Net8™

Getting Started

Release 8.0.6 for Windows NT and Windows 95/98

June 18, 1999

Part No. A70007-01

ORACLE

Net8 Getting Started, Release 8.0.6 for Windows NT and Windows 95/98

Part No. A70007-01

Primary Author: Helen Slattery

Contributing Authors: Eric Belden

Contributors: Windows NT Development Team

Contents

Contact Us! xiii

Before You Begin xix

1 Introducing Net8

Net8 Version 8.0 Overview 1-2
Oracle Connectivity Overview 1-3
Client Request 1-3
Server Response to Client Request 1-3
Architectural Overview 1-4
Net8 1-4
Oracle Protocol Adapters 1-5
Network–Specific Protocol Stack 1-5

2 Introducing Net8 Products

Net8 Products 2-2
Supported Protocol Stack Vendors 2-8
Oracle Advanced Networking Option Products 2-10
Net8 Features 2-12

3 Understanding Post Installation Tasks

Typical Installation Results 3-2
Custom Connection Manager Installation 3-3
Verifying Installation and Setup 3-4

4 Understanding Coexistence and Migration Issues

Net8 and SQL*Net Differences 4-2
Migration and Coexistence Overview 4-3
Migration and Coexistence Considerations 4-3
Migration Issues 4-7
Installation 4-7
File Names 4-9
Service Names 4-9
Migrating a Database to a New Oracle Home 4-9
Coexistence Issues 4-10
Installation 4-10
Listener 4-10
One Listener Supporting Multiple Oracle Homes 4-10
Configuration Files 4-12

5 Using Net8 with Multiple Oracle Homes

Multiple Oracle Homes Overview 5-2
Control Utilities with Multiple Oracle Homes 5-2
Specifying the Absolute Path 5-2
Changing the Value of PATH 5-2
Service Names 5-4
Network Listener 5-5
Listener Startup Mode 5-5
Configuration File Port Numbers 5-5
Oracle Names Server 5-6
Oracle Connection Manager 5-6

6 Configuring the Network

Configuration Overview 6-2
Naming Methods 6-3
Configuration Files 6-3
Using the Host Naming Method 6-4
Server Configuration 6-5
Client Configuration 6-5

Using the Local Naming Method 6-6
Server Configuration 6-6
Client Configuration 6-10
Using the Oracle Names Method 6-11
Oracle Names Features 6-12
Differences Between Versions of Oracle Names 6-14
Setting Up and Oracle Names Server 6-15
Step 1: Install 6-15
Step 2: Configure the Server 6-16
Step 3: Define a Well-Known Oracle Names Server 6-18
Step 4: Create a Well-Known Oracle Names Server 6-19
Step 5: Configure Clients and Servers To Use Oracle Names Server 6-21
Configuring Oracle Connection Manager 6-23
Conditions for Using Oracle Connection Manager 6-24
Setting Up an Oracle Connection Manager 6-24
Step 1: Install 6-24
Step 2: Configure Clients 6-25
Step 3: Configure Oracle Connection Manager 6-29
Step 4: Configure the Server 6-30
Testing the Configuration on the Server 6-31
Step 1: Start Oracle Names Server 6-32
Step 2: Start the Network Listener 6-33
Step 3: Start Oracle Connection Manager 6-35
Step 4: Perform a Loopback Test 6-36
Testing the Configuration on the Client 6-38
Verify TCP/IP Network Connections 6-38
Verify Oracle Database Connections Using TNSPING 6-42
Verify Oracle Database Connection Using Oracle Net8 Easy Configuration Tool 6-43

7 Connecting To a Database

Connection Overview 7-2
Step 1: Start Oracle Names Server(s) 7-2
Step 2: Start the Network Listener 7-3
Step 3: Start Oracle Connection Manager(s) 7-5
Step 4: Start Client Cache Service 7-6

Step 5: Connect to the Database 7-7
Use Server Manager 7-7
Use SQL*Plus 7-8

8 Performing Advanced Configuration

Using the External Naming Method 8-2
Configuring Authentication Adapters 8-4
NDS Authentication Adapter 8-4
Windows NT Native Authentication Adapter 8-5
Configuring Security for the Named Pipes Protocol Adapter 8-6
Configuring ANO 8-7
CyberSAFE Authentication Adapter 8-7
Identix Authentication Adapter 8-7
Authentication Servers for Identix 8-8
Kerberos Authentication Adapter 8-8
SecurID Authentication Adapter 8-8
Configuring External Procedure Calls 8-9
Oracle8 External Procedures Requirements 8-9
Configuring Net8 for External Procedures 8-9
How Do External Procedure Calls Work? 8-11

9 Using the Oracle SNMP Agent

What is the Purpose of SNMP? 9-2
Oracle SNMP Agent 9-2
Oracle SNMP Agent for Oracle Services 9-3
Configuring Oracle SNMP Agent 9-4
Controlling the Master Agent and the Encapsulator 9-6
Starting the Master Agent 9-6
Starting the Encapsulator 9-6
Understanding the MASTER.CFG File 9-9
Understanding the ENCAPS.CFG File 9-10

10 Performing Administration Tasks

Performing Oracle Names Server Administration Tasks 10-2

Starting Oracle Names Server 10-2
Stopping Oracle Names Server 10-3
Performing Server Administration Tasks 10-4
Starting the Network Listener 10-4
Stopping the Network Listener 10-6
Performing Oracle Connection Manager Administration Tasks 10-7
Starting Oracle Connection Manager(s) 10-7
Stopping Oracle Connection Manager(s) 10-10
Performing Client Administration Tasks 10-12
Starting the Client Cache Service 10-12
Specifying Naming Methods 10-13
Modifying Service Names and Addresses 10-15
Enabling Tracing 10-18
Using the Oracle Net8 Assistant 10-19
Manually Adding Parameters 10-24
Using the Control Utilities 10-24
Analyzing Trace Files 10-25

A Directory Structure

Net8 Directory Structure A-2

B Modifying and Adding Configuration Parameters

Understanding Net8 Registry Parameter and Subkeys B-2
Net80 Parameter B-2
Net8 Service Subkeys B-2
Modifying a Registry Value B-3
Understanding Optional Configuration Parameters B-6
LOCAL B-6
REMOTE B-6
TNS_ADMIN B-7
USE_SHARED_SOCKET B-7
Adding Optional Configuration Parameters B-7
Using the Registry B-8
Using the Control Panel on Windows NT B-9

C Configuration Files

Understanding the Configuration Files C-2
Understanding the TNSNAMES.ORA File C-4
Relationship To Other Configuration Files C-5
Specifying Service Names C-6
Specifying Connect Descriptors C-7
Configuring TNSNAMES.ORA for Oracle Protocol Adapters C-10
TCP/IP Addresses C-12
SPX Addresses C-12
Named Pipes Addresses C-13
LU6.2 Addresses C-14
Bequeath Addresses C-15
Understanding the SQLNET.ORA File C-16
Specifying Dead Connection Detection C-16
Using SQLNET.ORA Logging and Tracing Parameters C-17
Understanding Default Domains C-19
Understanding Client Parameters for Use with Oracle Names Server C-19
Understanding the IPC Parameter C-19
Understanding Authentication, Encryption, and Checksumming Parameters C-20
Understanding the LISTENER.ORA File C-21
Defining the Network Listener Name C-23
Defining the Network Listener Address C-23
Configuring the Listener to Handle Larger Volumes of Connection Requests C-24
Describing the Databases on the Network Listener C-25
Defining Listener Prespawned Dedicated Server Processes C-25
Using LISTENER.ORA Control Parameters C-26
Using Oracle Names C-27
Using the Host Naming C-28
Understanding the CMAN.ORA File C-29
CMAN C-30
CMAN_PROFILE C-31
CMAN_RULES C-33

D Troubleshooting

Diagnosing Net8 ..... D-2

Understanding Proper Net8 Installation D-3
Server Diagnostics D-3
Client Diagnostics D-5
Net8 Logging and Tracing D-7
Logging D-7
Tracing D-8
The Difference Between Logging and Tracing D-9
Tracing for an Oracle Names Server D-9
Oracle Trace for Net8 ..... D-9
Trace Assistant D-10
Resolving Common Error Messages D-10
ORA-12154: TNS: Could not resolve service name D-11
ORA-12203:TNS:unable to connect to destination D-12
ORA-3113: end of file communication channel D-15
ORA-3121: No interface driver connection - function not performed D-16
Resolving Oracle Names Server Problems D-16
Client Connections Not Established D-16
Service Is Not Resolved D-17
Resolving Improper Configuration of External Procedures D-18
Net8 Troubleshooting Hints and Tips from the Field D-18
Contacting Oracle Services Support D-20

E Net8 Services and Port Numbers

Services E-2
Port Numbers E-5

Glossary

Index

Contact Us!

Net8 Getting Started, Release 8.0.6 for Windows NT and Windows 95/98

Part No. A70007-01

This document describes how to contact Oracle Corporation if you have issues with the documentation or software.

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

How to Contact Oracle Technical Publications

Oracle Corporation welcomes your comments and suggestions on the quality and usefulness of this publication. Your input is an important part of the information used for revision.

- Did you find any errors?
- Is the information clearly presented?
- Do you need more information? If so, where?
- Are the examples correct? Do you need more examples?
- What features did you like most about this manual?
- Do you have suggestions for improvement? Please indicate the chapter, section, and page number (if available).

You can send comments regarding documentation to *ntdoc@us.oracle.com*

How to Contact Oracle Support Services

Please copy this page and distribute within your organization as necessary.

Oracle Support Services can be reached at the following telephone numbers. The hours of business are detailed in your support contract and the *Oracle Customer Support Guide* in your kit.

Oracle Support Services In...	Call...
United States of America	+ (650) 506-1500 for customers with support contracts + (650) 506-5577 to obtain a support contract
Europe	+44 1344 860 160 or the local support center in your country.
All other locations	The telephone number for your country listed at the following Web site: `http://www.oracle.com/support/html/suploc.html` Oracle Support Services telephone numbers are also listed in the *Oracle Customer Support Guide* in your kit.

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

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

❏ The hardware name on which your application is running.

❏ The operating system name and release number on which your application is running.

❑ The release numbers of the Oracle Server and associated products involved in the current problem. For example, Oracle8 Server release 8.0.6.0.0 and Oracle Replication Manager release 1.6.0.0.0.

❑ Are you using 16-bit or 32-bit Oracle software?

❑ The third-party vendor and version you are using.

❑ The exact error codes and messages. Please write these down as they occur. They are critical in helping Oracle Support Services to quickly resolve your problem.

❑ A description of the issue, including:

- **What happened?** For example, the command used and its result.
- **When did it happen?** For example, during peak system load, or after a certain command, or after an operating system upgrade.

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

  _____

  _____

  _____

- **What is the extent of the problem?** For example, production system unavailable, or moderate impact but increasing with time, or minimal impact and stable.

  _____

  _____

  _____

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

Resources for Oracle Partners and Developers

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

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

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

Information Source	Description
Expert*ONLINE* `http://www.oracle.com/support/sup_serv/online/index.html`	Oracle Support Services has launched a new line of services called Expert*ONLINE*. These services provide online database administration for companies looking to supplement their existing DBA staff or fill a DBA role. Services range from Expert*DETECT*, a monitoring, diagnostic, and recommendation service, to Expert*DBA*, a full online database administration service.
Virtual Support Analyst (VSA) `http://www.oracle.com/support/sup_serv/vsa_start.html`	VSA is Oracle's Internet e-mail service; it is available to U.S. customers with an Oracle*metals* support agreement. With VSA, you can initiate a request for assistance through e-mail, bypassing the queues you may encounter when using telephone support. VSA also enables you to access Oracle's bug database.
Customer Service `http://www.oracle.com/support/cus_serv/index.html`	This site provides resources to make your interactions with Oracle as easy as possible. Among the things you can do are ■ Learn what is a CPU Support Identification (CSI) number ■ Update your technical contact information ■ Find out whom to contact for invoice and collection issues ■ Request product update shipments ■ Access a glossary of Oracle Support Services terms
U.S. Customer Visit Program `http://www.oracle.com/support/cus_serv/cus_visit.html`	This U.S.-based program has been established to help our customers understand and obtain maximum benefit from the support services they have purchased. The visit typically offers a customized orientation presentation, a comprehensive overview and demonstration of Oracle's electronic services, and helpful tips on working more effectively with Oracle Support Services.
Support Web Center Library `http://www.oracle.com/support/library/index.html`	This site contains articles, guides, and other documentation to help you leverage the wealth of knowledge and reference material that Oracle Support Services produces.
Product Availability *infowin@us.oracle.com*	Send an e-mail to request information on future product releases on Oracle for Windows NT and Windows 95/98.

