Oracle9*i*

Network, Directory, and Security Guide

Release 1 (9.0.1) for Windows

June 2001

Part No. A90165-01

ORACLE®

Oracle9*i* Network, Directory, and Security Guide, Release 1 (9.0.1) for Windows

Part No. A90165-01

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Preface

This guide is your primary source of introductory, post-installation, configuration, and administration information for using Oracle9*i* network, directory, and security features for Windows operating systems.

This chapter contains these topics:

Audience

This guide is necessary for anyone configuring or administering Oracle9*i* network, directory, and security features for Windows operating systems.

Organization

This guide is organized as follows:

Chapter 1, "Authenticating Database Users with Windows"

This chapter describes authentication of Oracle9*i* database users on Windows operating systems.

Chapter 2, "Administering External Users and Roles"

This chapter describes the administration of external users and roles.

Chapter 3, "Administering Enterprise Users and Roles"

This chapter describes the administration of enterprise users and roles.

Chapter 4, "Using Oracle9i Directory Server Features with Active Directory"

This chapter describes the use of Oracle9*i* Directory Server Features with Active Directory.

Chapter 5, "Storing Oracle Wallets in the Windows Registry"

This chapter describes the storing and retrieving of Oracle Wallets in the Windows registry.

Chapter 6, "Windows 2000 PKI Integration"

This chapter describes the integration of Oracle Public Key Infrastructure (PKI) with Windows 2000 Public Key Infrastructure (Windows PKI) on Windows operating systems.

Appendix A, "Oracle Net Services Configuration"

This appendix describes Oracle Net Services configuration for Windows. For an overview of Oracle Net Services configuration in general, see *Oracle9i Net Services Administrator's Guide*

Glossary

Related Documentation

For more information, see these Oracle resources:

- Oracle9i Database installation guide for Windows
- Oracle9i Database release notes for Windows
- *Oracle9i Database Administrator's Guide for Windows*
- *Oracle Advanced Security Administrator's Guide*
- *Oracle Internet Directory Administrator's Guide*
- *Oracle Enterprise Manager Administrator's Guide*
- *Oracle9i Net Services Administrator's Guide*
- *Oracle9i Database New Features*
- *Oracle9i Database Reference*
- *Oracle9i Database Error Messages*

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Other customers can contact their Oracle representative to purchase printed documentation.

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

`http://technet.oracle.com/membership/index.htm`

If you already have a username and password for OTN, then you can go directly to the documentation section of the OTN Web site at

`http://technet.oracle.com/docs/index.htm`

Conventions

This section describes the conventions used in the text and code examples of this documentation set. It describes:

- Conventions in Text
- Conventions in Code Examples
- Conventions for Windows Operating Systems

Conventions in Text

We use various conventions in text to help you more quickly identify special terms. The following table describes those conventions and provides examples of their use.

Convention	Meaning	Example
Bold	Bold typeface indicates terms that are defined in the text or terms that appear in a glossary, or both.	The C datatypes such as **ub4**, **sword**, or **OCINumber** are valid. When you specify this clause, you create an **index-organized table**.
Italics	Italic typeface indicates book titles, emphasis, syntax clauses, or placeholders.	*Oracle9i Database Concepts* You can specify the *parallel_clause*. Run U*old_release*.SQL where *old_release* refers to the release you installed prior to upgrading.
UPPERCASE monospace (fixed-width font)	Uppercase monospace typeface indicates elements supplied by the system. Such elements include parameters, privileges, datatypes, RMAN keywords, SQL keywords, SQL*Plus or utility commands, packages and methods, as well as system-supplied column names, database objects and structures, usernames, and roles.	You can specify this clause only for a NUMBER column. You can back up the database using the BACKUP command. Query the TABLE_NAME column in the USER_TABLES data dictionary view. Specify the ROLLBACK_SEGMENTS parameter. Use the DBMS_STATS.GENERATE_STATS procedure.

Convention	Meaning	Example
lowercase monospace (fixed-width font)	Lowercase monospace typeface indicates executables and sample user-supplied elements. Such elements include computer and database names, net service names, and connect identifiers, as well as user-supplied database objects and structures, column names, packages and classes, usernames and roles, program units, and parameter values.	Enter `sqlplus` to open SQL*Plus. The `department_id`, `department_name`, and `location_id` columns are in the `hr.departments` table. Set the `QUERY_REWRITE_ENABLED` initialization parameter to `true.` Connect as `oe` user.

Conventions in Code Examples

Code examples illustrate SQL, PL/SQL, SQL*Plus, or other command-line statements. They are displayed in a monospace (fixed-width) font and separated from normal text as shown in this example:

```
SELECT username FROM dba_users WHERE username = 'MIGRATE';
```

The following table describes typographic conventions used in code examples and provides examples of their use.

Convention	Meaning	Example
[ ]	Brackets enclose one or more optional items. Do not enter the brackets.	`DECIMAL (digits [ , precision ])`
{ }	Braces enclose two or more items, one of which is required. Do not enter the braces.	`{ENABLE | DISABLE}`

|	A vertical bar represents a choice of two or more options within brackets or braces. Enter one of the options. Do not enter the vertical bar.	`{ENABLE | DISABLE}`
		`[COMPRESS | NOCOMPRESS]`

...	Horizontal ellipsis points indicate either:	
	■ That we have omitted parts of the code that are not directly related to the example	`CREATE TABLE ... AS subquery;`
	■ That you can repeat a portion of the code	`SELECT col1, col2, ... , col`*n* `FROM employees;`
. . .	Vertical ellipsis points indicate that we have omitted several lines of code not directly related to the example.	

Convention	Meaning	Example

Other notation	You must enter symbols other than brackets, braces, vertical bars, and ellipsis points as it is shown.	`acctbal NUMBER(11,2);`
		`acct    CONSTANT NUMBER(4) := 3;`

`Italics`	Italicized text indicates variables for which you must supply particular values.	`CONNECT SYSTEM/`*`system_password`*

`UPPERCASE`	Uppercase typeface indicates elements supplied by the system. We show these terms in uppercase in order to distinguish them from terms you define. Unless terms appear in brackets, enter them in the order and with the spelling shown. However, because these terms are not case sensitive, you can enter them in lowercase.	`SELECT last_name, employee_id FROM employees;`
		`SELECT * FROM USER_TABLES;`
		`DROP TABLE hr.employees;`

`lowercase`	Lowercase typeface indicates programmatic elements that you supply. For example, lowercase indicates names of tables, columns, or files.	`SELECT last_name, employee_id FROM employees;`
		`sqlplus hr/hr`

Conventions for Windows Operating Systems

The following table describes conventions for Windows operating systems and provides examples of their use.

Convention	Meaning	Example
Choose Start >	How to start a program. For example, to start Oracle Database Configuration Assistant, you must click the Start button on the taskbar and then choose Programs > Oracle - *HOME_NAME* > Configuration and Migration Tools > Database Configuration Assistant.	Choose Start > Programs > Oracle - *HOME_NAME* > Configuration and Migration Tools > Database Configuration Assistant
File and Directory Names	File/directory names are not case sensitive. The special characters <, >, :, ", /, |, and - are not allowed. The special character \ is treated as an element separator, even when it appears in quotes. If the file name begins with \\, Windows assumes it uses the Universal Naming Convention.	`c:\winnt"\"system32` is the same as `C:\WINNT\SYSTEM32`

Convention	Meaning	Example
`C:\>`	Represents the Windows command prompt of the current hard disk drive. The escape character in a command prompt is "^". Your prompt reflects the subdirectory in which you are working. Referred to as the command prompt in this manual.	`C:\oracle\oradata>`

	The backslash special character (\) is sometimes required as an escape character for the double quote (") special character at the Windows command prompt. Parentheses and the single quote special character (’) do not require an escape character. See your Windows operating system documentation for more information on escape and special characters.	`C:\>exp scott/tiger TABLES=emp QUERY=\"WHERE job=’SALESMAN’ and sal<1600\"`
		`C:\>imp SYSTEM/`*`password`*` FROMUSER=scott TABLES=(emp, dept)`

HOME_NAME	Represents the Oracle home name. The home name can be up to 16 alphanumeric characters. The only special character allowed in the home name is the underscore.	`C:\> net start Oracle`*`HOME_NAME`*`TNSListener`

Convention	Meaning	Example
ORACLE_HOME and *ORACLE_BASE*	In releases prior to Oracle8*i* release 8.1.3, when you installed Oracle components, 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 called your Oracle home. This release complies with Optimal Flexible Architecture (OFA) guidelines. All subdirectories are not under a top level *ORACLE_HOME* directory. There is a top level directory called *ORACLE_BASE* that by default is C:\oracle. If you install Oracle9*i* Release 1 (9.0.1) on a computer with no other Oracle software installed, the default setting for the first Oracle home directory is C:\oracle\ora90. The Oracle home directory is located directly under *ORACLE_BASE*. All directory path examples in this guide follow OFA conventions. See *Oracle9i Database Getting Started for Windows* for additional information on OFA compliances and for information on installing Oracle products in non-OFA compliant directories.	Go to the *ORACLE_BASE*\ORACLE_HOME\rdbms\admin directory.

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`http://www.oracle.com/accessibility/`

JAWS, a Windows screen reader, may not always correctly read the code examples in this document. The conventions for writing code require that closing braces should appear on an otherwise empty line; however, JAWS may not always read a line of text that consists solely of a bracket or brace.

What's New in Network, Directory, and Security Features for Oracle9*i*

This section describes the new Oracle9*i* network, directory, and security features for Windows operating systems.

- Oracle Public Key Infrastructure
- Active Directory Integration
- Oracle Wallets
- Using Oracle9i on Windows 2000
- Desupported and Deprecated Features

Oracle Public Key Infrastructure

Oracle Public Key Infrastructure (PKI) is used by the Oracle Enterprise Security Manager, Lightweight Directory Access Protocol (LDAP)-enabled Enterprise Manager, Oracle's Secure Socket Layer (SSL) authentication, and Oracle9*i* database.

Public Key Infrastructure is information security technology using public key cryptography. Public key cryptography involves encrypting and decrypting of information using a shared (public) and private key pair. Data that the private key encrypts, the public key decrypts, and data that the public key encrypts, the private key decrypts. Public key cryptography is the basis of PKI.

Using Oracle Advanced Security, Oracle offers a comprehensive set of tools in Oracle9*i* utilizing PKI technology.

Active Directory Integration

Active Directory enables users to access network resources with a single login. 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.

Oracle Wallets

Oracle Wallets in Oracle9*i* can be stored and retrieved from the Windows registry. Oracle Wallets store the private keys and trust points, and hold the digital certificates used in public key applications for authentication and encryption. The Oracle Wallet Manager tool creates and manages Oracle Wallets. Oracle Public Key applications use the decrypted Oracle Wallet for **authentication** and **encryption**.

Using Oracle9*i* on Windows 2000

There are some differences between using Oracle9*i* on Windows 2000 and Windows NT 4.0.

See Also: *Oracle9i Database Getting Started for Windows*

Desupported and Deprecated Features

CONNECT INTERNAL

`CONNECT INTERNAL` and `CONNECT INTERNAL/`*`PASSWORD`* are not supported in Oracle9*i*. Use the following instead:

```
CONNECT/ AS SYSDBA
CONNECT username/password AS SYSDBA
```

Oracle Net Services (Net8) Desupported Features

The following Oracle Net Services (formerly Net8) features are not supported in Oracle9*i*:

- NDS External Naming and NDS Authentication
- `protocol.ora` file
- SPX protocol
- Identix and SecurID authentication methods
- Net8 `OPEN`
- `TRCROUTE`
- `SPAWN` command in the Listener Control utility

1

Authenticating Database Users with Windows

This chapter describes authentication of Oracle9*i* database users with Windows operating systems.

This chapter contains these topics:

- Windows Native Authentication Overview
- Windows Authentication Protocols
- User Authentication and Role Authorization Methods
- Automatically Enabling Operating System Authentication During Installation

Windows Native Authentication Overview

The Oracle9*i* database can use Windows user login credentials to authenticate database users. The benefits include:

- Enabling users to connect to Oracle9*i* databases without supplying a username or password
- Centralizing Oracle9*i* database user authentication and role authorization information in Windows NT or Windows 2000, which frees Oracle9*i* from storing or managing user passwords or role information

The Windows native authentication adapter (automatically installed with Oracle Net Services) enables database user authentication through Windows NT or Windows 2000. This enables client computers to make secure connections to an Oracle9*i* database on a Windows NT or Windows 2000 server. The server then permits the user to perform the database actions on the server.

Note: This chapter describes using Windows native authentication methods with Windows NT 4.0 and Windows 2000. For information on the Secure Socket Layer (SSL) protocol and Oracle Internet Directory, see *Oracle Advanced Security Administrator's Guide* and *Oracle Internet Directory Administrator's Guide*.

Windows Authentication Protocols

The Windows native authentication adapter works with Windows authentication protocols to enable access to your Oracle9*i* database.

- Kerberos is the default authentication protocol for Windows 2000.
- NT LAN Manager (NTLM) is the default protocol for Windows NT 4.0.

If the user is logged on as a Windows 2000 domain user from a Windows 2000 computer, then Kerberos is the authentication mechanism used by the NTS adapter.

For all other users (local users, Windows NT 4.0 domain users, Windows 95 users, and Windows 98 users), NTLM is the authentication mechanism used by the NTS adapter.

If the authentication is set to NTS, on a standalone Windows 2000 or Windows NT 4.0 computer, ensure that the Windows Service NT LM Security Support Provider is started. If this service is not started on a standalone Windows 2000 or Windows NT 4.0 computer, NTS authentication fails. This issue is applicable only if you are running Windows 2000 or Windows NT 4.0 in standalone mode.

Client computers do not need to specify an authentication protocol when attempting a connection to an Oracle9*i* database. Instead, the Oracle9*i* database determines the protocol to use, completely transparent to the user. The only Oracle requirement is to ensure that `SQLNET.AUTHENTICATION_SERVICES` parameter contains `nts` in the *`ORACLE_BASE`*`\`*`ORACLE_HOME`*`\network\admin\sqlnet.ora` file on both the client and database server (this is the default setting for both after installation). For Oracle8 8.0 releases, you must manually set this value.

An Oracle9*i* database network typically includes client computers and database servers. The computers on this network may use different Oracle software releases on different Windows operating systems on different domains. For example, you may be running an Oracle release 8.0.5 client installed on Windows 95 that connects to an Oracle9*i* database installed on a Windows NT 4.0 computer that runs in a Windows 2000 domain. This combination of different releases means that the authentication protocol being used can vary.

Table 1–1 lists the Oracle software and Windows operating system releases required to enable Kerberos as the default authentication protocol:

Table 1–1 Software Requirements to Enable the Kerberos Authentication Protocol

For The...	This Windows Software is Required...	This Oracle Software is Required...
Client Computer	■ Windows NT 4.0 ■ Windows 2000	■ Oracle8*i* Client or later
Database Computer	■ Windows NT 4.0 ■ Windows 2000	■ Oracle8*i* database or later
Domain	■ Windows 2000	■ None

For all other combinations of Windows operating system and Oracle software releases used in your network, the authentication protocol used is NTLM.

> **See Also:** Microsoft Windows documentation for more information on each authentication protocol

User Authentication and Role Authorization Methods

This section describes how user login credentials are authenticated and database roles are authorized in Windows NT 4.0 or Windows 2000 domains. User authentication and role authorization are defined in Table 1–2.

Table 1–2 User Authentication and Role Authorization Defined

Feature	Description	More Information
User authentication	The process by which the database uses the user's Windows login credentials to authenticate the user.	*Oracle9i Database Administrator's Guide*
Role **authorization**	The process of granting an assigned set of roles to authenticated users.	*Oracle9i Database Administrator's Guide*

Oracle supports user authentication and role authorization in Windows NT 4.0 domains. Table 1–3 provides descriptions of these basic features.

Table 1–3 Basic Features of User Authentication and Role Authorization

Feature	Description
Authentication of external users	Users are authenticated by the database using the user's Windows login credentials that enable them to access the Oracle database without being prompted for additional login credentials.
Authorization of **external role**s	Roles are authorized using Windows NT local groups. Once an external role is created, you can grant or revoke that role to a database user. The `init.ora` parameter `OS_ROLES` is set to `false` by default. You must set `OS_ROLES` to `true` to authorize external roles.

For Oracle8*i* release 8.1.6 or later, enhancements were made to support enterprise user authentication and enterprise role authorization. Enhancements were also made to support Windows native authentication in Windows 2000 domains, and in Active Directory in addition to integration with Oracle Internet Directory. These enhancements are available only if you:

- Configure Oracle8*i* release 8.1.6 or later release to work with Active Directory
- Are running Oracle8*i* Client release 8.1.6 or later and Oracle8*i* database or later in a Windows 2000 domain

Enterprise user authentication (also called global user authentication) is enabled by setting the OSAUTH_X509_NAME registry parameter to true on the computer on which the Oracle9*i* database is running in a Windows 2000 domain. If this parameter is set to false (the default setting) in a Windows 2000 domain, then the Oracle9*i* database authenticates the user as an external user (described in "Enterprise User Authentication" on page 3-2). Setting this parameter to true in a Windows NT 4.0 domain is meaningless and does not enable you to use enterprise users.

> **See Also:** "Enterprise User Authentication" on page 3-2 for more information on using the OSAUTH_X509_NAME registry parameter.

Authentication and Authorization Methods To Use

Table 1–4 describes user authentication and role authorization methods to use based on your Oracle9*i* database environment:

Table 1–4 User Authentication and Role Authorization Methods

Use...	When...
Enterprise users and roles	You have many users connecting to multiple databases. Enterprise users have the same identity across multiple databases. Enterprise users require the use of a directory server. Use enterprise roles in environments where enterprise users assigned to these roles are located in many geographic regions and must access multiple databases. Each enterprise role can be assigned to more than one enterprise user in the directory. If you do not use enterprise roles, then you have to assign database roles manually to each database user. Enterprise roles require the use of a directory server.
External users and roles	You have a smaller number of users accessing a limited number of databases. External users must be created individually in each database, and do not require the use of a directory server. External roles must also be created individually in each database, and do not require the use of a directory server. External roles are authorized using group membership of the users in the local groups on the system.

Oracle9*i* Integration with Active Directory

This integration enables you to take advantage of the user authentication and role authorization. Note that these enhancements are only available if you are running in a Windows 2000 domain. Perform the following tasks to integrate Oracle components with Active Directory.

