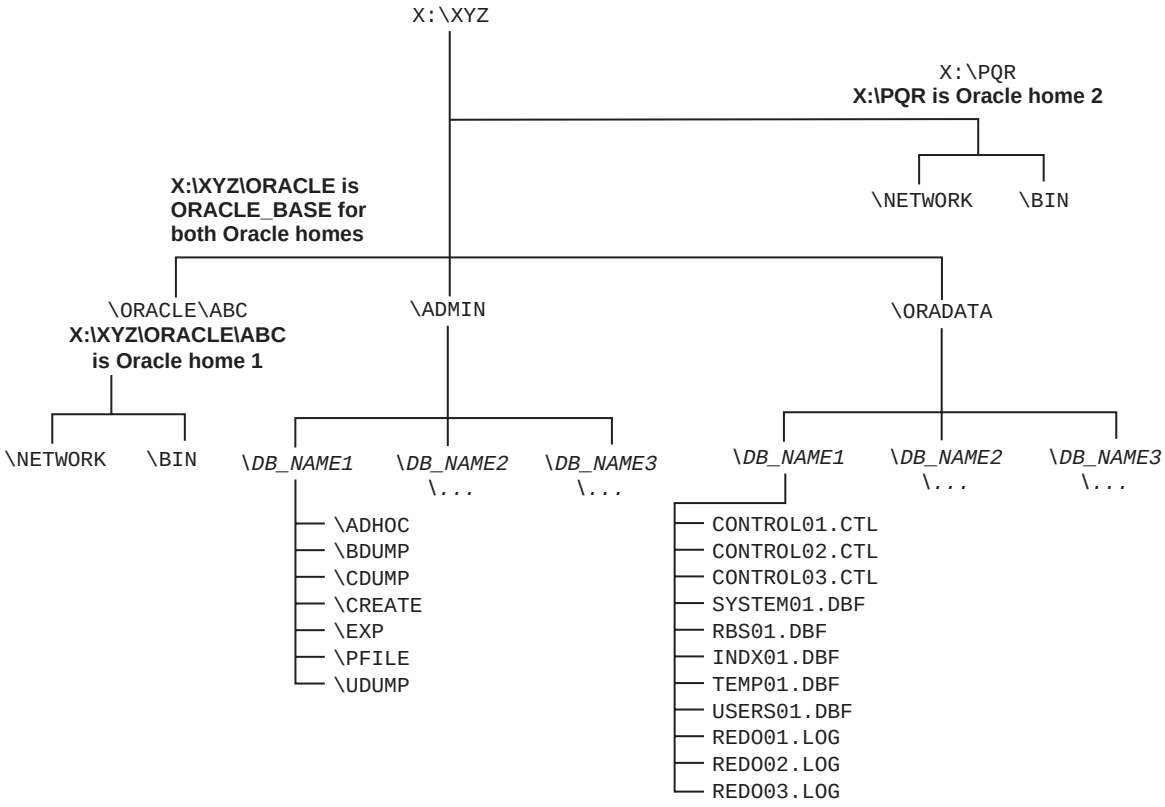
To install a non-default OFA database, case 2:

1. Install Oracle8*i* for Windows NT release 8.1.6 and change the default Oracle Universal Installer settings for the first Oracle home from C:\ORACLE\ORA81 in the *Path:* field to X:\XYZ\ORACLE\ABC.
2. Complete the installation.
3. Run Oracle Universal Installer again and change the default Oracle Universal Installer settings for the second Oracle home from C:\ORACLE\ORA82 to X:\PQR.

For case 2, the non-default OFA database settings are as follows:

Setting	Value
ORACLE_BASE	is X:\XYZ\ORACLE and is the same for both Oracle homes
Oracle home 1	is X:\XYZ\ORACLE\ABC
Oracle home 2	is X:\PQR

This figure illustrates the resulting directory tree:



Increasing Reliability and Performance

One of the basic goals of OFA is to increase reliability and performance by distributing I/O load across different physical drives. If you are trying to maximize reliability and performance, Oracle Corporation recommends that you do the following:

- Read "Disk Mirroring" on page 3-30 and "Disk Striping" on page 3-30.
- Move your files to the disks on your system to take advantage of the recommendations

Disk Mirroring

Oracle log files and database files can be separated and treated with different levels of hardware reliability. Generally, Oracle log files are more highly reliable, because of redundancy. Creating reliability based on redundancy may require you to duplicate all of your data, using disk mirrors.

Disk mirroring can be done with the Windows NT Disk Administrator and commonly with hardware controllers. Two identical drives are usually required to construct a mirror, the concept being that if one disk fails, the other disk can be used to recover data that would otherwise be lost. Using one of the disks to recover lost data may involve "breaking" the mirror. If the mirror breaks, you need to build a new mirror.

You can achieve a lesser degree of redundancy by configuring the disks, using a Redundant Array of Inexpensive Disks (RAID) configuration provided by the disk controller. The RAID level determines the amount of redundancy. Some RAID levels may use the "hot swapping" feature. Hot swapping means that you can replace a bad disk with a good one without turning off the computer or losing functionality.

Disk Striping

How you set up disks for use in a database depends on the number of disks and the type of hard disk controllers available. If the hard disk controllers support both striping and mirroring, Oracle Corporation recommends you configure the controllers to support striping.

Some controllers are configured at system startup time by issuing a keyboard sequence that brings up configuration programs written by the controller manufacturer. One goal is to stripe as many drives together as possible by configuring the controllers. Each stripe shows up as one logical device.

Striping provides significant performance advantages. All the space from the striped drives appears as a single logical drive. Furthermore, the space is used by interlacing "stripes" of space from all of the disks in the stripe. This means that a large file uses some space from the first disk, then some from the second disk and so on to the last disk and then starting back at the first disk again. Each file may be spread over all of the striped disks. The data in such a file may be accessed randomly by more than one CPU without contention.

The controllers that support striping usually provide caching as well. This means that data may be written to the controller and cached and saved for a time in storage not on the disk. Data that is read can be cached on the controller in a similar fashion. Read caching is not necessary for Oracle databases since all database reads are cached already in the System Global Area (SGA). The value of the DB_BLOCK_BUFFERS parameter in the initialization parameter file determines the number of buffers that can be used in the SGA. This value also configures the Oracle8*i* database on startup.

Using Raw Partitions for Tablespaces

A *raw partition* is a portion of a physical disk that is accessed at the lowest possible level. The I/O of a raw partition improves performance by approximately 5% to 10% compared to the I/O of a partition containing a file system. Therefore, Oracle Corporation encourages you to use raw partitions for your tablespaces.

Comparison Between OFA on Windows NT and UNIX

You implement OFA on Windows NT and UNIX in the same way. However, differences exist with regard to the following:

- Directory Naming
- ORACLE_BASE Directory
- Support for Symbolic Links on Windows NT

> **See Also:** Your UNIX operating system-specific administrator's reference for information about OFA on UNIX.

Directory Naming

The top-level names of the OFA directory tree differ between Windows NT and UNIX. However, the main subdirectory and file names are the same on both operating systems.

ORACLE_BASE Directory

On Windows NT, *ORACLE_BASE* is associated with an Oracle home directory. *ORACLE_BASE* is defined in the registry (for example, in HKEY_LOCAL_MACHINE \SOFTWARE\ORACLE\HOME0).

On UNIX, *ORACLE_BASE* is associated with a UNIX user's environment.

Support for Symbolic Links on Windows NT

Windows NT currently does not support symbolic links like those in UNIX, although Microsoft has announced the intention to support them in a near-future release.

The goal of OFA is to place all Oracle software under one *ORACLE_BASE* directory and to spread the files across different physical drives as your databases increase in size.

On Windows NT 4.0, this implies that everything is on the same hard drive, which may be neither feasible nor desirable.

On UNIX, although everything seems to be in one directory on the same hard drive, files can be on different hard drives if they are symbolically linked or have that directory as a mount point.

Oracle Corporation recommends that you use one logical drive to store your database administration files and that you place other files, as needed, on other logical drives in an ORADATA*DB_NAME* directory.

In the following example, there are four logical drives for a database named PROD:

- C:\ contains an Oracle home and the database administration files.
- F:\ contains the redo log files. (The F:\ drive could also represent two physical drives that have been striped to increase performance.)
- G:\ contains one of the control files and all of the tablespace files. (The G:\ drive could also use a RAID Level-5 configuration to increase reliability.)
- H:\ contains the second control file.

C:\ORACLE				First logical drive
	\ORA81			Oracle home
		\BIN		Subtree for Oracle binaries
		\NETWORK		Subtree for Net8
		\...		
	\ADMIN			Subtree for database administration files
		\PROD		Subtree for PROD database administration files
			\ADHOC	Ad hoc SQL scripts
			\ADUMP	Audit files
			\BDUMP	Background process trace files
			\CDUMP	Core dump files
			\CREATE	Database creation files
			\EXP	Database export files
			\PFILE	Initialization parameter file
			\UDUMP	User SQL trace files
F:\ORACLE				Second logical drive (represents two physical drives that have been striped)
	\ORADATA			Subtree for Oracle database files
		\PROD		Subtree for PROD database files
			REDO01.LOG	Redo log file group one, member one
			REDO02.LOG	Redo log file group two, member one
			REDO03.LOG	Redo log file group three, member one
G:\ORACLE				Third logical drive (uses a RAID Level 5 configuration)
	\ORADATA			Subtree for Oracle database files
		\PROD		Subtree for PROD database files
			CONTROL01.CTL	Control file 1
			SYSTEM01.DBF	System tablespace data file
			RBS01.DBF	Rollback tablespace data file
			INDX01.DBF	Index tablespace data file
			TEMP01.DBF	Temporary tablespace data file
			USERS01.DBF	Users tablespace data file
H:\ORACLE				Fourth logical drive
	\ORADATA			Subtree for Oracle database files
		\PROD		Subtree for PROD database files
			CONTROL02.CTL	Control file 2

4

Using Oracle8*i* Client Directory Features with Active Directory

This chapter describes how to enable Oracle8*i* directory features with Microsoft's Active Directory.

Specific topics discussed are:

- Overview
- Oracle8i Directory Server Features
- Integration with Active Directory
- Requirements for Using Oracle8i with Active Directory
- Installing and Configuring Oracle8i in an Active Directory Environment
- Testing Connectivity
- Managing Access Control Lists for Oracle Directory Objects
- Creating Security Domains

Overview

This section provides an overview of the following topics:

- What are LDAP and a Directory Server?
- What is Active Directory?

What are LDAP and a Directory Server?

The Lightweight Directory Access Protocol (LDAP) is a networking and directory access protocol for accessing information in a directory server. The directory server centrally stores and manages information about all network resources and makes that information accessible to users and applications. Resources can include user names, databases, computers, fax servers, applications, e-mail addresses, and printers. A directory server is analogous to a telephone directory, which stores information such as phone numbers and addresses of telephone subscribers.

What is Active Directory?

Active Directory is the LDAP-compliant directory server included with Windows 2000. Active Directory centrally stores all Windows 2000 information, including users, groups, and policies. Active Directory also stores information about network resources such as databases, and makes this information available to application users and network administrators. Active Directory enables users to access network resources with a single login. The scope of Active Directory can range from storing all the resources of a small computer network to storing all the resources of several wide areas networks (WANs).

Oracle8*i* Directory Server Features

With Oracle8*i* release 8.1.6, two new features are provided for storing Oracle information in a directory server. These new features are briefly described in the following sections:

- Net8 Directory Naming Features
- Enterprise User Security Features

References are provided to additional documentation. Both features have been enabled to work with Microsoft's Active Directory.

Net8 Directory Naming Features

This feature enables you to create and store database service and net service name entries for use with Net8 as directory objects in Active Directory. These objects contain connectivity information that can be used by various Oracle client applications when connecting to an Oracle8*i* database.

During Oracle8*i* release 8.1.6 database creation, a database service entry is created with Oracle Database Configuration Assistant. Clients configured to access the directory server can use this entry in their connect strings to connect to the database without any additional configuration.

If you prefer not to expose the database service entry to clients, you can use Net8 Assistant to create net service name entries in the directory server, which eliminates the need to create and maintain separate TNSNAMES.ORA files on each client computer. When clients attempt an Oracle8*i* database connection, the net service name is instead retrieved from a directory server. The Directory Server Migration Wizard, available with Net8 Assistant, enables you to export net service names stored in an existing TNSNAMES.ORA file to the directory server.

Note: Database service and net service name entries stored in an Oracle Names server can migrated to a directory server using the NAMESCTL utility. See the *Net8 Administrator's Guide* for more information.

This chapter frequently references Net8 directory naming terms and concepts. Read the following documentation for descriptions of terms and concepts that an administrator and client user must understand before using an Oracle8*i* database with Active Directory.

See Section...	Which Describes...
"Net8 and an LDAP-Compliant Directory Server" in Chapter 2 of the *Net8 Administrator's Guide*	■ How client computers use a directory server to connect to an Oracle8*i* database ■ Naming conventions and the location for Net8 and Oracle8*i* database entries in a directory server ■ How Oracle8*i* database service and net service name entries are created or modified ■ Database server requirements for using a directory server for lookups ■ Client requirements for performing entry lookups in a directory server ■ How to create connect strings to connect to an Oracle8*i* database using database service and net service names stored in a directory ■ Access Control List security overview (the client's privileges in the directory)
"Configuring the Directory Naming Method" in Chapter 6 of the *Net8 Administrator's Guide*	■ The Oracle8*i* and Active Directory configuration process (at the end of or separate from server and client installation) ■ Adding and removing users from the OracleNetAdmins group with the LDAPMODIFY utility ■ Exporting information into Active Directory from an existing TNSNAMES.ORA file or Oracle Names server

Enterprise User Security Features

This feature enables you to create and store Oracle8*i* information as directory objects in Active Directory. This enables users to make natively-authenticated, Single Sign-On (SSO) connections to a database. An administrator can create and store enterprise users and roles for the Oracle8*i* in Active Directory, which helps centralize the administration of users and roles across multiple databases.

This chapter frequently references enterprise user security terms and concepts. Read the following documentation for descriptions of terms and concepts that an administrator and client user must understand before using an Oracle8*i* database with Active Directory.

See...	Which Describes...
Chapter 17, "Managing Enterprise User Security" of *Oracle Advanced Security Administrator's Guide*	■ Enterprise user security and management ■ Descriptions of enterprise users, roles, domains, and concepts ■ Location for enterprise user security entries in a directory server ■ Installing and configuring enterprise user security
Chapter 20, "Using Oracle Enterprise Security Manager" of *Oracle Advanced Security Administrator's Guide*	■ Creating and managing enterprise users, roles, and domains

Note: Oracle Enterprise Security Manager cannot create or delete Windows 2000, Windows NT, Windows 95, or Windows 98 operating system user names. Instead, Oracle Enterprise Security Manager creates a contact name in Active Directory. You cannot log in with a contact name; it is just defined for external purposes. You can then assign roles to this "user". You then assign this contact user name to a global user.

Note: Enterprise domains are directory constructs consisting of Oracle8*i* databases and enterprise users and roles. Enterprise domains are different from Windows 2000 domains, which are a collection of computers that share a common directory database.

Integration with Active Directory

In addition to Net8 directory naming and enterprise user security integration with a directory server, the following features have been specifically integrated into Active Directory:

- Automatic Discovery of Directory Servers
- Integration with Microsoft Tools
- User Interface Extensions for Net8 Directory Naming
- Enhancement of Directory Object Type Descriptions
- Integration with Windows Login Credentials
- How Do Oracle Directory Objects Display in Active Directory?

Automatic Discovery of Directory Servers

Net8 Configuration Assistant enables you to configure client computer and Oracle8*i* database server access to a directory server. When Net8 Configuration Assistant starts at the end of Oracle8*i* database installation or is manually started after installation, it prompts you to specify a directory server type to use. When you select Active Directory as your directory server type, Net8 Configuration Assistant automatically:

- Discovers the Active Directory server location
- Configures access to the Active Directory server
- Creates the administrative context (also known as your domain)

If the Active Directory server through which client connections are accessing an Oracle8*i* database is shut down, another Active Directory server is automatically discovered and begins providing connection information; this prevents any downtime for client connections.

You must be running your Oracle client and database software in a Windows 2000 domain to take advantage of the automatic directory server discovery features of Net8 Configuration Assistant. This is regardless of the Oracle client and database releases you are using.

If you are not running in a Windows 2000 domain, Net8 Configuration Assistant does not automatically discover your directory server, and instead prompts you for additional information, such as the naming context and Active Directory location.