Before You Begin

This guide is your primary source of introductory, post installation, configuration and administration information for Net8.

Specific topics discussed are:

- Intended Audience
- Prerequisites
- How This Manual Is Organized
- Related Documents
- Conventions
- Types of Documentation

Intended Audience

This user guide is for both end-users and network administrators who install, configure, and use Oracle Networking Products.

Prerequisites

This guide assumes that you are familiar with:

- Windows NT or Windows 95/98 and have installed and tested it for your personal computer (PC) and network hardware
- Relational database management concepts

How This Manual Is Organized

This manual is organized as follows:

Chapter 1, "Introducing Net8"

Describes the connectivity architecture of Net8.

Chapter 2, "Introducing Net8 Products"

Describes Net8 products and features.

Chapter 3, "Understanding Post Installation Tasks"

Describes the results of installation.

Chapter 4, "Understanding Coexistence and Migration Issues"

Describes implications of migrating from SQL*Net to a Net8, and installing Net8 into the same Oracle home as SQL*Net.

Chapter 5, "Using Net8 with Multiple Oracle Homes"

Describes Net8 implications when using multiple Oracle homes.

Chapter 6, "Configuring the Network"

Describes how to configure and test your network using various Net8 methods.

Chapter 7, "Connecting To a Database"

Describes how to make database connections.

Chapter 8, "Performing Advanced Configuration"

Describes how to use optional configuration tools for specialized configurations.

Chapter 9, "Using the Oracle SNMP Agent"

Describes how to use and configure the Oracle SNMP Agent Kit.

Chapter 10, "Performing Administration Tasks"

Describes basic administrative tasks for the server, Oracle Names Server, Connection Manager, and client. Also, describes enabling tracing.

Appendix A, "Directory Structure"

Shows the installed directory structure as it relates to Net8.

Appendix B, "Modifying and Adding Configuration Parameters"

Describes how to add and modify Net8 configuration parameters.

Appendix C, "Configuration Files"

Describes the contents and parameters of the configuration files.

Appendix D, "Troubleshooting"

Describes diagnosing Net8 problems and resolving common error messages.

Appendix E, "Net8 Services and Port Numbers"

Lists the Window NT services and their port numbers.

Glossary

Provides brief descriptions of terms used throughout this guide.

Related Documents

For more information, see the following guides:

- *Oracle8 Client Getting Started for Windows NT and Windows 95*
- *Oracle8 Enterprise Edition Getting Started for Windows NT*
- *Oracle8 Getting Started for Windows NT*
- *Oracle8 Server Concepts*
- *Oracle8 Server Reference Manual*
- *Net8 Administrator's Guide*
- *Oracle Security Server Guide*
- *Oracle Advanced Networking Option Administrator's Guide*
- *Oracle Cryptographic Toolkit Programmer's Guide*

Conventions

The following conventions are used in this guide:

Convention	Example	Meaning
All uppercase plain	ORANT\DATABASE\INITORCL.ORA	Indicates command names, SQL reserved words, and keywords, as in ALTER DATABASE. All uppercase plain is also used for directory names and file names
Italic	Italic used to indicate a variable: *filename*.ORA Italic used for emphasis: The WHERE clause may be used to *join* rows in different tables.	Indicates a value that you must provide. For example, if a command asks you to type *filename*, you must type the actual name of the file. Italic is also used for emphasis in the text and to indicate the titles of other guides.

Convention	Example	Meaning
C:\>	C:\ORANT\DATABASE>	Represents the Windows NT command prompt of the current hard disk drive. Your prompt reflects the subdirectory in which you are working. Referred to as the *MS-DOS command prompt* in this guide.
Backslash (\) before a directory name	\DATABASE	Indicates that the directory is a subdirectory of the root directory.
ORACLE_HOME	Go to the *ORACLE_HOME*\DATABASE directory. SVRMGR> @%ORACLE_ HOME%\RDBMS80\ADMIN\CATALOG.SQL	Oracle home is represented as the hard drive letter and the top level directory where your Oracle software is installed. In this guide, the convention *ORACLE_ HOME* is used to indicate your Oracle home directory, which may be: ■ C:\ ORANT for Windows NT ■ C:\ ORAWIN95 for Windows 95 or whatever you may have called your Oracle home. In Server Manager commands, you may see %ORACLE_HOME%. Server Manager is able to locate your Oracle Home directory using the %ORACLE_ HOME% variable. This convention can be used in Server Manager, SQL*Plus, Export, and Import.
HOME_NAME	Oracle*HOME_NAME*TNSListener80	Represents the Oracle home name if you use multiple Oracle homes. This convention is not applicable for the first Oracle home. The home name can be up to sixteen alphanumeric characters. The only special character allowed in the home name is the underscore.

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

Types of Documentation

Your documentation set consists of two types of documentation:

Documentation Type	Describes...
Operating System-specific	Installation, configuration, and use of Oracle Parallel Server in a Windows NT environment. Operating system-specific documents are occasionally referred to in the generic documentation set. These documents are easy to identify because they always mention their specific operating system in their title.
Generic	Products that are uniform across all operating system platforms. The vast majority of documents in your documentation set belong to this category. While reading through the generic documentation set, you are occasionally asked to refer to your platform-specific or operating system-specific documentation for procedures specific to the Windows NT and Windows 95/98 operating systems. To easily identify where these generic documentation references are described in this document, see the index of this guide for the following entry: generic documentation references All generic documentation references described in this guide appear under this index entry.

1

Introducing Net8

This chapter covers the following topics:

- Net8 Release 8.0 Overview
- Oracle Connectivity Overview
- Architectural Overview

Net8 Release 8.0 Overview

Net8 replaces SQL*Net as the networking services and connectivity component for Oracle8. Net8 has evolved considerably from SQL*Net, supporting application programming interfaces, Java-enabled Internet browsers and network services such as naming and security—hence the name change.

Net8 is the foundation of Oracle's family of networking products, allowing databases and their applications to reside on different computers and communicate as peer applications. Net8 allows clients to communicate with Oracle8 and Oracle7 servers through *service names*, which are easy to remember aliases for database addresses. Setting up Net8 primarily involves creating service names for clients so a simple connect string, such as CONNECT SCOTT/TIGER@S*ERVICE_NAME*, can be used to make a connection from a client to a server.

Depending on your needs, service names can be stored in a variety of places, including the Domain Name System (DNS), configuration files on each client, a centrally located Oracle Names Server, or a non-Oracle naming service. Wherever you choose to store your service names, Net8 offers tools to easily configure service names.

Oracle Connectivity Overview

The main function of Net8 is to establish sessions and transfer data between a client and a server or between two servers. Once a session is established, Net8 acts as a data courier for the client and the server. The connection operation is initiated during any standard database login between the client application and the server, with information such as the client computer name and user name passed to the remote computer.

Sessions are established with the help of a network listener, located on the server. The network listener brokers the client request, handing off the request to the server. Every time a client (or server acting as a client) requests a session with a server, a network listener receives the actual request. The network listener determines the location of the server and enables the client to connect to the server. The network listener is a separate process whose responsibility is to listen for incoming client connection requests and manage the traffic to the server.

Client Request

The user requests a database connection from the server by supplying input (SQL command) through a client-side application such as SQL*Plus. The application sends the request to Net8 to be transported across the network to the server. After the connection request is accepted by the network listener on the server, the client application requests database information from the server.

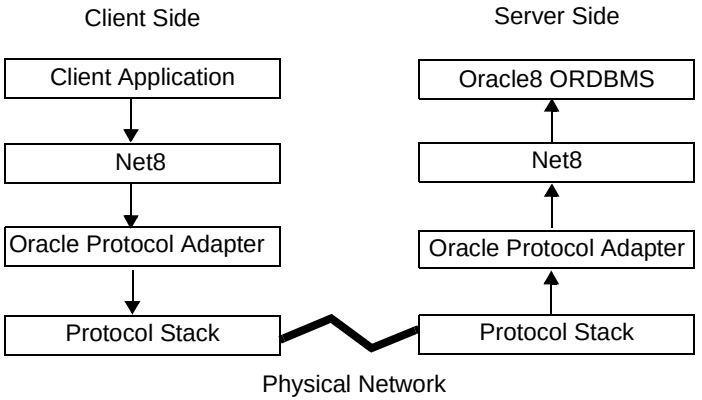
Server Response to Client Request

The server runs the Oracle8 database software and a Net8 network listener program. The Net8 network listener, through an Oracle Protocol Adapter, accepts connections from client applications on the network.

Net8 on the server delivers the client data transfer request to the Oracle8 database. The database performs the function requested by the user on the client computer. Finally, Net8 transfers the results of the database functions to the client computer.

Architectural Overview

Net8, the networking layer formerly known as SQL*Net, uses the Transparent Network Substrate (TNS) and standard industry network protocols to connect a client to a server and establish an Oracle session. The following figure shows the basic connectivity architecture and process, with a connection request originating from a client side application. The database returns the queried information in the reverse direction.



The following is an overview of Oracle network connectivity components:

- Net8
- Oracle Protocol Adapters
- Network–Specific Protocol Stack

Net8

Net8 is a software layer that is required to communicate between Oracle clients and servers. The role of Net8 is to establish and maintain a connection between the client application and the server and exchange messages between them. It provides both client to server and server to server communications across any network. It enables client tools to access, modify, share, and store data on Oracle8 Servers over a network. The communication between client applications and servers takes place across one or more networks and is referred to as client/server communication.

Transparent Network Substrate (TNS)

The TNS is an underlying layer of Net8 that receives requests and settles all generic connectivity functions such as opening and closing a session or sending and receiving requests or responses. TNS then passes control to an Oracle Protocol Adapter to make the protocol-specific call.

Oracle Protocol Adapters

The Oracle Protocol Adapters are responsible for mapping TNS functionality to industry–standard protocols used in the client / server connection. Each adapter is responsible for mapping the equivalent functions between TNS and a specific protocol.

An Oracle Protocol Adapter translates (or adapts):

- function calls of specific network protocols (such as TCP / IP) into equivalent function calls of the Oracle Transparent Network Substrate (TNS).
- TNS generic function calls into specific function calls for the underlying network protocol.

Additional Information: See:

- the third-party network documentation that came with your protocol software for a detailed technical discussion of these protocols.
- Chapter 2, "Introducing Net8 Products", for a list of available protocol adapters.

Network–Specific Protocol Stack

The protocol stack (third party software) supplies a reliable means of communication across the network. All Oracle software in the client / server connection process requires an existing network protocol stack to make the machine–level connection between two computers. The network protocol is responsible only for getting the data from the client computer to the server computer, at which point the data is passed to the Oracle Protocol Adapter on the server side.

2

Introducing Net8 Products

This chapter describes Net8 components and features.

Specific topics discussed are:

- Net8 Products
- Supported Protocol Stack Vendors
- Oracle Advanced Networking Option Products
- Net8 Features

Net8 Products

The table below lists each component of Oracle Networking Products and the platform on which it can be installed.

Net8 Products	NT as Oracle Server	NT as Oracle Client	95/98 as Oracle Client	Separately Installable?
Net8 Client[1]	yes	yes	yes	yes
Net8 Server	yes	no	no	yes
Oracle Protocol Adapters				
■ TCP/IP Protocol Adapter	yes	yes	yes	yes
■ SPX Protocol Adapter	yes	yes	yes	yes
■ Named Pipes Protocol Adapter	yes	yes	yes	yes
■ Logical Unit Type 6.2 (LU6.2) Protocol Adapter[2]	yes	yes	no	yes
■ Bequeath Protocol Adapter[3]	yes	yes	yes[4]	no
Configuration Tools				
■ Net8 Easy Configuration Tool	yes	yes	yes[5]	no
■ Oracle Net8 Assistant	yes	yes	yes[5]	yes
Oracle Names Server	yes	no	no	yes
Oracle Connection Manager[6]	yes	no	no	yes
Oracle SNMP Agent	yes	no	no	yes
NetWare Directory Services (NDS) Native Naming Adapter	no	yes	yes[7]	no
Authentication Adapters				
■ NDS Authentication Adapter	no	yes	yes[7]	no
■ Windows NT Native Authentication Adapter	yes	yes	yes	no

Net8 Products	NT as Oracle Server	NT as Oracle Client	95/98 as Oracle Client	Separately Installable?
Oracle Advanced Networking Option Products[8]				
Network Security and Single Sign-On	yes	yes	yes	yes
■ CyberSAFE Authentication Adapter	yes	yes	yes	yes
■ Identix (Biometric) Authentication Adapter	yes	yes	yes	yes
■ Kerberos Authentication Adapter	yes	yes	yes	yes
■ SecurID Authentication Adapter	yes	yes	yes	yes
DCE Integration	yes	yes	yes	yes

[1] If you choose to install only the Net8 Client software, Oracle Net8 Assistant and Oracle Net8 Easy Config configuration tools will not be installed on your system. To install these configuration tools, choose Custom Install, and select Oracle Net8 Assistant from the Available Products list in Oracle Installer.