- Task 1: Install and Configure Components
- Task 2: Set the OSAUTH_X509_NAME Registry Parameter
- Task 3: Start and Use Oracle Enterprise Security Manager

Task 1: Install and Configure Components

Read Chapter 4, "Using Oracle9i Directory Server Features with Active Directory" and the Oracle9i Database installation guide for Windows for information on pre-installation and configuration issues.

Task 2: Set the `OSAUTH_X509_NAME` Registry Parameter

Set the `OSAUTH_X509_NAME` registry parameter to enable client users to access the Oracle9*i* database as X.509-compliant enterprise users. This parameter is required only if you want to use enterprise users and roles.

Set This Parameter On...	Description
An Oracle9*i* database computer running in a Windows 2000 domain	When set to `true`, this parameter enables a client username to be identified as an X.509-compliant enterprise username when connecting to an Oracle9*i* database through Active Directory. A user's role authorization is done using Active Directory. When set to `false` (the default setting), the client user is identified as an external user and a user's role authorization is done using the Oracle9*i* database data dictionary.

To set the `OSAUTH_X509_NAME` registry parameter:

1. Go to the computer on which the Oracle9*i* database is installed.
2. Choose Start > Run.
3. Enter `regedt32` in the Open field, and choose OK.

   The registry editor window appears.
4. Go to `HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME`*`ID`*.

   where *`ID`* is the Oracle home that you want to edit.

5. If the registry value `OSAUTH_X509_NAME` exists, double-click `OSAUTH_X509_NAME`.

   A String Editor dialog box appears.

   Otherwise, add `OSAUTH_X509_NAME` as a registry value of type `REG_EXPAND_SZ`.

6. Choose Enter.
7. Set the value to `true` in the String field.
8. Choose OK.
9. Choose Exit from the Registry menu.

   The registry editor exits.

Task 3: Start and Use Oracle Enterprise Security Manager

Use Oracle Enterprise Security Manager to create and manage enterprise users, roles, and domains, and assign enterprise users and groups to enterprise roles.

Oracle Enterprise Security Manager is included as an integrated application with Oracle Enterprise Manager. The subsequent procedures describe Windows-unique features for using Oracle Enterprise Security Manager in a Windows 2000 domain.

> **See Also:** *Oracle Advanced Security Administrator's Guide* for information on using the Oracle Enterprise Security Manager

To use Oracle Enterprise Security Manager:

1. Choose Start > Programs > Oracle **-** *HOME NAME* > Configuration and Migration Tools > Enterprise Security Manager.
2. Use the online help and instructions in *Oracle Advanced Security Administrator's Guide* to use this tool.
3. Review the following issues for using Active Directory.

   - The administrator using Oracle Enterprise Security Manager must be a member of the security group OracleDBSecurityAdmin. By default, the administrator who created the Oracle Context (that is, configured the Oracle9*i* database to work with a directory server) is a member of this security group. Only members of this security group are authorized to use all features of Oracle Enterprise Security Manager. To manually add additional users, see "Access Control List Management for Oracle Directory Objects" on page 4-20 for information.

- Select Login from the Directory Server main menu to access a dialog box for selecting the authentication protocol appropriate to your environment:

Select...	If...
NT Native Authentication	Running an Oracle9*i* database on a Windows NT 4.0 or Windows 2000 computer in a Windows 2000 domain with Active Directory. Oracle Enterprise Security Manager automatically uses Windows native authentication if running in a Windows 2000 domain.
Simple Authentication	The other available selections do not work. Simple authentication can be used with either Oracle Internet Directory or Active Directory, but is also less secure.

Automatically Enabling Operating System Authentication During Installation

When you install the Oracle9*i* database, your Windows username is automatically added to a Windows NT local group called `ORA_DBA`. The `ORA_DBA` local group is:

- Automatically created when the Oracle9*i* database is installed.
- A special Windows NT local group whose members automatically receive the `SYSDBA` privilege.

This enables you to:

- Connect to any local Oracle9*i* databases without a password by issuing commands such as the following:

  ```
  CONNECT / AS SYSDBA
  ```

- Connect to remote Oracle9*i* databases without a password by issuing a command such as the following:

  ```
  CONNECT /@net_service_name AS SYSDBA
  ```

  where *`net_service_name`* is the net service name of the Oracle9*i* database to which to connect.

- Perform local or remote database administration procedures such as starting and shutting down local databases
- Add additional Windows NT users to `ORA_DBA`, enabling them to have the `SYSDBA` privilege, provided you have Administrator privileges

2

Administering External Users and Roles

This chapter describes the administration of external users and roles.

This chapter contains these topics:

- How to Administer External Users and Roles
- Using Oracle Administration Assistant for Windows NT
- Manually Administering External Users and Roles

How to Administer External Users and Roles

There are two methods for administering external users and roles:

- Using Oracle Administration Assistant for Windows NT
- Manually Administering External Users and Roles

Note: Both methods can also administer external users and roles in Windows 2000 domains, but cannot be used to administer enterprise users and roles. See "Administering Enterprise Users and Roles" on page 3-1 for more information on tools available for administering enterprise users and roles.

Using Oracle Administration Assistant for Windows NT

Oracle Administration Assistant for Windows NT runs from the Microsoft Management Console and enables you to configure the following Oracle database users and roles to be authenticated by the Windows operating system:

- Configure regular Windows NT domain users and global groups as external users to access the Oracle database without a password.
- Configure Windows NT database administrators (with the SYSDBA privilege) to access the Oracle database without a password.
- Configure Windows NT database operators (with the SYSOPER privilege) to access the Oracle database without a password.
- Create and grant local and external database roles to Windows NT domain users and global groups.

Oracle Administration Assistant for Windows NT eliminates the need to manually:

- Create NT local groups that match the database system identifier (SID) and role.
- Assign NT domain users to these local groups.
- Authenticate users in SQL*Plus with the `CREATE USER` *`username`* `IDENTIFIED EXTERNALLY` syntax.

This section describes how to perform the following tasks with Oracle Administration Assistant for Windows NT:

- Adding a Computer and Saving Your Configuration
- Granting Administrator and Operator Privileges for All Databases on a Computer
- Connecting to a Database
- Viewing Database Authentication Parameter Settings
- Creating a Nonprivileged Database User (External User)
- Creating a Local Database Role
- Creating an External Role
- Granting Administrator and Operator Privileges for a Single Database

> **Note:** Oracle Administration Assistant for Windows NT runs from the Microsoft Management Console, which is automatically included in Windows 2000. If you are using Windows NT 4.0, you must either:
>
> - Install the Microsoft Windows NT 4.0 Option Pack, which includes the Microsoft Management Console
> - Download the Microsoft Management Console from the Microsoft Web site:
>
>   `http://www.microsoft.com`

Note: If you want to use Oracle Administration Assistant for Windows NT to manage a remote computer, you must have administrator privileges for the remote computer. Oracle Administration Assistant for Windows NT always creates users in the database with the domain name as the prefix. Therefore, if you are managing Oracle7.*x* or later databases remotely, you must set the registry value `OSAUTH_PREFIX_DOMAIN` in `HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME`*`ID`* to `true` on the remote computer. If a Windows 2000 computer is not identified with a Domain Name System (DNS) domain name, you will receive the following error message:

```
Calling query w32RegQueries1.7.0.17.0  RegGetValue
Key = HKEY_LOCAL_MACHINE
SubKey = SYSTEM\CurrentControlSet\Services\Tcpip\Parameters
Value = Domain
Query Exception: GetValueKeyNotFoundException
Query Exception Class: class
oracle.sysman.oii.oiil.OiilQueryException
...
```

To assign a DNS name:

1. Choose Control Panel > System > Network Identification > More > Primary DNS.
2. Enter a domain name, for example, `US.ORACLE.COM`.

Adding a Computer and Saving Your Configuration

When you use Oracle Administration Assistant for Windows NT for the first time, it adds the local computer in the navigation tree. You can then add other computers.

To add a computer to the Microsoft Management Console tree:

1. Choose Start > Programs > Oracle - *HOME_NAME* > Configuration and Migration Tools > Administration Assistant for Windows NT.

   The Microsoft Management Console starts.

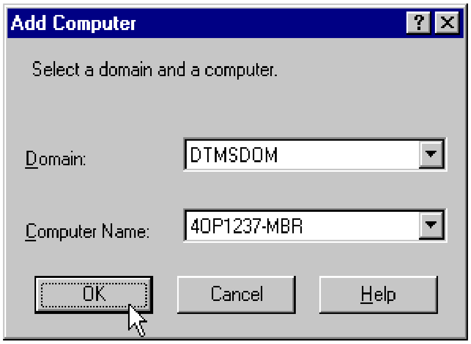
2. Double-click Oracle Managed Objects.

   The Computer icon appears.

3. Right-click Computers.

4. Choose New > Computer.

   The Add Computer dialog box appears.



Add Computer

Select a domain and a computer.

Domain: DTMSDOM

Computer Name: 4OP1237-MBR

5. Specify the domain and hostname of the computer on which your Oracle database is installed.

6. Choose OK.

7. Double-click Computers to display the computer you added.

8. Double-click the computer you added. Several nodes for authenticating database administrators and operators appear:

This Node...	Enables You To...
OS Database Administrators - Computer	Create an operating system-authenticated database administrator (with SYSDBA privileges) for all database instances on the computer.
OS Database Operators - Computer	Create an operating system-authenticated database operator (with SYSOPER privileges) for all database instances on the computer.

9. Save your configuration in a console file by choosing Save in the Console main menu.

   You can now authenticate database administrators and operators for all instances on the computer.

10. See "Granting Administrator and Operator Privileges for All Databases on a Computer" on page 2-6.

Granting Administrator and Operator Privileges for All Databases on a Computer

You can grant database administrator (SYSDBA) and database operator (SYSOPER) privileges to DBAs for *all* databases on a computer.

To grant privileges for all databases on a computer:

1. Choose Start > Programs > Oracle - *HOME_NAME* > Configuration and Migration Tools > Administration Assistant for Windows NT.

   Oracle Administration Assistant for Windows NT starts.

2. Make an appropriate selection:

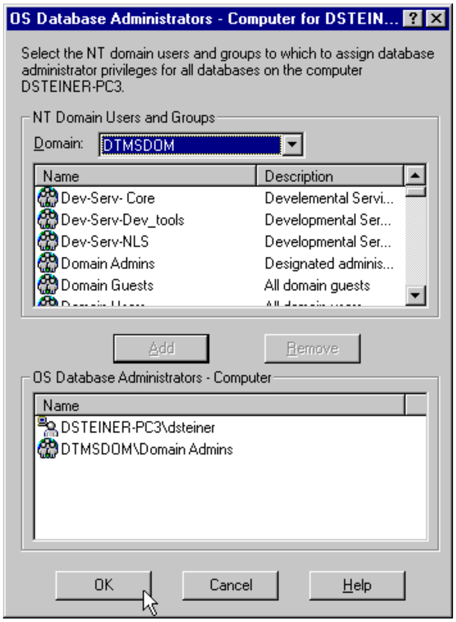
If You Want to Grant...	Then...
Database administrator (SYSDBA) privileges	1. Right-click OS Database Administrators - Computer. 2. See section "Granting Administrator Privileges for All Databases on a Computer" on page 2-7
Database operator (SYSOPER) privileges	1. Right-click OS Database Operators - Computer. 2. See section "Granting Operator Privileges For All Databases on a Computer" on page 2-8

Granting Administrator Privileges for All Databases on a Computer

To grant administrator (SYSDBA) privileges for all databases on a computer:

1. Choose Add/Remove.

   The OS Database Administrators - Computer for *hostname* dialog box appears:



OS Database Administrators - Computer for DSTEIN...

Select the NT domain users and groups to which to assign database administrator privileges for all databases on the computer DSTEINER-PC3.

NT Domain Users and Groups

Domain: DTMSDOM

Name	Description
Dev-Serv- Core	Develemental Servi...
Dev-Serv-Dev_tools	Developmental Ser...
Dev-Serv-NLS	Developmental Ser...
Domain Admins	Designated adminis...
Domain Guests	All domain guests

OS Database Administrators - Computer

Name
DSTEINER-PC3\dsteiner
DTMSDOM\Domain Admins

2. Select the domain of the user to which to grant SYSDBA privileges from the Domain drop-down list box.
3. Select the user.
4. Choose Add.

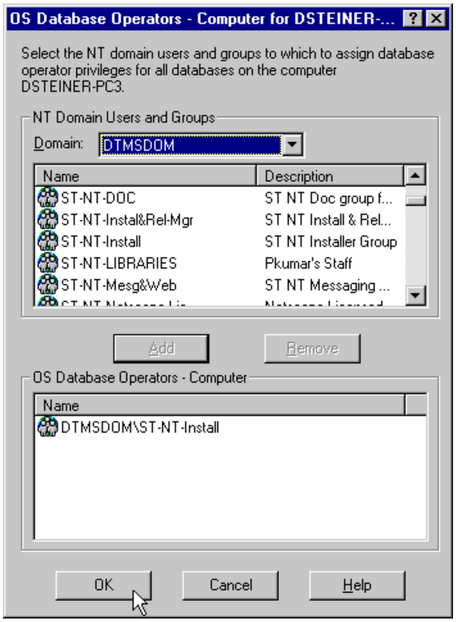
   The user now appears in the OS Database Administrators - Computer window.
5. Choose OK.

Granting Operator Privileges For All Databases on a Computer

To grant operator (SYSOPER) privileges for all databases on a computer:

1. Choose Add/Remove.

   The OS Database Operators - Computer for *hostname* dialog box appears:



OS Database Operators - Computer for DSTEINER-...

Select the NT domain users and groups to which to assign database operator privileges for all databases on the computer DSTEINER-PC3.

NT Domain Users and Groups

Domain: DTMSDOM

Name	Description
ST-NT-DOC	ST NT Doc group f...
ST-NT-Instal&Rel-Mgr	ST NT Install & Rel...
ST-NT-Install	ST NT Installer Group
ST-NT-LIBRARIES	Pkumar's Staff
ST-NT-Mesg&Web	ST NT Messaging ...

OS Database Operators - Computer

Name
DTMSDOM\ST-NT-Install

2. Select the domain of the user to which to grant SYSOPER privileges from the Domain drop-down list box.
3. Select the user.
4. Choose Add.

   The user now appears in the OS Database Operators - Computer window.
5. Choose OK.

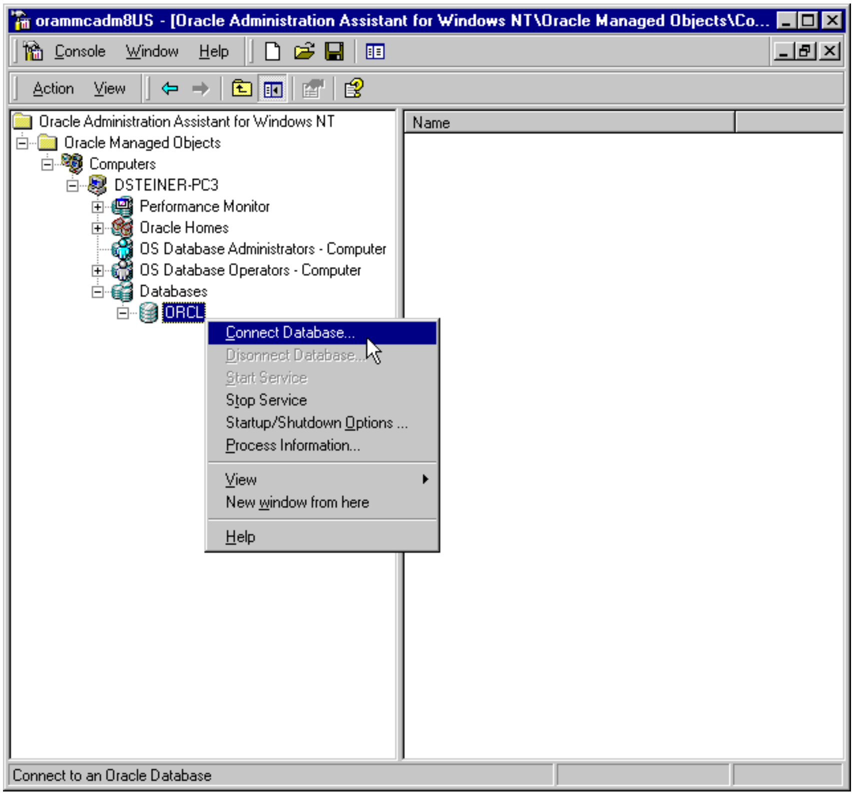
Connecting to a Database

Once you connect to a database, you can perform additional authentication tasks:

- Viewing Database Authentication Parameter Settings
- Creating a Nonprivileged Database User (External User)
- Creating a Local Database Role
- Creating an External Role
- Granting Administrator and Operator Privileges for a Single Database

To connect to a database:

1. Right-click the database instance to access (for example, ORCL) in the Microsoft Management Console scope pane:


orammcadm8US - [Oracle Administration Assistant for Windows NT\Oracle Managed Objects\Co...
Console
Window
Help
Action
View
Oracle Administration Assistant for Windows NT
Oracle Managed Objects
Computers
DSTEINER-PC3
Performance Monitor
Oracle Homes
OS Database Administrators - Computer
OS Database Operators - Computer
Databases
ORCL
Name
Connect Database...
Disconnect Database...
Start Service
Stop Service
Startup/Shutdown Options ...
Process Information...
View
New window from here
Help
Connect to an Oracle Database

To enable Secure Sockets Layer (SSL) when connecting to an Oracle database, do not use the default user account in the Windows NT Services dialog box when starting the Oracle service and the listener service. Start these services in the same user account as the wallet created in Oracle Wallet Manager. If the Oracle service and the listener service are started in the default user accounts, SSL does not work and the listener does not start. Support for SSL is an Oracle Advanced Security feature. Oracle Wallet Manager is also an Oracle Advanced Security feature.

> **See Also:** *Oracle Advanced Security Administrator's Guide* for more information on SSL support

2. Choose Connect Database.

   If you connect to the Oracle database, the following Windows NT nodes appear beneath the instance. If these nodes do not appear, double-click the instance.