Integration with Microsoft Tools

Oracle8*i* database service, Net8 net service name, and enterprise role entries in Active Directory display in the following Microsoft Windows 2000 tools:

Tool	Description	This Integration Enables You To...
Windows Explorer	A user tool that displays the hierarchical structure of files, directories, and local and network drives on your computer.	Display and test Oracle8*i* database service and Net8 net service name objects
Active Directory Users and Computers	An administrative tool installed on Windows servers configured as domain controllers. This tool enables you to add, modify, delete, and organize Windows 2000 accounts and groups, and publish resources in your organization's directory.	Display and test Oracle8*i* database service and Net8 net service name objects and manage access control

See Also:

- "Testing Connectivity from Microsoft Tools" on page 4-17
- "Managing Access Control Lists for Oracle Directory Objects" on page 4-20

User Interface Extensions for Net8 Directory Naming

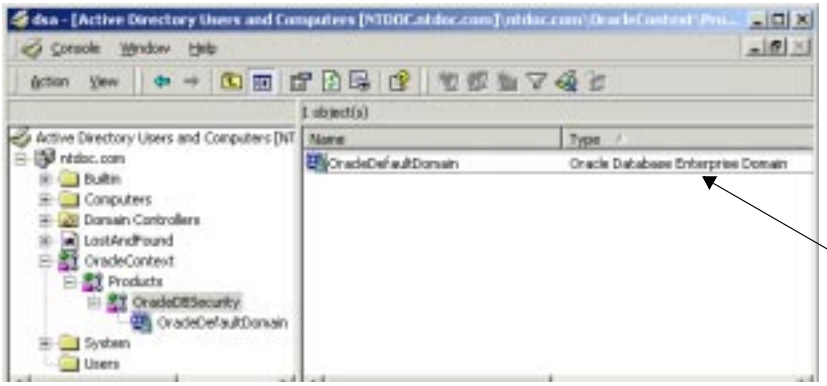
The property menus of Oracle8*i* database service and net service name objects in Windows Explorer and Active Directory Users and Computers have been enhanced. These enhancements enable you to test for object connectivity to the Oracle8*i* database and perform database administration. When you right click these Oracle directory objects, a menu presents you with two options for testing connectivity:

Menu Option	Description
Test	Starts an application that tests that the user name, password, and net service name you initially entered can connect to the Oracle8*i* database.
Connect with SQL*Plus	Starts SQL*Plus, which enables you to perform database administration, run scripts, and so on.

See Also: "Testing Connectivity from Microsoft Tools" on page 4-17 for more information

Enhancement of Directory Object Type Descriptions

Oracle directory object type descriptions in Active Directory have been enhanced to make them easier to understand. For example, here is the description for OracleDefaultDomain's type in the Type column of the right window pane:



Integration with Windows Login Credentials

SSO enables client users to access all authorized network resources (such as Active Directory) with a single authentication that is performed when they initially specify their user login credentials to access the network. SSO is included in Windows 2000 through the Kerberos and Secure Sockets Layer (SSL) authentication protocols.

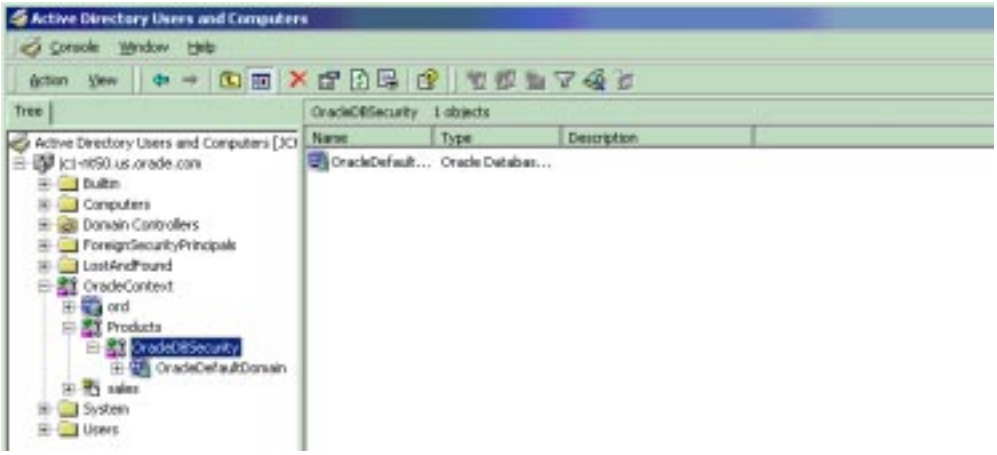
The Oracle8*i* database and configuration tools can use the Windows user's login credentials to automatically connect to Active Directory without having to re-enter their login credentials. This enables:

- Oracle8*i* clients and databases to securely connect to Active Directory and retrieve net service name, enterprise user, and enterprise role information
- Configuration tools such as Oracle Enterprise Security Manager, Net8 Configuration Assistant, Net Assistant, and Oracle Database Configuration Assistant to connect automatically to Active Directory and configure the Oracle8*i* database and net service name objects

For Windows 2000, the default authentication protocol used is Kerberos.

How Do Oracle Directory Objects Display in Active Directory?

When the Oracle8*i* database and Net8 are installed and configured to access Active Directory, Oracle directory objects appear in Active Directory Users and Computers:



This table describes these Oracle directory objects:

Object	Description
domain	The domain (also known as the administrative context) in which you created your Oracle Context. The administrative context contains various Oracle entries to support directory naming and enterprise user security. Net8 Configuration Assistant automatically discovers this information during Oracle8*i* database integration with Active Directory.
OracleContext	The top-level Oracle entry in the Active Directory tree that can contain Oracle8*i* database service and Net8 net service name object information. All Oracle software information is placed in this container.
orcl	The Oracle8*i* database service name (for this example, *orcl* is the name).
Products	A container for Oracle security and domain information.
OracleDBSecurity	A container for security domains.
OracleDefaultDomain	The default enterprise domain created. You can create additional enterprise domains with Oracle Enterprise Security Manager.
sales	The net service name object (for this example, *sales* is the name).
Users	The folder for the three Oracle security groups. See section "Managing Access Control Lists for Oracle Directory Objects" on page 4-20 for more information. Enterprise users and roles created with Oracle Enterprise Security Manager also appear in this folder.

Requirements for Using Oracle8*i* with Active Directory

The requirements that you must complete depend upon the Oracle features you want to use:

Requirement	Required For... Net8 Directory Naming?	Required For... Enterprise User Security?
"Oracle Schema Creation Requirements" on page 4-10	Yes	Yes
"Oracle Context Creation Requirements" on page 4-11	Yes	Yes
"Net8 Directory Naming Requirements" on page 4-12	Yes	No
"Enterprise User Security Requirements" on page 4-13	No	Yes

Note: The Oracle schema and Oracle Context are both created when you run Net8 Configuration Assistant.

Note: You must be running your Oracle clients and database server in a Windows 2000 domain. This is regardless of the Oracle client and Oracle database server releases you are running.

Oracle Schema Creation Requirements

Complete the following Oracle schema creation requirements to use the Net8 directory naming and enterprise user security features with Active Directory. A schema is a set of rules for Net8 and Oracle8*i* database entries and their attributes stored in Active Directory.

- You can create only one Oracle schema per forest.
- Perform schema creation on a Windows 2000 domain controller.
- The Windows 2000 domain controller must be the operations master. See your Microsoft documentation for instructions.

- Log in as a member of the Schema Administrator group to create the schema. Domain administrators by default are in the Schema Administrator group.
- Create the *Schema Update Allowed* registry parameter prior to installation. See your Microsoft documentation for instructions.
- Use Net8 Configuration Assistant to create the Oracle schema. You can create your schema during or after installation. The schema can be created by running Net8 Configuration Assistant on the Oracle8*i* database or on a client computer.

  See Also: *Net8 Administrator's Guide* for configuration procedures and *Oracle8i Client Installation Guide for Windows* for a configuration overview.

Oracle Context Creation Requirements

You must complete the following Oracle Context creation requirements to use the Net8 directory naming and enterprise user security features with Active Directory. The Oracle Context is the top-level Oracle entry in the Active Directory tree that contains Oracle8*i* database service and Net8 net service name object information.

- You can create only one Oracle Context per Windows 2000 domain (administrative context).
- You must have the right to create domain objects in order to create the Oracle Context in Active Directory with Net8 Configuration Assistant. If you are a domain administrator, you automatically have these rights.
- Use Net8 Configuration Assistant to create your Oracle Context. You can create the Oracle Context during or after installation.

  See Also: *Oracle8i Client Installation Guide for Windows* for installation procedures and the *Net8 Administrator's Guide* for configuration procedures

Net8 Directory Naming Requirements

Ensure that you first satisfy the requirements described in:

- "Oracle Schema Creation Requirements" on page 4-10
- "Oracle Context Creation Requirements" on page 4-11

This table describes the Microsoft and Oracle software releases that must be installed to use Net8 directory naming with Active Directory:

For...	The Required Microsoft Software Is...	The Required Oracle Software Is...
Client Computers	■ Windows 2000 ■ Windows 4.0 with Active Directory Service Interfaces (ADSI) ■ Windows 95 or 98 with the Distributed Systems Client upgrade	Oracle8*i* Client release 8.1.6, which includes Net8 Client and these configuration tools: ■ Net8 Configuration Assistant ■ Net8 Assistant **Note:** See the *Oracle8i Client Installation Guide for Windows* for installation instructions and "Required Configuration Tools" on page 4-14 for descriptions of the tasks that these configuration tools perform.
Database Server	■ Windows NT 4.0 ■ Windows 2000	Oracle8*i* database release 8.1.6 is required for registering the database service as an object in Active Directory.

Enterprise User Security Requirements

Ensure that you first satisfy the requirements described in:

- "Oracle Schema Creation Requirements" on page 4-10
- "Oracle Context Creation Requirements" on page 4-11

This table describes the Microsoft and Oracle software releases required to use enterprise user security with Active Directory:

For...	Microsoft Software	Oracle Software
Client Computers	■ Windows 2000 ■ Windows NT 4.0 with *or* without ADSI ■ Windows 95 or 98 with *or* without the Distributed Systems Client upgrade	Oracle8*i* Client release 8.1.5 or greater

Database Server	■ Windows NT 4.0 with ADSI
	■ Windows 2000
		Oracle database release 8.1.6, which automatically installs:
		■ Oracle Database Configuration Assistant
		■ Net8 Client, which includes these configuration tools:
		  ■ Net8 Configuration Assistant
		  ■ Net8 Assistant

Remote computer from which to manage the Oracle8*i* database		Oracle Enterprise Manager Console release 2.1, which includes: ■ Oracle Enterprise Security Manager ■ Net8 Client **Note:** Oracle Enterprise Security Manager is required if you want to create and manage enterprise users, roles, and domains.

Installing and Configuring Oracle8*i* in an Active Directory Environment

This section provides an overview of installation and configuration information. Specific topics covered include:

- Installation Tasks
- Required Configuration Tools
- Post-Installation Configuration Tasks

Installation Tasks

See Chapters 4 and 5 of the *Oracle8i Client Installation Guide for Windows* for Oracle8*i* installation instructions.

Required Configuration Tools

Several tools are required for configuring the Oracle clients and Oracle8*i* database for access to Active Directory. This table identifies:

- Tasks that these tools perform
- How to run these tools
- Documentation for additional information on using these tools

These tools are listed in the order in which to use them. After you configure your environment, you can take advantage of the Net8 directory naming and enterprise user security features.

To...	Run this Tool...	When Does This Tool Run?	For More Information...
Create an Oracle schema and Oracle Context in Active Directory (if one is not already installed) and Set up Access Control Lists for security in Active Directory	Net8 Configuration Assistant, which guides you through Oracle8*i* database server configuration with Active Directory. Run this tool either on the Oracle8*i* database server or from a client computer that connects to the server.	There are two methods: ■ Automatically started at the end of Custom installation of Oracle8*i* Server (the Oracle8*i* database) ■ Manually started after Oracle8*i* Server	■ Chapter 6 of *Net8 Administrator's Guide* ■ Chapters 4 and 5 of *Oracle8i Client Installation Guide for Windows* ■ online help included with Net8 Configuration Assistant

To...	Run this Tool...	When Does This Tool Run?	For More Information...
Register the Oracle8*i* database as an object in Active Directory **Note:** This task is not required if you are not using the enterprise user security feature.	Oracle Database Configuration Assistant	There are two methods: ■ Automatically started after Net8 Configuration Assistant has created the Oracle schema, Oracle Context, and set up Access Control List security, *if* you installed the Oracle8*i* database through the Custom installation type. ■ Manually started after Oracle8*i* Server installation and Active Directory access configuration by Net8 Configuration Assistant. Select the Change database configurations option.	■ *Oracle8i Administrator's Guide for Windows NT* ■ Chapters 4 and 5 of *Oracle8i Client Installation Guide for Windows*
Configure an Oracle8*i* client computer to access Active Directory	Net8 Configuration Assistant, which guides you through client computer configuration with Active Directory by prompting you to: ■ Select the Directory Naming Method as the naming method with which to connect to the Oracle8*i* database ■ Identify the Active Directory with which to integrate the Oracle client	There are two methods for running Net8 Configuration Assistant: ■ Automatically started at the end of any Oracle8*i* Client installation type: (Administrator, Application User, Programmer, or a Custom installation of Net8 Client) ■ Manually started after installation of any Oracle8*i* Client installation type	■ Chapter 6 of *Net8 Administrator's Guide* ■ Chapters 4 and 5 of *Oracle8i Client Installation Guide for Windows* ■ online help included with Net8 Configuration Assistant
Create and modify net service name objects or modify Net8 attributes of the database	Net8 Assistant	You must manually start Net8 Assistant.	■ *Net8 Administrator's Guide* ■ online help included with Net8 Assistant
Create enterprise users, roles, and domains in Active Directory (enterprise user security)	Oracle Enterprise Security Manager	Manually started as an integrated application of Oracle Enterprise Manager Console	■ *Oracle Advanced Security Administrator's Guide*

Note: Oracle Enterprise Security Manager is a feature of Oracle Advanced Security and can only be used if you have purchased an Oracle Advanced Security license.

Post-Installation Configuration Tasks

You must set the OSAUTH_X509_NAME registry parameter to TRUE to use enterprise user security.

Testing Connectivity

This section describes how to connect to an Oracle8*i* database through Active Directory. Specific topics discussed include:

- Testing Connectivity from Client Computers
- Testing Connectivity from Microsoft Tools

Testing Connectivity from Client Computers

Client computers connect to an Oracle8*i* database by specifying the database entry that appears in the Oracle Context. For example, if the database service entry under the Oracle Context in Active Directory was *sales*, a user connects through SQL*Plus to the Oracle8*i* database as follows:

If the Client and Oracle8*i* database are in...	The Client Specifies The Following...
The same domain	`SQL> CONNECT SCOTT/TIGER@SALES`
Different domains	`SQL> CONNECT SCOTT/TIGER@SALES@`*`DOMAIN`* where *domain* is the domain in which the Oracle8*i* database is located.

The connect strings in this table follow DNS-style conventions. While Active Directory also supports connections using X.500 naming conventions, DNS-style conventions are the recommended method because of ease of use. DNS-style conventions enable client users to access an Oracle8*i* database through a directory server by entering minimal connection information; this is the case even when the client computer and Oracle8*i* database are in separate domains. X.500 names are longer; this is especially the case when the client and Oracle8*i* database are located in different domains (also known as administrative contexts).

To learn more about X.500 naming conventions, see Chapter 2, "Net8 Concepts", of the *Net8 Administrator's Guide* for information.

Testing Connectivity from Microsoft Tools

Oracle directory objects in Active Directory are integrated with Microsoft tools such as:

- Windows NT Explorer
- Active Directory Users and Computers

You can perform the following tasks from within these Microsoft tools:

- Connect with SQL*Plus to an Oracle8*i* database
- Test Oracle8*i* database connectivity

> **Note:** All clients accessing an Oracle8*i* database through Active Directory require read access on all Net8 net service name objects in the Oracle Context and must be able to authenticate anonymously with Active Directory. Net8 Configuration Assistant automatically sets this up.

Accessing Connectivity Tools

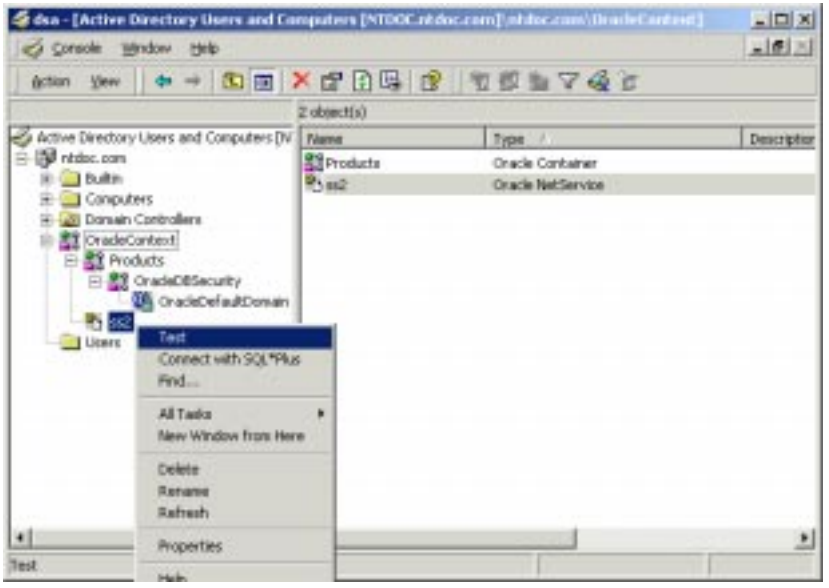
To access connectivity tools:

1. Start the Microsoft tool with which you want to connect:

With...	Choose...
Active Directory Users and Computers	1. Start > Programs > Administrative Tools > Active Directory Users and Computers.
Windows Explorer	1. Start > Programs > Accessories > Windows Explorer 2. Expand My Network Places. 3. Expand Entire Network. 4. Expand Directory.