[2] Microsoft SNA Server version 3.0 is required for LU6.2 on Windows NT.

[3] The local, non-network Bequeath Protocol Adapter is automatically installed with Net8 on Windows NT and is available for 32 bit applications, allowing client applications to communicate with a database server running on the same computer.

[4] Bequeath only works on Windows 95/98 for connections to a Personal Oracle8 database.

[5] We were not able to qualify these Java based products on Windows 98 for this release, as an officially supported version of Java is not yet available for Windows 98. No problems were found using these tools on Windows 98 during testing.

[6] Oracle Connection Manager is only available in the Oracle8 Enterprise Edition CD-ROM.

[7] NDS Authentication and Naming Adapters are not supported for Windows 98 in this release.

[8] The Advanced Networking Option is packaged separately from Net8.

The Net8 products are described below:

Product	Description
Net8 Client	Provides products that allow client connection to databases across a network. A client-side application sends a request to Net8 to be transported across the network to the server.
Net8 Server	Provides products that allow the network listener, through an Oracle Protocol Adapter, to accept connections from client applications on the network.

Product	Description
Oracle Protocol Adapters	The following Oracle Protocol Adapters are available:
■ TCP/IP Protocol Adapter	Enables client/server conversation over a network using TCP/IP and Net8. This combination of Oracle products enables an Oracle application on a client to communicate with remote Oracle databases through TCP/IP (if the Oracle database is running on a host system that supports network communication using TCP/IP).
■ SPX Protocol Adapter	Enables client/server conversation over a network using SPX and Net8. This combination of Oracle products enables an Oracle application on a client to communicate with remote Oracle databases through SPX (if the Oracle database is running on a host system that supports network communication using SPX). This protocol is predominantly used in Novell Netware environments.
■ Named Pipes Protocol Adapter	Enables client/server conversation over a network using Named Pipes and Net8. This combination of Oracle products enables an Oracle application on a client to communicate with remote Oracle databases through Named Pipes (if the Oracle database is running on a host system that supports network communication using Named Pipes). The Named Pipes Protocol Adapter is a high-level interface providing interprocess communications between clients and servers (distributed applications). One process (the server side of the application) creates the pipe, and the other process (the client side) opens it by name. What one side writes, the other can read, and vice versa. Named Pipes is specifically designed for PC LAN environments.
■ Logical Unit Type 6.2 (LU6.2) Protocol Adapter	The adapter is part of the IBM Advanced Program-to-Program Communication (APPC) architecture. APPC is the IBM peer-to-peer (program-to-program) protocol for a System Network Architecture (SNA) network. SNA is an IBM reference model similar to the Open Systems Interconnect (OSI) model of the International Standards Organization (ISO). APPC architecture lets the client and host communicate over an SNA network without forcing the client to emulate a terminal (as in terminal-to-host protocols). APPC architecture allows peer-to-peer communication; the client can initiate communication with the server. An SNA network with the LU6.2 and Physical Unit Type 2.1 (PU2.1) protocols provides APPC. The LU6.2 protocol defines a session between two application programs; LU6.2 is a product-independent LU-type. The LU6.2 Protocol Adapter enables an Oracle application on a PC to communicate with an Oracle database. This communication occurs over an SNA network with the Oracle database on a host system that supports APPC.

Product	Description
■ Bequeath Protocol Adapter	Enables clients to retrieve information from the database without using the network listener. The Bequeath Adapter internally spawns a server thread for each client application. In a sense, it does the same operation that a remote network listener does for your connection, yet locally. The Bequeath Protocol Adapter: ■ does not use a network listener (therefore, no network listener configuration is required) ■ is used for local connections where an Oracle client application (such as SQL*Plus) communicates with an Oracle server running on the *same* computer ■ only works in Dedicated Server mode. It cannot be used in a Multi-Threaded Server (MTS) mode. ■ is supported on Windows NT for 32-bit applications. It also works on Windows 95/98 for connections to a Personal Oracle8 database for 32-bit applications. ■ is installed by default with Net8 Client
Configuration Tools	Net8 has a number of new features that simplify configuration and administration of the Oracle network:
■ Net8 Easy Configuration Tool	This Java-based tool enables you to set up service names in the TNSNAMES.ORA file. Use this tool for configuring simple networks and testing the configuration. For more information, see "Using the Local Naming Method" on page 6-6.
■ Oracle Net8 Assistant	Oracle Net8 Assistant helps you to configure and administer: ■ Service Names — The tool enables the user to create or edit the local naming file (TNSNAMES.ORA). ■ Profile — The tool enables the user to create or edit the local configuration file (SQLNET.ORA) on the local computer. ■ Network Listeners — The tool enables the user to create or edit the local configuration file (LISTENER.ORA) on the local computer. ■ Oracle Names Servers — The tool enables the user to configure and control a Names Server from the local computer, and to control other Names Servers on remote computers. For more information, see: ■ "Using the Local Naming Method" on page 6-6. ■ *Oracle Net8 Administrator's Guide*

Product	Description
Oracle Names Server	Oracle Names is a distributed naming service developed for Oracle environments to help simplify the setup and administration of global, client/server computing networks. Oracle Names does this by establishing and maintaining an integrated system of Names Servers. Names Servers work like a directory service storing addresses for all the database services on a network and making them available to clients wishing to make a connection. For more information, see "Using the Oracle Names Method" on page 6-11.
Oracle Connection Manager	The Oracle Connection Manager provides three capabilities for Oracle8:
■ Connection Concentration	Allows you to multiplex multiple logical client sessions through a single transport connection to an Oracle server destination. This permits large numbers of users to access a single database which is running in Multi-Threaded Server (MTS) mode, and thus increases the server's scalability. To enable connection concentrations, add the following parameter to the INTI*SID*.ORA configuration file for that server: `MTS_DISPATCHERS = (MULT=ON)` For more information, see: ■ "Configuring Oracle Connection Manager" on page 6-23. ■ *Oracle Net8 Administrator's Guide*
■ Network Access Control (also known as *firewall support*)	Provides a proxy for denying or allowing access to a database server. This feature, implemented only over the TCP/IP protocol, provides network filtering similar to that offered with a firewall. For more information, see: ■ "Configuring Oracle Connection Manager" on page 6-23. ■ *Oracle Net8 Administrator's Guide*
■ Multi-Protocol Support	Replaces the Multi-Protocol Interchange. Allows client and database servers operating on different protocol stacks to communicate with each other. For more information, see: ■ For more information, see "Configuring Oracle Connection Manager" on page 6-23. ■ *Oracle Net8 Administrator's Guide*
Oracle SNMP Agent	Oracle SNMP Agent enables Oracle products running anywhere on an enterprise's network to be located, identified, and monitored by a management station running at one or more centrally located nodes. For more information, see Chapter 9, "Using the Oracle SNMP Agent".

Product	Description
NetWare Directory Services (NDS) Native Naming Adapter	Enables you to integrate Oracle service names (or database aliases) and addresses into your existing non-Oracle name services. This feature allows users from multiple points to use a single login to access a multi-server and multi-database network, and view the entire network under a single directory tree. The NDS Native Naming Adapter uses the NDS naming environment to store service names and addresses of Oracle8 Server for NetWare databases. This environment allows users to connect to Oracle8 databases on NetWare servers whose server name is defined as an NDS object name. To use the NDS Naming Adapter, you must configure your Windows client computer to a Novell NetWare 4.*x* Workstation.
Authentication Adapters	Net8 offers the following authentication adapters:
■ NDS Authentication Adapter	Allows a single login access a multi-server and multi-database network and view the entire network under a single NDS directory tree.
■ Windows NT Native Authentication Adapter	Allows operating system authentication to be performed between a client and an Oracle server on Windows NT.
Oracle Advanced Networking Option	See "Oracle Advanced Networking Option Products" on page 2-10.

Supported Protocol Stack Vendors

The table below lists the supported protocol vendor for each Oracle Protocol Adapter:

Oracle Protocol Adapter	Platform	Supported Vendor
TCP/IP Protocol Adapter	Windows NT and Windows 95/98	Microsoft TCP/IP
SPX Protocol Adapter	Windows NT and Windows 95/98	Microsoft NW Link Novell NetWare Client 32 version 4.1 Novell IntranetWare Client version 4.1 for Windows NT Novell IntranetWare Client version 2.2 for Windows 95 **Note:** For Microsoft NW Link, Client Service for NetWare must be installed.
Named Pipes Protocol Adapter	Windows NT and Windows 95/98	Microsoft NETBEUI
LU6.2 Protocol Adapter	Windows NT	Microsoft SNA Server version 3.0
Host Naming Adapter	Windows NT	Microsoft TCP/IP
NDS Native Naming Adapter	Windows NT and Windows 95	Novell NetWare Client 32 version 4.1 Novell IntranetWare Client version 4.1 for Windows NT Novell IntranetWare Client version 2.2 for Windows 95/98 **Note:** An Oracle7 Server release 7.2.2 or above for Netware release 4.1 is required.
NDS Authentication Adapter	Windows NT and Windows 95	Novell NetWare Client 32 version 4.1 Novell IntranetWare Client version 4.1 for Windows NT Novell IntranetWare Client version 2.2 for Windows 95/98 **Note:** An Oracle7 Server release 7.2.2 or above for Netware release 4.1 is required.

Oracle Protocol Adapter	Platform	Supported Vendor
Windows NT Native Authentication Adapter	Windows NT and Windows 95/98	Microsoft
ANO CyberSAFE Authentication Adapter	Windows NT and Windows 95/98	CyberSafe Application Security Toolkit version 1.0.4a
ANO Identix (Biometric) Authentication Adapter	Window NT and Windows 95/98	Identix hardware and driver on an Oracle8 client.
ANO Kerberos Authentication Adapter	Windows NT and Windows 95/98	No vendor software requirements on an Oracle8 client or server
ANO SecurID Authentication Adapter	Windows NT and Windows 95/98	No vendor software requirements on an Oracle8 client or server, but a SecurID card is needed
ANO DCE Integration	Windows NT and Windows 95/98	Gradient PC-DCE/32 Runtime Services Kit version 2.0

Oracle Advanced Networking Option Products

The Advanced Networking Option (ANO) is an optional product that provides enhanced functionality to Net8. Its set of features provides enhanced security and authentication to your network, and enables integration with a Distributed Computing Environment (DCE).