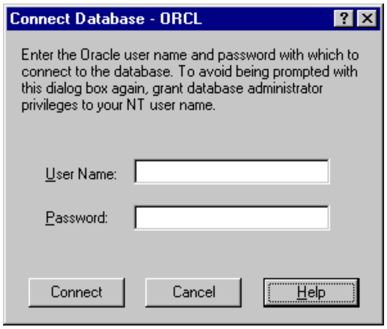
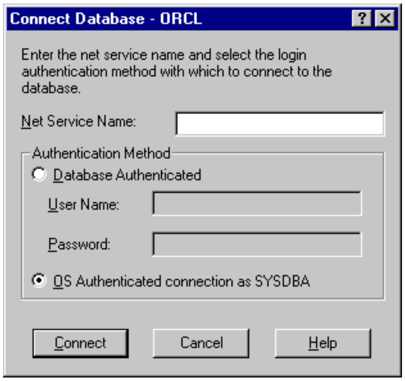
This Node...	Enables You To...	For More Information...
External OS Users	Authenticate a Windows NT user to access the Oracle database as an external user without being prompted for a password. External users are typically regular database users (non-database administrators) to which you assign standard database roles (such as `CONNECT` and `RESOURCE`), but do not want to assign `SYSDBA` (database administrator) or `SYSOPER` (database operator) privileges.	See "Creating a Nonprivileged Database User (External User)" on page 2-14
Local Roles	Create a role and have it managed by the database. Once a local role is created, you can grant or revoke that role to a database user.	See "Creating a Local Database Role" on page 2-18
External OS Roles	Create an external role and have it managed by the Windows operating system. Once an external role is created, you can grant or revoke that role to a database user.	See "Creating an External Role" on page 2-20

This Node...	Enables You To...	For More Information...
OS Database Administrators	Authenticate a Windows NT user with SYSDBA privileges for a specific instance on a computer.	See "Granting Administrator and Operator Privileges for a Single Database" on page 2-24
OS Database Operators	Authenticate a Windows NT user with SYSOPER privileges for a specific instance on a computer.	See "Granting Administrator and Operator Privileges for a Single Database" on page 2-24

Troubleshooting Connection Problems

When connecting to a local computer, Oracle Administration Assistant for Windows NT first tries to connect as a SYSDBA to the database using the Bequeath networking protocol. When connecting to a remote computer, Oracle Administration Assistant for Windows NT tries to connect using Windows native authentication as a SYSDBA to the database using the TCP/IP networking protocol (port 1521 or the deprecated 1526). If it is unsuccessful, the dialog boxes shown in Table 2–1 appear and prompt you to enter information to connect to the database:

Table 2–1 Resolving Database Connection Problems

This Dialog Box Appears...	Because...
 Connect Database - ORCL Enter the Oracle user name and password with which to connect to the database. To avoid being prompted with this dialog box again, grant database administrator privileges to your NT user name. 	The Windows NT domain user with which you are attempting to connect to the Oracle database is not recognized as an authenticated user with SYSDBA privileges. Enter an Oracle username and password to access the database. To avoid being prompted with this dialog box again, configure your domain user to be a database administrator authenticated by the Windows NT operating system.
 Connect Database - ORCL Enter the net service name and select the login authentication method with which to connect to the database. Net Service Name: Authentication Method ○ Database Authenticated User Name: Password: ● OS Authenticated connection as SYSDBA 	You are not using the TCP/IP networking protocol to connect to a remote Oracle database or the Oracle database is not running. Using a protocol other than TCP/IP (Named Pipes for example) causes this dialog box to appear each time you attempt a remote connection. If you do not want this dialog to appear each time change to the TCP/IP protocol and make sure the Oracle Net Services listener is for the database listening on the default port 1521 (or the deprecated default port 1526). Otherwise, this dialog appears every time. Ensure also that the Oracle database is started. **1.** Enter the net service name with which to connect to your Oracle database. You must enter a net service name regardless of the authentication method you select. **2.** If you want to access the database with an Oracle username and password, select the Database Authenticated option. This username and password must exist in the Oracle database and have the SYSDBA privilege. **3.** If you want to access the database with the Windows NT domain user with which you are currently logged in, select the OS Authenticated Connection as SYSDBA option. This domain user must already be recognized by Windows NT as an authenticated user with SYSDBA privileges. Otherwise, your logon fails.

Viewing Database Authentication Parameter Settings

To view database authentication parameter settings:

1. Right-click the database.
2. Choose Properties.
3. The ORCL Properties dialog box appears displaying the following parameter values:

Parameter	Description
OS_AUTHENT_PREFIX	OS_AUTHENT_PREFIX is an init.ora file parameter that authenticates external users attempting to connect to the Oracle database with the user's Windows NT username and password. The value of this parameter is attached to the beginning of every user's Windows username. By default, the parameter is set to none ("") during Oracle9*i* database creation. Create Oracle users in the database without the prefix OPS$, which was needed for Oracle7 and Oracle8 release 8.0.*x*. Therefore, a Windows domain username of frank is authenticated as username frank. You can set this parameter to an appropriate value. For example, if you set this parameter to xyz, the Windows NT domain user frank is authenticated as user xyzfrank.
OS_ROLES	OS_ROLES is an init.ora file parameter that, if set to true, enables the Windows NT operating system to manage the authorization of external roles for database users. By default, OS_ROLES is set to false. You must set OS_ROLES to true and restart your Oracle database before you can create external roles. If OS_ROLES is set to false, the Oracle database manages the granting and revoking of roles for database users. See section "Understanding the OS_ROLES Parameter" on page 2-13 for more information.

Understanding the OS_ROLES Parameter

OS_ROLES is a parameter in the init.ora file that, if set to true, enables the Windows NT operating system to manage the authorization of external roles for database users. You must set OS_ROLES to true and restart your Oracle database before you can create external roles.

If OS_ROLES is set to false, the Oracle database manages the granting and revoking of roles for database users.

If OS_ROLES is set to true and you assign an external role to an NT global group, it is granted only at the global group level, and not at the level of the individual user in this global group. This means that you cannot revoke or edit the external role assigned to an individual user in this global group through the Roles tab of the User Name Properties dialog box at a later time. Instead, you must use the Assign External OS Roles to an NT Global Group field in the dialog box to revoke the external role from this global group (and therefore all its individual users).

External roles assigned to an individual domain user or local roles (with `OS_ROLES` set to `false`) assigned to an individual domain user or NT global group are not affected by this issue, and can be edited or revoked.

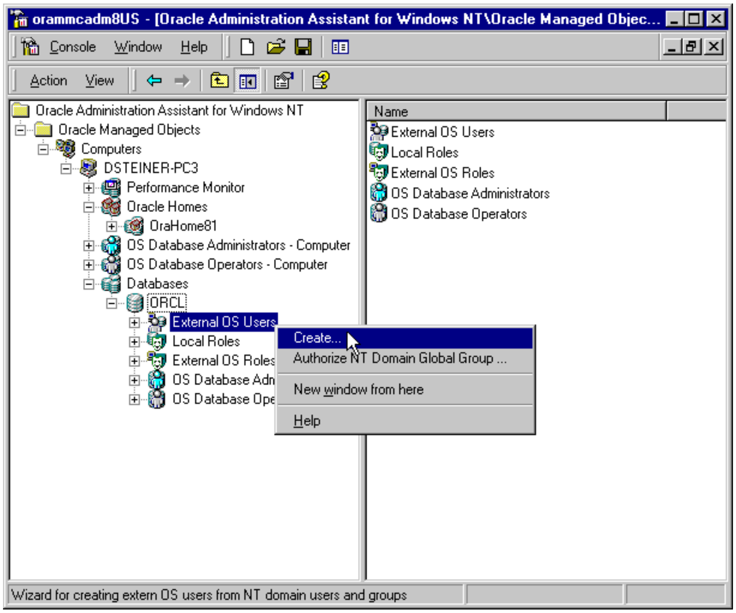
If `OS_ROLES` is set to `true`, you cannot grant local roles in the database to any database user. You must grant the roles through Windows NT. See "Creating a Local Database Role" on page 2-18 and "Creating an External Role" on page 2-20 for more information.

Creating a Nonprivileged Database User (External User)

You can create a nonprivileged database user (external user).

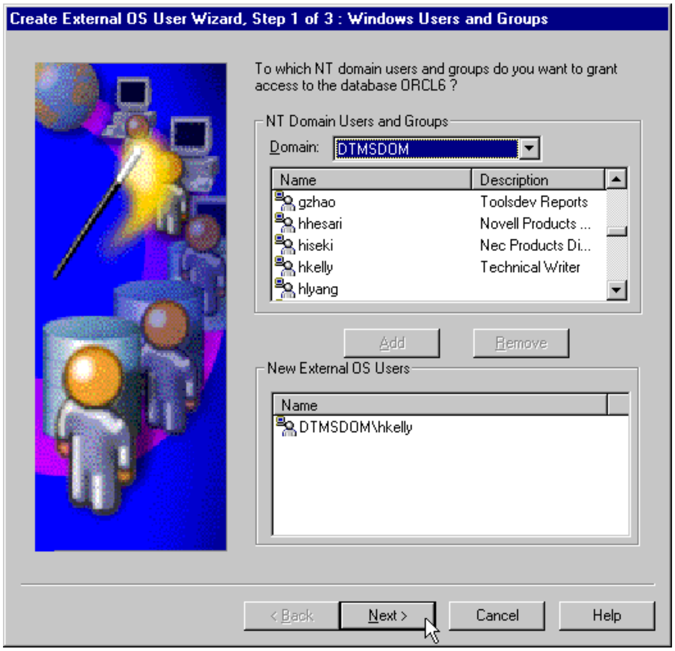
To create a nonprivileged database user:

1. Follow the steps in "Connecting to a Database" on page 2-9 to connect to a database.
2. Right-click External OS Users.
3. Choose Create.



Wizard for creating extern OS users from NT domain users and groups

The Create External OS User Wizard starts:



Create External OS User Wizard, Step 1 of 3 : Windows Users and Groups

To which NT domain users and groups do you want to grant access to the database ORCL6 ?

NT Domain Users and Groups

Domain: DTMSDOM

Name	Description
gzhao	Toolsdev Reports
hhesari	Novell Products ...
hiseki	Nec Products Di...
hkelly	Technical Writer
hlyang	

New External OS Users

Name
DTMSDOM\hkelly

4. Select the domain in which your Windows NT domain users and global groups are located.

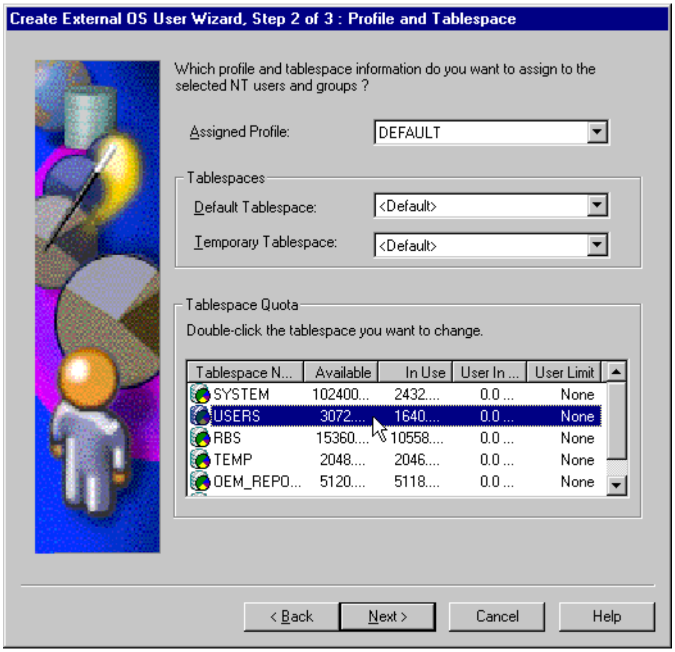
5. Select the Windows NT domain users and global groups to which to grant access to the database.

6. Choose Add.

   The user now appears in the New External OS Users window.

Note: If you select an NT global group for authentication when using Oracle Administration Assistant for Windows NT, all users currently in the group are added to the Oracle database. If at a later time, you use a Windows NT tool to add or remove users in this Windows NT global group, these updates are not reflected in the Oracle database. The newly added or removed users must be explicitly added or removed in the Oracle database with Oracle Administration Assistant for Windows NT.

7. Choose Next.



Create External OS User Wizard, Step 2 of 3 : Profile and Tablespace

Which profile and tablespace information do you want to assign to the selected NT users and groups ?

Assigned Profile: DEFAULT

Tablespaces

Default Tablespace: <Default>

Temporary Tablespace: <Default>

Tablespace Quota

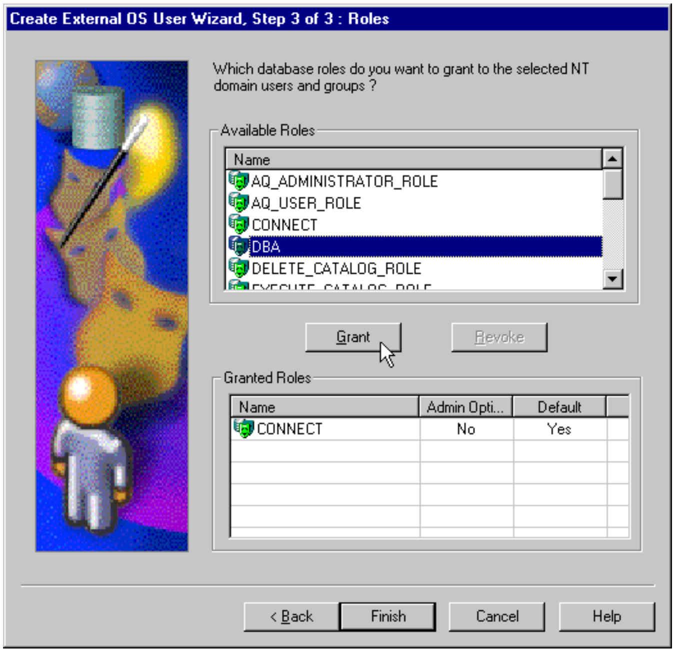
Double-click the tablespace you want to change.

Tablespace N...	Available	In Use	User In ...	User Limit
SYSTEM	102400...	2432....	0.0 ...	None
USERS	3072....	1640....	0.0 ...	None
RBS	15360....	10558....	0.0 ...	None
TEMP	2048....	2046....	0.0 ...	None
OEM_REPO...	5120....	5118....	0.0 ...	None

8. Select a profile for the new external users. A profile is a named set of resource limits. If resource limits are enabled, Oracle limits database usage and instance resources to whatever is defined in the user’s profile. You can assign a profile to each user, and a default profile to all users who do not have specific profiles.

9. Double-click the tablespace to assign a tablespace quota in the Tablespace Quota window. This assigns profile and tablespace information to the users, and grants database roles.

10. Choose Next.



Create External OS User Wizard, Step 3 of 3 : Roles

Which database roles do you want to grant to the selected NT domain users and groups ?

Available Roles

Name
AQ_ADMINISTRATOR_ROLE
AQ_USER_ROLE
CONNECT
DBA
DELETE_CATALOG_ROLE
EXECUTE_CATALOG_ROLE

Granted Roles

Name	Admin Opti...	Default
CONNECT	No	Yes

11. Select the database roles to grant to the new external users.

12. Choose the Grant button.

13. Choose Finish.

14. Right-click the external user for which you want to view information and select Properties.

The assigned properties appear.

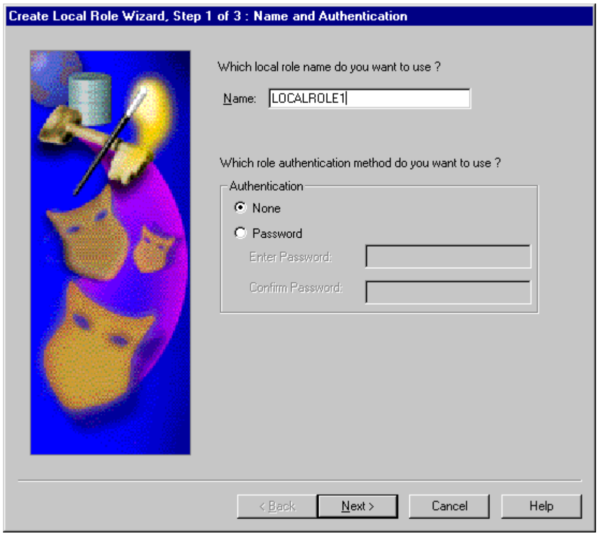
Creating a Local Database Role

You can create a local database role.

To create a local database role:

1. Follow the steps in "Connecting to a Database" on page 2-9 to connect to a database.
2. Right-click Local Roles for the database for which you want to create a local role.
3. Choose Create.

   The Create Local Role wizard appears:



Create Local Role Wizard, Step 1 of 3 : Name and Authentication

Which local role name do you want to use ?

Name: LOCALROLE1

Which role authentication method do you want to use ?

Authentication

● None

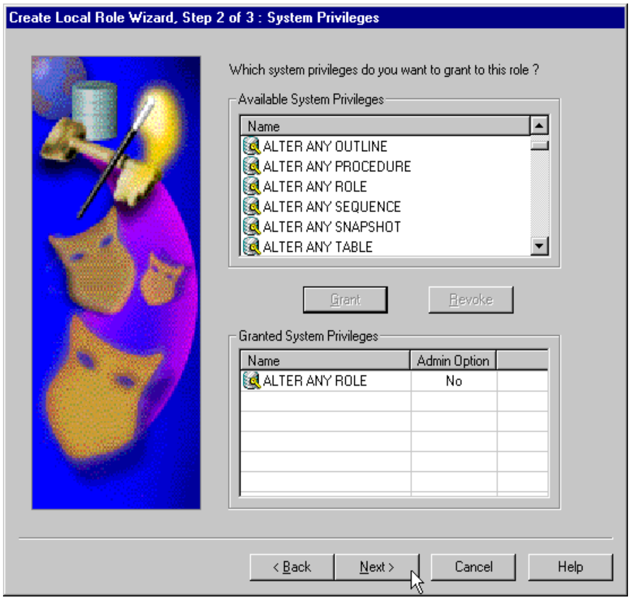
○ Password

Enter Password:

Confirm Password:

4. Enter a local role name to use. A local role is a role that is managed by the Oracle database.
5. Select None if you want a user to use this local role without being required to enter a password.
6. Select Password if you want the use of this role to be protected by a password. These roles can only be used by supplying an associated password with the SET ROLE command. See *Oracle9i Database Administrator's Guide* for additional information.
7. Enter the password to use with this role.

8. Confirm the password by entering it a second time.
9. Choose Next.



Create Local Role Wizard, Step 2 of 3 : System Privileges

Which system privileges do you want to grant to this role ?