2. Expand the domain in which your Oracle Context is located.
3. Go to your Oracle Context.
4. Right click the object that defines your net service name attributes.

   A menu appears with several options:



5. Make an appropriate selection:

If You Want To...	Then...
Test connectivity	**1.** Choose Test. **2.** Go to section "Testing Connectivity" on page 4-19
Connect with SQL*Plus	**1.** Choose Connect with SQL*Plus. **2.** Go to section "Connecting With SQL*Plus" on page 4-19

Testing Connectivity

A status message appears describing the status of your connection attempt:

Connecting With SQL*Plus

The *Oracle SQL*Plus Login* dialog box appears:

1. Enter your user name and password.

   A status message appears describing the status of your connection attempt.

Managing Access Control Lists for Oracle Directory Objects

Access Control Lists provide Active Directory security by specifying:

- The user that can access the object attributes in the object
- Authentication method to access the entry
- Access rights, or what the user can do with the object (read / write) attributes in the object

Three security groups are automatically created when the Oracle Context is created in Active Directory. The user configuring access (and thus creating the Oracle Context) is automatically added to each:

Group	Description
OracleDBSecurityAdmin	Group for the creator of the Oracle Context. Users in this group can also: ■ Manage the group membership for all three security groups ■ Manage any object in the Oracle Context ■ Use Oracle Enterprise Security Manager to create security domains
OracleDBCreator	Group for the creator of the Oracle8*i* database. Users in this group can: ■ Modify the Oracle8*i* database objects that they create ■ Read, but not modify, the membership for this group The domain administrator is automatically a member of this group. **Note:** The domain administrator can start Oracle Database Configuration Assistant and Net8 Assistant, but cannot use Oracle Enterprise Security Manager. You must be a member of the OracleDBSecurityAdmins group to use Oracle Enterprise Security Manager.
OracleNetAdmins	Users in this group can: ■ Create and modify net service name objects ■ Read the group membership of this group ■ Modify the net service information in the database objects

Accessing the Security Groups

Active Directory Users and Computers enables you to add or remove users or change permission settings in the three security groups.

There are several tools available for adding or removing users:

If You Want to...	Use...
Add or remove users in OracleNetAdmins	Active Directory Users and Computers
Add or remove users in OracleDBSecurityAdmin or OracleDBCreator	Oracle Enterprise Security Manager or Active Directory Users and Computers

This section describes how to use Active Directory Users and Computers. See the *Oracle Advanced Security Administrator's Guide* for instructions on using Oracle Enterprise Security Manager.

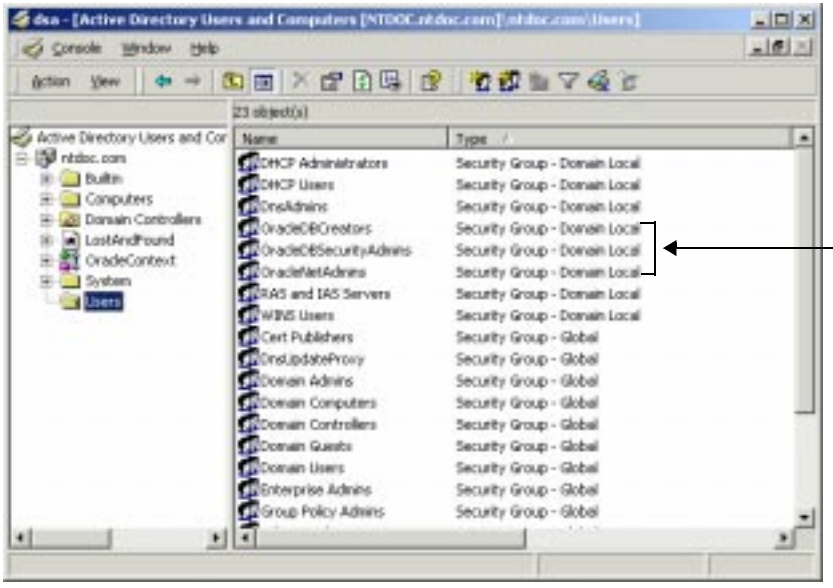
> **Note:** Use Active Directory Users and Computers to perform the procedures described in this section. Windows Explorer does not provide the functionality.

To add or remove users or change permission settings:

1. Choose Start > Programs > Administrative Tools > Active Directory Users and Computers.
2. Choose Advanced Features from the View main menu.

   This enables you to view and edit information that is normally hidden.
3. Expand the domain (administrative context) in which your Oracle Context is located.
4. Expand Users.

The three security groups appear in the right window pane:



5. Right-click the Oracle security group that you want to view or modify.

   A menu appears with several options.

6. Choose Properties.

7. Make an appropriate selection:

If You Want To...	Then...
Add or remove users	1. Click the Members tab. 2. Go to section "Adding or Removing Users" on page 4-23.
Change permissions	1. Click the Security tab. 2. Go to section "Changing User Permissions" on page 4-24.

Adding or Removing Users

To add or remove users:

1. Complete the access procedures in "Accessing the Security Groups" on page 4-21.

   The *Properties* dialog box for the group you selected appears (in this example, *OracleDBSecurityAdmins*):

2. Make an appropriate selection:

To...	Then...
Add Users	**1.** Click Add. The *Select Users, Contacts, Computers, or Groups* dialog box appears. **2.** Select appropriate users or groups, and click Add. Your selections appear in the *Select Users, Contacts, Computers, or Groups* dialog box. **3.** Click OK.

To...	Then...
Remove Users	1. Select a user to remove. 2. Click Remove. The user is removed. 3. Click OK.

Changing User Permissions

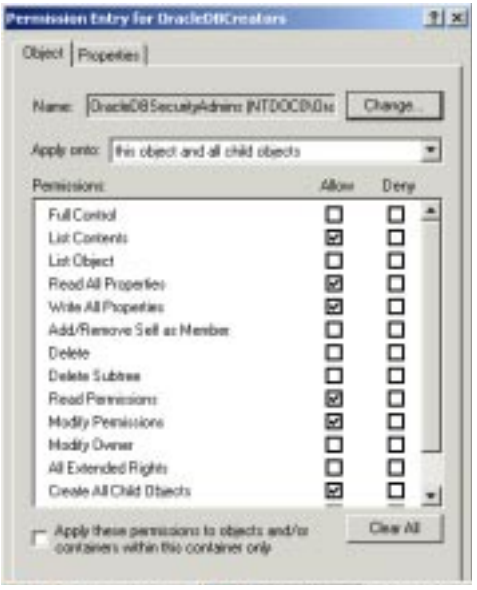
To change user permissions:

1. Complete the access procedures in "Accessing the Security Groups" on page 4-21.

   The *Properties* dialog box for the group you selected appears.

2. Click Advanced.
3. Click View / Edit.

   The *Permission Entry* dialog box for the security group you selected appears:



4. View or make appropriate changes to group permissions.
5. Click OK.

Creating Security Domains

A default security domain, OracleDefaultDomain, is created in your Oracle Context. If you do not want to use this domain or want to create another domain, use Oracle Enterprise Security Manager to create additional security domains (called enterprise domains). These domains are added under the OracleDBSecurity folder.

5

Post-Installation Configuration Tasks

This chapter focuses on the post-installation configuration of Oracle *inter*Media and the Oracle Visual Information Retrieval Client. Where appropriate, the chapter provides references to other guides for those configuration tasks.

Specific topics discussed are:

- Oracle interMedia Client
- Oracle Visual Information Retrieval Client

Note: The directory path examples in this chapter follow Optimal Flexible Architecture (OFA) guidelines (for example, *ORACLE_BASE**ORACLE_HOME*\RDBMS\ADMIN). If you specified non-OFA compliant directories during installation, your directory paths will differ. See "OFA and Multiple Oracle Home Configurations" on page 3-23 for more information.

Oracle *inter*Media Client

Oracle *inter*Media Client provides an Oracle8*i* Java interface that lets you use local (client-side) applications to manipulate and/or modify multimedia data stored in network-accessible (server-side) database. It also provides a simple image sample (SIMPIMG.EXE) that was developed, using Microsoft Visual C++. SIMPIMG.EXE locates and updates images, using *inter*Media in an Oracle8*i* database.

Audio

Oracle *inter*Media Audio manages audio data in multiple file formats in an Oracle database. Types of audio data supported include conversations, songs, and other sounds in popular audio file formats. This makes it possible to integrate audio data with other application-specific object-relational data.

Video

Oracle *inter*Media Video manages video data in multiple video file formats. This makes it possible to integrate video data with other application-specific object-relational data.

Image

Oracle *inter*Media Image provides image storage, retrieval, and format conversion capabilities through an object data type (ODT). It also supports image storage, using Binary Large Objects (BLOBs), and references to image data residing in external files (BFILEs).

The Image component of Oracle *inter*Media also comes with a sample demonstration that shows how an image is extracted from an Oracle database.

Locator

Oracle *inter*Media Locator enables Oracle8*i* to support online internet-based geocoding facilities for locator applications and proximity queries.

Text

Oracle *inter*Media Text (formerly called ConText) enables text queries through SQL and PL/SQL from most Oracle interfaces.

By installing Oracle *inter*Media Text with an Oracle database server, client tools such as SQL*Plus, Oracle Forms, and Pro*C/C++ are able to retrieve and manipulate text in an Oracle database.

Oracle *inter*Media Text manages textual data in concert with traditional data types in an Oracle database. When text is inserted, updated, or deleted, Oracle *inter*Media Text automatically manages the change.

Oracle *inter*Media Audio, Video, Image, and Locator Configuration Responsibilities

Review the following table to determine how to configure Oracle *inter*Media Audio, Video, Image, and Locator.

If You...	Then...
Installed Oracle *inter*Media through the Oracle8*i* Client Typical installation type path	No manual configuration is required. All tasks described in "Configuring Oracle interMedia Audio, Video, Image, and Locator" on page 5-4 are automatically performed.
Installed both Oracle *inter*Media and Oracle8*i* Client together through the Oracle8*i* Client installation type path	Oracle Database Configuration Assistant starts at the end of installation. If you select either of the following options: ■ Custom ■ Typical, and then select the new database files suboption Oracle Database Configuration Assistant asks if you want Oracle *inter*Media to be automatically configured.
Installed Oracle *inter*Media during a *separate* installation from Oracle8*i* Client	You must manually configure Oracle *inter*Media by either: ■ Performing the tasks under "Configuring Oracle interMedia Audio, Video, Image, and Locator" on page 5-4. ■ Starting Oracle Database Configuration Assistant and selecting Modify a database. Then following the on-screen instructions.
Manually copy your Oracle7 LISTENER.ORA and TNSNAMES.ORA files into your Oracle8*i* network directory	You must modify the TNSNAMES.ORA and LISTENER.ORA network configuration files on your server to enable external procedure calls to work and *inter*Media to function properly. Follow the tasks in "Configuring Net8 for External Procedures" in Chapter 8 of *Net8 Administrator's Guide.*
Want to use the demos	Perform the tasks described for the configuration of Oracle *inter*Media sample demos below.
Want to build the Oracle *inter*Media Image sample demonstration	Install a C compiler.
Want to use Oracle Visual Information Retrieval with Oracle *inter*Media	Install Oracle *inter*Media first. If you used the Custom Installation type and selected both components for installation at the same time, Oracle *inter*Media was installed first.

Configuring Oracle *inter*Media Audio, Video, Image, and Locator

To configure Oracle *inter*Media Audio, Video, Image, and Locator:

1. Start SQL*Plus:

   ```
   C:\> SQLPLUS
   ```

2. Connect to the database with the SYS account:

   ```
   SQL> CONNECT SYS/PASSWORD AS SYSDBA
   ```

3. Start the database (if necessary):

   ```
   SQL> STARTUP
   ```

4. Run the ORDINST.SQL script:

   ```
   SQL> @ORACLE_BASE\ORACLE_HOME\ORD\ADMIN\ORDINST.SQL
   ```

5. Run the IMINST.SQL script:

   ```
   SQL> @ORACLE_BASE\ORACLE_HOME\ORD\IM\ADMIN\IMINST.SQL
   ```

6. Exit SQL*Plus:

   ```
   SQL> EXIT
   ```

Configuring Oracle *inter*Media, Audio, Video, Image, and Locator Demos

To configure Oracle *inter*Media Audio demonstrations:

1. Go to the *ORACLE_BASE**ORACLE_HOME*\ORD\AUD\DEMO directory.
2. Follow the instructions in the README.TXT file.

To configure Oracle *inter*Media Video demonstrations:

1. Go to the *ORACLE_BASE**ORACLE_HOME*\ORD\VID\DEMO directory.
2. Follow the instructions in the README.TXT file.

To configure Oracle *inter*Media Image demonstrations:

1. Go to the *ORACLE_BASE**ORACLE_HOME*\ORD\IMG\ADMIN directory.
2. Read the README file in this directory for instructions on configuring the demo.
3. Make the *inter*Media Image demos for a Microsoft C compiler by entering:

   ```
   C:\> MAKE
   ```

An additional demonstration resides in the following location:

*ORACLE_BASE**ORACLE_HOME*\ORD\IMG\DEMO\VC\IMGSAMP\SIMPIMG

In order to build and run the demonstration, you must first modify the MAKEFILE to adapt it to your environment.

To configure Oracle *inter*Media Locator demonstrations:

1. Go to the *ORACLE_BASE**ORACLE_HOME*\MD\DEMO\GEOCODER directory.
2. The NH_CS.SQL file contains the sample data that can be loaded into Oracle8*i*. GEOHTTP.SQL and GEOLOCAT.SQL are examples that show the use of Locator functionality. GEOINDEX.SQL contains examples of data indices created by using the Locator.

Oracle *inter*Media Text Configuration Responsibilities

Review the following table to determine your Oracle *inter*Media Text post-installation tasks.

If You...	Then...
Installed Oracle *inter*Media Text from the CD-ROM and you do not have a previous release of *inter*Media Text installed (formerly called ConText)	See the description below this table.
Installed Oracle *inter*Media Text from the CD-ROM and you do have a previous release of *inter*Media Text installed (formerly called ConText)	See *Oracle8i interMedia Text Migration*.
Migrated your database, you may need to configure Net8 for external procedures. Otherwise, Oracle *inter*Media Text may not work. In any case other than migration, Net8 should be configured correctly by default to work with Oracle *inter*Media Text.	See the *Oracle8i interMedia Text Migration* and *Oracle8i interMedia Text Reference*.
Are indexing formatted documents such as Microsoft Word	You must set your environment to use the INSO filter before you can index your documentation set. For more information on setting up your environment for INSO filtering, see Appendix C of the *Oracle8i interMedia Text Reference*.

If one of the following is true, the Oracle8*i* database is already configured for use with Oracle *inter*Media Text:

- The database is a starter database that you created by installing Oracle8*i* Enterprise Edition with the Typical installation type.
- The database is a starter database that you created by performing the following sequence of steps:
  1. Installed Oracle8*i* Enterprise Edition or Oracle8*i* with the Custom installation type.
  2. Selected Oracle8i Server in the *Available Product Components* dialog box.
  3. Clicked Yes when prompted to run Oracle Database Configuration Assistant.
  4. Selected the Typical database creation type.
  5. Selected Copy existing database files from the CD-ROM.
- You created the database by using Oracle Database Configuration Assistant in standalone mode, selecting the Typical database creation type, and selecting Copy existing database files from the CD-ROM.

If none of these are true, you must configure the Oracle database for use with Oracle *inter*Media Text by doing one of the following:

- Using Oracle Database Configuration Assistant
- Configuring Manually

Using Oracle Database Configuration Assistant

You can use Oracle Database Configuration Assistant to configure an Oracle8*i* database for use with Oracle *inter*Media Text either at the time you create the database or later.

To configure...	Do this...
At a later time	1. Select Modify a database in the *Welcome* page. 2. Select the database that you want to modify in the *Modify Instance* page. 3. Select Oracle *inter*Media Text in the *Modify Database Cartridges and Options* page.

Configuring Manually

Manually configuring an Oracle database for use with Oracle *inter*Media Text consists of creating a tablespace for the Oracle *inter*Media Text data dictionary tables and then creating the CTXSYS user name and the Oracle *inter*Media Text data dictionary tables themselves.