ANO includes the following components:

Component	Description
Network Security	This Oracle network data encryption and checksumming service ensures secure transmission of data over networks. Network Security uses encryption and authentication engines from RSA Data Security, Incorporated. The following algorithms are supported: Encryption ■ RC4_40 (US, Export & Upgrade versions of ANO) ■ RC4_56 (US only) ■ RC4_128 (US only) ■ DES_56 (US & Upgrade) ■ DES_40 (US, Export & Upgrade) Checksumming ■ MD5 (US, Export & Upgrade)
Single Sign-On	Allows users to access multiple accounts and applications with a single password. This feature eliminates the need for multiple passwords for users and simplifies management of user accounts and passwords for system administrators. Centralized, secure authentication services allow you to have high confidence in the identity of users, clients, and servers in distributed environments. Network authentication services can also provide the benefit of single sign–on for users. The following adapters are supported: ■ CyberSAFE Authentication Adapter ■ Identix (Biometric) Authentication Adapter ■ Kerberos Authentication Adapter ■ SecurID Authentication Adapter

Component	Description
DCE Integration	Distributed Computing Environment (DCE) Integration enables users to transparently use Oracle tools and applications to access Oracle8 databases in a DCE environment. The Oracle DCE Integration product consists of two major components: ■ DCE Communications/Security Adapter ■ DCE CDS (Cell Directory Service) Naming Adapter

Additional Information: See the *Oracle Advanced Networking Option Administrator's Guide.*

Net8 Features

Net8 supports very large scale mission-critical environments, offers a state-of-the-art security server and simplifies administration and configuration of all environments, large and small. The major enhancements in Net8 can be grouped into these areas:

- Manageability
- Naming Methods
- Scalability
- Security
- Enhancements for Developers

Feature	Description
Manageability	Net8 has a number of features that simplify configuration and administration of the Oracle network:
■ Net8 Easy Configuration Tool	This Java-based tool enables you to graphically set up service names. This tool succeeds the previously available tool called SQL*Net Easy Configuration (SQL*Net release 2.*x*). For more information, see "Using the Local Naming Method" on page 6-6.
■ Oracle Net8 Assistant	This Java-based graphical configuration and management tool succeeds Oracle Network Manager, included in previous SQL*Net release 2.*x* releases. Oracle Net8 Assistant helps you to configure and administer complex networks. For more information, see: ■ "Using the Local Naming Method" on page 6-6. ■ *Oracle Net8 Administrator's Guide*
■ Trace Assistant	Formats level 16 (SUPPORT) traces into paragraphs that are easier to read than unformatted trace files. For more information, see: ■ "Enabling Tracing" on page 10-18. ■ "Trace Assistant" on page D-10.

Feature	Description
Naming Methods	Net8 clients communicate with Oracle8 servers through service names, which are easy to remember aliases for database addresses. Net8 resolves service names using the following naming methods:
■ Host Naming	Resolves Oracle service names via the existing name resolution service in a TCP/IP network. This name resolution service might be Domain Name System (DNS) or simply a centrally-maintained set of /ETC/HOSTS files. Host naming allows users to connect to an Oracle server simply by using the host's network name. No client configuration is required to take advantage of this feature. For more information, see "Using the Host Naming Method" on page 6-4.
■ Local Naming	Resolves service names using a local TNSNAMES.ORA configuration file. For more information, see "Using the Local Naming Method" on page 6-6
■ Oracle Names	Resolves service names using Oracle Names Servers. Oracle Names is a distributed naming service for Oracle networks. Oracle Names helps administrators manage large numbers of clients and servers in their environments. For more information, see "Using the Oracle Names Method" on page 6-11.
■ External Naming	Resolves service names using a supported third-party naming service. External naming is implemented with the NetWare Directory Services (NDS) Native Naming Adapter. For more information, see "Using the External Naming Method" on page 8-2.

Feature	Description
Scalability	Scalability refers to the ability to support simultaneous network access by a large number of clients to a single server. With Net8, this is accomplished by optimizing the usage of network resources by reducing the number of physical network connections a server must maintain.
■ Oracle Connection Manager's Connection Concentration	The Oracle Connection Manager uses multiplexing to combine the network traffic from several clients onto a single physical connection to the server, therefore conserving server resources. Unlike connection pooling, client connections to the server are maintained continually. This makes it ideal for applications requiring continuous connectivity (such as process control or a stock ticker). This functionality is supported by Multi-Threaded Server (MTS) configurations. For more information, see: ■ "Configuring Oracle Connection Manager" on page 6-23. ■ *Oracle Net8 Administrator's Guide*
■ Connection Pooling	Connection pooling is a feature implemented with Net8 clients and dispatchers for Multi-Threaded Server (MTS) configurations. It allows a limited number of (physical) transport connections to be shared among a large number of (logical) network sessions. This is achieved by using a time-out mechanism to temporarily release an idle transport connection while maintaining its network session. The transport connection is released only if it has been idle for the specified time-out period, all the transport connections in the pool are busy, and an active network session needs a transport connection. Use of connection pooling optimizes network resource utilization and increases the number of client-server sessions possible across a fixed number of physical server ports. It is ideal when many clients run interactive, "high idle/search time" applications, such as messaging or OLAP. Connection pooling is enabled by setting the MTS_DISPATCHERS parameter to the INTI*SID*.ORA initialization file in *ORACLE_HOME*\DATABASE. **Note:** Connection pooling is only available with MTS on TCP/IP networks. For more information, see: ■ *Oracle8 Server Reference Manual* ■ *Oracle Net8 Administrator's Guide* ■ your Getting Started guide

Feature	Description
■ Listener Load Balancing	Distributes the number of incoming sessions over multiple network listeners for a single database or for two or more equivalent databases. This feature is configured by defining multiple network listeners for each database. To enable multiple network listeners for Multi-Threaded Server (MTS), add the MTS_MULTIPLE_LISTENERS=TRUE parameter to the INIT*SID*.ORA initialization file in *ORACLE_HOME*\DATABASE. For more information, see: ■ *Oracle Net8 Administrator's Guide* ■ your Getting Started guide
■ Multi-Threaded Server Support (MTS)	Net8 supports the MTS only in TCP/IP network environments. **Note:** IPC Dispatchers are not supported in this release. For more information, see: ■ your Getting Started guide ■ *Oracle8 Concepts*
■ WINSOCK2 Support	This release of Net8 supports both the WINSOCK 1.1 and WINSOCK2 socket interface. Net8 automatically detects WINSOCK2 on Windows NT and uses it if it is available. WINSOCK2 is a standard feature of Windows NT 4.0. Oracle uses these WINSOCK2 features in Net8: ■ overlapped I/O with events ■ shared sockets (can be enabled as an optional feature), as described in Appendix B, "Modifying and Adding Configuration Parameters" WINSOCK2 support enables Net8 features such as: ■ Multi-Threaded Server (MTS) support ■ Oracle Connection Manager ■ connection pooling
Security	Net8 offers the following security features:
■ Oracle Security Server	Supports authentication and authorization in an Oracle network environment using public-key cryptography. The Oracle Security Server is a separate product bundled with Oracle8 and Net8. For more information see the *Oracle Security Server Guide*.
■ Oracle Connection Manager's Network Access Control	Incorporates a Net8 application proxy for implementing firewall-like functionality. For more information, see "Configuring Oracle Connection Manager" on page 6-23.

Feature	Description
Enhancements for Developers	Net8 offers the following enhancement for developers:
■ Net8 OPEN	Net8 OPEN is an application programming interface (API) that allows users to write applications that use Net8 for connectivity. Net8 OPEN: ■ enables developers to develop both database and non-database applications that use the Net8 network already deployed in their environment ■ enables developers to deploy an application developed on one computer to another without needing to modify their calls to the network interface ■ provides developers with a single common interface to all industry standard network protocols ■ On Windows NT and Windows 95, use $*ORACLE_HOME*\NET80\LIB\TNSAPI.LIB and the include file $*ORACLE_HOME*\NET80\INCLUDE\TNSAPI.H. **Note:** The TRCROUTE application is not supported on Windows platforms. For more information, see *Oracle Net8 Administrator's Guide.*

3

Understanding Post Installation Tasks

This chapter describes what happens during the installation of Net8 and what tasks must be performed after installation for basic operation.

Specific topics discussed are:

- Typical Installation Results
- Verifying Installation and Setup

Typical Installation Results

If a Typical Installation is performed, the following Net8 products are installed:

Oracle8 Database	Oracle8 Client
Net8 Server and Net8 Client	Net8 Client
Oracle Protocol Adapter(s): ■ TCP/IP ■ SPX ■ Named Pipes **Note:** Installation of adapters is dependent on protocol stacks on the system.	Oracle Protocol Adapter(s): ■ TCP/IP ■ SPX ■ Named Pipes **Note:** Installation of adapters is dependent on protocol stacks on the system.
Oracle Names Server	

Installation of some Oracle Protocol Adapters (TCP/IP, SPX and Named Pipes) is done based on automatic detection of protocol stacks. LU6.2 must be installed separately through the Oracle Installer's Custom Installation option.

Additional Information: See the CD-ROM insert for more information about the Oracle Installer and its options.

When you install Net8, Oracle services are created and displayed in the *Services* dialog box. Note that some service names include a *HOME_NAME*. You can now have multiple active Oracle homes usable concurrently on a single computer. Each Oracle home has a unique *HOME_NAME* to distinguish it from all other Oracle homes active on your computer. This *HOME_NAME* is reflected in the names of the services. *HOME_NAME* is null for the first Oracle home. See Chapter 5, "Using Net8 with Multiple Oracle Homes", for more information about *HOME_NAME*.

The following Net8 Windows NT services are installed:

Oracle Service	Description	Server	Client
Oracle*HOME_NAME*ClientCache80	Service to enable client caching. Not started, and set up as Manual Startup.	yes	yes
Oracle*HOME_NAME*NamesService80	Service associated with the Oracle Names Servers. Not started, and set up as Manual Startup.	yes	no
Oracle*HOME_NAME*TNSListener80	Service associated with the network listener. Started, and set up as Automatic Startup.[1]	yes	no

[1] The network listener is set to Automatic Startup mode if no other network listener is started on the system or set up as Automatic Startup mode. Otherwise, the network listener is setup in Manual Startup mode.

Custom Connection Manager Installation

When Connection Manager is installed through the Custom Installation option, the following NT services are installed. After configuration, you must start service(s) you need:

Oracle Service	Description
Oracle*HOME_NAME*CMAdminService80	Service associated with the Connection Manager's administrative process. This service registers the Connection Manager with the Names Servers and acquires information about the Names Servers. Not started, and set up as Manual Startup.
Oracle*HOME_NAME*CManService80	Service associated with the Connection Manager's main process. Not started, and set up as Manual Startup.

Verifying Installation and Setup

To verify installation:

1. Start the Oracle Installer:

   From the taskbar, select Start > Programs > Oracle for Windows NT or Windows 95/98 - *HOME_NAME* > Oracle Installer.

   The *Software Asset Manager* window appears with the currently installed products listed in the list box on the right side of the window.

   Note: Third-party network protocol stacks must also be installed and tested prior to installing Oracle8.

2. Click Exit to exit the Oracle Installer.

   A dialog box appears, asking you if you want exit the Oracle Installer.

3. Choose Yes.

   Oracle Installer exits.

4

Understanding Coexistence and Migration Issues

This chapter describes migration and coexistence issues for SQL*Net release 2.*x* and Net8. Specific topics discussed are:

- Net8 and SQL*Net Differences
- Migration and Coexistence Overview
- Migration Issues
- Coexistence Issues

Net8 and SQL*Net Differences

When dealing with SQL*Net to Net8 migration and SQL*Net and Net8 coexistence, keep in mind the following features that impact the location and structure of the configuration files:

This Feature...	SQL*Net	Net8
Configuration File Location	SQL*Net stores files in *ORACLE_HOME*\NETWORK\ADMIN	Net8 stores files in *ORACLE_HOME*\NET80\ADMIN
Multiple Protocol Support	Multi-Protocol Interchange allows applications in TNS networks to communicate across different protocols.	The Oracle Connection Manager has a multi-protocol support feature which allows client and database servers operating on different protocol stacks to communicate with each other. For more information, see "Configuring Oracle Connection Manager" on page 6-23.
Configuration Tools	SQL*Net provides: ■ SQL*Net Easy Configuration to create service names ■ Oracle Network Manager for complex configurations	Net8 provides: ■ Net8 Easy Configuration Tool to create service names ■ Oracle Net8 Assistant for complex configurations and network administration
External Procedures	Not Applicable	Support for external procedure, a function or procedure written in a third-generation language (3GL) that can be called from PL/SQL code.

Migration and Coexistence Overview

When installing Oracle Networking Products, you have these installation decisions to make:

Installation Decision	Description
Coexistence	Install Net8 into the same Oracle home as your SQL*Net release 2.*x*.
Migration	Migration is the process of moving from SQL*Net release 2.*x* to Net8. Migration involves installing Net8 and de-installing SQL*Net release 2.*x*.