Available System Privileges

Name
ALTER ANY OUTLINE
ALTER ANY PROCEDURE
ALTER ANY ROLE
ALTER ANY SEQUENCE
ALTER ANY SNAPSHOT
ALTER ANY TABLE

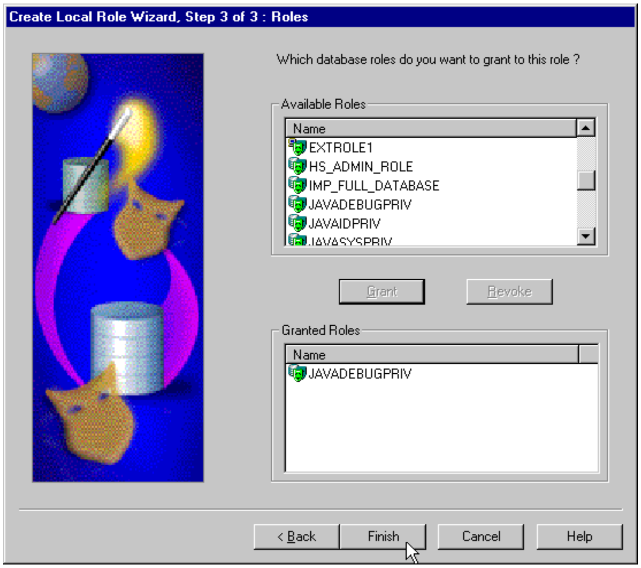
Granted System Privileges

Name	Admin Option
ALTER ANY ROLE	No

10. Select appropriate system privileges to assign to the local role.
11. Choose Grant to grant the selected system privileges to the local role.

    The Granted System Privileges field displays the list of system privileges granted to the local role. To revoke a system privilege, make an appropriate selection, then choose Revoke.
12. If you want to grant the Admin Option to this role, click the value in the Admin Option column to display a drop-down list box. This enables you to select Yes.
13. Choose Next.

14. Select appropriate roles to assign to the local role. Both local roles and external roles appear in this list.



Create Local Role Wizard, Step 3 of 3 : Roles

Which database roles do you want to grant to this role ?

Available Roles

Name
EXTROLE1
HS_ADMIN_ROLE
IMP_FULL_DATABASE
JAVADEBUGPRIV
JAVAIDPRIV
JAVASYSPRIV

Granted Roles

Name
JAVADEBUGPRIV

15. Choose Grant to grant the selected roles to the role.

    The Granted Roles field displays the list of roles granted to the role. Both local roles and external roles can appear in this list. To revoke roles, make appropriate selections, then choose Revoke.

16. Choose Finish.

Creating an External Role

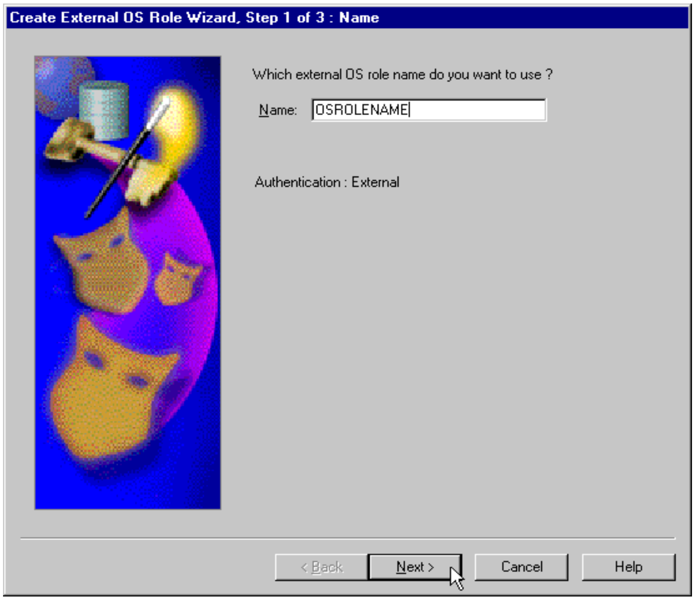
You can create external roles.

To create an external role:

1. Follow the steps in "Connecting to a Database" on page 2-9 to connect to a database.
2. Right-click External OS Roles for the database for which to create an external role.
3. Choose Create.

Note: This wizard is only available if you set the `init.ora` parameter `OS_ROLES` to `true` and restart the Oracle database.

"Authentication: External" appears on this page to indicate that only external roles can be created.



Create External OS Role Wizard, Step 1 of 3 : Name

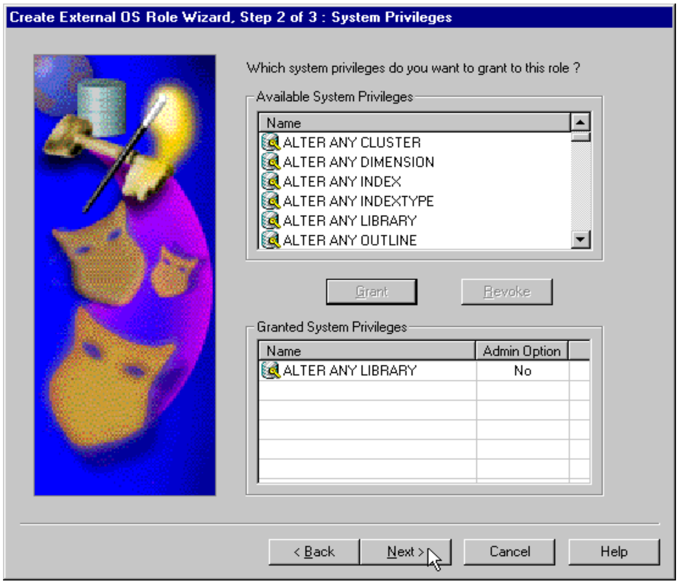
Which external OS role name do you want to use ?

Name: OSROLENAME

Authentication : External

4. Enter an external role name to use. An external role is a role that is managed by the Windows operating system.

5. Choose Next.



Create External OS Role Wizard, Step 2 of 3 : System Privileges

Which system privileges do you want to grant to this role ?

Available System Privileges

Name
ALTER ANY CLUSTER
ALTER ANY DIMENSION
ALTER ANY INDEX
ALTER ANY INDEXTYPE
ALTER ANY LIBRARY
ALTER ANY OUTLINE

Granted System Privileges

Name	Admin Option
ALTER ANY LIBRARY	No

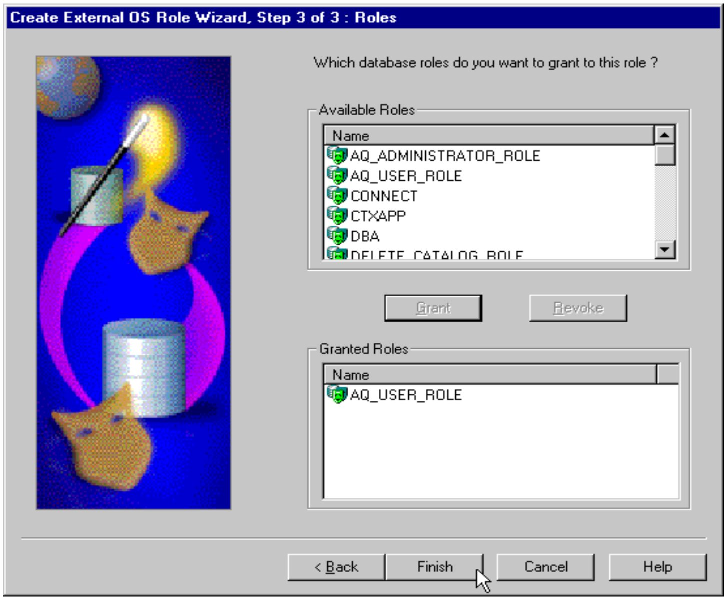
6. Select appropriate system privileges to assign to the external role.

7. Choose Grant to grant the selected system privileges to the external role.

8. The Granted System Privileges field displays the list of system privileges granted to the external role. To revoke a system privilege, make an appropriate selection, then choose Revoke.

9. If you want to grant the Admin Option to this role, choose the value in the Admin Option column to display a drop-down list box. This enables you to select Yes.

10. Choose Next.



Create External OS Role Wizard, Step 3 of 3 : Roles

Which database roles do you want to grant to this role ?

Available Roles

Name
AQ_ADMINISTRATOR_ROLE
AQ_USER_ROLE
CONNECT
CTXAPP
DBA
DELETE_CATALOG_ROLE

Granted Roles

Name
AQ_USER_ROLE

11. Select appropriate roles to assign to the external role.
12. Choose Grant to grant the selected roles to the external role. Both local roles and external roles appear in this list.

    The Granted Roles field displays the list of roles granted to the external role.
13. Choose Finish.

Granting Administrator and Operator Privileges for a Single Database

You can grant database administrator (SYSDBA) and database operator (SYSOPER) privileges to database administrators for a single database on a computer.

To grant privileges for a single database:

1. Follow the steps in "Connecting to a Database" on page 2-9 to connect to a database.
2. Right-click the database to access (for example, `orcl`) in the Microsoft Management Console scope pane.
3. Choose Connect Database.

   Several icons, including OS Database Administrators and OS Database Operators, appear.
4. Make an appropriate selection:

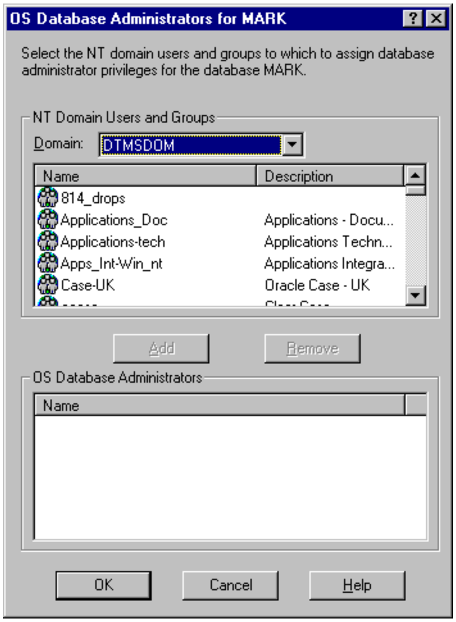
If You Want to Grant...	Then...
Database administrator (SYSDBA) privileges	1. Right-click OS Database Administrators. 2. Follow the steps 1-4 above.
Database operator (SYSOPER) privileges	1. Right-click OS Database Operators. 2. See section "Granting Operator Privileges for a Single Database" on page 2-26

Granting Administrator Privileges for a Single Database

To grant administrator (SYSDBA) privileges for a single database:

1. Choose Add/Remove.

   The OS Database Administrators for *instance* dialog box (MARK in this example) appears:



OS Database Administrators for MARK
NT Domain Users and Groups
Add
Remove
OS Database Administrators
Name
OK
Cancel
Help

Select the NT domain users and groups to which to assign database administrator privileges for the database MARK.

Domain: DTMSDOM

Name	Description
814_drops	
Applications_Doc	Applications - Docu...
Applications-tech	Applications Techn...
Apps_Int-Win_nt	Applications Integra...
Case-UK	Oracle Case - UK

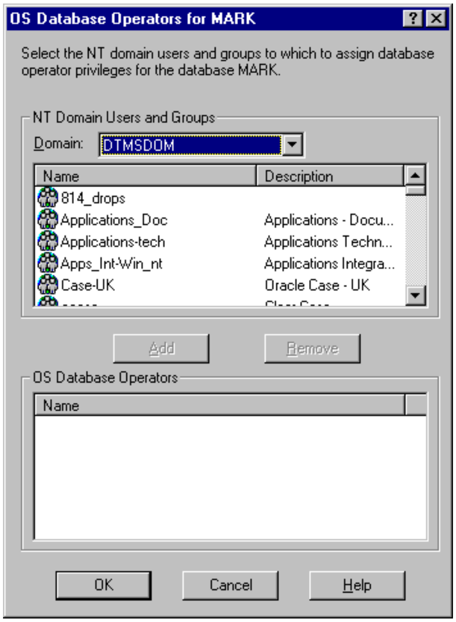
2. Select the domain of the user to which to grant SYSDBA privileges from the NT Domain Users and Groups drop-down list box.
3. Select the user. The user now appears in the OS Database Administrators window.
4. Choose OK.

Granting Operator Privileges for a Single Database

To grant operator (`SYSOPER`) privileges for a single database:

1. Choose Add/Remove.

   The OS Database Operators for *`instance`* dialog box (`mark` in this example) appears:



OS Database Operators for MARK

Select the NT domain users and groups to which to assign database operator privileges for the database MARK.

NT Domain Users and Groups

Domain: DTMSDOM

Name	Description
814_drops	
Applications_Doc	Applications - Docu...
Applications-tech	Applications Techn...
Apps_Int-Win_nt	Applications Integra...
Case-UK	Oracle Case - UK

2. Select the domain of the user to which to grant `SYSOPER` privileges from the NT Domain Users and Groups drop-down list box.
3. Select the user.
4. Choose Add.

   The user now appears in the OS Database Operators window.
5. Choose OK.

Manually Administering External Users and Roles

Manual configuration involves using Oracle command line tools, editing the registry, and creating local groups in Windows NT User Manager. This enables you to:

- Configure nonprivileged Windows NT users (external users) to access the Oracle database without a password.
- Configure Windows NT database administrators (with the SYSDBA privilege) to access the Oracle database without a password.
- Configure Windows NT database operators (with the SYSOPER privilege) to access the Oracle database without a password.
- Create and grant local and external database roles to Windows NT domain users and global groups.

This section describes:

- Creating a Nonprivileged Database User (External User)
- Granting Administrator and Operator Privileges for Databases
- Creating an External Role

Note: Use extreme care when manually configuring administrators, operators, users, and roles to be authenticated by the operating system. If possible, use Oracle Administration Assistant for Windows NT to perform configuration procedures.

Creating a Nonprivileged Database User (External User)

This section describes how to authenticate nonprivileged database users (nondatabase administrators) using Windows NT so that a password is not required when accessing the database. See Table 2–2. When you use Windows NT to authenticate nonprivileged database users, your database relies solely on Windows NT to restrict access to database usernames. In the steps below, the following Windows NT usernames are authenticated:

Table 2–2 External User Database Access

Username	This User...
Local user `frank`	Logs into their local Windows NT client computer to access an Oracle9*i* database. The database can be on a different computer. To access other databases and resources on other computers, the local user must provide a username and password each time.
Domain user `frank` on domain `sales`	Logs into a domain (`sales` in the steps below) that includes many other Windows NT computers and resources, one of which contains an Oracle9*i* database. The domain user can access all the resources the domain provides with a single username and password.

The local and domain username `frank` and the domain `sales` are used in the steps. Substitute the appropriate local and domain username and domain name for your environment.

Follow the subsequent steps to connect without a password as a nonprivileged database user:

- Task 1: Perform Authentication Tasks on the Oracle9i Database Server
- Task 2: Perform Authentication Tasks on the Client Computer

Task 1: Perform Authentication Tasks on the Oracle9*i* Database Server

To perform authentication tasks on an Oracle9*i* database server:

1. Add the `OS_AUTHENT_PREFIX` parameter to your `init.ora` file.

   The `OS_AUTHENT_PREFIX` value is prefixed to local or domain usernames attempting to connect to the server with the user’s operating system name and password. The prefixed username is compared with the Oracle usernames in the database when a connection request is attempted. Using the `OS_AUTHENT_PREFIX` parameter with Windows native authentication methods is the recommended method for performing secure, trusted client connections to your server.

2. Set OS_AUTHENT_PREFIX to an appropriate value. Values are case insensitive. For example:

Set OS_AUTHENT_PREFIX to...	Result
xyz	xyz is prefixed to the beginning of the Windows NT username (for example, xyzfrank for local user frank or xyzsales\frank for domain user frank on domain sales). **Note:** xyz is only an example of an acceptable parameter value. Use a value appropriate to your environment.
""	This is recommended, as it eliminates the need for any prefix to the Windows NT usernames (for example, frank for local user frank or sales\frank for domain user frank on domain sales).
Not included in init.ora file	The value defaults to OPS$ (for example, OPS$FRANK for local user frank or OPS$sales\frank for domain user frank on domain sales).

The parameter value xyz is used in the subsequent steps. Substitute xyz with the value you set for OS_AUTHENT_PREFIX.

3. Use User Manager to create a Windows NT local or domain username for frank (if the appropriate name does not currently exist). See your Windows NT documentation or your network administrator if you do not know how to do this.

4. Follow these substeps to create a new registry parameter *only* if you are not authenticating a domain name with a user (for example, just frank instead of frank on domain sales). Otherwise, go to step 5.

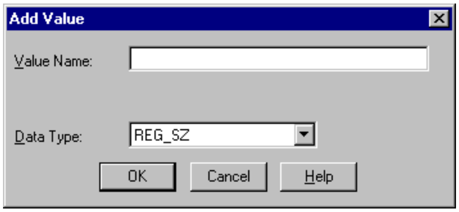
   a. Start the registry editor from the MS-DOS command prompt:

   ```
   C:\> regedt32
   ```

   b. Go to HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME*ID*, where *ID* is the Oracle home directory you want to edit.

   c. Choose the Add Value option in the Edit menu.

The Add Value dialog box appears:


Add Value

Value Name:

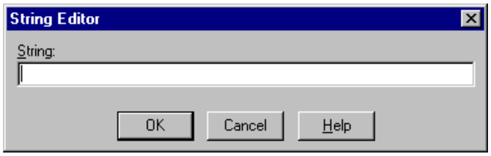
Data Type: REG_SZ

d. Enter `OSAUTH_PREFIX_DOMAIN` in the Value Name field.

e. Choose `REG_EXPAND_SZ` from the Data Type drop-down list box.

f. Choose OK.

The String Editor dialog box appears:


String Editor

String:

g. Enter `true` in the String field to enable authentication at the domain level.

`true` enables the server to differentiate between multiple `frank` usernames, whether they are local user `frank`, domain user `frank` on `sales`, or domain user `frank` on another domain in your network. Entering `false` causes the domain to be ignored and local user `frank` to become the default value of the operating system user returned to the server.

h. Choose OK.

The Registry Editor adds the parameter.

i. Choose Exit from the registry menu.

The String Editor exits.

5. Ensure that the `SQLNET.AUTHENTICATION_SERVICES` parameter in the `sqlnet.ora` file contains `nts`.

6. Start SQL*Plus:

```
C:\> SQLPLUS
```

7. Connect to the database with the SYSTEM database administrator (DBA) name:

```
SQL> CONNECT
```

```
Enter user-name: SYSTEM/password
```

Unless you have changed it, the SYSTEM password is MANAGER by default.