To create a tablespace for the Oracle *inter*Media Text data dictionary tables:

1. Start SQL*Plus:

   ```
   C:\> SQLPLUS
   ```

2. Connect as SYS:

   ```
   Enter user-name: SYS/PASSWORD
   ```

3. Create a tablespace for the Oracle *inter*Media Text data dictionary tables:

   ```
   SQL> CREATE TABLESPACE TABLESPACE_NAME DATAFILE 'ORACLE_BASE\ORADATA\
   DB_NAME\DR01.DBF' SIZE 80M;
   ```

To create the CTXSYS user name and the Oracle *inter*Media Text data dictionary tables:

1. Connect as INTERNAL:

   ```
   SQL> CONNECT INTERNAL/PASSWORD
   ```

2. Run the DR0CSYS.SQL script to create the CTXSYS user name:

   ```
   SQL> @ORACLE_BASE\ORACLE_HOME\CTX\ADMIN\DR0CSYS.SQL PASSWORD
   DEFAULT_TABLESPACE_NAME TEMPORARY_TABLESPACE_NAME;
   ```

   where:

   - *PASSWORD* is the password that you want to use for the CTXSYS user name.
   - *DEFAULT_TABLESPACE_NAME* is the default tablespace for the Oracle *inter*Media Text data dictionary tables. Set the default tablespace to the value of *TABLESPACE_NAME* in step 3 of the instructions "To create a tablespace for the Oracle interMedia Text data dictionary tables:".
   - *TEMPORARY_TABLESPACE_NAME* is the temporary tablespace for the Oracle *inter*Media Text data dictionary tables. Set the temporary tablespace to the value of *TABLESPACE_NAME* in step 3 of the instructions "To create a tablespace for the Oracle interMedia Text data dictionary tables:".

3. Connect as CTXSYS:

   ```
   SQL> CONNECT CTXSYS/PASSWORD
   ```

4. Run the DR0INST.SQL script to create and populate the Oracle *inter*Media Text data dictionary tables:

   ```
   SQL> @ORACLE_BASE\ORACLE_HOME\CTX\ADMIN\DR0INST.SQL ORACLE_BASE\
   ORACLE_HOME\CTX\LIB\ORACTXX8.DLL;
   ```

5. Run the language-specific default script, where *XX* is the language code (for example, US):

   ```
   SQL> @ORACLE_BASE\ORACLE_HOME\CTX\ADMIN\DEFAULTS\DRDEFXX.SQL;
   ```

6. Exit SQL*Plus:

   ```
   SQL> EXIT
   ```

Configuration Required to Use the Java Client:

To use the Java library:

1. Set the environment variable CLASSPATH so that it contains the Oracle *inter*Media library. The library resides in the following location:

   *ORACLE_BASE**ORACLE_HOME*\ORD\JLIB\ORDEIM.ZIP

   The JDBC OCI driver (classes111.zip) must also be in CLASSPATH.

2. Include the JDBC OCI shared library in the PATH.

To run the SIMPIMG demonstration:

1. Refer to the README file that resides at the following location for information on setting up and running the SIMPIMG demonstration:

   *ORACLE_BASE**ORACLE_HOME*\ORD\IMG\DEMO\VC\IMGSAMP\README.TXT

Oracle Visual Information Retrieval Client

Oracle Visual Information Retrieval Client provides an Oracle8i Java interface that lets you use local (client-side) applications to manipulate and / or modify image data stored in a network-accessible (server-side) database.

This option provides image storage, content-based retrieval, and format conversion capabilities through an object data type. This option is a building block for various imaging applications, rather than being an end-user application. Some common applications for this option consist of digital art galleries and museums, real estate marketing, document imaging, and stock photo collections for fashion designers and architects.

Oracle Visual Information Retrieval also provides a sample demonstration, showing how an image is extracted from an Oracle database.

Review the following table to determine your configuration responsibilities.

Note: When you select installation of Oracle Visual Information Retrieval, Oracle *inter*Media is installed automatically since Oracle Visual Information Retrieval cannot function properly without it.

If You...	Then...
Installed Oracle Visual Information Retrieval through the Oracle8*i* Client Typical installation type	No manual configuration is required. All configuration tasks described under "To configure Oracle Visual Information Retrieval:" are automatically performed.
Installed both Oracle Visual Information Retrieval and Oracle8*i* Server together through the Oracle8*i* Enterprise Edition Custom installation type path	Oracle Database Configuration Assistant starts at the end of installation. If you select either of the following options: ■ Custom ■ Typical, and then select the Create new database files suboption Oracle Database Configuration Assistant asks if you want Oracle Visual Information Retrieval to be automatically configured.
Installed Oracle Visual Information Retrieval during a separate installation from Oracle8*i* Client	You must manually configure Oracle Visual Information Retrieval by either: ■ Performing the configuration tasks described under "Configuring Oracle Visual Information Retrieval Client" on page 5-10. ■ Starting Oracle Database Configuration Assistant and selecting "Modify a database". Then, following the on-screen instructions.

If You...	Then...
Want to use the demonstration	Perform the configuration tasks described under "Configuring Oracle Visual Information Retrieval Client".
Want to build an Oracle Visual Information Retrieval sample demonstration.	Install a C compiler.
Manually copy your Oracle7 LISTENER.ORA and TNSNAMES.ORA files into your Oracle8*i* network directory	You must modify the TNSNAMES.ORA and LISTENER.ORA network configuration files on your server to enable external procedure calls to work and Oracle Visual Information Retrieval to function properly. Follow the tasks in the *Net8 Administrator's Guide.*

Configuring Oracle Visual Information Retrieval Client

To configure Oracle Visual Information Retrieval:

1. Ensure that Oracle *inter*Media is already configured. Oracle *inter*Media must be configured before Oracle Visual Information Retrieval. See the configuration instructions for Oracle *inter*Media under "Configuring Oracle interMedia, Audio, Video, Image, and Locator Demos" on page 5-4 for information about running the ordinst.sql and iminst.sql scripts.
2. Start SQL*Plus:

   ```
   C:\> SQLPLUS
   ```

3. Connect to the database with the SYS account:

   ```
   SQL> CONNECT SYS/PASSWORD AS SYSDBA
   ```

4. Start the database (if necessary):

   ```
   SQL> STARTUP
   ```

5. Run the VIRINST.SQL script:

   ```
   SQL> @ORACLE_BASE\ORACLE_HOME\ORD\VIR\ADMIN\VIRINST.SQL
   ```

6. Run the IMINST.SQL script:

   ```
   SQL> @ORACLE_BASE\ORACLE_HOME\ORD\IM\ADMIN\IMINST.SQL
   ```

7. Exit SQL*Plus:

   ```
   SQL> EXIT
   ```

To configure the Oracle Visual Information Retrieval demonstration:

1. Go to the *ORACLE_BASE**ORACLE_HOME*\ORD\VIR\ADMIN directory.
2. Read the README file in this directory for instructions on configuring the demonstration.
3. Make the Oracle Visual Information Retrieval demonstration for a Microsoft C compiler by entering:

   ```
   C:\> MAKE
   ```

Configuration Required to Use the Java Client

To use the Java library:

1. Set the environment variable CLASSPATH so that it contains the Oracle Visual Information Retrieval library. The library resides in the following location:

   *ORACLE_BASE**ORACLE_HOME*\ORD\JLIB\ORDVIR.ZIP

   The Oracle *inter*Media Java Client Library (ORDIM.ZIP) and JDBC OCI driver (CLASSES111.ZIP) must also be in CLASSPATH.
2. Include the JDBC OCI shared library in the PATH.

6

Developing Applications

This chapter describes topics of interest to application developers on Windows NT.

Specific topics discussed are:

- Finding Information on Application Development for Windows NT
- Building External Routines
- Accessing Web Data with Intercartridge Exchange

Finding Information on Application Development for Windows NT

The following table describes where to find the information on developing applications specifically for Windows NT.

To find information on...	Look in the guide...
XML Oracle's XML products include the XML Parser for Java - Version 1 and Version 2 (which includes an XSLT processor), the XML Class Generator, and the XML Parsers for C, C++, and PL/SQL as well as demos, utilities and sample code designed to illustrate the simplest and most powerful ways to work with XML-formatted data.	*Oracle8i Application Developer's Guide - XML*
Internet Tools Oracle WebDB enables you to publish your data to the Web	*Oracle WebDB Installation Guide and Tutorial* **Note:** WebDB is available on a separate CD-ROM and included with Oracle8*i* for Windows NT.
Application Wizards Oracle Application Wizards allow developers to create database applications easily and quickly. They improve ease-of-use and reduce development time by generating much of the code for database connectivity.	*Oracle AppWizard for Microsoft Visual C++ User's Guide for Windows NT*
OLE Automation	*Oracle COM Automation Developer's Guide* Oracle Objects for OLE (online Help) for Windows NT
Oracle Services for MTS Oracle8*i* Client provides Oracle Services for Microsoft Transaction Server (MTS). A Windows NT service called Oracle Service for MTS, permits enhanced deployment of COM components in MTS, using an Oracle database as the resource manager.	*Using Microsoft Transaction Server With Oracle8*
Pro*C/C++ and Pro*COBOL—based applications	*Pro*C/C++ Precompiler Getting Started* *Pro*COBOL Precompiler Getting Started* *Oracle Call Interface Getting Started*

To find information on...	Look in the guide...
Writing external routines and the call specification	This chapter. *PL/SQL User's Guide and Reference* *Oracle8i Java Stored Procedures Developer's Guide* *Oracle8i Application Developer's Guide - Fundamentals* The following files in *ORACLE_BASE**ORACLE_HOME*\RDBMS\EXTPROC: ■ EXTERN.C (code example shown in "Step 2: Writing an External Routine") ■ MAKE.BAT (batch file that builds the dynamic link library) ■ EXTERN.SQL (automates the instructions described in "Step 4: Registering an External Routine" and "Step 5: Executing an External Routine") ■ README.DOC (explains how to run the sample and provides debugging advice)
OLE DB	*Oracle Provider for OLE DB*

Additional Information: Oracle ODBC Driver Release 8.1.6 is included on your CD-ROM. This driver is updated on a regular basis. To download the latest release of this driver, visit the following Web site:

`http://technet.oracle.com/software/utilities/software_index.htm`

Building External Routines

This section describes how to create and use external routines on Windows NT.

External Routines Overview

External routines, previously referred to as external procedures, are functions written in a third-generation language (3GL), such as C, and callable from within PL/SQL or SQL as if they were a PL/SQL routine or function. External routines let you take advantage of the strengths and capabilities of a 3GL programming language in a PL/SQL environment.

> **Note:** Oracle also provides a special purpose interface, the call specification, that lets you call external routines from other languages, as long as it is callable by C.

The main advantages of external routines consist of the following:

- Performance, because some tasks are performed more efficiently in a 3GL language than in PL/SQL, which is better suited for SQL transaction processing
- Code re-usability, because dynamic link libraries (DLLs) can be called directly from PL/SQL programs on the server or in client tools such as SQL*Forms

You can use external routines to perform specific processes, such as the following:

- Solving scientific and engineering problems
- Analyzing data
- Controlling real-time devices and processes

Creating and using an external routine would involve the following sequential tasks:

- Step 1: Installing and Configuring
- Step 2: Writing an External Routine
- Step 3: Building a DLL
- Step 4: Registering an External Routine
- Step 5: Executing an External Routine

> **Attention:** You can combine the instructions described in the fourth and fifth tasks into one SQL script that automates the process of registering and executing your external routine. For an example of a SQL script that combines these steps, see *ORACLE_BASE**ORACLE_HOME*\RDBMS\EXTPROC\EXTERN.SQL.

Step 1: Installing and Configuring

This section describes the installation and configuration of the Oracle8*i* database and Net8.

Installing the Oracle8*i* Database

Install these products on your Windows NT server:

- Oracle8*i* Server. Contains PL/SQL, from which external routines are called, and the PL/SQL external routine program (EXTPROC), which executes external routines.
- Net8 Client, Net8 Server, and Oracle Protocol support

> **Note:** You must also have a C compiler and linker installed on your system to build DLLs.

Configuring Net8

If you install Net8 Server from your CD-ROM, your server network files are automatically configured to use external routines.

When PL/SQL calls an external routine, the Net8 listener launches a session-specific process called EXTPROC. Through Net8, PL/SQL passes the following information to EXTPROC:

- DLL name
- External routine name
- Parameters (if necessary)

EXTPROC then loads the DLL and invokes the external routine.

If you copy your Oracle7 server network files into your Oracle8*i* network files directory, you must manually configure the following files for the external routine behavior described previously to occur:

- *ORACLE_BASE**ORACLE_HOME*\NETWORK\ADMIN\LISTENER.ORA
- *ORACLE_BASE**ORACLE_HOME*\NETWORK\ADMIN\TNSNAMES.ORA

See Chapter 8 of the *Net8 Administrator's Guide* for instructions.

> **Note:** The SQLNET.ORA file requires no changes. By default, the values for the parameters NAMES.DEFAULT_DOMAIN and NAME.DEFAULT_ZONE are set to WORLD. These values match with the .WORLD extension on the end of EXTPROC_CONNECTION_DATA in the TNSNAMES.ORA file.

Step 2: Writing an External Routine

Using a 3GL programming language, such as C, you can write functions to be built into DLLs and invoked by EXTPROC. The following is a simple Microsoft Visual C++ example of an external routine:

> **Note:** Since external routines are built into DLLs, they must be explicitly exported. In this example, the dllexport storage class modifier exports the function *find_max* from a dynamic link library.

```
#include <windows.h>
#define NullValue -1
/*
  This function simply returns the larger of x and y.
*/
long __declspec(dllexport) find_max(long x,
 short x_indicator,
long y,
short y_indicator,
```

```
short *ret_indicator)
{
   /* It can be tricky to debug DLL's that are being called by a process
      that is spawned only when needed, as in this case.
      Therefore try using the DebugBreak(); command.
      This will start your debugger.  Uncomment the line with DebugBreak();
      in it and you can step right into your code.
   */
   /* DebugBreak();  */

   /* first check to see if you have any nulls */
   /* Just return a null if either x or y is null */

   if ( x_indicator==NullValue || y_indicator==NullValue) {
      *ret_indicator = NullValue;
      return(0);
   } else {
      *ret_indicator = 0;        /* Signify that return value is not null */
      if (x >= y) return x;
      else return y;
   }
}
```

Step 3: Building a DLL

After writing your external routine(s) in a 3GL programming language, use the appropriate compiler and linker to build a DLL, making sure to export the external routines, as noted above. See your compiler and linker documentation for instructions on building a DLL and exporting its functions.

After building the DLL, you can move it to any directory on your system. For the example above, you can build the external routine find_max into a DLL called EXTERN.DLL. To build the above example, go to *ORACLE_BASE**ORACLE_HOME*\RDBMS\EXTPROC and type MAKE.

Step 4: Registering an External Routine

Once you have built a DLL containing your external routine(s), you must register your external routine(s) with the Oracle8*i* Database:

1. Create a PL/SQL library to map to the DLL.
2. Start SQL*Plus:

   ```
   C:\> SQLPLUS
   ```

3. Connect to the database with the appropriate user name and password.

4. Create the PL/SQL library using the CREATE LIBRARY command:

```
SQL> CREATE LIBRARY externProcedures AS 'C:\ORACLE\ORA81\RDBMS\
EXTPROC\EXTERN.DLL';
```

Where...	Represents the...
`externProcedures`	Alias library (essentially a schema object in the database)
`C:\ORACLE\ORA81\RDBMS\EXTPROC\EXTERN.DLL`	Path to the Windows NT operating system DLL EXTERN.DLL. This example uses C:\ORACLE as your Oracle base and \ORA81 as your Oracle home.

Note: The DBA must grant EXECUTE privileges on the PL/SQL library to users who want to call the library's external routine from PL/SQL or SQL.

5. Create a PL/SQL program unit specification.

   Do this by writing a PL/SQL subprogram that uses the EXTERNAL clause instead of declarations and a BEGIN...END block. The EXTERNAL clause is the interface between PL/SQL and the external routine. The EXTERNAL clause identifies the following information about the external routine:

   - Name
   - DLL alias
   - Programming language in which it was written
   - Calling standard (defaults to C if omitted)

```
CREATE OR REPLACE FUNCTION PLS_MAX(
       x BINARY_INTEGER,
      y BINARY_INTEGER)
 RETURN BINARY_INTEGER AS
       EXTERNAL LIBRARY externProcedures
      NAME "find_max"
      LANGUAGE C
      PARAMETERS (
         x long,            -- stores value of x
          x_INDICATOR short,  -- used to determine if x is a NULL value
          y long,             -- stores value of y
          y_INDICATOR short,  -- used to determine if y is a NULL value

       RETURN INDICATOR short ); -- need to pass pointer to return value's indicator
                                 -- variable to determine if NULL.
                    -- This means that my  function will be defined as:
                                      - long max(long x, short x_indicator,
                                      - long y, short y_indicator, short * ret_indicator)
```

DLL alias. You need EXECUTE privileges for this library.

External routine to call. If enclosed in double quotes, it becomes case-sensitive.

Language in which the external routine was written.