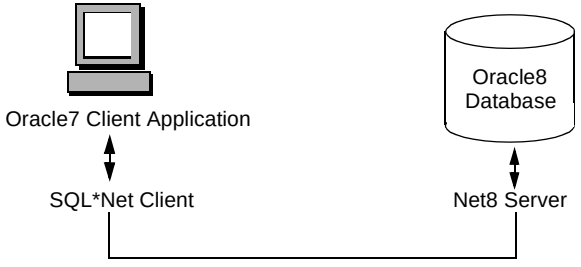
Migration and Coexistence Considerations

This section discusses:

- Oracle7 Client Connections to Oracle8 Databases
- Oracle8 Client Connections to Oracle7 Databases
- Oracle Names

Oracle7 Client Connections to Oracle8 Databases

As the diagram below depicts, an Oracle7 Client requires SQL*Net Client, and an Oracle Server requires Net8 Server. When the client and server are on the same computer, both SQL*Net Client and Net8 Server are required.



Consider the following questions for your own environment.

- Will my third party Oracle7 applications be able to take advantage of Net8 features?

  No. You must rebuild or upgrade applications to work with Net8 libraries.

- *Do my Oracle7 clients require Net8 Client to connect to a remote Oracle8 database?*

  No. If an Oracle7 client needs to connect to a *remote* Oracle8 database, only SQL*Net Client release 2.*x* has to be configured on the Oracle7 client. Net8 is backward compatible with SQL*Net release 2.*x*. The only limitation is that the new network features available with Net8 are unavailable with this connection type.

- *Do my Oracle7 clients require Net8 Client to connect to a local Oracle8 database?*

  Yes. If the Oracle7 client needs to connect to a *local* Oracle8 database, you should have SQL*Net Client release 2.*x*, Net8 Client, and Net8 Server on the same system. SQL*Net Client 2.x needs to be in the Oracle7 Client Oracle home, while the Net8 Client and Server should be in the Oracle8 Oracle home. Note that Net8 Client and Net8 Server are already installed during the installation of Oracle8/TM Enterprise Edition or Oracle8.

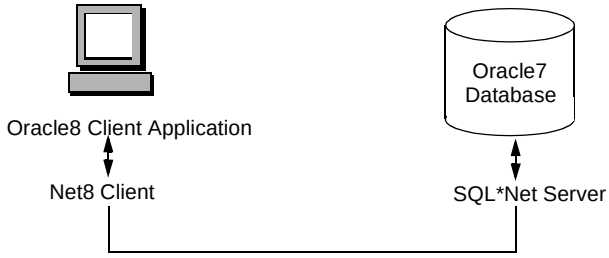
  If you are using Oracle7 release 7.3.4 and SQL*Net release 2.3.4, you can connect to the Oracle8 database without specifying a service name. Oracle7 client automatically uses the Bequeath Protocol Adapter when connecting to an Oracle8 database.

  If you are using Oracle7 release 7.3.3 (or lower) and SQL*Net release 2.3.3 (or lower), you need to create a service name using SQL*Net Easy Configuration or Oracle Network Manager in the SQL*Net Client release 2.*x* TNSNAMES.ORA file. Ensure you specify this service name in the connect string when connecting to the Oracle8 database.

  The service can use any protocol adapter installed except the Bequeath Protocol Adapter. The figure below gives an example of this network configuration:

Oracle8 Client Connections to Oracle7 Databases

An Oracle8 Client requires Net8 Client, and an Oracle7 Server requires SQL*Net Server. When the client and server are on the same computer, both Net8 Client and SQL*Net Server are required.



Consider the following questions for your own environment.

- *Do my Oracle8 clients require SQL*Net Client release 2.x to connect to a remote Oracle7 database?*

  No. If an Oracle8 client needs to connect to a *remote* Oracle7 database, only Net8 Client needs to be configured on the Oracle8 client. SQL*Net release 2.*x* is upwards compatible with Net8. The only limitation is that the new network features available with Net8 are unavailable with this connection type.

- *Do my Oracle8 clients require SQL*Net Client release 2.x to connect to a local Oracle7 database?*

  Yes. If the Oracle8 client needs to connect to a *local* Oracle7 database, you need both SQL*Net Server release 2.*x* and Net8 Client on the same system. Net8 Client needs to be in the Oracle8 Oracle home, while SQL*Net 2.*x* should be in the Oracle7 Oracle home. Note that the Oracle8 client uses the Bequeath protocol adapter by default to connect to an Oracle7 database.

Oracle Names

If you migrate all or part of your network to Net8, and you add or upgrade any release 8 Names Servers to an existing network, you should upgrade all the Names Servers in the region to version 8. There should be at least two Names Servers, for fault-tolerance.

- *Can my Oracle7 clients use Oracle Names version 8 to resolve service names?*

  Yes.

- *Can my Oracle7 client then use the connect string returned form Oracle Names version 8 to connect to an Oracle7 or Oracle8 database?*

  Yes, if the connect string was specified correctly when it was entered into Oracle Names. In other words, if the connect string worked from a TNSNAMES.ORA file, it will work from Oracle Names.

  Net8 Client is not available for Windows 3.1x, however, SQL*Net version 2 clients can be used to connect to Oracle8 databases.

Migration Issues

SQL*Net release 2.*x* clients should migrate to Net8 only when their client applications migrate to Oracle8.

Installation

If you are migrating from SQL*Net release 2.*x* to Net8 in the same Oracle home, Oracle Installer automatically performs these tasks:

1. Configuration files are copied from *ORACLE_HOME*\NETWORK\ADMIN and saved into *ORACLE_HOME*\NET80\ADMIN.
2. SQL*Net release 2.*x* network listener is stopped. The startup type is changed from Automatic to Manual (Windows NT Control Panel).
3. Net8 network listener is setup as Automatic startup and is started.
4. Entries are added to the TNSNAMES.ORA and LISTENER.ORA files for external procedures, if the entries are not already present.

When migrating from Oracle7 Server release 7.3.*x* to Oracle8 release 8.0.6, install the appropriate version of SQL*Net for the server before using Oracle Data Migration Assistant. Migration will be unsuccessful if you do not install the appropriate versions of SQL*Net.

You do not need to install a SQL*Net patch when migrating from Oracle7 release 7.3.4 to Oracle8 release 8.0.6.

Migrating from...	Install...
Oracle7 release 7.3.2.*x* to Oracle8	SQL*Net release 2.3.2.1.4 SQL*Net patch 2.3.2.1.12 **Note:** If you do not have SQL*Net release 2.3.2.1.4 on your system, you must install it before installing SQL*Net patch 2.3.2.1.12. SQL*Net release 2.3.2.1.4 is not available on the release 8.0.6 CD-ROM. You must install it from the release 7.3.2 CD-ROM.
Oracle7 release 7.3.3.*x* to Oracle8	SQL*Net release 2.3.3.0.3
	To install SQL*Net patch 2.3.2.1.12 or patch 2.3.3.0.3 1. Start Oracle Installer from the CD-ROM. See *Oracle8 Enterprise Edition Installation Release 8.0.6 for Windows NT* for complete installation instructions. 2. Answer questions about language and Oracle home directory location. 3. Select Custom Installation. The *Software Asset Manager* window appears. 4. Click From... 5. Navigate to \PATCHES\SQLNET\232112 on the CD-ROM if you want to install SQL*Net patch 2.3.2.1.12. Navigate to \PATCHES\SQLNET\23303 if you want to install SQL*Net patch 2.3.3.0.3. 6. Select SQL*Net Server 2.3.2.1.12 and SQL*Net Client 2.3.2.1.12 if you want to install SQL*Net patch 2.3.2.1.12. Select SQL*Net Server 2.3.3.0.3 and SQL*Net Client 2.3.3.0.3 if you want to install SQL*Net patch 2.3.3.0.3. 7. Click Install. A window appears showing the progress of the installation. After installation is complete, a message appears confirming the installation. 8. Click Exit to exit Oracle Installer.

File Names

In Net8, executables (.EXE files) and dynamic link libraries (.DLL files) are contained in the directory:

ORACLE_HOME\BIN

File names in Net8 typically have an 80 appended to the corresponding name in SQL*Net release 2.*x*. This suffix prevents conflict with SQL*Net release 2.*x* files.

Service Names

Net8 service names differ from SQL*Net release 2.*x* service names:

Net8 Component	SQL*Net V2 Name	Net8 Name
Listener	OracleTNSListener	Oracle*HOME_NAME*TNSListener80
Oracle Names	OracleNamesService	Oracle*HOME_NAME*NamesService80
Oracle Connection Manager	n/a	Oracle*HOME_NAME*CMAdminService80
		Oracle*HOME_NAME*CMANService80
Client Cache	n/a	Oracle*HOME_NAME*ClientCache80
SNMP	n/a	OracleSNMPPeerMasterAgent
SNMP	n/a	OracleSNMPPeerEncapsulator

Migrating a Database to a New Oracle Home

When a database is migrated from one Oracle home to another Oracle home, the SID of the migrated database is added to the SID_LIST section of the LISTENER.ORA file located in the *ORACLE_HOME*\NET80\ADMIN directory for the second Oracle home, but the SID for the first Oracle home still remains in the LISTENER.ORA file for the first Oracle home. This entry can cause a conflict in the SIDs if you need to bring up both the listeners. You should either:

- ensure that the listener for the first Oracle home is not brought up

or

- remove the SID from the SID_LIST section of the LISTENER.ORA in the first Oracle home.

Coexistence Issues

SQL*Net release 2.*x* can coexist with Net8 on the same computer in the same Oracle home directory.

Installation

If you are not migrating, and you are installing Net8 onto the same computer where SQL*Net release 2.*x* exists, Oracle Installer automatically performs these tasks to enable coexistence:

1. Configuration files are copied from *ORACLE_HOME*\NETWORK\ADMIN and saved into *ORACLE_HOME*\NET80\ADMIN.
2. The Net8 network listener is setup as Manual startup. The network listener is not started.
3. Entries are added to the TNSNAMES.ORA and LISTENER.ORA file for external procedures, if the entries are not already present.

Listener

To use the version 8 network listener, you may need to change your network configuration on either the SQL*Net release 2.*x* or Net8 configurations to prevent conflict. For example, you may need to change:

- Port number on a TCP/IP network
- Service name on an SPX network
- Pipe name on a Named Pipes network
- KEY for IPC connection

You may also need to start the Net8 network listener, and change the status to Automatic startup, depending upon your network needs. If you make changes to the network listener, you must make changes to client configuration files to ensure that clients can connect to the network listener.

One Listener Supporting Multiple Oracle Homes

You can use one listener for spawning databases for multiple Oracle homes. You only need to add all the System Identifiers (SIDs) to the SID_LIST section in the *ORACLE_HOME*\NET80\ADMIN\LISTENER.ORA file. Since the SID is unique on a system across different Oracle homes, the listener can spawn the database thread

for a specific SID in the correct Oracle home, and the *ORACLE_HOME* parameter (used in UNIX environments only) is not needed in the LISTENER.ORA.

You can use release 8.0.6 listeners to spawn release 8.0.6 or 7.3.*x* databases. In a mixed environment, however, you cannot enable the use of shared sockets. Oracle Corporation recommends using different listeners for release 8.0.4, 8.0.5 and 8.0.6 databases.

There are some restrictions in using release 8.0.6 listeners to spawn release 8.0.4, 8.0.5 and 8.0.6 databases. These restrictions include:

- Since release 8.0.4 only supports process mode external procedures, you should enable process mode external procedures for release 8.0.5 and 8.0.6. Releases 8.0.5 and 8.0.6 support both process and thread external procedures.
- You must install the 8.0.4.0.3 (or later) patch for Net8.
- You cannot enable the use of shared sockets.

Configuration Files

SQL*Net release 2.*x* will use configuration files from *ORACLE_HOME*\NETWORK\ADMIN, while Net8 will use files from *ORACLE_HOME*\NET80\ADMIN by default. If you want both SQL*Net and Net8 to use configuration files from the same directory, set the registry variable TNS_ADMIN.

Additional Information: See Appendix B, "Modifying and Adding Configuration Parameters", for more information on setting TNS_ADMIN.

5

Using Net8 with Multiple Oracle Homes

This chapter describes how you work with multiple Oracle homes and Net8.

Specific topics discussed are:

- Multiple Oracle Homes Overview
- Control Utilities with Multiple Oracle Homes
- Service Names
- Network Listener
- Configuration File Port Numbers
- Oracle Names Server
- Oracle Connection Manager

Multiple Oracle Homes Overview

Previous releases of Oracle for Windows NT and Windows 95 supported only single Oracle homes, allowing you to install and run only one SQL*Net or Net8 version in a single Oracle home directory. For example, you could not install SQL*Net release 2.3.2 and SQL*Net release 2.3.3 or multiple installations of Net8 release 8.0.3 on the same computer.