8. Create an operating system-authenticated user by entering the following:

If Authenticating a...	Then Enter...
Local username	SQL> CREATE USER xyzfrank IDENTIFIED EXTERNALLY;
Domain username	SQL> CREATE USER "XYZSALES\FRANK" IDENTIFIED EXTERNALLY;

Where:	Is the...
xyz	Value set for the OS_AUTHENT_PREFIX initialization parameter.
frank	Windows NT local username.
SALES\FRANK	Domain name and Windows NT domain username. The double quotes are required and the entire syntax must be in uppercase.

9. Grant the Windows NT local user frank or domain user frank appropriate database roles:

If Authenticating a...	Then Enter...

Local username	SQL> GRANT RESOURCE TO xyzfrank;
	SQL> GRANT CONNECT TO xyzfrank;

Domain username[1]	SQL> GRANT RESOURCE TO "XYZSALES\FRANK";
	SQL> GRANT CONNECT TO "XYZSALES\FRANK";

[1] Enter the syntax for domain users in uppercase and with double quotes around the domain username.

10. Connect to the database with the SYSDBA name:

```
SQL> CONNECT /AS SYSDBA
```

11. Shut down the database:

    ```
    SQL> SHUTDOWN
    ```

12. Restart the database:

    ```
    SQL> STARTUP
    ```

    This causes the change to the `OS_AUTHENT_PREFIX` parameter value to take affect.

Task 2: Perform Authentication Tasks on the Client Computer

To perform authentication tasks on the client computer:

1. Create Windows NT local or domain username `frank` with the same username and password that exist on the Windows NT server (if the appropriate name does not currently exist).
2. Ensure that the `SQLNET.AUTHENTICATION_SERVICES` parameter in the `sqlnet.ora` file contains `nts`.
3. Use Oracle Net Configuration Assistant to configure a network connection from your client computer to the Windows NT server on which your Oracle9*i* database is installed. See *Oracle9i Net Services Administrator's Guide* for instructions.
4. Start SQL*Plus:

    ```
    C:\> SQLPLUS / NOLOG
    ```

5. Connect to your Windows NT server:

    ```
    SQL> CONNECT /@connect_identifier
    ```

    where *`connect_identifier`* is the net service name for the Oracle9*i* database.

    The Oracle9*i* database searches the data dictionary for an automatic login username corresponding to the Windows NT local or domain username, verifies it, and enables connection as `xyzfrank` or `xyzsales\frank`.

6. Verify that you have connected to the Oracle9*i* database as local or domain user `frank` by viewing the roles assigned in step 5 of "Task 2: Perform Authentication Tasks on the Client Computer".

```
SQL> SELECT * FROM USER_ROLE_PRIVS;
```

which outputs for local user `frank`:

```
USERNAME                       GRANTED_ROLE                   ADM DEF OS_
------------------------------ ------------------------------ --- --- ---
XYZFRANK                       CONNECT                        NO  YES NO
XYZFRANK                       RESOURCE                       NO  YES NO
2 rows selected.
```

or, for domain user `frank`:

```
USERNAME                       GRANTED_ROLE                   ADM DEF OS_
------------------------------ ------------------------------ --- --- ---
XYZSALES\FRANK                 CONNECT                        NO  YES NO
XYZSALES\FRANK                 RESOURCE                       NO  YES NO
2 rows selected.
```

As the Oracle9*i* username is the whole name `xyzfrank` or `xyzsales\frank`, all objects created by `xyzfrank` or `xyzsales\frank` (that is, tables, views, indexes, and so on) are prefixed by this name. For another user to reference the table `shark` owned by `xyzfrank`, for example, the user must enter:

```
SQL> SELECT * FROM xyzfrank.shark
```

Note: Automatic authorization is supported for all Oracle Net protocols.

Granting Administrator and Operator Privileges for Databases

This section describes how to enable Windows NT to grant the database administrator (SYSDBA) and database operator (SYSOPER) privileges to database administrators. This enables database administrators to issue the following commands from a client computer and connect to the Oracle9*i* database without entering a password:

- `CONNECT / AS SYSOPER`
- `CONNECT / AS SYSDBA`

To enable this feature, the Windows NT local or domain username of the client must belong to one of the following four Windows NT local groups on the server. See Table 2–3.

Table 2–3 Windows NT Local Groups

Local Group	This Local Group Includes All...
ORA_OPER	SYSOPER database privileges; applicable for all databases on a computer.
ORA_DBA [1]	SYSDBA database privileges; applicable for all databases on a computer.
ORA_*SID*_DBA	SYSDBA database privileges; applicable only for a single database on a computer (identified by the *SID*).
ORA_*SID*_OPER	SYSOPER database privileges; applicable only for a single database on a computer (identified by the *SID*).

[1] ORA_DBA is automatically created during installation. See section "Automatically Enabling Operating System Authentication During Installation" on page 1-8 for information.

The SYSOPER and SYSDBA privileges are mapped to the following Windows NT local groups. See Table 2–4.

Table 2–4 SYSOPER and SYSDBA Privileges

This Privilege...	Maps to the Local Group...
SYSOPER	ORA_*SID*_OPER, ORA_OPER
SYSDBA	ORA_*SID*_DBA, ORA_DBA, ORA_*SID*_OPER, ORA_OPER

Follow these steps to connect as SYSOPER or SYSDBA without a password:

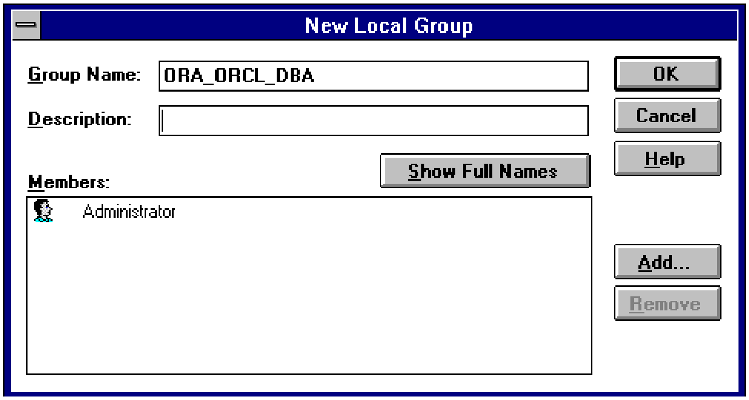
- Task 1: Perform Authentication Tasks on the Oracle9i Database Server
- Task 2: Perform Authentication Tasks on the Client Computer

Task 1: Perform Authentication Tasks on the Oracle9*i* Database Server

To perform authentication tasks on the Oracle9*i* database server:

1. Open User Manager on the Windows NT server where your Oracle9*i* database is installed.
2. Choose New Local Group from the User Menu.

   The New Local Group dialog box appears.
3. Enter the appropriate Windows NT local group name in the Group Name field. For this example, the SID entered is ORCL.



Group Name: ORA_ORCL_DBA

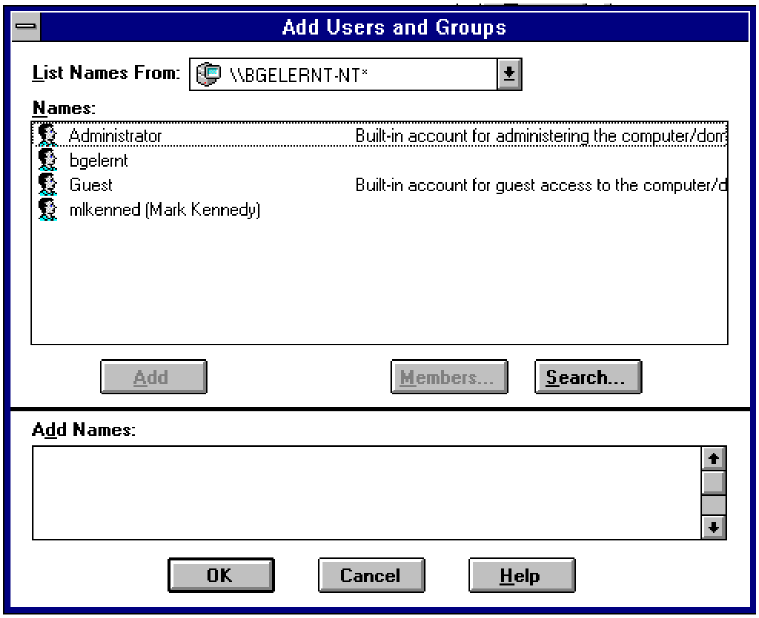
Description:

Members:

Administrator

4. Choose Add.

The Add Users and Groups dialog box appears:



Add Users and Groups

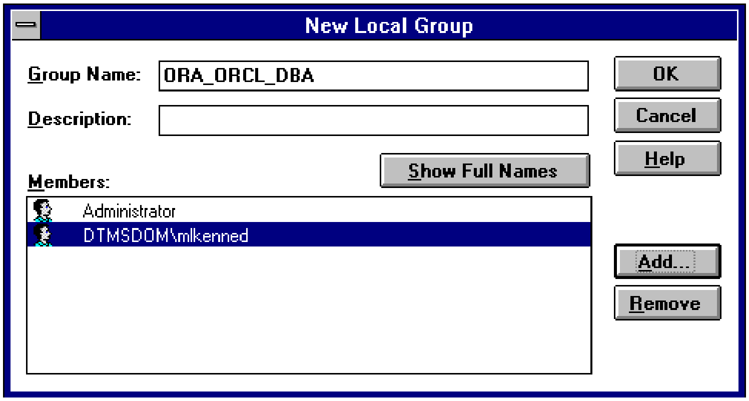
List Names From: \\BGELERNT-NT*

Names:

- Administrator — Built-in account for administering the computer/dom
- bgelernt
- Guest — Built-in account for guest access to the computer/d
- mlkenned (Mark Kennedy)

5. Select an appropriate Windows NT user from the Names field and choose Add.
6. Choose OK.

   Your selection is added to the Members field of the New Local Group dialog box:



New Local Group

Group Name: ORA_ORCL_DBA

Description:

Members:

- Administrator
- DTMSDOM\mlkenned

7. Choose OK.
8. Exit User Manager.
9. Ensure that the `SQLNET.AUTHENTICATION_SERVICES` parameter in the `sqlnet.ora` file contains `nts`.
10. Start the registry edit from the command prompt: `C:\>regedt32`
11. Go to `HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME`*`ID`*.
12. Set the parameter `OSAUTH_PREFIX_DOMAIN` to `true` where *`ID`* is the Oracle home that you want to edit.

Task 2: Perform Authentication Tasks on the Client Computer

To perform authentication tasks on the client computer:

1. Create a Windows NT local or domain username with the same username and password that exist on the Windows NT server (if the appropriate username does not currently exist).
2. Ensure that the `SQLNET.AUTHENTICATION_SERVICES` parameter in the `sqlnet.ora` file contains `nts`.
3. Use Oracle Net Configuration Assistant to configure a network connection from your client computer to the Windows NT server on which your Oracle9*i* database is installed. See *Oracle9i Net Services Administrator's Guide* for instructions.
4. Start SQL*Plus:

   ```
   C:\> sqlplus
   ```

5. Connect to the Oracle9*i* database:

   ```
   SQL> SET INSTANCE net_service_name
   ```

   where *`net_service_name`* is the Oracle Net network service name for the Oracle9*i* database.

6. Connect as SYSOPER or SYSDBA based on the local group you specified in step 3 of "Task 1: Perform Authentication Tasks on the Oracle9i Database Server":

If The Local Group Is...	Then Enter...

`ORA_DBA` or `ORA_`*`SID`*`_DBA`	`SQL> CONNECT / AS SYSOPER`
	or
	`SQL> CONNECT / AS SYSDBA`

`ORA_OPER` or `ORA_`*`SID`*`_OPER`	`SQL> CONNECT / AS SYSOPER`

You are connected to the Windows NT server. If you connect with SYSDBA, you are given DBA privileges.

Creating an External Role

This section describes how to grant Oracle9*i* database roles to users directly through Windows NT (known as external roles). When you use Windows NT to authenticate users, Windows NT local groups can grant these users external roles. Through User Manager, you can create, grant, or revoke external roles to users.

All privileges for these roles are active when the user connects. When using external roles, all roles are granted and managed through the operating system. You cannot use both external roles and Oracle roles at the same time. For example see Table 2–5:

Table 2–5 External Roles and Oracle Roles

If You...	Then...
1. Enable external roles.	
2. Log onto a Windows NT domain with your domain username; for example, `sales\frank`, where `sales` is the domain name and `frank` is the domain username.	
3. Connect to the Oracle9*i* database as Oracle database user `scott`.	You only receive the roles granted to `sales\frank`, and *not* the roles granted to `scott`.

Follow the subsequent tasks to grant external roles with Windows NT:

- Task 1: Perform Authentication Tasks on the Oracle9i Database Server
- Task 2: Perform Authentication Tasks on the Client Computer

Task 1: Perform Authentication Tasks on the Oracle9*i* Database Server

To perform authentication tasks on the Oracle9*i* database server:

1. Add the `OS_ROLES` initialization parameter to the `init.ora` file.
2. Set `OS_ROLES` to `true`.

   The default setting for this parameter is `false`.
3. Ensure that the `SQLNET.AUTHENTICATION_SERVICES` parameter in the `sqlnet.ora` file contains `nts`.
4. Start SQL*Plus:

   ```
   C:\> SQLPLUS / NOLOG
   ```
5. Connect to your Windows NT server:

   ```
   SQL> CONNECT / AS SYSDBA
   ```
6. Create a new database role:

   ```
   SQL> CREATE ROLE DBSALES3 IDENTIFIED EXTERNALLY;
   ```

   where `DBSALES3` is the name of the role for these steps. Substitute a role name appropriate to your database environment.
7. Grant Oracle roles to `DBSALES3` that are appropriate to your database environment:

   ```
   SQL> GRANT DBA TO DBSALES3 WITH ADMIN OPTION;
   SQL> GRANT RESOURCE TO DBSALES3 WITH ADMIN OPTION;
   SQL> GRANT CONNECT TO DBSALES3 WITH ADMIN OPTION;
   ```
8. Connect to the database with the `SYSDBA` name:

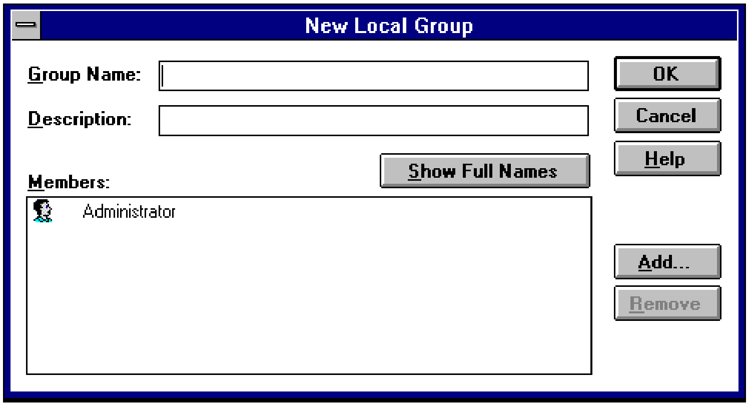
   ```
   SQL> CONNECT / AS SYSDBA
   ```
9. Shut down the database:

   ```
   SQL> SHUTDOWN
   ```
10. Restart the database:

    ```
    SQL> STARTUP
    ```

11. Open the Windows NT User Manager.
12. Choose New Local Group from the User menu.

    The New Local Group dialog box appears:



Administrator

13. Enter the Windows NT local group name corresponding to the database role in the Group Name field with the following syntax:

    `ORA_`*`sid_rolename`* `[_D] [_A]`

    where:

    `sid` Indicates the database instance.

    `rolename` Identifies the database role granted to users of a database session.

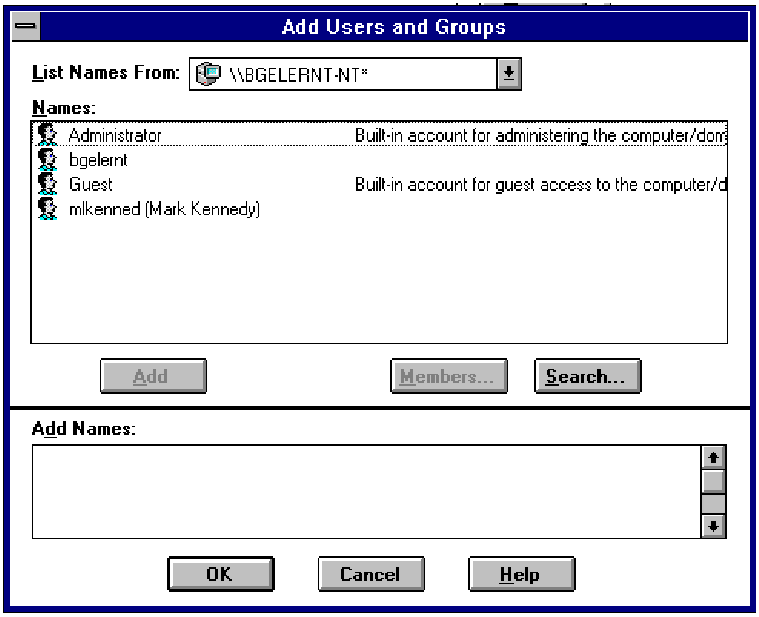
    `D` Optional character indicating that this database role is to be the default role of the database user. If specified, this character must be preceded by an underscore.

    `A` Optional character indicating that this database role includes the `ADMIN OPTION`. This enables the user to grant the role to other roles only. If specified, this character must be preceded by an underscore.

    For this example, `ORA_orcl_dbsales3_D` is entered.

14. Choose Add.

The Add Users and Groups dialog box appears:

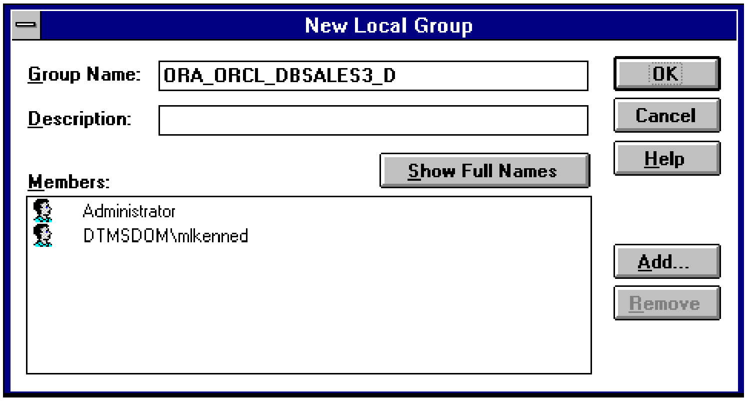


List Names From: \\BGELERNT-NT*

Names	
Administrator	Built-in account for administering the computer/dom
bgelernt	
Guest	Built-in account for guest access to the computer/d
mlkenned (Mark Kennedy)	

15. Select the appropriate Windows NT local or domain username and choose Add.
16. Choose OK.

Your selection is added to the Members field of the New Local Group dialog box:



Group Name: ORA_ORCL_DBSALES3_D

Description:

Members:

Administrator

DTMSDOM\mlkenned

You can convert additional database roles to several possible Windows NT groups, as shown in the following table. Then, users connecting to the ORCL instance in this example and authenticated by Windows NT as members of these Windows NT local groups have the privileges associated with dbsales3 and dbsales4 by default (because of the _D option). DBSALES1 and dbsales2 are available for use by the user if they first connect as members of dbsales3 or dbsales4 and use the SET ROLE command. If a user tries to connect with dbsales1 or dbsales2 without first connecting with a default role, they are unable to connect. Additionally, users can grant dbsales2 and dbsales4 to other roles.