Step 5: Executing an External Routine

To execute an external routine, you must call the PL/SQL program unit (that is, the alias for the external function) that registered the external routine. These calls can appear in any of the following:

- Anonymous blocks
- Standalone and packaged subprograms
- Methods of an object type
- Database triggers
- SQL statements (calls to packaged functions only)

In "Step 4: Registering an External Routine", the PL/SQL function PLS_MAX registered the external routine find_max**.** Follow the steps below to execute find_max:

1. Call the PL/SQL function PLS_MAX from a PL/SQL routine named UseIt:

```
CREATE OR REPLACE PROCEDURE UseIt AS
        a integer;
        b integer;
        c integer;
BEGIN
        a := 1;
        b := 2;
        c := PLS_MAX(a,b);
        dbms_output.put_line('The maximum of '||a||' and '||b||' is  '||c);
END;
```

2. Run the routine:

```
SQL> EXECUTE UseIt;
```

Accessing Web Data with Intercartridge Exchange

This section discusses the following topics:

- Configuring Intercartridge Exchange
- Using Intercartridge Exchange
- UTL_HTTP Exception Conditions
- Exception Conditions and Error Messages
- Troubleshooting

Configuring Intercartridge Exchange

You must add a parameter to the registry before using Intercartridge Exchange.

To configure Intercartridge Exchange:

1. Start the registry editor from the MS-DOS command prompt:

   ```
   C:\> REGEDT32
   ```

   The *Registry Editor* window appears.

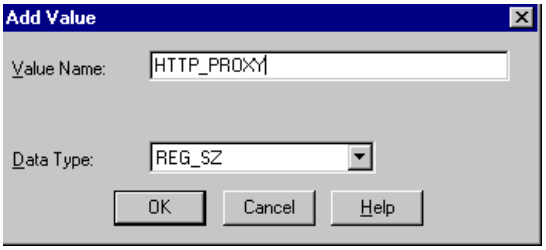
2. Add HTTP_PROXY to the registry subkey of the Oracle home directory that you are using. The location of this parameter is determined by how many Oracle home directories are on your computer:

If you have...	Add HTTP_PROXY to...
One home directory	HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME0
Additional directories	HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\ HOME*ID* where *ID* is incremented for each additional Oracle home directory on your computer.

3. Choose Add Value from the Edit menu.

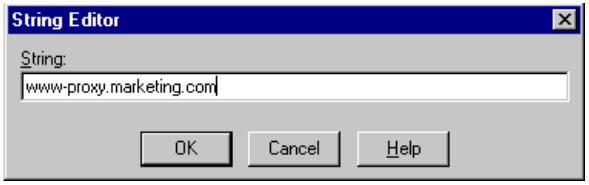
   The *Add Value* dialog box appears.

4. Type HTTP_PROXY in the Value Name text box and REG_SZ in the Data Type text box.



5. Click OK.

6. Type www-proxy.*your-site* in the String text box,



where *marketing.com* is an example of a Web site. (Type the domain name of your real Web site.)

Using Intercartridge Exchange

Intercartridge Exchange enables you to use a stored package called UTL_HTTP to make Hypertext Transfer Protocol (HTTP) calls from PL/SQL, SQL, and SQL*Plus statements.

UTL_HTTP can do both of the following:

- Access data on the Internet
- Call Oracle Web Application Server cartridges

UTL_HTTP contains two similar entry points, known as packaged functions, that turn PL/SQL and SQL statements into HTTP callouts:

- UTL_HTTP.REQUEST
- UTL_HTTP.REQUEST_PIECES

Both packaged functions peform the following tasks:

- Take a string universal resource locator (URL) of a site
- Contact that site
- Return the data (typically HTML) obtained from that site

The declarations to use with both packaged functions are described in the following subsections.

Packaged Function UTL_HTTP.REQUEST

UTL_HTTP.REQUEST uses a URL as its argument and returns up to the first 2000 bytes of data retrieved from that URL.

Specify UTL_HTTP.REQUEST as follows:

```
FUNCTION REQUEST (URL IN VARCHAR2) RETURN VARCHAR2;
```

To use UTL_HTTP.REQUEST from SQL*Plus, enter:

```
SQL> SELECT UTL_HTTP.REQUEST('HTTP://WWW.ORACLE.COM/') FROM DUAL;
```

which returns:

```
UTL_HTTP.REQUEST('HTTP://WWW.ORACLE.COM/')
--------------------------------------------------------------

<html>
<head><title>Oracle Corporation Home Page</title>
<!--changed Jan. 16, 19
1 row selected.
```

Packaged Function UTL_HTTP.REQUEST_PIECES

UTL_HTTP.REQUEST_PIECES uses a URL as its argument and returns a PL/SQL table of 2000 bytes of data retrieved from the given URL. The final element may be shorter than 2000 characters. The UTL_HTTP.REQUEST_PIECES return type is a PL/SQL table of type UTL_HTTP.HTML_PIECES.

UTL_HTTP.REQUEST_PIECES, which uses type UTL_HTTP.HTML_PIECES, is specified as:

```
type html_pieces is table of varchar2(2000) index by binary_integer;
function request_pieces (url in varchar2,
   max_pieces natural default 32767)
return html_pieces;
```

A call to REQUEST_PIECES can look like the example below. Note the use of the PL/SQL table method COUNT to discover the number of pieces returned; this may be zero or more:

```
declare pieces utl_http.html_pieces;
begin
  pieces := utl_http.request_pieces('http://www.oracle.com/');
   for i in 1 .. pieces.count loop
     .... -- process each piece
   end loop;
end;
```

The second argument to UTL_HTTP.REQUEST_PIECES, (MAX_PIECES) is optional. MAX_PIECES is the maximum number of pieces (each 2000 characters in length, except for the last, which may be shorter) that UTL_HTTP.REQUEST_ PIECES returns. If provided, that argument is usually a positive integer.

For example, the following block retrieves up to 100 pieces of data (each 2000 bytes, except perhaps the last) from the URL. The block prints the number of pieces retrieved and the total length, in bytes, of the data retrieved.

```
set serveroutput on
/
declare
  x utl_http.html_pieces;
begin
  x := utl_http.request_pieces('http://www.oracle.com/', 100);
  dbms_output.put_line(x.count || ' pieces were retrieved.');
  dbms_output.put_line('with total length ');
  if x.count < 1
  then dbms_output.put_line('0');
  else dbms_output.put_line
((2000 * (x.count - 1)) + length(x(x.count)));
  end if;
end;
/
```

which outputs:

```
Statement processed.
4 pieces were retrieved.
with total length
7687
```

The elements of the PL/SQL table returned by UTL_HTTP.REQUEST_PIECES are successive pieces of data obtained from the HTTP request to that URL.

UTL_HTTP Exception Conditions

This subsection describes the exceptions (errors) that can be raised by packaged functions UTL_HTTP.REQUEST and UTL_HTTP.REQUEST_PIECES.

UTL_HTTP.REQUEST

PRAGMA RESTRICT_REFERENCES enables the display of exceptions:

```
create or replace package utl_http is
function request (url in varchar2) return varchar2;
pragma restrict_references (request, wnds, rnds, wnps, rnps);
```

UTL_HTTP.REQUEST_PIECES

PRAGMA RESTRICT_REFERENCES enables exceptions to be displayed:

```
create or replace package utl_http is
type html_pieces is table of varchar2(2000) index by binary_integer;
function request_pieces (url in varchar2,
    max_pieces natural default 32767)
return html_pieces;
pragma restrict_references (request_pieces, wnds, rnds, wnps, rnps);
```

Exception Conditions and Error Messages

The following table describes error messages that may appear.

If...	Then...
Initialization of the HTTP callout subsystem fails for environmental reasons such as lack of available memory	Exception UTL_HTTP.INIT_FAILED is raised: `init_failed exception;`
The HTTP call fails due to failure of the HTTP daemon or because the argument to REQUEST or REQUEST_PIECES cannot be interpreted as a URL, because it is NULL or has non-HTTP syntax	Exception UTL_HTTP.REQUEST_FAILED is raised: `request_failed exception;`

If...	Then...

No response is received from a request to the given URL, because the function made no contact with a site corresponding to that URL	A formatted HTML error message may be returned:
	`<HTML>`
	`<HEAD>`
	`<TITLE>Error Message</TITLE>`
	`</HEAD>`
	`<BODY>`
	`<H1>Fatal Error 500</H1>`
	`Can't Access Document: http://home.nothing.comm.`
	`<P>`
	`<B>Reason:</B> Can't locate remote host: home.nothing.comm.`
	`<P>`
	`<P><HR>`
	`<ADDRESS><A HREF="http://www.w3.org">`
	`CERN-HTTPD3.0A</A></ADDRESS>`
	`</BODY>`
	`</HTML>`

Note: The first two exceptions in the preceding table, unless explicitly caught by an exception handler, are reported by this generic message:

```
ORA-06510: PL/SQL: unhandled user-defined exception
```

that shows them as "user-defined" exceptions, although they are defined in this system package.

If any other exception is raised during the processing of the HTTP request (for example, an out-of-memory error), then function UTL_HTTP.REQUEST or UTL_HTTP.REQUEST_PIECES reraises that exception.

Troubleshooting

Do not expect UTL_HTTP.REQUEST or UTL_HTTP.REQUEST_PIECES to succeed in contacting a URL unless you can contact that URL by using a browser on the same computer (and with the same privileges, environment variables, and so on).

If UTL_HTTP.REQUEST or UTL_HTTP.REQUEST_PIECES fails (that is, if it raises an exception or returns an HTML-formatted error message, yet you believe that the URL argument is correct), try contacting that same URL with a browser to verify network availability from your computer.

A

Directory Structures

This appendix describes the default directory structures created when you install Oracle8*i* Client components.

Specific topics discussed are:

- Oracle8i Client Directory Structure
- Filename Extensions

See Also:

- Chapter 3, "Multiple Oracle Homes and Optimal Flexible Architecture" for more information on Oracle homes and OFA. See especially "Directory Tree of a Sample OFA-Compliant Database" on page 3-19 for a depiction of how the default OFA-compliant directory tree is organized.
- *Oracle Enterprise Manager Administrator's Guide* for directory structures for those products.

Oracle8*i* Client Directory Structure

ORACLE_BASE is the root of the Oracle directory tree.

Oracle Universal Installer places Oracle8*i* Client products into the *ORACLE_HOME* directory of *ORACLE_BASE*.

If you install Oracle8*i* Client with the Programmer installation type, the following *ORACLE_HOME* directories are created.

Directory	Contents
\ASSISTANTS	Oracle assistants
\BIN	Executable files
\DOC	HTML documentation library
\JAVAVM	Java Virtual Machine files
\JDBC	Java Database Connectivity (JDBC) drivers files
\JLIB	Java files used by various applications
\LDAP	Files used by directory client libraries
\LIB	Java VM and EJB jar files
\MSHELP	Help files
\NETWORK	Net8 files
\OCI	Oracle Call Interface files. \OCI contains the following subdirectories:
\INCLUDE	■ Header files
\LIB	■ Library files
\SAMPLES	■ Sample files
\OCOMMON	NLS files
\ODBC	Oracle ODBC files
\OLEDB	OLE DB files
\OO4O	Oracle Objects for OLE files
\ORACORE	Message files
\ORD	Data option files. \ORD contains the following subdirectories:

Directory	Contents
\ADMIN	■ SQL scripts
\AUD	■ Oracle interMedia Audio files
\IMG	■ Oracle interMedia Image files
\MESG	■ Message files
\TS	■ Oracle Time Series files
\VID	■ Oracle interMedia Video files
\VIR*	■ Oracle Visual Information Retrieval files
\IM	■ Oracle interMedia files
\JLIB	■ Java libraries for Oracle options
\TRACE	Oracle Trace files
\OWM	Oracle Wallet Manager files
\PLSQL	Message files for PL/SQL
\PRECOMP	Precompiler files
\RDBMS	Oracle Server files
\RELNOTES	Release Notes
\SLAX	Message files
\SQLJ	SQLJ files
\SQLPLUS	SQL*Plus files

Filename Extensions

A description of filename extensions is shown below.

Extension	Description
.AUD	Oracle audit file
.BMP	bitmap file
.C	C source file
.CTL	SQL*Loader control file; Oracle Server control file
.DAT	SQL*Loader datafile

.DBF	Oracle Server tablespace file
.DMP	Export file
.DOC	ASCII text file
.H	C header file; also, SR.H is a SQL*Report Writer help file
.JAR	Java class archive
.LIS	output of SQL*Plus scripts
.LOG	installation log files; Oracle Server redo log files
.MK	make files
.MSB	NLS message file (binary)
.MSG	NLS message file (text)
.O	object module
.ORA	Oracle configuration files
.PC	Pro*C source file
.PCO	Pro*COBOL source file
.SQL	SQL* script files
.TAB	SQL* script file
.TRC	trace files

B

Oracle8*i* Configuration Parameters and the Registry

This appendix describes use of the registry for various Oracle8*i* Client components. It also lists the recommended values and ranges for configuration parameters.

Specific topics discussed are:

- About Configuration Parameters
- Registry Overview
- Registry Parameters
- Modifying a Registry Value with REGEDT32
- Adding a Registry Parameter with REGEDT32

About Configuration Parameters

Oracle8*i* for Windows NT uses configuration parameters to locate files and specify runtime parameters common to all Oracle products. When an Oracle program or application requires a translation for a particular configuration variable, Oracle8*i* for Windows NT uses the associated parameter. All Oracle parameters are stored in the registry.

Registry Overview

Oracle8*i* Client stores its configuration information in a database (the registry) that is organized in a tree format. The tree format consists of keys in the registry and parameter values for the keys. Keys and parameter values can be viewed and modified in the Registry Editor.

Keys are folders that appear in the left pane of a Registry Editor window. A key contains subkeys or parameters.

> **WARNING: Although the Registry Editor lets you view and modify registry keys and parameter values, you normally do not need to do so. In fact, you may render your system useless if you make incorrect changes. Therefore, only advanced users should edit the registry! Back up your system before making any changes in the registry.**

Parameters in the Registry Editor appear as a string, consisting of three components:

- Parameter name
- Value class or type of entry
- Value itself

For example, parameter ORACLE_SID can have the following entry in the registry:

```
ORACLE_SID:REG_SZ:ORCL1
```

Value classes for Oracle8*i* Client parameters consist of the following:

- String value with a REG_SZ, REG_EXPAND_SZ (for an expandable string), or a REG_MULTI_SZ (for multiple strings) prefix to identify a parameter value entry as a data string
- Binary value with a REG_DWORD prefix to identify a value entry as a DWORD (hexadecimal data) entry

  Most Oracle8*i* Client parameter values are string types. Use Oracle Universal Installer defaults when a type is not given.

Registry Parameters

This section describes the Oracle8*i* Client registry parameters for the following keys. Other products, such as Oracle Enterprise Manager, have additional keys and parameters that are not described in this appendix.

- HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOMEID
- HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE
- HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\ALL_HOMES
- HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet

To modify the registry values described below, see "Modifying a Registry Value with REGEDT32" on page B-10.

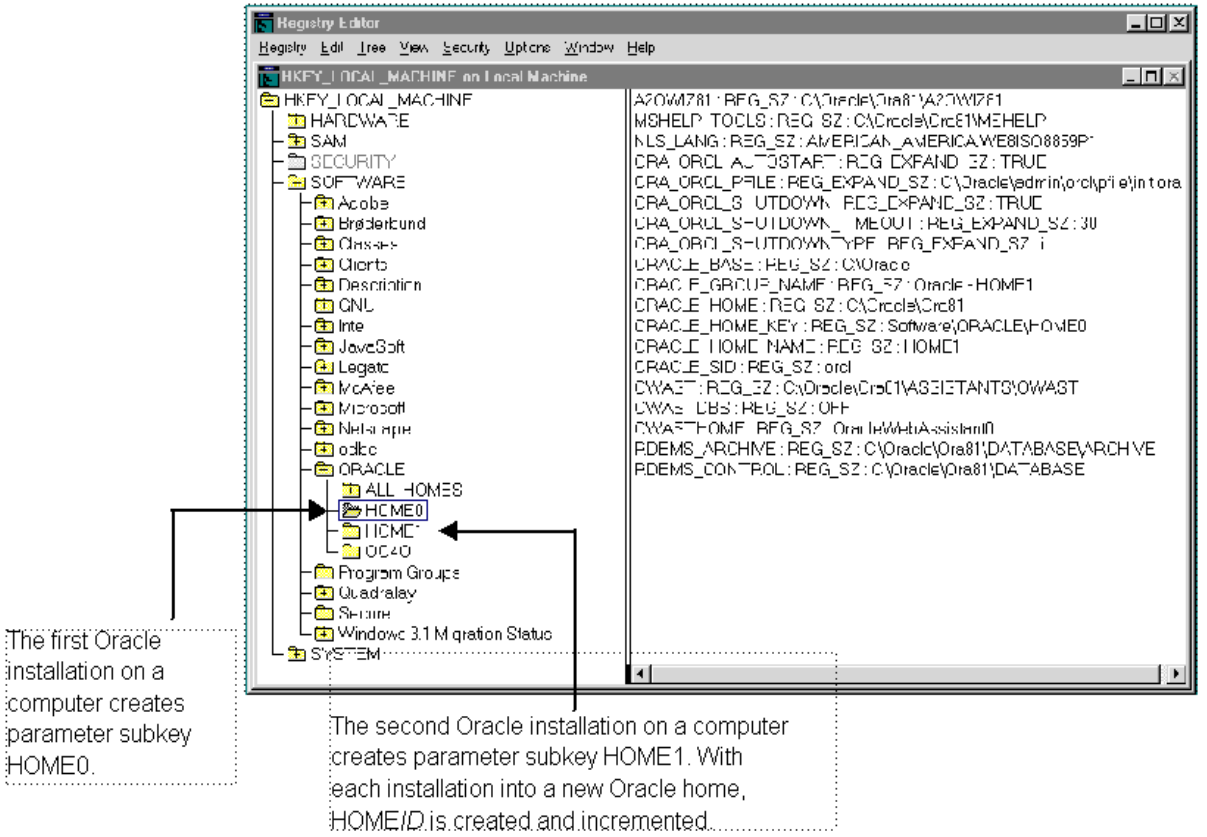
Note: This appendix describes how to use REGEDT32 to edit your registry. If you are using Windows 95 or Windows 98, you must use REGEDIT. REGEDIT operates slightly differently than REGEDT32. See your Windows 95 or Windows 98 documentation for instructions.

HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME*ID*

Each time you install Oracle products into a new Oracle home on your computer, HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME*ID* is created and *ID* is incremented. This subkey contains parameter values for most Oracle products.

> **See Also:** Chapter 3, "Multiple Oracle Homes and Optimal Flexible Architecture" for details on the PATH variable and registry values when you are working with multiple Oracle homes.

This figure shows the parameter subkeys created with two Oracle home directories on the same computer.



HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME*ID* includes the following parameters for an Oracle home directory on a computer. Depending on the products you install, additional parameters can also be created.

Parameter	Description	Default Value
MSHELP_TOOLS	Specifies the location of the Windows help files.	*ORACLE_BASE**ORACLE_HOME*\MSHELP
NLS_LANG	Specifies the supported language, territory, and character set. This parameter specifies the language in which the messages are displayed, the territory and its conventions for calculating week and day numbers, and the character set displayed.	During installation, Oracle Universal Installer sets this value based on the language setting of the operating system. See *Oracle8i Client Installation Guide for Windows* for a list of commonly used values. **Note:** If this parameter is deleted at a later time, Oracle uses the value AMERICAN_AMERICA.US7ASCII.
ORA_CWD	Specifies the current working directory. This parameter must be manually set. For example, if you set this parameter and then use ORADIM, a log file called ORADIM.LOG is created in this directory.	The value for this parameter must be set manually.
ORA_*SID*_AUTOSTART	Starts the database when the OracleService*SID* service is started.	TRUE
ORA_*SID*_PFILE	The full path to the initialization parameter file.	*ORACLE_BASE*\ADMIN*DB_NAME*\PFILE\INIT.ORA
ORA_*SID*_SHUTDOWN	When set to TRUE, shuts down the Oracle database identified by *SID* when OracleService*SID* is stopped.	TRUE
ORA_*SID*_SHUTDOWN_TIMEOUT	Sets the maximum time (in seconds) to wait for the shutdown to complete before the service for a particular SID stops.	30
ORA_*SID*_SHUTDOWNTYPE	The mode in which the database is shut down when you stop OracleService*SID*. The valid values are a (Abort), i (Immediate), and n (Normal).	i (Immediate)

Parameter	Description	Default Value
ORACLE_ AFFINITY	Specifies the Windows NT processor affinity of the threads within the Oracle process. The format is: `name1:cpumask1;name2:cpumask2` Each name setting must be the name of a background thread, USER for non-background (shadow) threads, and DEF for any thread type not handled specifically. The name MASK sets the affinity mask of the Oracle process. Valid background thread names are DBWR, LGWR, PMON, SMON, ARCH, RECO, CKPT, TRWR, SNP0 through SNP9, and P000 through P481. Each affinity setting must be a valid affinity mask (or its numeric equivalent) for the corresponding name. The process affinity mask is used only when the Oracle service is first started. Each thread's affinity is set only when the individual thread is started (for example, at database startup time for the background threads). **Note:** This parameter must be manually added.	The value for this parameter must be set manually. Oracle Corporation recommends consulting Oracle Support Services before changing this parameter.
ORACLE_BASE	The top-level Oracle directory (for example, C:\ORACLE) that contains *ORACLE_HOME*, \ADMIN, and \ORADATA.	*ORACLE_BASE*
ORACLE_GROUP_ NAME	Specifies the name of the group containing icons of the Oracle products installed. The parameter is added to your registry when you first install Oracle products, even if Oracle Universal Installer does not create a program group for the Oracle products you have installed (for example, if you have installed only Net8 software).	Oracle - *HOME_NAME*
ORACLE_HOME	Specifies the Oracle home directory in which Oracle products are installed. This directory is immediately beneath the Oracle base directory in the Oracle directory hierarchy.	The drive letter and name that you specify during installation
ORACLE_HOME_ KEY	The HKEY_LOCAL_MACHINE location of Oracle parameters.	SOFTWARE\ORACLE\HOME*ID*
ORACLE_HOME_ NAME	Specifies the home name of the Oracle home directory in which Oracle products are installed.	The name that you specify during installation

Parameter	Description	Default Value
ORACLE_ PRIORITY	Determines the Windows NT scheduling priorities of the threads within the Oracle ORDBMS or DBMS process. The format is: `name1:priority1;name2:priority2 . . .`	CLASS:normal; DEF:normal The name CLASS sets the priority class of the Oracle process. Threads can be assigned priority either collectively or individually. The collective name USER designates non-background (shadow) threads; the collective name DEF designates any thread type not handled specifically. Valid individual background thread names are DBWR, LGWR, PMON, SMON, ARCH, RECO, CKPT, TRWR, and SNP0 through SNP9. **Note:** ORACLE_PRIORITY is not automatically created for you in the registry. When it is not defined in the registry, the Windows NT default values are used for the priorities of the thread.
ORACLE_SID	Specifies the name of the Oracle database instance on the host machine. The value of this parameter is the SID for the instance.	The default value is specified by the entry in the *Database Identification* window of Oracle Universal Installer.
OWAST	Specifies the location of Oracle Web Publishing Assistant files.	*ORACLE_BASE**ORACLE_ HOME*\ASSISTANTS\OWAST
OWASTDBS	Specifies whether database connection sharing is disabled.	OFF
OWAST_HOME	Specifies the name of the Oracle Web Publishing Assistant service.	OracleWebAssistant0
RDBMS_ ARCHIVE	Specifies the location of the backup database files.	*ORACLE_BASE**ORACLE_ HOME*\DATABASE \ARCHIVE
RDBMS_ CONTROL	Specifies the location of the backup database control files.	*ORACLE_BASE**ORACLE_ HOME*\DATABASE
SQLPATH	Specifies the location of SQL scripts.	*ORACLE_BASE**ORACLE_ HOME*\DBS

HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE

This subkey contains the following parameters:

Parameter	Description	Default Value Entry
INST_LOC	Specifies the location of Oracle Universal Installer files.	*System Drive:*\Program Files\Oracle\Inventory
OO4O	Specifies the location of Oracle Objects for OLE message files.	*ORACLE_BASE**ORACLE_HOME*\OO4O\MESG

HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\ALL_HOMES

This subkey provides general information on each Oracle home directory on a computer. This subkey contains the ID*x* subkey(s) and its parameters, described below, as well as other parameters listed on page B-9.

ID*x*

This subkey corresponds to the HOME*ID* of the same number (for example, HOME0 for the first installation, HOME1 for the second installation, and so on). ID*x* contains the following parameters. The values that display are determined by what you enter during installation in the *File Locations* dialog box of Oracle Universal Installer.

Parameter	Description	Default Value Entry
NAME	Specifies the home name of the Oracle home for ID*x*. This is the value that you specify when prompted for an Oracle home name.	The name that you specify during installation.
PATH	Specifies the Oracle home directory for ID*x*.	*ORACLE_BASE**ORACLE_HOME*

HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\ALL_HOMES Parameters

This subkey contains the following parameters.

Parameter	Description	Default Value
DEFAULT_HOME	Specifies the default Oracle home name (that is, the first Oracle home installed on your machine).	The name that you specify during installation.
HOME_COUNTER	Specifies the number of installed Oracle homes.	1
LAST_HOME	Displays the ID number of the most recently installed Oracle home. For example, if HOME0 was the most recently installed Oracle home, the number 0 appears.	0

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services

The HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services subkey contains additional subkeys that correspond to each Oracle service.

Each service subkey contains the following parameters:

Parameter	Description	Default Value Entry
DisplayName	Specifies the service name of the instance whose SID is *SID*.	Name of the service. For example, OracleServiceORCL1, where ORCL1 is the SID.
ImagePath	Specifies the fully qualified path name of the executable invoked by the service and any command-line arguments passed into the executable at runtime.	Path to the executable file of the product.
ObjectName	Specifies the logon user account and machine to which the service should log on.	LocalSystem

Modifying a Registry Value with REGEDT32

CAUTION: Do not edit your registry unless absolutely necessary. If an error occurs in your registry, Oracle8*i* Client can stop functioning and the registry itself can become unusable.

To edit the Oracle-related settings:

1. Start the registry in one of two ways:
   - From the command prompt, enter:

     ```
     C:\> REGEDT32
     ```

   - Choose Start > Run, enter REGEDT32 in the Open field, and click OK.

Note: Use REGEDIT to edit the registry on Windows 95 and Windows 98. The dialog boxes for adding a registry parameter using REGEDIT are slightly different than those described below for REGEDT32. See your Windows 95 and Windows 98 documentation for specific instructions.

The *Registry Editor* window appears.

2. Navigate to the values you want to view or modify by double-clicking the appropriate keys.

   The left-hand side of the window shows the hierarchy of registry keys, and the right-hand side of the window shows various values associated with a key.

3. Double-click the parameter to edit.

   The *String Editor* dialog box appears:

4. Make any necessary edits.

5. Click OK.
6. Choose Exit from the Registry menu.

Adding a Registry Parameter with REGEDT32

To add a parameter to the registry:

1. Start the registry in one of two ways:
   - From the MS-DOS command prompt, enter:

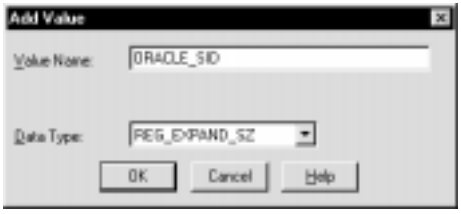
     ```
     C:\> REGEDT32
     ```

   - Choose Start > Run, enter REGEDT32 in the Open field, and click OK.

   Note: Use REGEDIT to edit the registry on Windows 95 and Windows 98. The dialog boxes for adding a registry parameter using REGEDIT are slightly different than those described below for REGEDT32. See your Windows 95 and Windows 98 documentation for specific instructions.

   The *Registry Editor* window appears.
2. Navigate to the key to which you want to add the new value.
3. Choose Add Value from the Edit menu.

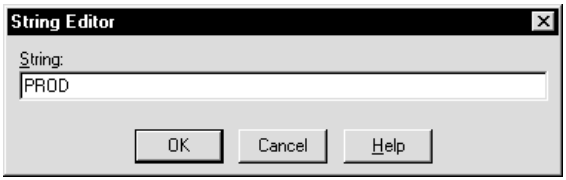
   The *Add Value* dialog box appears:



4. In the *Value Name* text box, type the name that you want to assign to the currently selected key.

5. In the *Data Type* list, select the value class that you want to assign to the added value:
   - REG_SZ, REG_EXPAND_SZ (for an expandable string), or REG_MULTI_SZ (for multiple strings) for a data string
   - Binary value with a REG_DWORD prefix to identify a value entry as a DWORD (hexadecimal data) entry
6. Click OK.

   A *String Editor* dialog box appropriate for the data type appears:



7. Type the value for the parameter.
8. Click OK.

   The Registry Editor adds the parameter.
9. Choose Exit from the Registry menu.

   The registry exits.

C

Net8 Configuration

This appendix describes Net8 configuration for Windows. For an overview of Net8 configuration in general, see the *Net8 Administrator's Guide.*

Specific topics discussed are:

- Unsupported Net8 Features
- Understanding Net8 Registry Parameter and Subkeys
- Understanding Optional Configuration Parameters
- Advanced Network Configuration
- Named Pipes Protocol on Windows 95
- Net8 Port Numbers

> **See Also:** Net8 integration with Active Directory for Windows 2000 is described in Chapter 4, "Using Oracle8i Client Directory Features with Active Directory".

Unsupported Net8 Features

The following Net8 features are currently unsupported on the Windows NT and Windows 95/98 platforms.

Feature	Description
TRCROUTE	Client application not supported.
SPAWN	SPAWN command in the listener control utility is not supported.
Pre-SPAWNED dedicated server processes	Not supported by the listener. Therefore, do not include the following parameters in the SID_DESC's of the LISTENER.ORA file: PRESPAWN_MAX, PROTOCOL, POOL_SIZE, and TIMEOUT.

Understanding Net8 Registry Parameter and Subkeys

Net8 contains the registry entries for Net8 parameters and Net8 service subkeys. To successfully add or modify Net8 configuration parameters, you must understand where they are located and the rules that apply to them.

Net8 Parameters

The location of the Oracle Net8 registry parameters is:

HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME*ID*

where *ID* is incremented for each additional Oracle home directory on your computer (for example, HOME0 is for a first directory, HOME1 is for a second directory, and so forth).

Net8 Service Subkeys

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\SERVICES contains subkeys that correspond to services. Depending on what is installed, your Net8 services will consist of all or a subset of the following:

- Oracle*HOME_NAME*ClientCache
- Oracle*HOME_NAME*CMAdmin
- Oracle*HOME_NAME*CMan
- Oracle*HOME_NAME*TNSListener

Each service subkey contains the following parameters:

Parameter	Description
DisplayName	Specifies the service name.
ImagePath	Specifies the fully qualified path name of the executable invoked by the service and any command line arguments passed to the executable at runtime.
ObjectName	Specifies the logon user account and computer to which the service should log on.

Understanding Optional Configuration Parameters

You can use the following parameters on Windows NT and Windows 95/98:

- LOCAL
- TNS_ADMIN
- USE_SHARED_SOCKET

Net8 first checks for the parameters as environment variables, and uses the values defined. If environment variables are not defined, it searches for these parameters in the registry.

> **See Also:** Appendix B, "Oracle8i Configuration Parameters and the Registry" for instructions on editing Windows registry keys.

LOCAL

You can add the LOCAL parameter to make a connection without specifying a connect string service name. The value for LOCAL is the service name in the TNSNAMES.ORA file located in the *ORACLE_BASE**ORACLE_HOME*\NETWORK\ADMIN directory.

For example, if the LOCAL parameter is specified as finance**,** you connect to a database from SQL*Plus with the following command:

```
SQL> CONNECT SCOTT/TIGER
```

Net8 checks if LOCAL is defined as an environment variable or as a parameter in the registry, and uses finance as the service name. If it exists, Net8 connects.

TNS_ADMIN

You can add the TNS_ADMIN parameter to change the directory name for configuration files from the default location. For example, if you set TNS_ADMIN to *ORACLE_BASE**ORACLE_HOME*\TEST\ADMIN, the configuration files are used from *ORACLE_BASE**ORACLE_HOME*\TEST\ADMIN.

USE_SHARED_SOCKET

You can set the USE_SHARED_SOCKET parameter to TRUE to enable the use of shared sockets. If this parameter is set to TRUE, the network listener passes the socket descriptor for client connections to the database thread. As a result, the client does not need to establish a new connection to the database thread and database connection time improves. Also, all database connections share the port number used by the network listener, which can be useful if you are setting up third-party proxy servers.

On Windows NT 4.0 Service Pack 3 or earlier, enabling this option precluded bringing the network listener up or down in a case where a database connection spawned by the network listener is active. This is not an issue on Windows NT 4.0 Service Pack 4 or later. Oracle recommends that you upgrade to Windows NT 4.0 Service Pack 4 if you intend to set this parameter.

This parameter only works in dedicated server mode in a TCP/IP environment. If this parameter is set, you cannot use the 8.1.6 listener to spawn Oracle 7.*x* databases. To spawn an Oracle 8.0.*x* database from an 8.1.6 listener with the shared socket enabled, you must also set the variable *USE_SHARED_SOCKET* for the 8.0.*x* Oracle home.

Advanced Network Configuration

The following sections describe advanced configuration procedures specifically for Net8 on the Windows NT and Windows 95/98 platforms.

Configuring Authentication Methods

Net8 provides two authentication methods for Windows NT and for Windows 95/98, NDS Authentication and Windows Native Authentication.

NDS Authentication

The automatically installed Novell Directory Service (NDS) authentication method allows client applications and users to access a NetWare server running Oracle through NDS. Following NDS authentication, a user logged into an NDS directory tree can use an Oracle database on a NetWare server in the same tree. This permits the user from having to enter an additional user name and password.

> **Note:** To connect from a client using the NDS authentication method, the server must be running the NetWare operating system.

If you also use NDS External Naming, you can view the entire network under a single NDS directory tree.

Configuring a NetWare Server

> **Note:** SQLNET.AUTHENTICATION_SERVICES enables one or more authentication services. If authentication has been installed, it is recommended that this parameter be set to either NONE or to one of the authentication methods.