Releases 8.0.4, 8.0.5, and 8.0.6 supports multiple Oracle homes, a feature that allows you to install one or more Net8 releases on the same computer (in multiple Oracle home directories). For example, using multiple Oracle homes, you can install release 8.0.4 products and 8.0.6 products in different Oracle homes on the same computer.

Control Utilities with Multiple Oracle Homes

The Oracle home in which you installed products most recently is the first directory listed in your PATH (primary home). As such, it has priority over the other Oracle home entries in your PATH. If you invoke a control utility, the version of the product invoked will be that stored in the Oracle home listed first in your path.

You can specify a different version of a control utility by:

- Specifying the Absolute Path
- Changing the Value of PATH

Specifying the Absolute Path

Oracle Corporation recommends going to the absolute path to the version of the LSNRCTL80, NAMESCTL80, CMCTL80 control utility (*ORACLE_HOME*\BIN) you want to use prior to starting it.

Changing the Value of PATH

You can change the value of PATH so that the first entry points to the binary files for the product version you want to use by resetting PATH from the:

- Oracle Home Selector
- System Level
- Command Line

Oracle Home Selector

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

1. Choose Start > Programs > Oracle for Windows NT - *HOME_NAME* > Oracle Home Selector.

   The *Oracle Home Selector* window appears.

2. Enter the Oracle home in the drop-down list that you want to be the primary Oracle home.

System Level

The new value you assign to PATH exists until you change the value of PATH again.

To change the value of PATH at the system level:

1. Choose Start > Settings > Control Panel.

   The *Control Panel* window appears.

2. Double-click on the System icon.

   The *System Properties* window appears.

3. Click on the *Environment* tab.

   The System Variables appear.

4. Edit the value of the PATH in the Systems Variables window and click OK to exit when you are satisfied with the changes you have made.

Command Line

The value of PATH reverts to its previous value when you quit the session.

To change the value of PATH at the command line:

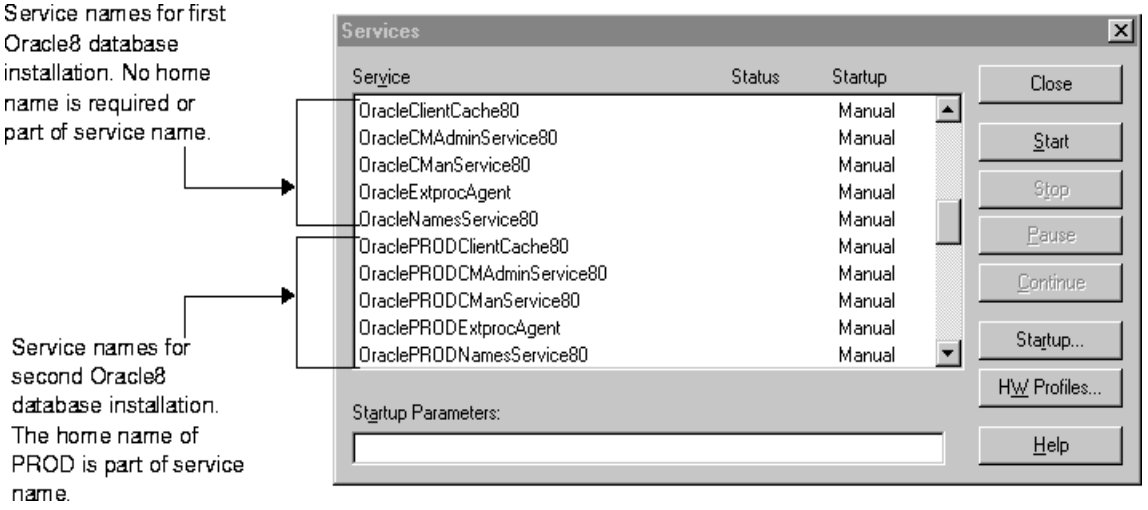
At the command prompt enter:

```
SETPATH=pathname;%PATH%
```

where *pathname* is the full path to the binary files for the products you want to use.

Service Names

Multiple Oracle homes affect the naming conventions for Oracle services. If you have only one Oracle home directory on a computer, there are no differences between the conventions for naming service names in this release and previous releases (that is, no Oracle *HOME_NAME* is required and the SID is typically the default of ORCL.) However, as you perform subsequent installations into different Oracle home directories you must specify a different Oracle *HOME_NAME* for each Oracle home directory during installation, which is added to some service names.



Network Listener

To use the version 8 network listener, you may need to change your network configuration in one of your multiple Oracle homes to prevent conflict. For example, you may need to change:

- port number on a TCP/IP network
- service name on an SPX network
- pipe name on a Named Pipes network
- KEY for IPC connection

Listener Startup Mode

If any other network listener (for a different Oracle home or Oracle7 network listener) is already started or set up in Automatic Startup mode, the new network listener is installed with Manual Startup mode, and is not started for you. You must start the network listener manually after proper configuration to resolve any possible conflict.

Configuration File Port Numbers

When the network listener, Oracle Names, and Oracle Connection Manager are installed into another Oracle home, the configuration files installed specify the default port numbers. These port numbers may be in conflict with the configuration file of another Oracle home. Ensure each Oracle home contains configuration files (located in *ORACLE_HOME*\NET80\ADMIN) with unique port number.

Additional Information: See Appendix E, "Net8 Services and Port Numbers", for default port number assignments.

Oracle Names Server

If you are using multiple Oracle homes on an Oracle Names Server, Oracle Corporation recommends using the more recent version in order to take advantage of new functionality.

Oracle Connection Manager

If you are using multiple Oracle homes on a computer with Oracle Connection Manager, Oracle Corporation recommends using the more recent version in order to take advantage of new functionality.

6

Configuring the Network

This chapter describes how to configure your network.

Specific topics discussed are:

- Configuration Overview
- Using the Host Naming Method
- Using the Local Naming Method
- Using the Oracle Names Method
- Configuring Oracle Connection Manager
- Testing the Configuration on the Server
- Testing the Configuration on the Client

Configuration Overview

Before a database server can receive connections from clients, clients must be configured with service names (easy to remember aliases for database addresses) that match the address preconfigured in each server computer's LISTENER.ORA file. These addresses are used by the client to connect to the network listener during a connection. During a connection, a client passes the system ID (SID) of the server to which it wants to connect.

The LISTENER.ORA file identifies and controls the behavior of the network listeners that listen for the databases on the computer. This file includes network listener descriptors and addresses of all network listeners on a computer, the SIDs of the databases they listen for, and various control parameters.

Client configuration is accomplished by creating a list of the service names and addresses of network database destinations through a TNSNAMES.ORA client configuration file or an Oracle Names Server. A client (or a server that is part of a distributed database) needs this information to know where to make connections.

Configuration is based upon one of two models:

Network Configuration Model	Suitable When...	Naming Method	Configuration Tool
Localized management	Network addresses are mapped in a TNSNAMES.ORA file on each node (no Oracle Names Server).	Host naming Local naming External naming	Net8 Easy Configuration Tool
Centralized management	Networks where an Oracle Names Server performs network address resolution. An Oracle Names Server stores client configuration profiles in one location.	Oracle Names	Oracle Net8 Assistant

Naming Methods

Service names can be created using the following configuration methods:

Naming Method	Description
Host Naming	Resolves service names through a TCP/IP network's Domain Name System (DNS) or in the /ETC/HOSTS file. This method is recommended for simple TCP/IP environments. See "Using the Host Naming Method" on page 6-4.
Local Naming (no Oracle Names Server)	Resolves service names to network addresses by using information configured and stored on each individual client. Local Naming is most appropriate for simple distributed networks with a small number of services that change infrequently. See "Using the Local Naming Method" on page 6-6.
Oracle Names	Stores names and addresses of all database services on a network on an Oracle Names Server. Connection requests are routed through an Oracle Names Server, which resolves the service name to a network address. The information is then returned to the client. See "Using the Oracle Names Method" on page 6-11.
External Naming	External naming refers to service name resolution by using a supported third-party naming service. See "Using the External Naming Method" on page 8-2.

Configuration Files

Depending on the naming method you use, the following configuration files may be created or updated in *ORACLE_HOME*\NET80\ADMIN:

Configuration File	Description
LISTENER.ORA	Includes addresses of all network listeners on a server, the SIDs of the databases for which they listen, and various control parameters used by the network listener. This file resides on the server.
TNSNAMES.ORA	Includes a list of service names of databases. This file resides on clients.
SQLNET.ORA	Includes the names resolution method. This file resides on clients.
SDNS.ORA	Includes lists of Oracle Names Servers. This file resides on clients.

Additional Information: See Appendix C, "Configuration Files" for more information about these files.

Using the Host Naming Method

The host naming method is enabled by default during Typical installation for TCP/IP network environments only. The LISTENER.ORA has a line which specifies the TCP/IP host name of your server. Clients that use this host name in their connect string can connect.

Your client computer may connect to a database using the host name of the computer on which the database resides if:

- you are connecting to an Oracle8 database with Net8 Server/Client software installed
- your client and server are connecting over a TCP/IP protocol
- all names are resolved through an IP address translation mechanism such as DNS, or a centrally maintained TCP/IP hosts file
- no advanced features like Oracle Connection Manager are requested or required

Server Configuration

Ensure GLOBAL_DBNAME = *HOSTNAME* as specified in the *ORACLE_HOME*\NET80\ADMIN\LISTENER.ORA configuration file, where *HOSTNAME* is the TCP/IP host name or alias of the server system.

During the installation of Net8, the GLOBAL_DBNAME of the default database is set to the system name.

To verify GLOBAL_DBNAME is correctly specified, manually check the LISTENER.ORA file of use the Oracle Net8 Assistant:

Check the LISTENER.ORA file...	Use the Oracle Net8 Assistant...

Ensure the line shown in bold exists:
`SID_LIST_`*`LISTENER_NAME`*`=`
`(SID_LIST =`
`(SID_DESC =`
`(SID_NAME = `*`SID`*`)`
`(GLOBAL_DBNAME = `*`HOSTNAME`*`)`
`)`
`)`
	1. Choose Start > Programs > Oracle for Windows NT - *HOME_NAME* > Oracle Net8 Assistant.
	The Oracle Net8 Assistant starts.
	2. Double-click the Listeners folder.
	3. Select the appropriate network listener from the Listeners folder.
	The network listener details appear on the right side of the screen:
	4. Select Database Services from the drop-down list.
	5. Ensure the TCP/IP host name is correctly specified in the Global Database Field.
	6. Choose Save Network Configuration from the File menu.
	7. Choose Exit from the File menu to exit the Oracle Net8 Assistant application.

Client Configuration

No client configuration is necessary for using the Host Naming Adapter. The connection is established by using the default TCP/IP port for the network listener.

Multiple Databases On a Server

If you have multiple databases on a server, you can set TCP/IP aliases for the server system, and assign a separate GLOBAL_DBNAME parameter for each different databases in the LISTENER.ORA file.

The client will then connect to the specific database based on the host name used for connection.

Using the Local Naming Method

With the local naming method, service names are added to the TNSNAMES.ORA files. Service names are mapped to database address. Clients use this service name in their connect string to connect.

Server Configuration

To configure using the local naming method:

Note: Net8 Easy Configuration Tool only supports configurations using TCP/IP, SPX, Named Pipes, and Bequeath Protocol Adapters. To configure a service name using the LU6.2 Protocol Adapter, you must manually edit the configuration files.