Database Roles	Windows NT Groups
dbsales1	ORA_ORCL_dbsales1
dbsales2	ORA_ORCL_dbsales2_a
dbsales3	ORA_ORCL_dbsales3_d
dbsales4	ORA_ORCL_dbsales4_da

Note: When the Oracle9*i* database converts the group name to a role name, it changes the name to uppercase.

17. Choose OK.
18. Exit User Manager.

Task 2: Perform Authentication Tasks on the Client Computer

To perform authentication tasks on the client computer:

1. Create a Windows NT local or domain username with the same username and password that exist on the Windows NT server (if the appropriate username does not currently exist).
2. Ensure that the SQLNET.AUTHENTICATION_SERVICES parameter in the sqlnet.ora file contains nts.
3. Use Oracle Net Configuration Assistant to configure a network connection from your client computer to your Oracle9*i* database. See *Oracle9i Net Services Administrator's Guide* for instructions.

4. Start SQL*Plus:

   ```
   C:\> SQLPLUS / NOLOG
   ```

5. Connect to the correct instance:

   ```
   SQL> SET INSTANCE connect_identifier
   ```

   where *connect_identifier* is the net service name for the Oracle9*i* database that you created in Step 3.

6. Connect to the Oracle9*i* database:

   ```
   SQL> CONNECT scott/tiger AS SYSDBA
   ```

   You are connected to the Windows NT server over net service with the Oracle username scott/tiger. The roles applied to the Oracle username scott consist of all roles defined for the Windows NT username that were mapped to the database roles above (in this case, ORA_DBSALES3_D). All roles available under an authenticated connection are determined by the Windows NT username and the Oracle-specific Windows NT local groups to which the user belongs (for example, ORA_*SID*_DBSALES1 or ORA_*SID*_DBSALES4_DA).

> **Note:** OSDBA and OSOPER are the generic names for the two special operating system groups that control database administrator logins when using operating system authentication. On Windows NT, OSDBA and OSOPER are mapped to local groups in User Manager. The Windows NT-specific names for OSDBA and OSOPER are described in "Granting Administrator and Operator Privileges for Databases" on page 2-34. See *Oracle9i Database Administrator's Guide* for more information on OSDBA and OSOPER.

3

Administering Enterprise Users and Roles

Use Oracle Enterprise Security Manager to create and manage enterprise users, roles, and domains. Oracle Enterprise Security Manager is included as an integrated application of the Oracle Enterprise Manager Console. See the *Oracle Advanced Security Administrator's Guide* for more information on using Oracle Enterprise Security Manager.

This chapter contains these topics:

- Enterprise User Authentication
- Enterprise Role Authorization

Note: You can administer external users and roles in Windows 2000 domains, but you cannot use Oracle Enterprise Security Manager to perform this administration. See "How to Administer External Users and Roles" on page 2-2 for more information on tools available for administering external users and roles.

Enterprise User Authentication

Enterprise users are created and managed centrally in a directory server (for example, Oracle Internet Directory or Active Directory). To allow access to multiple databases, enterprise users need to be defined in each database as an external user.

For example, assume there is an enterprise user (`cn=joe,cn=users,dc=acme,dc=com`) who needs access to two databases: `sales` and `marketing`. This enterprise user must be defined in both databases as an external user.

Most users do not need their own schemas in the database; they typically need to access only application schemas in a database. This is especially critical in an Internet environment, where a number of users access the same application and there is no need to create schemas for each of these users.

In Oracle9*i*, you can create one shared schema in the database and map multiple enterprise users in a directory server to this one shared schema with Oracle Enterprise Security Manager.

> **See Also:** *Oracle Advanced Security Administrator's Guide* for more information

Enterprise user authentication is enabled, if you:

- Set the `OSAUTH_X509_NAME` registry parameter to `true.` (See "Oracle9i Integration with Active Directory" on page 1-6 for instructions.)
- Operate your Oracle9*i* database in a Windows 2000 domain.
- Use Oracle Enterprise Security Manager. If you are using shared schema you must use the Oracle Enterprise Security Manager to map enterprise users to the shared schema.

The Kerberos authentication protocol is used if the Windows and Oracle releases match those listed in the table in "Windows Authentication Protocols" on page 1-2. Otherwise, NTLM is used.

Enterprise Role Authorization

Enterprise Users are assigned one or more enterprise roles. Authorization of enterprise roles is supported with Oracle8*i* release 8.1.6 and later. An enterprise role is a single role created in a directory server with Oracle Enterprise Security Manager. Use Oracle Enterprise Security Manager to assign global roles and groups located on multiple databases to an enterprise role. A global role is a role that must be created individually in each Oracle9*i* database.

For example, an enterprise user can be assigned the enterprise role `HR`, which contains the global role `HR user` in the human resources database, and the global role `employee` in the corporate information database. If a user changes jobs, his enterprise role assignment is only changed in the directory, altering his privileges in multiple databases throughout the enterprise. Also, an administrator can add capabilities to enterprise roles or remove privileges from the enterprise role without having to update each users' privileges individually.

Use enterprise roles in environments where users assigned to these roles are located in many geographic regions and must access multiple databases.

> **See Also:** *Oracle Advanced Security Administrator's Guide* for more information on creating and storing enterprise roles in a directory server with Oracle Enterprise Security Manager

The permissions authorized to an enterprise user are authorized for the enterprise role contained in the global role.

Users can belong to Windows 2000 global and universal groups. These groups can be assigned to enterprise roles using Oracle Enterprise Security Manager.

> **Note:** Enterprise roles are authorized by the directory server, and not by setting the `OS_ROLES` initialization file parameter to `true` (the method for enabling external role authorization).

4

Using Oracle9*i* Directory Server Features with Active Directory

This chapter describes the use of Oracle9*i* Directory Server Features with Active Directory.

This chapter contains these topics:

LDAP and Active Directory Overview

This section provides an overview of the following topics:

- LDAP and a Directory Server
- Oracle Internet Directory
- Active Directory

LDAP and a Directory Server

The Lightweight Directory Access Protocol (LDAP) is a standard, extensible directory access protocol that enables directory clients and servers to interact using a common language. LDAP is a lightweight implementation of the X.500 Directory Access Protocol (DAP). LDAP runs directly over TCP/IP.

Oracle Internet Directory

Oracle Internet Directory provides data management tools, such as Oracle Directory Manager and command line tools, for manipulating large amounts of LDAP data. Oracle Internet Directory implements three levels of user authentication, namely, anonymous, password-based, and certificate-based using Secure Socket Layer (SSL) for authenticated access and data privacy.

Active Directory

Active Directory is the LDAP-compliant directory server included with Windows 2000. Active Directory 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). When using Oracle features that support Active Directory using LDAP, ensure that the Active Directory computer can be successfully reached using all of the TCP/IP hostname forms possible to reach the domain controller. For example, if the hostname of the domain controller is `server1` in the `domain acme.com`, then you can ping that computer using:

```
server1.acme.com acme.com and server1
```

Active Directory often issues referrals back to itself in one or more of these forms, depending upon the operation being performed. If all of the forms cannot be used to reach the Active Directory computer, then some LDAP operations may fail.

Oracle9*i* Directory Server Features

Two features are provided which make use of a directory server. These features are briefly described in the following sections:

- Directory Naming
- Enterprise User Security

Both features have been enabled to work with Microsoft's Active Directory.

Directory Naming

This feature enables clients to connect to the database server making use of information stored centrally in an LDAP-compliant directory server such as Active Directory. For example, net service names previously stored in the `tnsnames.ora` file can now be stored in Active Directory.

> **Note:** Database service and net service name entries stored in an Oracle Names Server can be migrated to a directory server using the Oracle Names Server Control utility. See *Oracle9i Net Services Administrator's Guide* for more information.

Enterprise User Security

This feature enables you to create and store Oracle9*i* database information as directory objects in an LDAP-compliant directory server. An administrator can create and store enterprise users and roles for the Oracle9*i* database in the 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 in Table 4–1 for descriptions of terms and concepts that an administrator and client user must understand before using an Oracle9*i* database with Active Directory. You must license Oracle Advanced Security to use Active Directory to manage enterprise roles.

Table 4–1 Descriptions of Terms and Concepts

See...	Which Describes...
"Managing Enterprise User Security" in *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
"Using Oracle Enterprise Security Manager" in *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 usernames. 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."

Note: Enterprise domains are directory constructs consisting of Oracle9*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 Oracle Net 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 Oracle Net Directory Naming
- Enhancement of Directory Object Type Descriptions
- Integration with Windows Login Credentials
- Oracle Directory Objects in Active Directory

Automatic Discovery of Directory Servers

Oracle Net Configuration Assistant enables you to configure client computer and Oracle9*i* database server access to a directory server. When Oracle Net Configuration Assistant starts at the end of Oracle9*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 the directory server type, Oracle Net Configuration Assistant automatically:

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

If the Active Directory server through which client connections are accessing an Oracle9*i* database is shut down, another Active Directory server is automatically discovered and begins providing connection information; this prevents any downtime for client connections.

Note: You must be running the Oracle client and database software in a Windows 2000 domain to take advantage of the automatic directory server discovery features of Oracle Net 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, Oracle Net Configuration Assistant does not automatically discover your directory server, and instead prompts you for additional information, such as the Active Directory location.

When using the Oracle Net Configuration Assistant to complete directory usage configuration against Active Directory, Oracle schema creation can fail due to Active Directory display not being populated with all 24 default languages. Before running the Oracle Net Configuration Assistant to complete directory access configuration, verify that display specifiers for all 24 languages are populated by entering the following at the command prompt:

```
ldifde -p OneLevel -d cn=DisplaySpecifiers,cn=Configuration,domain

context -f temp file
```

where:

`domain context` is the domain context for this Active Directory server. For example `dc=acme,dc=com`

`temp file` is a file where you want to put the output.

If the command reports that less than 24 entries were found, you can still use the Oracle Net Configuration Assistant. However, it will report that Oracle schema creation failed when all that failed was that display specifiers for some languages were not created.

Integration with Microsoft Tools

Oracle9*i* database services, net service names, and enterprise role entries in Active Directory display in the Microsoft Windows 2000 tools in Table 4–2:

Table 4–2 Displaying Services in Active Directory

Tool	Description	This 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 Oracle9*i* database service and 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 Oracle9*i* database service and net service name objects and manage access control

See Also:

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

User Interface Extensions for Oracle Net Directory Naming

The property menus of Oracle9*i* database service and net service name objects in Windows Explorer and Active Directory Users and Computers have been enhanced. This enables you to test for object connectivity to the Oracle9*i* database and perform database administration. When you right-click these Oracle directory objects, a menu presents you with two options for testing connectivity shown in Table 4–3:

Table 4–3 Connectivity Testing Options

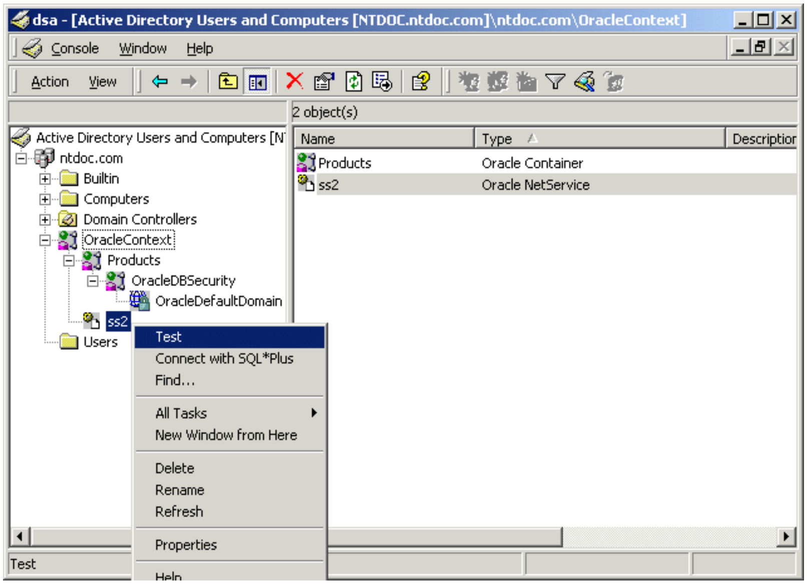
Menu Option	Description
Test	Starts an application that tests that the username, password, and net service name you initially entered can connect to the Oracle9*i* database.
Connect with SQL*Plus	Starts SQL*Plus, which enables you to perform database administration, run scripts, and so on.

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, in Figure 4–1 is the description for OracleDefaultDomain's type in the Type column of the right window pane.

Figure 4–1 Directory Object Type Descriptions in Active Directory



Name	Type	Description
Products	Oracle Container	
ss2	Oracle NetService	

Integration with Windows Login Credentials

This feature enables the Oracle client and database to use the credentials of the currently logged on Windows user for authentication and authorization.

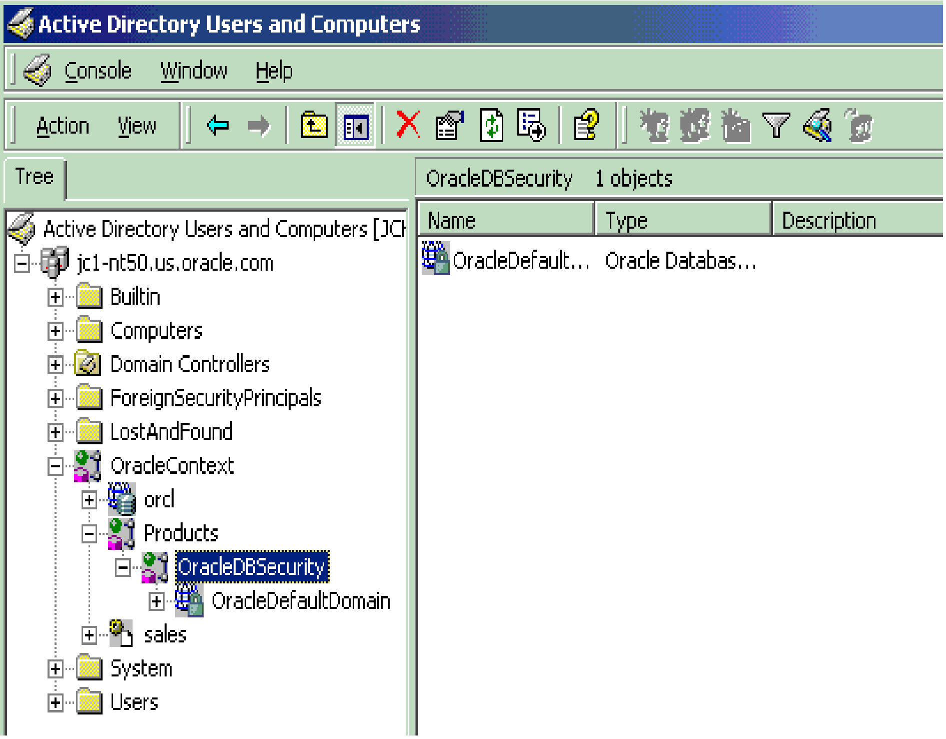
The Oracle9*i* database and configuration tools can use the currently logged on Windows user’s login credentials to automatically connect to Active Directory without having to re-enter their login credentials. This enables:

- Oracle9*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, Oracle Net Configuration Assistant, and Oracle Database Configuration Assistant to connect automatically to Active Directory and configure the Oracle9*i* database and net service name objects

Oracle Directory Objects in Active Directory

Figure 4–2 shows when the Oracle9*i* database and Oracle Net Services are installed and configured to access Active Directory, Oracle directory objects appear in Active Directory Users and Computers:

Figure 4–2 Oracle Directory Objects in Active Directory Users and Computers



Name	Type	Description
OracleDefault...	Oracle Databas...	

Table 4–4 describes these Oracle directory objects:

Table 4–4 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. Oracle Net Configuration Assistant automatically discovers this information during Oracle9*i* database integration with Active Directory.
Oracle Context	The top-level Oracle entry in the Active Directory tree that can contain Oracle9*i* database service and net service name object information. All Oracle software information is placed in this folder.
`orcl`	The Oracle9*i* database service name (for this example, `orcl` is the name).
Products	A folder for Oracle product information.
OracleDBSecurity	A folder for database security information.
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 "Access Control List Management 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 Oracle9*i* with Active Directory

Table 4–5 lists the requirements that you must complete depend upon the Oracle features you want to use:

Table 4–5 Requirements for Using Active Directory

	Required For...	
Requirement	**Net Directory Naming?**	**Enterprise User Security?**
"Oracle Schema Creation Requirements" on page 4-12	Yes	Yes
"Oracle Context Creation Requirements" on page 4-13	Yes	Yes
"Directory Naming Requirements" on page 4-13	Yes	No
"Enterprise User Security Requirements" on page 4-15	No	Yes

Note: The Oracle schema and Oracle Context can both be created by running Oracle Net 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.

If you are using Active Directory with Oracle on Windows 2000 or Windows NT, then ping the DNS domain name of your Windows 2000 domain. If this does not work, perform either of the following tasks:

- Set your Windows 2000 primary domain controller's IP address as your DNS.

  For example, if your Windows 2000 domain is `sales`, the DNS domain name for this domain is `sales.acme.com`. The IP address is of the form 001.002.003.0.

- Add the DNS domain name of your Windows 2000 domain and your domain controller's IP address to your `hosts` or `lmhosts` file.

  On the Windows 2000 computer, either 001.002.003.0 can be set as the DNS, or 001.002.003.0 `sales.acme.com` can be added to the `hosts` or `lmhosts` file.