To configure the server:

1. Install and configure Net8 for NetWare on the server.
2. Add the following entry to the SQLNET.ORA file:

```
SQLNET.AUTHENTICATION_SERVICES = (NDS)
```

Configuring a Client

To configure a client:

1. Install and configure the Net8 on a client.
2. Add the following entry to the SQLNET.ORA file:

```
SQLNET.AUTHENTICATION_SERVICES = (NDS)
```

Connecting from a Client

To connect from a client with the NDS authentication method:

1. Log into the NDS tree.
2. Enter the following command to access an Oracle for NetWare database:

```
C:\> SQLPLUS
SQL> CONNECT /@SERVICE_NAME
```

Using the NDS Naming Method

NDS naming refers to the resolution of a service name by using a supported third-party naming service. The NDS Native Naming Adapters resolve service names stored in a native naming service.

> **Note:** To connect from a client using the NDS Native Naming Adapter, the server must be running the NetWare operating system.

The NDS Native Naming Adapter for Windows NT and Windows 95/98 clients uses the NDS naming environment to store service names and addresses of Oracle8*i* NetWare Servers. This lets an NDS user view the entire network under a single NDS directory tree. You can use native name services in addition to, or instead of, Oracle Names or the TNSNAMES.ORA file.

If the NDS Authentication Adapter is used as well, a single logon can access a multi-server and multi-database network.

NetWare Server Configuration

To configure the NetWare Server:

1. Install and configure Net8 for NetWare on your server.
2. Log into the NDS tree.
3. Add NOVELL to the NAMES.DIRECTORY_PATH parameter in the SQLNET.ORA file:

```
NAMES.DIRECTORY_PATH = (NOVELL, TNSNAMES, ONAMES)
```

Client Configuration

To configure the client:

1. Install and configure the NDS Native Naming Adapter and Net8 on your client.
2. When you configure the NDS Native Naming Adapter, add NOVELL to the NAMES.DIRECTORY_PATH parameter in the SQLNET.ORA file:

```
NAMES.DIRECTORY_PATH = (NOVELL, TNSNAMES, ONAMES)
```

Client Connection

To connect from a client with the NDS Native Naming Adapter:

Enter the following command to access an Oracle8 for NetWare database:

```
C:/> SQLPLUS
SQL> CONNECT USERNAME/PASSWORD@DATABASE_OBJECT_NAME
```

where *DATABASE_OBJECT_NAME* identifies Oracle8*i* in NDS.

Additional Information:

- Novell NetWare documentation for further information about NDS
- Oracle8*i* NetWare documentation

Configuring Security for Named Pipes Protocol

If you are using Named Pipes protocol with Oracle Names, the network listener may not be able to connect to the Oracle Names server.

Oracle Names creates a “named pipe” at startup time. The network listener tries to open the Named Pipe at startup. If it cannot, the network listener uses the default system account “Local System.”

The network listener service may be unable to open the Named Pipe created by Oracle Names unless the Oracle*HOME_NAME*TNSListener service has a valid user ID and password associated.

To set up the network listener permissions:

1. From the Control Panel window, double-click Services.

   The Services window appears.

2. Select the Oracle*HOME_NAME*TNSListener service and double-click.

   The *Services* dialog box appears.

3. Click the This Account option button. Then, click the **"..."** option button next to it.

   The *Add User* dialog box appears.

4. Select your logon ID (user ID) from the Names list and click Add.

   The user ID appears in the Add Name text box.

5. Click OK.

   The *Services* dialog box appears with the user ID displayed in the This Account text box.

6. Type your password in the Password text box.

7. Retype the same logon password in the Confirm Password text box.

8. Click OK.

Named Pipes Protocol on Windows 95

If you use the Named Pipes protocol on a Windows 95 system to connect to Oracle8*i* for Windows NT, client applications may run very slowly due to a known problem in Microsoft's implementation of Windows 95 NWLinkDirect-Hosting.

To work around this problem, you may do any of the following:

- Use other protocols (for exampl, TCP / IP, SPX) for connecting from an Oracle client
- Remove the protocol NWLink from the Windows 95 system if you do not need to access NetWare Servers
- Disable Direct-Hosting feature on Windows 95

Refer to Microsoft documentation for detailed information.

Net8 Port Numbers

The following table describes the port numbers used by Net8.

Product	Default Port Number	How do I change the port number?
Listener	1521	Modify the LISTENER.ORA and TNSNAMES.ORA files, using Net8 Assistant. These files are located in the *ORACLE_BASE**ORACLE_HOME*\NETWORK\ADMIN directory, or in the directory specified by the TNS_ADMIN environment variable or registry value.
Oracle Names	1575	Modify the NAMES.ORA file, using Net8 Assistant. NAMES.ORA is located in the *ORACLE_BASE**ORACLE_HOME*\NETWORK\ADMIN directory.
Oracle Connection Manager, using TCP/IP	1630 1830	Modify the CMAN.ORA configuration file, using Net8 Assistant. CMAN.ORA is located in the *ORACLE_BASE**ORACLE_HOME*\NETWORK\ADMIN directory, or in the directory specified by the TNS_ADMIN environment variable or registry value.

D

Error Messages

This appendix lists the error messages, causes, and corrective actions that are specific to the operation of Oracle8*i* Client. This appendix also includes database connection issues.

Specific topics discussed are:

- Logging Error Messages
- Codes 04000-04999: Windows-Specific Oracle Messages
- Database Connection Issues

> **Note:** The ORA.HLP file, which was shipped in previous releases, is no longer available. See this Appendix and *Oracle8i Error Messages* for information on error messages.

Logging Error Messages

Keep a log of error messages you receive by redirecting the messages to a file. You can record the contents of normal utility messages by using the LOGFILE parameter discussed in *Oracle8i Utilities*. You can separately record the error message portion by using standard Windows file redirection. For example, use the following syntax to redirect the output from the Export Utility:

```
C:\> EXP USERNAME/PASSWORD PARFILE=FILENAME >FILE1.LOG 2>FILE2.ERR
```

In this command line, FILE1.LOG receives the standard output from Export, while FILE2.ERR receives the standard error messages.

Codes 04000-04999: Windows-Specific Oracle Messages

The error messages in this section are Oracle operating system-dependent (OSD) messages issued in response to an error condition in Windows. Each message in this section triggers an Oracle8*i* database error message.

- File I/O Errors: OSD-04000 to OSD-04099
- Memory Errors: OSD-04100 to OSD-04199
- Process Errors: OSD-04200 to OSD-04299
- Loader Errors: OSD-04300 to OSD-04399
- Semaphore Errors: OSD-04400 to OSD-04499
- Miscellaneous Errors: OSD-04500 to OSD-04599

File I/O Errors:	OSD-04000 to OSD-04099
4000	logical block size mismatch
4001	invalid logical block size
4002	unable to open file
4003	unable to read file header block
4004	invalid file header
4005	SetFilePointer() failure, unable to read from file
4006	ReadFile() failure, unable to read from file
4007	truncated read
4008	WriteFile() failure, unable to write to file
4009	truncated write

File I/O Errors:	OSD-04000 to OSD-04099
4010	<create> option specified, file already exists
4011	GetFileInformationByHandle() failure, unable to obtain file info
4012	file size mismatch
4013	unable to read line from file
4014	unable to close file
4015	An asynchronous I/O request returned an error
4016	Error queuing an asynchronous I/O request
4017	Unable to open the specified RAW device
4018	Unable to access the specified directory or device
4019	Unable to set file pointer
4020	Unable to set eof file marker
4021	Unable to read file
4022	Unable to write file
4023	SleepEx() failure, unable to Sleep
4024	Unable to delete file
4025	Invalid question asked
4026	Invalid parameter passed

Memory Errors:	OSD-04100 to OSD-04199
4100	malloc() failure, unable to allocate memory
4101	invalid SGA: SGA not initialized
4102	Unable to open/create file for shared memory objec
4103	unable to attach to SGA: SGA does not exist
4104	Unable to map shared memory (SGA) into the address space
4105	Shared memory (SGA) mapped to wrong address
4106	Unable to allocate memory with VirtualAlloc
4107	Unable to deallocate memory with VirtualFree
4108	Unable to protect memory with VirtualProtect

Process Errors:	OSD-04200 to OSD-04299
4200	unable to begin another thread
4201	no pid structure supplied to spdcr()
4202	DosSetPriority() failure, unable to set process priority
4203	DosKillProcess() failure, unable to kill process
4204	invalid pid
4205	CreateProcess() failure, unable to spawn process
4207	invalid priority specified in CONFIG parameter ORACLE_PRIORITY
4208	OpenProcess() failure, unable to open process handle
4209	Incorrect or unknown backgound image name given to spdcr()
4210	Timeout waiting for thread semaphore
4211	Thread information not found
4212	Maximum number of ORACLE threads reached
4213	ORACLE thread unable to DuplicateHandle()
4214	ORACLE thread unable to CreateEvent()
4215	Bad function code supplied to ssthreadop
4216	Unable to find file handle for that thread
4217	Unable to retrieve system user name for current user
4218	Can not post thread
4219	Bad thread list semaphore
4221	Target thread is currently busy
4222	Unable to get the threads context
4223	Unable to set the threads context
4224	Unable to suspend the target thread
4225	Unable to resume the target thread

Loader Errors:	OSD-04300 to OSD-04399
4300	unable to read complete record from data file
4301	record size too large
4302	invalid record type and/or load options

Semaphore Errors:	OSD-03400 to OSD-03499
4400	unable to acquire internal semaphore for process
4401	WaitForSingleObject() failure, unable to obtain semaphore

Miscellaneous Errors:	OSD-04500 to OSD-04599
4500	illegal option specified
4501	internal buffer overflow
4502	translations nested too deep
4503	text contains no translatable elements
4505	stdin not responding
4506	unable to spawn process via system()
4507	password for 'internal' is incorrect
4508	no password given
4509	no password found
4510	operating system roles are not supported
4511	unable to get date and time from the operating system
4512	unable to translate the 'USERNAME' config.ora variable on server
4513	'remote_os_authent' init.ora variable not set to true
4514	The NT Group name is too long for internal buffer
4515	This command is not implemented at this time

File I/O Errors: OSD-04000 to OSD-04099

OSD-04000

Logical block size mismatch

Cause: The database block size specified in the initialization parameter file does not match the block size of the actual database files.

Action: Use matching logical block sizes.

OSD-04001

Invalid logical block size

Cause: The logical block size is not a multiple of 512 bytes, or it is too large.

Action: Change the value of DB_BLOCK_SIZE in the initialization parameter file.

OSD-04002

Unable to open file

Cause: The specified path or file name is invalid, or the destination device is full. This error can also be caused by insufficient Windows file handles.

Action: Make sure the path and file exist, and the device has free space. If this fails, increase the number of Windows file handles.

OSD-04003

Unable to read file header block

Cause: The media has been damaged.

Action: Recover the file if necessary, and verify that Windows is functioning correctly.

OSD-04004

Invalid file header

Cause: The file is corrupted.

Action: Recover the file.

OSD-04005

SetFilePointer() failure, unable to read from file

Cause: There was an unexpected return from the Windows system service, SetFilePointer().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04006

ReadFile() failure, unable to read from file

Cause: There was an unexpected return from the Windows system service, ReadFile().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04007

Truncated read

Cause: The system encountered an unexpected end-of-file, which is due to damaged media.

Action: Verify that the file is not damaged.

OSD-04008

WriteFile() failure, unable to write to file

Cause: There was an unexpected return from the Windows system service, WriteFile().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04009

Truncated write

Cause: The destination device is full or the media is damaged.

Action: Verify that the device has free space and the file is not damaged.

OSD-04010

<create> option specified, file already exists

Cause: The file you attempted to create already exists.

Action: Delete the existing file or use the REUSE option in the SQL statement.

OSD-04011

GetFileInformationByHandle() failure, unable to obtain file info

Cause: There was an unexpected return from the Windows system service, GetFileInformationByHandle().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04012

File size mismatch

Cause: The file to be re-used is either too large or too small.

Action: Specify the correct file size or delete the existing file.

OSD-04013

Unable to read line from file

Cause: This error is caused by an operating system error or by damaged media.

Action: Check the operating system error code (if available) and consult the Windows documentation. If no operating system error code is presented, verify that the media is not damaged.

OSD-04014

Unable to close file

Cause: The media has been damaged.

Action: Recover the file, if necessary, and verify that Windows is functioning correctly.

OSD-04015

Asynchronous I/O request returned an error

Cause: There was an unexpected return from the Windows system service.

Action: Check the operating system error code and consult the Windows documentation.

OSD-04016

Error queuing an asynchronous I/O request

Cause: There was an unexpected return from the Windows system service.

Action: Check the operating system error code and consult the Windows documentation.

OSD-04017

Unable to open the specified RAW device

Cause: An invalid path or file name was specified or the device is full.

Action: Make sure the file exists and / or device is not full; verify that the operating system is functioning correctly.

OSD-04018

Unable to access the specified directory or device

Cause: An invalid path name was specified.

Action: Make sure the directory or device exists and is accessible.

OSD-04019

Unable to set file pointer

Cause: This error is caused by an operating system error or by damaged media.

Action: Check the operating system error code (if available) and consult the Windows documentation. If no operating system error code is presented, verify that the media is not damaged.

OSD-04020

Unable to set eof file marker

Cause: This error is caused by an operating system error or by damaged media.

Action: Check the operating system error code (if available) and consult the Windows documentation. If no operating system error code is presented, verify that the media is not damaged.

OSD-04021

Unable to read file

Cause: This error is caused by an operating system error or by damaged media.

Action: Check the operating system error code (if available) and consult the Windows documentation. If no operating system error code is presented, verify that the media is not damaged.

OSD-04022

Unable to write file

Cause: This error is caused by an operating system error or by damaged media.

Action: Check the operating system error code (if available) and consult the Windows documentation. If no operating system error code is presented, verify that the media is not damaged.

OSD-04023

SleepEx() failure, unable to Sleep

Cause: There was an unexpected return from the Windows system service.

Action: Check the operating system error code and consult the Windows documentation.

OSD-04024

Unable to delete file

Cause: This error is caused by an operating system error or by damaged media.

Action: Check the operating system error code (if available) and consult the Windows documentation. If no operating system error code is presented, verify that the media is not damaged.

OSD-04025

Invalid question asked

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04026

Invalid parameter passed

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

Memory Errors: OSD-04100 to OSD-04199

OSD-04100

Malloc() failure, unable to allocate memory

Cause: The program is out of memory.

Action: Shut down all unnecessary processes or install more memory in the computer.

OSD-04101

Invalid SGA: SGA not initialized

Cause: The System Global Area (SGA) has been allocated but not initialized.

Action: Wait until the STARTUP has completed before attempting to connect.

OSD-04102

Unable to open/create file for shared memory object

Cause: There was an unexpected return from the Windows system service, CreateFile().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04103

Unable to attach to SGA: SGA does not exist

Cause: The SGA does not exist.

Action: Start up an Oracle instance.

OSD-04104

Unable to map shared memory (SGA) into the address space

Cause: There was an unexpected return from the Windows system service, MapViewOfFileEx().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04105

Shared memory (SGA) mapped to wrong address

Cause: There was an unexpected return from the Windows system service, MapViewOfFileEx().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04106

Unable to allocate memory with VirtualAlloc

Cause: The program is out of memory.

Action: Shut down all unnecessary processes or install more memory in the computer.

OSD-04107

Unable to deallocate memory with VirtualFree

Cause: There was an unexpected return from the Windows system service, VirtualFree().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04108

Unable to protect memory with VirtualProtect

Cause: There was an unexpected return from the Windows system service, VirtualProtect().

Action: Check the operating system error code and consult the Windows documentation.

Process Errors: OSD-04200 to OSD-04299

OSD-04200

Unable to begin another thread

Cause: The program has run out of system resources.

Action: Shut down all unnecessary processes; install more memory in the computer.

OSD-04201

No pid structure supplied to spdcr()

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04202

DosSetPriority() failure, unable to set process priority

Cause: There was an unexpected return from the Windows system service, DosSetPriority().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04203

DosKillProcess() failure, unable to kill process

Cause: There was an unexpected return from the Windows system service, DosKillProcess().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04204

Invalid pid

Cause: Process ID not recognized by system, process previously terminated.

Action: Verify that process ID is correct and that process is active.

OSD-04205

CreateProcess() failure, unable to spawn process

Cause: There was an unexpected return from the Windows system service, CreateProcess().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04207

Invalid priority specified in CONFIG parameter ORACLE_PRIORITY

Cause: The priority specified is invalid or out of range.

Action: Specify a valid setting for ORACLE_PRIORITY.

OSD-04208

OpenProcess() failure, unable to open process handle

Cause: There was an unexpected return from the Windows system service, OpenProcess().

Action: Check the operating system error code and consult the Windows documentation.

OSD-04209

Incorrect or unknown background image name given to spdcr()

Cause: There was an unexpected background name given to spdcr().

Action: Contact Oracle Support Services.

OSD-04210

Timeout waiting for thread semaphore

Cause: An Oracle8 database thread died holding the semaphore.

Action: Restart Oracle8 database instance.

OSD-04211

Thread information not found

Cause: An Oracle8 database thread died without deleting its information.

Action: Restart Oracle8 database instance.