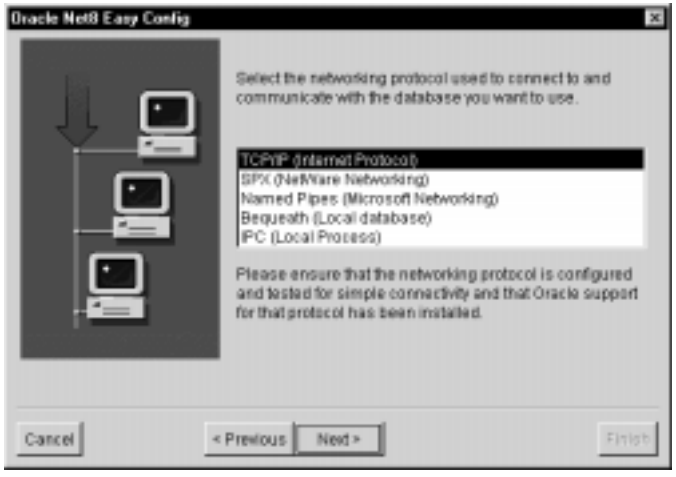
---

1. Choose Start > Programs > Oracle for Windows NT - *HOME_NAME* > Net8 Easy Configuration Tool.

   The *Oracle Net8 Easy Config* wizard starts:

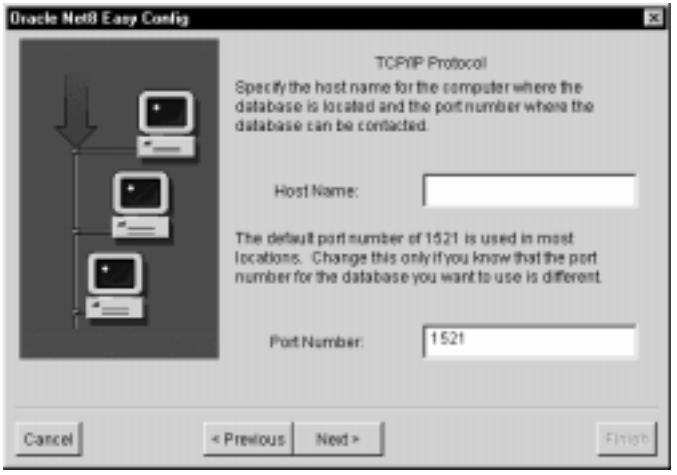
2. Enter a new service name (up to 64 characters) in the New Service Name field to create a new service name, and click Next. The service name can be any name you choose.

The next page appears:



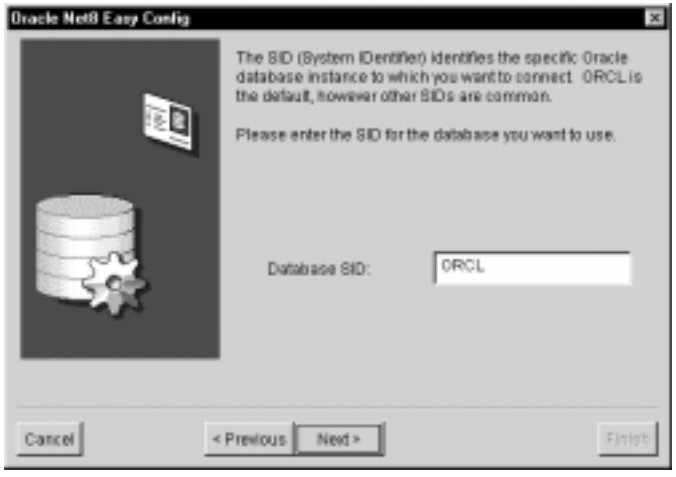
3. Select the network protocol you want to use (this protocol adapter must also be installed on the clients), and click Next.

The page appropriate for your protocol adapter appears; in the example here, TCP/IP is assumed:



4. Enter the appropriate information for your chosen protocol in the fields, and click Next.

The next page appears:



5. Enter the name of the SID of the database to which you want to connect in the Database SID field, and click Next. The default SID is ORCL.

The following page appears:

6. Click Next (testing is performed later in this chapter).

7. Click Finish to save your configuration and quit the Net8 Easy Configuration Tool.

   Oracle Net8 Easy Config adds the new service names to the TNSNAMES.ORA in *ORACLE_HOME*\NET80\ADMIN.

8. If you have more than one supported Oracle Protocol Adapter in your *ORACLE_HOME* directory, use Net8 Easy Configuration Tool to configure other services following the same steps.

Client Configuration

After the server is configured, it is best to simply copy over the TNSNAMES.ORA configuration file located at *ORACLE_HOME*\NET80\ADMIN on the server to the same location on the clients. This will ensure the files are consistent. Otherwise, you must use the Oracle Net8 Easy Config tool on every client, introducing possible errors.

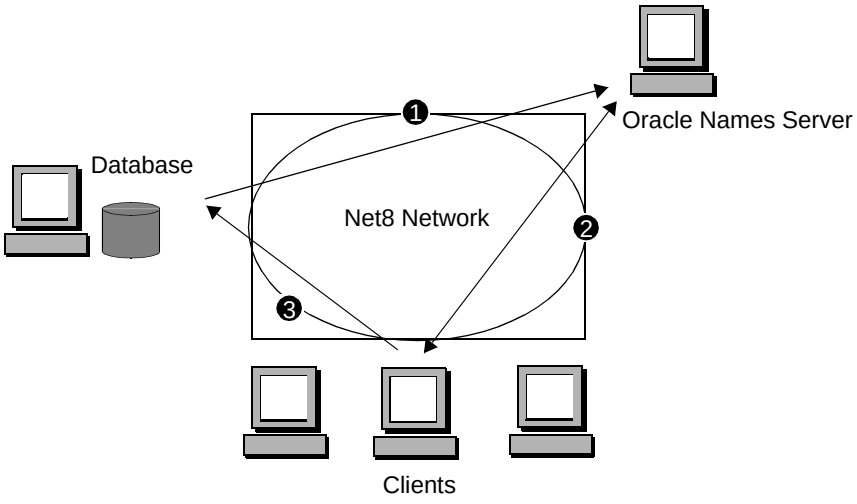
Using the Oracle Names Method

Oracle Names simplifies the setup and administration of global, client/server computing networks. Oracle Names makes network address and database link information available to all nodes throughout the network. Each database server's network address is identified with a simple service name. Client applications then can request a database connection with that name rather than a lengthy address.

Oracle Names is made up of Names Servers that store a service's name and network address. Services include databases, database link definitions, and object aliases. Client applications request a connection using a simple name, rather than the lengthy address, and the name is resolved to the address by a Names Server. Oracle Names shields users and applications from changes made to the network infrastructure. It provides for centralized administration of network service names.

The diagram below shows that:

1. Oracle services can dynamically register themselves with Oracle Names Servers.
2. Clients seeking to locate a service on an Oracle network contact their closest Oracle Names Server to retrieve the network address.
3. Clients then transparently connect to the service.



Oracle Names Features

The automatic discovery feature of Oracle Names version 8 enables network connectivity with virtually no configuration files.

Oracle Names version 8 includes three features to improve network performance and ease of administration:

- Dynamic Service Registration
- Client Discovery of Names Servers
- Client Caching of Oracle Names Servers

Feature	Description
Dynamic Service Registration	With dynamic service registration, a Net8 network listener automatically locates a Names Server through the mechanism of a well-known address and registers its services with Oracle Names. A single database network listener can service connection requests for several database instances. At startup, the network listener forwards connect descriptors and global names for each of these services. When the service or network listener is shut down, the network listener automatically deregisters its services with Oracle Names. The network listener registers with the Oracle Names Servers by looking for a Names Server with a well-known address. The well-known Names Server address on a TCP/IP network is a host aliased to oranamesrvr0, oranamesrvr1,...oranamesrvr4, using port 1575. Once the service is registered, its address is made available to all other Names Servers in the region. The address information is shared in one of two ways: ■ Service Replication — In service replication, service information is stored in a Names Server's cache and is instantly replicated to the caches of all other Names Servers. ■ Oracle Names database — If an Oracle database is used as the registration repository, the registration information is stored in the database, and from there is accessible to all the Names Servers.

Feature	Description
Client Discovery of Names Servers	The discovery process involves running an REORDER_NS command from the NAMESCTL80 utility or choosing Discover Oracle Names Server (from the Tools menu) in the Net8 Assistant. This produces a SDNS.ORA file in the *ORACLE_HOME*\NET80\NAMES directory. This file contains a list of the Oracle Names Servers the client can connect. The discovery process allows the client to: ■ retrieve a list of all of the existing Names Server addresses with minimal network configuration at installation ■ find out about new Names Servers as they appear in the network. This allows for dynamic changes in the network topology with minimal involvement on the user's part and with little or no impact on the performance of a normal query. Clients discover Names Servers in much the same way that services find them for registration: **1.** A client first looks in its own SDNS.ORA client cache file. If it has contacted a Names Server within the past 24 hours, the address of a Names Server may be in the cache. **2.** A client looks for a Names Server with a well-known address. The well-known Names Server address on a TCP/IP network is a host aliased to oranamesrvr0, oranamesrvr1,...oranamesrvr4, using port 1575. Once a Names Server is found, the addresses of all the other version 8 Names Servers in the region are made available to the client.
Client Caching of Oracle Names Servers	After the clients have discovered Oracle Names Servers, the SDNS.ORA client cache file can simply be updated with new Oracle Names Server information by starting the Oracle*HOME_NAME*ClientCach80 service on the client(s). Oracle*HOME_NAME*ClientCache80 contacts each of the Names Servers in turn, and orders the list on the basis of the speed of each Names Server's response. Subsequently, when a client makes a query to a Names Server, the Names Server at the top of the list in the SDNS.ORA file is contacted first. The local client-side cache is particularly advantageous if at some time no Names Server is available. In this case, the local client-side cache has the current list of recently accessed services. All the information in the client cache has a time to live (TTL). At the end of that TTL, the information is flushed from the cache. The purpose of this feature is to avoid having stale information in the client cache. The default TTL is 86,400 seconds (24 hours). It cannot be changed.

Differences Between Versions of Oracle Names

There are significant differences between this version of Oracle Names and earlier versions:

- In Oracle Names version 1, administrators configured Names Servers using Oracle Network Manager and stored all topology data in a database. All the Names Servers in a region shared the same information because they accessed the same database.
- In Oracle Names version 2, the administrator could choose between continuing Names Server configuration as in version 1, or using the Dynamic Discovery Option. The Dynamic Discovery Option was recommended only for a network with a flat namespace (that is, only one domain). If the Dynamic Discovery Option was chosen, no database was needed; each Names Server automatically replicated its data to all other well-known Names Servers in the region. Network listeners could register themselves with well-known Names Servers and clients could find them without configuration. Otherwise, Oracle Names could be used just as the earlier version had been.
- Oracle Names version 8 takes the features of the Dynamic Discovery Option and expands on them significantly. Included among the differences are the following:
  - A service can register itself with any Names Server it can find, and its name and address are made available to all Names Servers in the region. Similarly, if an administrator manually registers a service to any Names Server, that service information is available to all other Names Servers.
  - A client-side process times the connections from the client to all Names Servers in the region, and maintains an ordered list so that the client queries the Names Server that has the shortest response time first. Clients using SQL*Net release 2.3. are able to take advantage of this feature.
  - On most platforms, the client maintains a client-side cache that includes the results of the client's queries to the Names Servers. This feature improves performance as it reduces the number of client-Names Server queries.
  - Oracle Names version 8 does not require a database to hold topology information. However, an administrator may choose to use one, and it is recommended.

Setting Up and Oracle Names Server

The steps to set up an Oracle Names Server include:

Step 1: Install

Step 2: Configure the Server

Step 3: Define a Well-Known Oracle Names Server

Step 4: Create a Well-Known Oracle Names Server

Step 5: Configure Clients and Servers To Use Oracle Names Server

Step 1: Install

Ensure the following are installed:

- Oracle Names Server on its own computer that is designated as the Oracle8 Server
- Net8 Client on the clients
- Net8 Server on the server
- TCP/IP, or Named Pipes or SPX on all clients

Note: Oracle Names Server only supports TCP/IP, Named Pipes and SPX Protocol Adapters.

Additional Information: See "Verifying Installation and Setup" on page 3-4 to verify installation and the CD-ROM insert for more information about the Oracle Installer and its options.

Step 2: Configure the Server

On the server, the network listener must be configured to identify a database listener on that server for an Oracle Names Server.

To configure the network listener:

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

   The *Services* window appears.

2. Check the status of the network listener Oracle*HOME_NAME*TNSListener. If the network listener is stopped (the status column is blank), go to the Step 3. If the status is Started, stop the network listener:

   To stop the network listener:

   a. From the Control Panel's *Services* window, select Oracle*HOME_NAME*TNSListener80 (the service name if you are using the default network listener name LISTENER) or Oracle*HOME_NAME*TNSListener80*LSNR* (where *LSNR* is the non-default network listener name), and click Stop.

      The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service.

   b. Click Yes.

      The network listener is stopped. The status column is blank.

3. Click Close to quit the *Services* window.

4. Set the global database name and register services with the Oracle Names Server using the Oracle Net8 Assistant or editing the *ORACLE_HOME*\NET80\ADMIN\LISTENER.ORA file.