If this step is not performed, then errors such as the following are returned when using Active Directory:

```
Cannot Chase Referrals
```

On Windows NT and Windows 2000, the Oracle database service runs in the security context of the LocalSystem or a specific local or domain user. When using Oracle8*i* release 8.1.7 with Active Directory, if the database service runs in the security context of LocalSystem, manually add the computer name in which the database service is running. This enables you to access control entries on the OracleDBSecurity container object in the Active Directory with read permissions on the OracleDBSecurity container object. For example, if the database service `OracleServiceORCL` is running in the security context of LocalSystem in the computer `mypc1`, then add `mypc1` with READ permissions ON OracleDBSecurity object to the access control entries on the OracleDBSecurity container object.

Oracle Schema Creation Requirements

Complete the following Oracle schema creation requirements to use the net directory naming and enterprise user security features with Active Directory. A schema is a set of rules for Oracle Net Services and Oracle9*i* database entries and their attributes stored in Active Directory.

- You can create only one Oracle schema for each **forest**.
- Perform schema creation on a Windows 2000 domain controller.
- The Windows 2000 domain controller must be the operations master that allows schema updates. See your Microsoft Windows operating system 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.
- Use Oracle Net Configuration Assistant to create the Oracle schema. You can create your schema during or after installation. The schema can be created by running Oracle Net Configuration Assistant on the Oracle9*i* database.

> **See Also:** *Oracle9i Net Services Administrator's Guide* for configuration procedures and Oracle9i Database installation guide for Windows for a configuration overview

Oracle Context Creation Requirements

You must complete the following Oracle Context creation requirements to use the net 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 Oracle9*i* database service and Oracle Net service name object information.

- You can create only one Oracle Context for each 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 Oracle Net Configuration Assistant. If you are a domain administrator, you automatically have these rights.
- Use Oracle Net Configuration Assistant to create your Oracle Context. You can create the Oracle Context during Oracle9*i* Database Custom install or after installation.

> **See Also:** See Oracle9i Database installation guide for Windows for installation procedures and *Oracle9i Net Services Administrator's Guide* for configuration procedures

Directory Naming Requirements

Ensure that you first satisfy the requirements described in:

- "Oracle Schema Creation Requirements" on page 4-12
- "Oracle Context Creation Requirements" on page 4-13

Table 4–6 describes the minimum Microsoft and Oracle software releases that must be installed to use directory naming with Active Directory:

Table 4–6 Minimal Directory Naming Requirements

For...	Required Microsoft Software	Required Oracle Software
Client Computers from which to manage the Oracle9*i* enterprise users, roles and domains	▪ Windows 2000 ▪ Windows NT 4.0 with **Active Directory Service Interfaces (ADSI)** ▪ Windows 95 or 98 with the Distributed Systems Client upgrade ▪ Must be in the Windows 2000 domain	Oracle8*i* Client release 8.1.6 or later
Database Server	▪ Windows NT 4.0 with ADSI ▪ The computer running the database server should be in the Windows 2000 domain ▪ Windows 2000	Oracle8*i* database release 8.1.6 or later 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 4-12
- "Oracle Context Creation Requirements" on page 4-13

Table 4–7 describes the Microsoft and Oracle software releases required to use enterprise user security with Active Directory:

Table 4–7 Enterprise User Security Software Requirements

For...	Microsoft Software	
Database Server	■ Windows NT 4.0 with ADSI ■ The computer running the database server should be in the Windows 2000 domain ■ Windows 2000	Oracle8*i* database release 8.1.6 or later is required for registering the database service as an object in Active Directory.
Remote computer	■ The host computer has to be in the Windows 2000 domain ■ Windows NT 4.0 with ADSI or Windows 2000	Oracle Enterprise Manager Console release 2.1, which includes: ■ Oracle Enterprise Security Manager ■ Oracle Net Services **Note:** Oracle Enterprise Security Manager is required if you want to create and manage enterprise users, roles, and domains. If Oracle Enterprise Security Manager uses Native Authentication to connect to Active Directory, the host computer should be in a Windows 2000 domain and the user should be logged into the host computer as a Windows 2000 domain user.

Oracle9*i* Installation and Configuration with Active Directory

This section provides an overview of installation and configuration information. This section contains these topics:

- Installation Tasks
- Post-Installation Configuration Tasks

Installation Tasks

See the Oracle9i Database installation guide for Windows for Oracle9*i* installation instructions.

Post-Installation Configuration Tasks

You must set the `OSAUTH_X509_NAME` registry parameter to `true` to use enterprise user security in the Oracle Windows Native Authentication Adapter. See "Task 2: Set the OSAUTH_X509_NAME Registry Parameter".

Testing Connectivity

This section describes how to connect to an Oracle9*i* database through Active Directory. This section contains these topics:

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

Testing Connectivity from Client Computers

When using Oracle Net directory naming client computers connect to a database by specifying the database or net service name entry that appears in the Oracle Context. For example, if the database entry under the Oracle Context in Active Directory was `orcl`, a user connects through SQL*Plus to the Oracle9*i* database as shown in Table 4–8:

Table 4–8 Connectivity from Client Computers

If the Client and Oracle9*i* database are in...	The Client Specifies The Following...
The same domain	`SQL> CONNECT scott/tiger@orcl`
Different domains	`SQL> CONNECT scott/tiger@orcl.`*`domain`* where *`domain`* is the domain in which the Oracle9*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 Oracle9*i* database through a directory server by entering minimal connection information; this is the case even when the client computer and Oracle9*i* database are in separate domains. X.500 names are longer; this is especially the case when the client and Oracle9*i* database are located in different domains (also known as administrative contexts).

To learn more about X.500 naming conventions, see "Configuration Management Concepts", of *Oracle9i Net Services Administrator's Guide* for information.

Testing Connectivity from Microsoft Tools

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

- Windows Explorer
- Active Directory Users and Computers

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

- Connect with SQL*Plus to an Oracle9*i* database
- Test Oracle9*i* database connectivity

Note: All clients accessing an Oracle9*i* database through Active Directory require read access on all net service name objects in the Oracle Context and must be able to authenticate anonymously with Active Directory. Oracle Net Configuration Assistant automatically sets this up.

Accessing Connectivity Tools

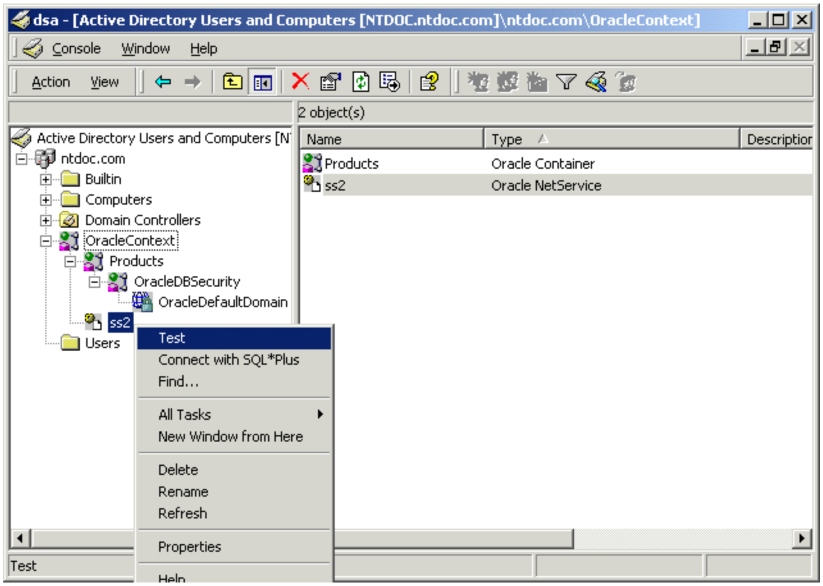
To access connectivity tools:

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

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

2. Expand the domain in which your Oracle Context is located.
3. Go to your Oracle Context.
4. Right-click a database service or Oracle Net Service name object.

   A menu appears with several options:



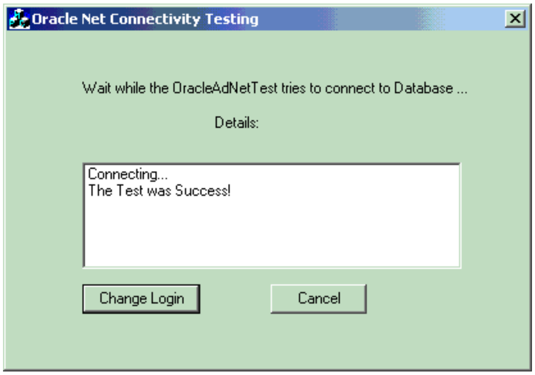
Name	Type	Description
Products	Oracle Container	
ss2	Oracle NetService	

5. Make an appropriate selection:

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

Testing Connectivity

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



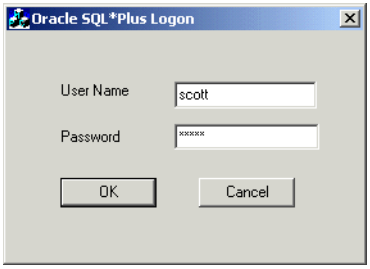
Wait while the OracleAdNetTest tries to connect to Database ...

Details:

```
Connecting...
The Test was Success!
```

Connecting With SQL*Plus

The Oracle SQL*Plus Login dialog box appears:



User Name: scott

Password: *****

Enter your username and password. A status message appears describing the status of your connection attempt.

Access Control List Management 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 shown in Table 4–9 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:

Table 4–9 Oracle Context Security Groups

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 enterprise domains
OracleDBCreator	Group for the creator of the Oracle9*i* database. Users in this group can: ■ This group creates new Oracle9*i* database objects in the Oracle Context ■ Modify the Oracle9*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.
OracleNetAdmins	Users in this group can: ■ Create, modify, and read Oracle Net Services objects and attributes ■ Read the group membership of this group

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. See Table 4–10.

Table 4–10 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 *Oracle Advanced Security Administrator's Guide* for instructions on using Oracle Enterprise Security Manager.

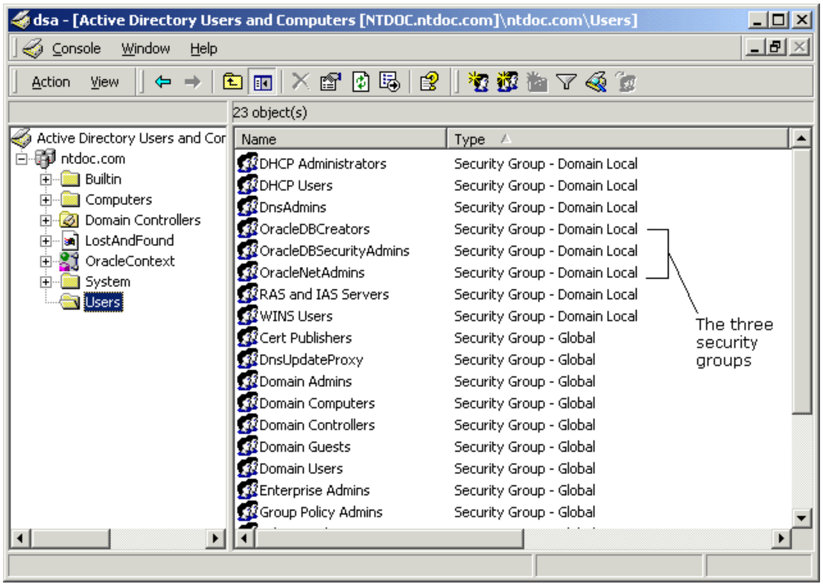
Note: Use Active Directory Users and Computers to perform the procedures described in this section. Windows Explorer does not provide the functionality.

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:



Name	Type
DHCP Administrators	Security Group - Domain Local
DHCP Users	Security Group - Domain Local
DnsAdmins	Security Group - Domain Local
OracleDBCreators	Security Group - Domain Local
OracleDBSecurityAdmins	Security Group - Domain Local
OracleNetAdmins	Security Group - Domain Local
RAS and IAS Servers	Security Group - Domain Local
WINS Users	Security Group - Domain Local
Cert Publishers	Security Group - Global
DnsUpdateProxy	Security Group - Global
Domain Admins	Security Group - Global
Domain Computers	Security Group - Global
Domain Controllers	Security Group - Global
Domain Guests	Security Group - Global
Domain Users	Security Group - Global
Enterprise Admins	Security Group - Global
Group Policy Admins	Security Group - Global

The three security groups

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:

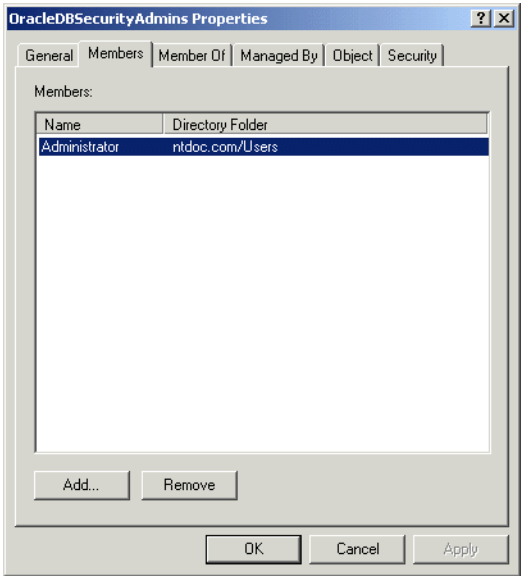
If You Want To...	Then...
Add or remove users	1. Choose the Members tab. 2. Go to section "Adding or Removing Users" on page 4-23.
Change permissions	1. Choose the Security tab. 2. Go to section "Changing User Permissions" on page 4-24.

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):

Name	Directory Folder
Administrator	ntdoc.com/Users

2. Make an appropriate selection:

To...	Then...
Add Users	**1.** Choose Add. The Select Users, Contacts, Computers, or Groups dialog box appears. **2.** Select appropriate users or groups, and choose Add. Your selections appear in the Select Users, Contacts, Computers, or Groups dialog box. **3.** Choose OK.
Remove Users	**1.** Select a user to remove. **2.** Choose Remove. The user is removed. **3.** Choose OK.

Changing User Permissions

To change user permissions:

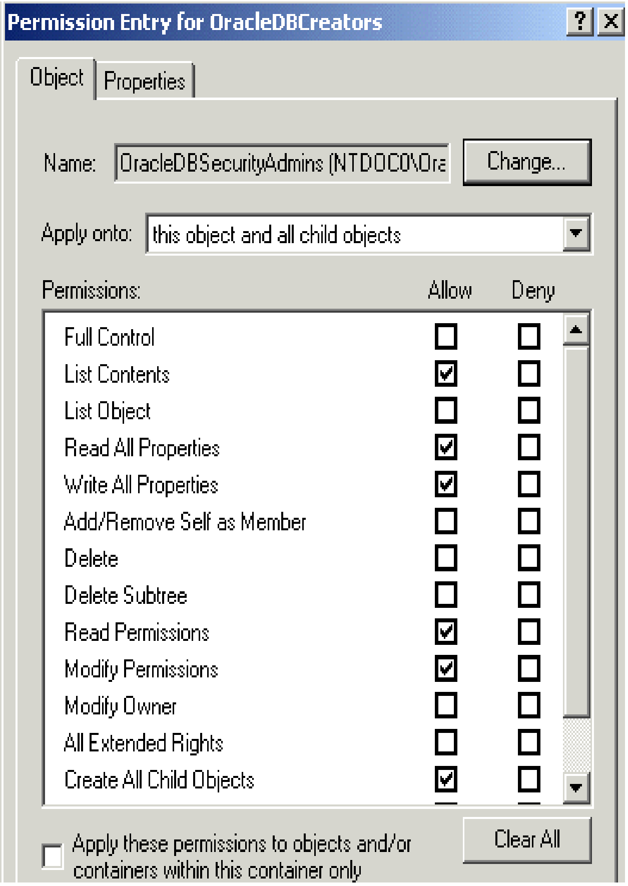
1. Complete the access procedures in "Accessing the Security Groups" on page 4-21.

   The Properties dialog box for the group you selected appears.

2. Choose Advanced.

3. Choose View / Edit.

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



Permission Entry for OracleDBCreators

Name: OracleDBSecurityAdmins (NTDOC0\Ora

Apply onto: this object and all child objects

Permissions:	Allow	Deny
Full Control	□	□
List Contents	☑	□
List Object	□	□
Read All Properties	☑	□
Write All Properties	☑	□
Add/Remove Self as Member	□	□
Delete	□	□
Delete Subtree	□	□
Read Permissions	☑	□
Modify Permissions	☑	□
Modify Owner	□	□
All Extended Rights	□	□
Create All Child Objects	☑	□

□ Apply these permissions to objects and/or containers within this container only

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

Creating Enterprise Domains

A default enterprise 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 enterprise domains. These domains are added under the OracleDBSecurity folder.

5

Storing Oracle Wallets in the Windows Registry

This chapter describes the storing and retrieving of Oracle Wallets in the Windows registry.

This chapter contains these topics:

Storing Private Keys and Trustpoints

Oracle Wallets store the private keys and trustpoints, and holds the digital certificates used in public key applications for authentication and encryption. The Oracle Wallet Manager tool creates and manages Oracle Wallets. Oracle Enterprise Login Assistant is used to create an obfuscated wallet. Oracle Public Key applications use obfuscated Oracle Wallets for authentication and encryption. Using Oracle Enterprise Login Assistant, the user can log on once for each session and until the user logs out, all applications use the same obfuscated wallet to authenticate. On Windows 95, Windows 98, Windows NT, Windows 2000, the encrypted and obfuscated Oracle Wallets can be stored in the file system or the user profile area in the Windows registry. Oracle Wallet Manager, Oracle Enterprise Login Assistant and their related functionality are features of Oracle Advanced Security, a separately licensable option to the Oracle9*i* database.

Storing the User's Profile

In a Windows 2000 or Windows NT 4.0 domain, a user's profile is stored on the local. When the local user logs on, the user's profile on the local machine is uploaded into the user profile in the registry. When the user logs out, their profile stored on the local file system is updated, ensuring that the domain user or local user always has the most recent version of their user profile area.

Storing Oracle Wallets in the Windows Registry

On Windows operating systems, Oracle Wallets are located in the user profile area `\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS` in the registry. The wallets are stored in the same format as those in the file system. All functionality is the same except for the location of the wallets.

The `WALLET_LOCATION` parameter in the `sqlnet.ora` file specifies whether Oracle Wallets are stored in the file system or in the registry. It also specifies the location of the encrypted or obfuscated Oracle Wallet.