OSD-04212

Maximum number of Oracle threads reached

Cause: The maximum number of Oracle8 database threads for the instance is reached.

Action: Wait until some connections exit before trying again.

OSD-04213

Oracle thread unable to DuplicateHandle()

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04214

Oracle thread unable to CreateEvent()

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04215

Bad function code supplied to ssthreadop

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04216

Unable to find file handle for that thread

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04217

Unable to retrieve system username for current user

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04218

Cannot post thread

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04219

Bad thread list semaphore

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04221

Target thread is currently busy

Cause: The target thread is processing an oradebug command.

Action: Wait and re-issue command.

OSD-04222

Unable to get the threads context

Cause: Check OS error code.

Action: Remedy OS error.

OSD-04223

Unable to set the threads context

Cause: Check OS error code.

Action: Remedy OS error.

OSD-04224

Unable to suspend the target thread

Cause: Check OS error code.

Action: Remedy OS error.

OSD-04225

Unable to resume the target thread

Cause: Check OS error code.

Action: Remedy OS error.

Loader Errors: OSD-04300 to OSD-04399

OSD-04300

Unable to read complete record from data file

Cause: The data file ended in the middle of a record. This error occurs when loading files with a fixed record length.

Action: Verify that the data file is of the correct length and contains complete records.

OSD-04301

Record size too large

Cause: The specified record size is too large to load.

Action: Reduce record size and reload the data.

OSD-04302

Invalid record type and/or load options

Cause: The control file's Windows file processing options string contains an invalid option or keyword.

Action: Set the Windows file processing options string to an acceptable value.

Semaphore Errors: OSD-04400 to OSD-04499

OSD-04400

Unable to acquire internal semaphore for process

Cause: Oracle8 database has exceeded the maximum number of connections.

Action: Delete any unused connections and try again.

OSD-04401

WaitForSingleObject() failure, unable to obtain semaphorex

Cause: There was an unexpected return from the Windows system service, WaitForSingleObject().

Action: Check the operating system error code and consult the Windows documentation.

Miscellaneous Errors: OSD-04500 to OSD-04599

OSD-04500

Illegal option specified

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04501

Internal buffer overflow

Cause: This is an internal error, not normally expected to occur.

Action: Contact Oracle Support Services.

OSD-04502

Translations nested too deep

Cause: The program encountered too many intermediate translations while attempting to translate a configuration variable.

Action: Simplify the values of configuration parameters to include fewer intermediate translations.

OSD-04503

Text contains no translatable elementsx

Cause: The program cannot recognize variables in the text to be translated.

Action: Check and, if necessary, correct the text to be translated.

OSD-04505

Stdin not responding

Cause: The system is unable to receive input from the standard input stream.

Action: Verify that the process has access to an input device.

OSD-04506

Unable to spawn process via system()

Cause: The system is out of memory or the executable is invalid.

Action: Shut down unnecessary processes; install more memory in the computer. Verify the name of the executable.

OSD-04507

Password for 'internal' is incorrect

Cause: An attempt was made to connect as 'internal' with an invalid password.

Action: Verify that the password is correct and try again.

OSD-04508

No password given

Cause: An attempt was made to connect as 'internal' without a password.

Action: Enter a valid password when connecting as internal.

OSD-04509

No password found

Cause: Oracle was unable to locate and retrieve the password for 'internal'.

Action: Verify that Oracle is installed and configured correctly.

OSD-04510

Operating system roles are not supported

Cause: An attempt was made to use an operating system role.

Action: Only use roles that were created 'IDENTIFIED BY *PASSWORD*' as opposed to 'IDENTIFIED EXTERNALLY'.

OSD-04511

Unable to get date and time from the operating system

Cause: There was an unexpected return from GetLocalTime() call.

Action: Verify that the system time is correct on the computer.

OSD-04512

Unable to translate the 'USERNAME' configuration variable on server

Cause: The 'USERNAME' configuration parameter variable on the host is not properly set.

Action: Verify the 'USERNAME' variable is set.

OSD-04513

'REMOTE_OS_AUTHENT' variable not set to TRUE'

Cause: For remote operating system log on to function, the 'REMOTE_OS_ AUTHENT' parameter must be set to TRUE.

Action: Shut down and start up the instance with 'REMOTE_OS_AUTHENT = TRUE' in the initialization parameter file.

OSD-04514

The Windows Group name is too long for internal buffer

Cause: The Windows Group name is too long.

Action: Use a shorter Windows group name.

Database Connection Issues

This table lists and provides answers to common Oracle8*i* database connection issues:

If You Receive This Error...	Ensure Your...
`TNS-12203 TNS: unable to connect to destination`	Oracle Service*SID* and Oracle*Home_Name*TNSListener[1] services are started. See the *Net8 Administrator's Guide*.
`ORA-12547 TNS: lost contact`	Oracle Service*SID* and Oracle*Home_Name*TNSListener[1] services are started. You receive this error if you attempt to use any of the Oracle8*i* Utilities, such as SQL*Plus. **Note:** This error is analogous to the following Oracle7 error: `ORA-09352: Windows 32-bit Two-Task driver unable to spawn new ORACLE task`

`ORA-28575: unable to open RPC connection to external procedure agent`
`ORA-06512: at "APPLICATIONS.OSEXEC", line 0`
`ORA-06512: at "APPLICATIONS.TEST", line 4`
`ORA-06512: at line 2`
	TNSNAMES.ORA and LISTENER.ORA files have been correctly configured to use external routines. See Chapter 8 of *Net8 Administrator's Guide*.

[1] Ensure that Oracle*HOME_NAME*TNSListener is started if you are using an Oracle8*i* database that has a home name.

Glossary

alert file

A file that contains important information and error messages that are generated during database operations.

authenticate

To verify the identity of a user, device, or other entity in a computer system, often as a prerequisite for allowing access to resources in a system.

authorization

Permission given to a user, program, or process to access an Oracle database or operating system.

backup

A representative copy of data. This copy includes important parts of your database such as the control file, redo log files, and data files.

A backup is a safeguard against unexpected data loss; if you lose your original data, you can use the backup to make the data available again. A backup is also a safeguard against an application error; if an application makes incorrect changes, you can restore the backup.

connect string

See "net service name".

control file

A file that records the physical structure of a database and contains the database name, the names and locations of associated databases and online redo log files, the timestamp of the database creation, the current log sequence number, and checkpoint information.

Common Object Request Broker Architecture (CORBA)

A standard that enables distributed objects to communicate with each other, independent of programming language, operating system, and location.

data dictionary

A set of read-only tables that provide information about a database.

database alias

See "net service name".

downgrade

To transform an installed version of an Oracle database from a later release back into an earlier release.

Dynamic Link Library (DLL)

An executable file that a Windows application can load when needed.

Enterprise JavaBeans

A server-side component model for Java.

external role

Roles created and managed by the Windows NT operating system. Once an external role is created, you can grant or revoke that role to a database user. You must set the INIT.ORA parameter OS_ROLES to TRUE and restart your Oracle database before you can create an external role. You cannot use both Windows NT and the Oracle database to grant roles concurrently.

external user

A user authenticated by the Windows NT operating system who can access the Oracle database without being prompted for a password. External users are typically regular database users (non-database administrators) to which you assign standard database roles (such as CONNECT and RESOURCE), but do not want to assign SYSDBA (database administrator) or SYSOPER (database operator) privileges.

external routine

A function written in a third-generation language (3GL), such as C, and callable from within PL/SQL or SQL as if it were a PL/SQL function or procedure.

HOME*ID*

Represents a unique registry subkey for each Oracle home directory in which you install products. A new HOME*ID* is created and incremented each time you install products to a different Oracle home directory on one computer. Each HOME*ID* contains its own configuration parameter settings for installed Oracle products.

HOME_NAME

Represents the name of an *ORACLE_HOME*. In release 8.1.6, all Oracle homes have a unique *HOME_NAME*.

initialization parameter file

An ASCII text file that contains information needed to initialize a database and instance.

instance

Every running Oracle database is associated with an Oracle instance. When a database is started on a database server (regardless of the type of computer), Oracle allocates a memory area called the System Global Area (SGA) and starts one or more Oracle processes. This combination of the SGA and the Oracle processes is called an instance. The memory and processes of an instance manage the associated database's data efficiently and serve the one or more users of the database.

instantiate, instantiation

Producing a more defined version of some object by replacing variables with values (or other variables).

In object-oriented programming, producing a particular object from its class template. This involves allocation of a structure with the types specified by the template, and initialization of instance variables with either default values or those provided by the constructor function of the class.

Internet Inter-ORB Protocol (IIOP)

A standard that enables Object Request Brokers (ORBs) from different vendors to communicate with each other using TCP/IP.

listener

The server process that listens for and accepts incoming connection requests from client applications. Oracle listener processes start up Oracle database processes to handle subsequent communications with the client.

LISTENER.ORA

A configuration file that describes one or more Transparent Network Substrate (TNS) listeners on a server.

local role

Roles created and managed by the database. Once a local role is created, you can grant or revoke that role to a database user. You cannot use both Windows NT (for external roles) and the Oracle database (for local roles) to grant roles concurrently.

Microsoft Management Console

An application that serves as a host for administrative tools called snap-ins. By itself, Microsoft Management Console does not provide any functionality.

Microsoft Transaction Server

A COM-based transaction processing system that runs on an Internet or network server.

migrate

To transform an installed version of an Oracle database from a major release to another major release, for example, from Oracle8 to Oracle8*i*.

mount

To associate a database with an instance that has been started.

multiple Oracle homes

The capability of having more than one ORACLE_HOME on a computer.

National Language Support (NLS)

The Oracle architecture that ensures that database utilities, error messages, sort order, date, time, monetary, numeric, and calendar conventions automatically adapt to the native language and locale.

net service name

The name used by clients to identify a Net8 server. A net service name is mapped to a port number and protocol. Also known as a connect string, database alias, or service name.

Net8

The Oracle network interface that enables Oracle tools running on network workstations and servers to access, modify, share, and store data on other servers.

network listener

A listener on a server that listens for connection requests for one or more databases on one or more protocols. See "listener".

network service

In an Oracle application network, a service performs tasks for its service consumers. For example, a Names Server provides name resolution services for clients.

NLS

See "National Language Support (NLS)".

NT global groups

Contains users with access to computers and resources throughout the current domain and within any other domains that trust it. Global groups only contain global domain user accounts as their members.

Object Request Broker (ORB)

A software component that serves as the middleware between distributed objects. The distributed objects must comply with the Common Object Request Broker Architecture (CORBA) standard.

Optimal Flexible Architecture (OFA)

A set of file naming and placement guidelines for Oracle software and databases.

Oracle8*i* Enterprise Edition and Oracle8*i*

The information in this guide applies to both the Oracle8*i* Enterprise Edition and Oracle8*i* database types. Unless otherwise noted, the features and functionality described in this guide are common to both Oracle8*i* Enterprise Edition and Oracle8*i*.

Oracle Call Interface (OCI)

An application programming interface that enables you to manipulate data and schemas in an Oracle database. You compile and link an Oracle Call Interface program in the same way that you compile and link a non-database application. There is no need for a separate preprocessing or precompilation step.

ORACLE_HOME

Corresponds to the environment in which Oracle products run. This environment includes the location of installed product files, the *PATH* variable pointing to the products' binary files, registry entries, net service names, and program groups.

If you install an OFA-compliant database, using Oracle Universal Installer defaults, Oracle home (known as *\ORACLE_HOME* in this guide) is located beneath *X:\ORACLE_BASE*. It contains subdirectories for Oracle software executables and network files.

Oracle JServer or Oracle JServer Enterprise Edition

Oracle8*i* includes Oracle JServer, the integrated Java Virtual Machine. Oracle JServer provides Java2 support (JDK1.2), a CORBA 2.0 Object Request Broker, an embedded JDBC driver, a SQLJ translator, and an Enterprise JavaBeans transaction server.

Oracle Protocol Support

A product that maps the functions of a given network protocol into Oracle Transparent Network Substrate (TNS) architecture. This process translates TNS function calls into requests to the underlying network protocol. This allows TNS to act as an interface among all protocols. Net8 requires Oracle protocol support.

Oracle service

A service that is associated with an Oracle component.

ORACLE_BASE

Oracle base, known as *ORACLE_BASE* in this guide, is the root of the Oracle directory tree.

If you install an OFA-compliant database using Oracle Universal Installer defaults, *ORACLE_BASE* is *X*:\ORACLE where *X* is any hard drive (for example, C:\ORACLE).

PL/SQL

Oracle Corporation's procedural language extension to SQL.

PL/SQL enables you to mix SQL statements with procedural constructs. You can define and execute PL/SQL program units such as procedures, functions, and packages.

precompiler

A programming tool that enables you to embed SQL statements in a high-level source program.

privilege

A right to execute a particular type of SQL statement or to access another user's object.

process

A mechanism in an operating system that can run an executable. (Some operating systems use the terms job or task.) A process normally has its own private memory area in which it runs. On Windows NT a process is created when a program runs (such as Oracle or Microsoft Word). In addition to an executable program, all processes consist of at least one *thread*. The ORACLE master process contains hundreds of threads.

quota

A limit on a resource, such as a limit on the amount of database storage used by a database user. A database administrator can set tablespace quotas for each Oracle user name.

raw partition

A portion of a physical disk that is accessed at the lowest possible disk (block) level.

recovery

To *restore* a physical backup is to reconstruct it and make it available to the Oracle server. To *recover* a restored backup is to update it using redo records (that is, records of changes made to the database after the backup was taken). Recovering a backup involves two distinct operations: rolling forward the backup to a more current time by applying redo data, and rolling back all changes made in uncommitted transactions to their original state.

redo log file

A file that contains a record of all changes made to data in the database buffer cache. If an instance failure occurs, the redo log files are used to recover the modified data that was in memory.

redo log buffer

A circular buffer in the System Global Area (SGA) that contains information about changes made to the database.

registry

A Windows repository that stores configuration information for a computer.

remote computer

A computer on a network other than the local computer.

remote database

A database on a computer other than the local database.

replication

The process of copying and maintaining database objects in multiple databases that make up a distributed database system.

role

A named group of related privileges. You can grant a role to users or other roles.

schema

A named collection of objects, such as tables, views, clusters, procedures, and packages, associated with a particular user.

service

An executable process installed in the Windows NT registry and administered by Windows NT. Once a service is created and started, it can run even when no user is logged on to the computer.

service name

See "net service name".

SID

See "system identifier (SID)".

snap-in

An administrative tool that runs within Microsoft Management Console.

snapshot

(1) Information stored in rollback segments to provide transaction recovery and read consistency. Rollback segment information can be used to recreate a snapshot of a row before an update.

(2) A read-only copy of a master table located on a remote node. Snapshots can be queried, but not updated; only the master table can be updated. Snapshots are periodically refreshed to reflect changes made to the master table.

starter database

A preconfigured, ready-to-use database that requires minimal user input to create.

synonym

An alias for a table, view, sequence, or program unit. A synonym is not actually an object itself; rather, it is a direct reference to its base object.

SYSDBA

A special database administration role that contains all system privileges with the ADMIN OPTION, and the SYSOPER system privilege. SYSDBA also permits CREATE DATABASE actions and time-based recovery.

SYSOPER

A special database administration role that permits a database administrator to perform STARTUP, SHUTDOWN, ALTER DATABASE OPEN/MOUNT, ALTER DATABASE BACKUP, ARCHIVE LOG, and RECOVER, and includes the RESTRICTED SESSION privilege.

System Global Area (SGA)

A group of shared memory structures that contain data and control information for an Oracle instance.

system identifier (SID)

A unique name for an Oracle instance. To switch between Oracle databases, users must specify the desired SID. The SID is included in the CONNECT DATA parts of the connect descriptors in a TNSNAMES.ORA file, and in the definition of the network listener in a LISTENER.ORA file.

SYSTEM user name

One of two standard DBA user names automatically created with each database. (The other user name is SYS.) SYSTEM is created with an initial password of MANAGER. The SYSTEM user name is the preferred user name for DBAs to use for database maintenance.

tablespace

A database is divided into one or more logical storage units called tablespaces. Tablespaces are divided into logical units of storage called segments, which are further divided into extents.

thread

An individual path of execution within a process. Threads are objects within a process that execute program instructions. Threads allow concurrent operations within a process so that a process can execute different parts of its program simultaneously on different processors. A thread is the most fundamental component that can be scheduled on Windows NT.

TNSNAMES.ORA

A file that contains connect descriptors mapped to net service names. The file may be maintained centrally or locally, for use by all or individual clients.

trace file

Each server and background process can write to an associated trace file. When a process detects an internal error, it dumps information about the error to its trace file. Some of the information written to a trace file is intended for the database administrator, while other information is intended for Oracle Support Services. Trace file information is also used to tune applications and instances.

upgrade

To transform an installed version of an Oracle database major release into another major release of the same version. Compare with "migrate".

user name

A name that can connect to and access objects in a database.

view

A selective presentation of the structure of, and data in, one or more tables (or other views).

Index

Symbols

Numerics

A

B

C

D

E

F

G

H

I

L

M

N

O

P

Q

R

S

T

U

V

W

X