For example, the `WALLET_LOCATION` parameter for storing an Oracle Wallet in the registry in:

`\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS\SALESAPP` is

```
WALLET_LOCATION =
 (SOURCE= (METHOD=REG) (METHOD_DATA= (KEY=SALESAPP)))
```

The encrypted or obfuscated Oracle Wallet is stored in the registry under `\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\ORACLE\WALLETS\SALESAPP\EWALLET.P12` or `\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\ORACLE WALLETS\SALESAPP\CWALLET.SSO`, respectively.

Oracle Wallet Manager

The Oracle Wallet Manager tool creates and manages Oracle Wallets. To use the Windows registry for Oracle Wallets, the Use Windows System registry check box needs to be selected. If Windows System Registry is selected, when the tool opens a wallet or saves a new wallet, it shows a list of existing keys under:

`\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS`

The user can select one of the existing locations, or enter the name for a new location (registry key). For example, if the new key is `key1`, then the tool creates a registry key:

`\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS\KEY1`

and the encrypted wallet is stored at the registry value:

`\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS\KEY1\EWALLET.P12`,

and the obfuscated wallet is stored at the registry value:

`\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS\KEY1\CWALLET.SSO`.

If the user does not select the Use Windows System registry check box, then the tool displays all the available drives and directories on the local computer. The user can select one of the existing directories or can enter a new directory. The tool stores the encrypted or obfuscated wallet in the selected directory, or creates the directory if it does not exist.

Oracle Enterprise Login Assistant

When the Oracle Enterprise Login Assistant is launched, the tool looks for the encrypted or obfuscated Oracle Wallet and stores the obfuscated wallet in the default file system location: `%USERPROFILE%\ORACLE\WALLETS`. If an obfuscated wallet is found, the tool returns a message stating that autologin has been enabled. Otherwise, the tool displays a message stating that autologin has not been enabled. If Login from the Oracle Enterprise Login Assistant is selected, the tool looks for the encrypted wallet in the default file system location, prompts the user for the wallet password, and creates an obfuscated wallet in the default location. Oracle Enterprise Login Assistant then displays a message that autologin has been enabled. Otherwise, if Login from the tool is selected and no encrypted wallet is found in the default location, the tool displays a message stating that no wallet is found in the default location. If Logout from the tool is selected, the obfuscated wallet is removed from the default location. If the user exits the tool, without selecting Logout, then the obfuscated wallet is left in the default location.

In Oracle9*i*, Windows when the Oracle Enterprise Login Assistant is launched, the tool looks for the obfuscated wallet in the registry location:

```
\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS\DEFAULT
```

If an obfuscated wallet is found and Logout is selected, the tool removes this obfuscated wallet from the registry. If no obfuscated wallet is found in the registry, the tool looks in the file system location `%USERPROFILE%\ORACLE\WALLETS` for an obfuscated wallet. If an obfuscated wallet is found and Logout is selected, the tool removes this obfuscated wallet from the file system. If an obfuscated wallet is not found in the registry or the file system default locations, then the tool displays a message stating that autologin is not enabled.

If Login from the Oracle Enterprise Login Assistant is selected, the tool looks for the encrypted wallet in the registry location:

```
\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS\DEFAULT
```

If an encrypted wallet is found in this location, the user is prompted for the wallet password and the tool creates the obfuscated wallet in the same registry location. At the next Logout in the same session of the tool, the obfuscated wallet is removed from the registry. If Login is selected from the Oracle Enterprise Login Assistant and no encrypted wallet is found in the registry, the tool then looks for the encrypted wallet in the local computer’s file system under `%USERPROFILE%\ORACLE\WALLETS`. If an encrypted wallet is found in this location, the user is prompted for the wallet password and an obfuscated wallet is created in the same default file system location. At the next Logout in the same session of the tool, the obfuscated wallet is removed from the file system. If Login is selected and no encrypted wallet is found in the default location (in the registry or file system) then the tool displays a message stating that no Oracle Wallet was found in the default location.

Wallet Resource Locator

The parameter `WALLET_LOCATION` in the `sqlnet.ora` file is extended to support Oracle Wallets in the registry. `WALLET_LOCATION` specifies the location of the obfuscated Oracle Wallet for use by Oracle PKI applications.

On Windows operating systems, if there is no value specified for the `WALLET_LOCATION` parameter in the `sqlnet.ora` file, Oracle PKI applications first look for the obfuscated wallet in the registry key:

```
\\HKEY_CURRENT_USER\SOFTWARE\ORACLE\WALLETS\DEFAULT
```

If it is not found, Oracle PKI applications look for the obfuscated wallet in the computer's local file system under `%USERPROFILE%\ORACLE\WALLETS`

If no obfuscated Oracle Wallet is found in the registry or file system default locations, then a No Oracle Wallet exists error is displayed.

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Windows 2000 PKI Integration

This chapter describes the integration of Oracle Public Key Infrastructure (PKI) with Windows 2000 Public Key Infrastructure (Windows PKI) on Windows operating systems.

This chapter contains these topics:

Oracle Public Key Infrastructure

Oracle Public Key Infrastructure (PKI) is used by the Oracle Enterprise Security Manager, LDAP-enabled Oracle Enterprise Manager, Oracle's Secure Socket Layer (SSL) authentication, Oracle9*i* database, and Oracle Application Server.

Oracle PKI includes the following components:

- Oracle Wallets - Stores the digital certificates trustpoints and private keys used in public key applications for encryption, digital signature, and verification.
- Oracle Wallet Manager (OWM) - Creates an encrypted Oracle Wallet that holds the digital certificates.
- Oracle Enterprise Login Assistant - Creates or deletes the decrypted, obfuscated Oracle Wallets.

Windows Public Key Infrastructure

The Microsoft Certificate Store integration works only with the certificates that use Microsoft Enhanced Cryptographic Provider. You need to install the Windows High Encryption Pack to get this Cryptographic Provider and select Microsoft Enhanced Cryptographic Provider when creating these certificates. Also, when there are more than one of these certificates available for the same key usage (signature/key exchange), the first certificate retrieved will be used for Oracle SSL.

Microsoft Certificate Stores

Microsoft Certificate Stores are repositories for storing certificates and their associated properties. Windows 2000 stores certificates and certificate revocation lists in logical and physical stores. Logical stores contain pointers to the public key objects in the physical stores. Logical stores enable public key objects to be shared between users, computers, and services without requiring the storage of duplicates of the objects for each user, computer, or service. With physical stores, public key objects are stored in the registry of the local computer or, for some user certificates, in Active Directory. Some of the standard system certificate stores defined by Microsoft are:

- MY or Personal - holds a user's certificates for which the associated private key is available. The MY certificate store maintains certificate properties that indicate the Cryptographic Service Provider (CSP) associated with the private key. An application uses this information to obtain the private key from the CSP for the associated certificate.

- CA - holds issuing or intermediate CA certificates
- ROOT - holds only self-signed CA certificates for trusted root CAs

Microsoft Certificate Services

Microsoft Certificate Services (MCS) consists of the following modules:

- The Server Engine - handles all certificate requests. The engine interacts with modules at each processing stage to ensure that the proper action is taken based on the state of the request.
- The Intermediary - receives requests for new certificate from clients and then submits them to the Server Engine.
- The Policy Module - contains the set of rules controlling the issuance of certificates. This module may be upgraded or customized as needed.

Wallet Resource Locator

The Wallet Resource Locator (WRL) specifies that the `WALLET_LOCATION` parameter in the `sqlnet.ora` file identifies a particular PKI.

The user can choose between using Oracle Wallet or Microsoft Certificate Store by setting the `WALLET_LOCATION` parameter in `sqlnet.ora`.

To use the credentials from Microsoft Certificate Store:

- The `WALLET_LOCATION` parameter in `sqlnet.ora` is set to:

  ```
  WALLET_LOCATION = (SOURCE = (METHOD=MCS))
  ```

- The Oracle application uses Oracle's TCP/IP with SSL protocol (TCPS) to connect to the Oracle Server.
- The SSL protocol uses the X.509 certificates and trustpoints from the user's Microsoft Certificate Store for SSL authentication.

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Oracle Net Services Configuration

This appendix describes Oracle Net Services configuration for Windows. For more specific information on Oracle Net Services configuration, see *Oracle9i Net Services Administrator's Guide.*

This appendix contains these topics:

- Understanding Oracle Net Services Registry Parameter and Subkeys
- Listener Requirements
- Understanding Optional Configuration Parameters
- Advanced Network Configuration
- Named Pipes Protocol for Windows 95

> **See Also:** Oracle Net Services integration with Active Directory for Windows 2000 in Chapter 4, "Using Oracle9i Directory Server Features with Active Directory"

Understanding Oracle Net Services Registry Parameter and Subkeys

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

Oracle Net Service Subkeys

`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services` contains subkeys that correspond to services. Depending on what is installed, your Oracle Net Services 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 parameters shown in Table A–1.

Table A–1 Service Subkey 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.

Listener Requirements

In Oracle9*i* release 9.0.1, the listener is set to start automatically at system reboot. If you intend to use only the listener for all of your databases, ensure that only the Windows NT service for the listener, as listed in the Windows NT services Control Panel, is set to start automatically.

Oracle Corporation normally recommends that you only have a single net listener service running on a Windows NT computer at any one time. This single listener can support multiple databases. If you need to have two different net listener services running on a Windows NT computer at the same time, make sure that they are configured to listen on different TCP/IP port numbers.

If the same IP address and port are used for different listeners, then instead of the second and the consecutive listeners failing to bind as expected, it allows them to go ahead and listen on this IP address and port. This results in unexpected behavior of the listeners. This is a suspected Windows NT operating system problem with TCP/IP and has been reported to Microsoft.

Understanding Optional Configuration Parameters

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

- LOCAL
- TNS_ADMIN
- USE_SHARED_SOCKET

Oracle Net Service 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.

LOCAL

You can use the LOCAL parameter to connect to the database without specifying a connect identifier in the connect string. The value for the LOCAL parameter is the net 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 AS finance
```

Oracle Net Services 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, Oracle Net 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.

This parameter only works in dedicated server mode in a TCP/IP environment. If this parameter is set, you cannot use the 9.0 listener to spawn Oracle 7.*x* databases. To spawn a dedicated server for an Oracle database not associated with the same Oracle home as the listener and have shared socket enabled, you must also set the variable `USE_SHARED_SOCKET` for both Oracle homes.

Advanced Network Configuration

The following sections describe advanced configuration procedures specifically for Oracle Net Services on the Windows operating systems.

Configuring Authentication Method

Oracle Net Services provides authentication methods for Windows operating systems using Windows Native Authentication.

Configuring Security for Named Pipes Protocol

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 with it.

To set up the network listener permissions:

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

   The Services window appears.

2. Double-click the `Oracle`*`HOME_NAME`*`TNSListener` service.

   The Services dialog box appears.

3. Choose the This Account option button. Then, choose the "..." option button next to it.

The Add User dialog box appears.

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

   The user ID appears in the Add Name text box.

5. Choose 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. Choose OK**.**

Named Pipes Protocol for Windows 95

If you use the Named Pipes protocol for Windows 95 to connect to Oracle9*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 example, TCP/IP) for connecting from an Oracle client
- Remove the protocol NWLink from Windows 95 if you do not need to access NetWare Servers
- Disable the Direct-Hosting feature on Windows 95

TCP/IP Support for Windows 95

Oracle TCP/IP support for Windows 95/98 uses Windows Sockets 2 interfaces. Therefore, you must install Windows Socket 2 Update for Windows 95 before installing Oracle9*i*. Download it from the following Microsoft Web site:

```
http://www.microsoft.com/windows95/downloads
```

Windows Socket 2 Update for Windows 95 can also be installed by double-clicking on the file `WS2SETUP.EXE` located in the `\WINSOCK2` directory at the root of your distribution media.

Glossary

Active Directory Service Interfaces (ADSI)

A client-side product based on the Component Object Model (COM). ADSI defines a directory service model and a set of COM interfaces that enable Windows 2000, Windows NT, Windows 98, and Windows 95 client applications to access several network directory services, including Active Directory. ADSI allow applications to communicate with Active Directory.

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.

authentication

The process of verifying the identity of a user, device, or other entity in a computer system, often as a prerequisite to granting access to resources in a system. A recipient of an authenticated message can be certain of the message's origin (its sender). Authentication is presumed to preclude the possibility that another party has impersonated the sender.

authorization

Permission given to a user, program, or process to access an object or set of objects. In Oracle, authorization is done through the role mechanism. A single person or a group of people can be granted a role or a group of roles. A role, in turn, can be granted other roles. The set of privileges available to an authenticated entity.

Certificate Authority

A certificate authority (CA) is a trusted third party that certifies the identity of other entities such as users, databases, administrators, clients, and servers. The certificate authority verifies the user's identity and grants a certificate, signing it with the certificate authority's private key.

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.

connect descriptor

A specially formatted description of the destination for a network connection. A connect descriptor contains destination service and network route information. The destination service is indicated by using its service name for Oracle*9i* or Oracle*8i* databases or its Oracle system identifier (SID) for Oracle8 release 8.0 databases. The network route provides, at a minimum, the location of the listener through use of a network address.

connect identifier

A net service name or service name, that maps to a connect descriptor. Users initiate a connect request by passing a username and password along with a connect identifier in a connect string for the service to which they wish to connect, for example:

```
CONNECT username/password@connect_identifier
```

connect string

Information the user passes to a service to connect, such as username, password and net service name. For example:

```
CONNECT username/password@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.

credentials

A username, password, or certificate used to gain access to the database.

data dictionary

A set of read-only tables that provide information about a database.

database alias

See net service name.

digital certificate

An ITU X.509 v3 standard data structure that securely binds an identity to a public key. A certificate is created when an entity's public key is signed by a trusted identity, a certificate authority. The certificate ensures that the entity's information is correct and that the public key actually belongs to that entity.

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.

encryption

The process of disguising a message rendering it unreadable to any but the intended recipient.

Enterprise Java Beans

A server-side component model for Java.

external role

Roles created and managed by the Windows NT and Windows 20000 operating systems. 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 operating systems and the Oracle database to grant roles concurrently.

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.

external user

A user authenticated by the Windows 2000 or 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.

forest

A group of one or more Active Directory trees that trust each other. All trees in a forest share a common schema, configuration, and global catalog. When a forest contains multiple trees, the trees do not form a contiguous namespace. All trees in a given forest trust each other through transitive bidirectional trust relationships.

Globalization Support

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.

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*. 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. The `init.ora` file resides in \ORACLE_BASE\admin\DB_NAME\pfile directory on Windows operating systems.

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.

Internet Inter-ORB Protocol (IIOP)

A standard that enables Object Request Brokers (ORBs) from different vendors to communicate with each other using TCP/IP.

LDAP

See Lightweight Directory Access Protocol.

Lightweight Directory Access Protocol (LDAP)

A standard, extensible directory access protocol. It is a common language that LDAP clients and servers use to communicate. LDAP is a framework of design conventions supporting industry-standard directory products, such as the Oracle Internet Directory.

listener

A process that resides on the server whose responsibility is to listen for incoming client connection requests and manage the traffic to the server.

Every time a client requests a network session with a server, a listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the server.

listener.ora

A configuration file for the listener that identifies the listener name, protocol addresses for accepting connection requests, and the services for which it is listening.

The `listener.ora` file typically resides in *`ORACLE_BASE`*`\`*`ORACLE_HOME`*`\network\admin` on Windows operating systems.

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 Oracle9*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.

net service name

The name used by clients to identify a database server. A net service name is mapped to a port number and protocol. Also known as a connect string, database alias, or service name.

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, an Oracle Names server provides name resolution services for clients.

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 middle ware 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.

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 nondatabase application. There is no need for a separate preprocessing or precompilation step.

Oracle9*i* Enterprise Edition, Oracle9*i* Standard Edition, and Oracle9*i* Personal Edition

The information in this guide applies to the Oracle9*i* Enterprise Edition, Oracle9*i* Standard Edition, and Oracle9*i* Personal Edition database types. Unless otherwise noted, the features and functionality described in this guide are common to all three database types.

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`).

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 Net

A component of Oracle Net Services that enables a network session from a client application to an Oracle database server. Once a network session is established, Oracle Net acts as a data courier for the client application and the database server. It is responsible for establishing and maintaining the connection between the client application and database server, as well as exchanging messages between them. Oracle Net is able to perform these jobs because it is located on each computer in the network.

Oracle Net foundation layer

A networking communication layer that is responsible for establishing and maintaining the connection between the client application and server, as well as exchanging messages between them.

Oracle Net Services

A suite of networking components that provide enterprise-wide connectivity solutions in distributed, heterogeneous computing environments. Oracle Net Services are comprised of the Oracle Net, listener, Oracle Connection Manager, Oracle Net Configuration Assistant, and Oracle Net Manager.

Oracle Protocol Support

A software layer responsible for mapping Transparent Network Substrate (TNS) functionality to industry-standard protocols used in the client/server connection.

Oracle service

A service that is associated with an Oracle component.

Oracle9*i* JVM

Oracle9*i* includes Oracle9*i* JVM, the integrated Java Virtual Machine. Oracle9*i* JVM provides Java2 support (JDK1.2), a CORBA 2.0 Object Request Broker, an embedded JDBC driver, a SQLJ translator, and an Enterprise Java Beans transaction server.

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.

private key

In public-key cryptography, this key is the secret key. It is primarily used for decryption but is also used for encryption with digital signatures.

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 term 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.

public key infrastructure

Information security technology utilizing the principles of public key cryptography. Public key cryptography involves encrypting and decrypting information using a shared public and private key pair. Provides for secure, private communications within a public network.

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 username.

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 buffer

A circular buffer in the System Global Area (SGA) that contains information about changes made to the database.

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.

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 remote computer from the local client computer.

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.

starter database

A preconfigured, ready-to-use database that requires minimal user input to create.

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 username

One of two standard DBA usernames automatically created with each database. (The other username is SYS.) SYSTEM is created with an initial password of MANAGER. The SYSTEM username is the preferred username 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.

The `tnsnames.ora` file typically resides in *`ORACLE_BASE`*`\`*`ORACLE_HOME`*`\network\admin` on Windows NT.

trust point

A trust point or trusted certificate is a third party identity that is qualified with a level of trust. The trusted certificate is used when an identity is being validated as the entity it claims to be. The certificate authorities you trust are called trusted certificates. If there are several levels of trusted certificates, a trusted certificate at a lower level in the certificate chain does not need to have all its higher level certificates reverified.

upgrade

To transform an installed version of an Oracle database major release into another major release of the same version. Compare with "migrate".

username

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).

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