   The *global database name* specifies the name by which the network listener registers the database instance with an Oracle Names Server and the name by which the Oracle Names Server identifies a database. You can use any alias, but Oracle Corporation recommends setting the global database name to the value of the INIT*SID*.ORA's DB_NAME and DB_DOMAIN parameters. The default global database name is ORACLE.WORLD.

   When clients request the connect information for a database from an Oracle Names Server, this is the alias they use. The domain must also be added to the end of this name.

   Registering services with the Oracle Names Server instructs the network listener to find and register with a well-known Oracle Names Server. When the network listener starts, it looks for hosts with the well-known host names, tries

to gather connection information from the Oracle Names Server, and registers its SID(s) with it.

Use the Net8 Assistant...	Modify the LISTENER.ORA file...
1. Choose Start > Programs > Oracle for Windows NT - *HOME_NAME* > Oracle Net8 Assistant. The Oracle Net8 Assistant starts. **2.** Double-click the Listeners folder. **3.** Select the appropriate network listener from the Listeners folder. The network listener details appear on the right side of the page: **4.** Select Database Services from the drop-down list. **5.** Modify the Global Database Field with the an alias. Preferably, use the values of DB_NAME and DB_DOMAIN from the INIT*SID*.ORA as the alias. **6.** Select General Parameters from the drop-down list. **7.** Select Register Services with Oracle Names. **8.** Choose Save Network Configuration from the File menu. **9.** Choose Exit from the File menu to exit the Oracle Net8 Assistant.	Ensure GLOBAL_DBNAME is set to an alias. Preferably, use the values of DB_NAME and DB_DOMAIN from the INIT*SID*.ORA as the alias. For example: SID_LIST_*LISTENER_NAME*= (SID_LIST = (SID_DESC = (SID_NAME = *SID*) (GLOBAL_DBNAME = *GLOBAL_DBNAME.DOMAIN*))) USE_PLUG_AND_PLAY_listener = ON

Step 3: Define a Well-Known Oracle Names Server

To define a well-known Oracle Names Server:

For all clients and servers, ensure your network administrator has named the Oracle Names Servers as a well-known names server, allowing clients to access the Oracle Names Servers using the well-known name.

Well-known names are dependent on the protocol adapter:

The well-known host names for TCP connections	The well-known computer Names for Named Pipes connections[1]	The well-known service name for an SPX connection
oranamesrvr0	ORANAMESRVR0	oranamesrvr
oranamesrvr1	ORANAMESRVR1	
oranamesrvr2	ORANAMESRVR2	
oranamesrvr3	ORANAMESRVR3	
oranamesrvr4	ORANAMESRVR4	

[1] Well-known Names Server names for Names Pipes must be in all uppercase letters.

This implies you can have as few as one well-known Oracle Names Server (whose alias would be oranamesrvr0) and as many as five (with aliases oranamesrvr0 to oranamesrvr4).

The numbers 0 to 4 indicate the order in which the client tries to contact the Oracle Names Servers, if more than one exists in the network.

For example, for TCP/IP, Oracle Names Servers are made well-known by adding aliases oranamesrvr(0-4) to the Domain Name Service (DNS) or in the *SYSTEMROOT*\SYSTEM32\DRIVERS\ETC\HOSTS file.

The HOSTS file may include the following entries:

```
144.25.219.146 host0  oranamesrvr0
144.25.219.147 host1  oranamesrvr1
144.25.219.148 host1  oranamesrvr2
```

Step 4: Create a Well-Known Oracle Names Server

You may use the Oracle Names Control Utility (NAMESCTL80), or the Oracle Net8 Assistant to create a well-known Oracle Names Server on the computer where Oracle Names Server is installed.

Prior to creating a well-known Oracle Names Server, you must decide whether:

- You need support for one or more administrative *regions.* An administrative region consists of a collection of Oracle Names Servers in one or more domains.
- You need service registration data replicated continuously among Oracle Names Servers, or want Oracle Names Server to store their registration data in an Oracle database.

See Chapter 6, "Oracle Names," of the *Oracle Net8 Administrator's Guide* to help with these decisions.

Oracle Corporation recommends you create at two least Oracle Names Servers, one to act as the Oracle Names Server and one to act as a backup Oracle Names Server. Each of these should reside on its own computer.

To create a well-known Oracle Names Server, use the Oracle Net8 Assistant or the NAMESCTL control utility:

Note: Keep the following considerations in mind when configuring Oracle Names Servers with the Oracle Net8 Assistant:

- Removal of Oracle Names Servers is not supported. You must manually delete Oracle Names Server entries in the *ORACLE_HOME*\NET80\ADMIN\NAMES.ORA and *ORACLE_HOME*\NET80\NAMES\CKP*.ORA files.
- Creation of Oracle Names Servers on Windows 95 is not supported, but the functionality is not disabled from the Oracle Net8 Assistant. The Oracle Net8 Assistant allows you to create Oracle Names Servers, but you cannot start, stop, or configure them.

Use the Net8 Assistant...	Use the control utility NAMESCTL80...
1. If you want to create a region database, follow Steps 1-2 in Section 6.7, "Creating a Database to Store Names Server Information", of the *Oracle Net8 Administrator's Guide.*	**1.** If you want to create a region database, follow Steps 1-2 in Section 6,7, "Creating a Database to Store Names Server Information", of the *Oracle Net8 Administrator's Guide*.

2. On the computer where Oracle Names software resides, choose Start > Programs > Oracle for Windows NT - *HOME_NAME* > Oracle Net8 Assistant.
 	
The Oracle Net8 Assistant starts.
	2. Start the Oracle Names Server on each computer where Oracle Names software resides:
	
	From the MS-DOS command prompt, enter:
	
	`C:\> NAMESCTL80`
	
	`NAMESCTL> START`
	
	Or, from the Control Panel's *Services* window, select Oracle*HOME_NAME*NamesService80, and click Start.

3. Select the Oracle Names Servers folder. A message appears, saying the Oracle Net8 Assistant does know of any Oracle Names Servers in the network.	**3.** Create a SDNS.ORA file in *ORACLE_HOME*\NET80\NAMES. This file contains the names of the Oracle Names Server(s) in a particular region. The computer reads this file to find the addresses of other Oracle Names Servers. From the command line, enter: `NAMESCTL> REORDER_NS`
4. Click OK to acknowledge message.	
5. Choose Create from the Edit menu, or click on the "+" button to create a new Names Server. The Names Wizard starts.	
6. The wizard guides you through the creation and configuration process. ■ a unique Oracle Name Server name ■ an address for the Oracle Names Server ■ a choice to store information in a database or replicate information among Oracle Names Server If you choose to store information in a database, you are prompted for the listener address, and database SID, user name and password. ■ to identify if this Oracle Names Server is in the root region	
7. Choose Exit from the File menu to exit the Oracle Net8 Assistant application.	
8. Repeat Steps 2-7 to create additional Oracle Names Servers on different computers within a region or another region. The Oracle Net8 Assistant does not support creation of multiple Oracle Names Servers on one computer.	

Step 5: Configure Clients and Servers To Use Oracle Names Server

To configure the client and server computers to recognize Oracle Names Servers, use the Oracle Net8 Assistant or the NAMESCTL control utility:

Use the Net8 Assistant...	Use the control utility NAMESCTL80...

Note: Discovery of Oracle Names Servers may take several minutes.
1. Choose Start > Programs > Oracle for Windows NT/Windows 95/98 - *HOME_NAME* > Oracle Net8 Assistant.
The Oracle Net8 Assistant starts.
2. Select the Oracle Names Servers folder.
A message appears, saying the Oracle Net8 Assistant does know of any Oracle Names Servers in the network.
3. Choose Discover Oracle Names Servers from the Tools menu.
This produces an SDNS.ORA file in *ORACLE_HOME*\NET80\NAMES. This file contains the names of the Oracle Names Server(s). This file is read to find the addresses of Oracle Names Servers.
The following message appears:
"Discovered Oracle Names Server in the region. Please exit the tool and start again."
4. Choose Exit from the File menu to exit the Oracle Net8 Assistant application.
	From the command line, enter:
	`C:\> NAMESCTL80`
	`NAMESCTL> REORDER_NS`
	This produces an SDNS.ORA file in *ORACLE_HOME*\NET80\NAMES. This file contains the names of the Oracle Names Server(s). This file is read to find the addresses of Oracle Names Servers.

5. Ensure Oracle Names is the first method Net8 will use to reconcile service names by using the Oracle Net8 Assistant or editing the *ORACLE_HOME*\NET80\ADMIN\SQLNET.ORA file:

Use the Net8 Assistant...	Modify the SQLNET.ORA file...
1. Choose Start > Programs > Oracle for Windows NT/Windows 95/98 - *HOME_NAME* > Oracle Net8 Assistant. The Oracle Net8 Assistant starts.	Add the NAMES.DIRECTORY_PATH parameter, so it includes ONAMES: `NAMES.DIRECTORY_PATH = (ONAMES, TNSNAMES)`
2. Click the Profiles icon. The profile details appear on the right side of the page:	The order is important. Net8 tries to use the first method. If the first method fails to resolve the service name, Net8 tries to use the next method.
3. Select Naming from the drop-down list.	Oracle Names configuration is complete.
4. Click the Methods tab.	
5. Choose ONAMES from the Available Methods list, and click <.	
6. Select the ONAMES in the Selected Methods list, and click the Promote button to move the selection to the top of the list.	
7. Choose Save Network Configuration from the File menu.	
8. Choose Exit from the File menu to exit the Oracle Net8 Assistant application. Oracle Names Server configuration is complete.	

Configuring Oracle Connection Manager

The Oracle Connection Manager provides three capabilities for Oracle8:

- Connection Concentration

  Allows you to multiplex multiple logical client sessions through a single transport connection to an Oracle server destination. This permits large numbers of users to access a single database which is running in multi-threaded server (MTS) mode, and thus increases the server's scalability. This feature is available only in a TCP/IP network.

  Concentration reduces the demand on resources needed to maintain multiple connections between two processes by enabling the server to use fewer connection end points for incoming requests. This enables you to increase the total number of sessions that a server can handle. By using multiple Connection Managers, it is possible for thousands of concurrent users to connect to a server.

- Network Access Control

  Provides a proxy for denying or allowing access to a database server. This feature, implemented only over the TCP/IP protocol, provides network filtering similar to that offered with a firewall.

- Multi-Protocol Support

  Replaces the Multi-Protocol Interchange. Allows client and database servers operating on different protocol stacks to communicate with each other.

The clients require a TNSNAMES.ORA file or Oracle Names Server, the Oracle Connection Manager requires a CMAN.ORA, and the server requires multiplexing parameters set in the INIT*SID*.ORA.

Conditions for Using Oracle Connection Manager

- TCP/IP must be installed and configured for local connectivity, because the Oracle Connection Manager Administration service (Oracle*HOME_NAME*CMAdminService80) uses TCP/IP for communication with Oracle Connection Manager.
- The parameter AUTOMATIC_IPC=OFF must be set up in the SQLNET.ORA configuration file in order for a client to use Oracle Connection Manager.
- When Connection Manager is used in an Oracle Names environment, it automatically attaches itself to every listener address registered for an Oracle Names Server. If the listener address list contains greater than or equal to five addresses, then you may not be able to connect to that particular listener through the Connection Manager. In that case you need to reduce the listener address list.

Setting Up an Oracle Connection Manager

The steps to set up an Oracle Connection Manager include:

Step 1: Install

Step 2: Configure Clients

Step 3: Configure Oracle Connection Manager

Step 4: Configure the Server

Step 1: Install

Ensure the following are installed:

- Oracle Connection Manager on its own computer
- Net8 Client on the clients
- Net8 Server on the server

Additional Information: See "Verifying Installation and Setup" on page 3-4 to verify installation and the CD-ROM insert for more information about the Oracle Installer and its options.

Step 2: Configure Clients

To configure the client:

Set the Oracle Connection Manager address through a TNSNAMES.ORA file or Oracle Names Server.

If using Oracle Names Server, the Oracle Connection Manager automatically updates the addresses in the Names Server, inserting the address for the CMAN into the existing address.

If you are using the local naming method, modify the *ORACLE_HOME*\NET80\ADMIN\TNSNAMES.ORA file located in *ORACLE_HOME*\NET80\ADMIN.

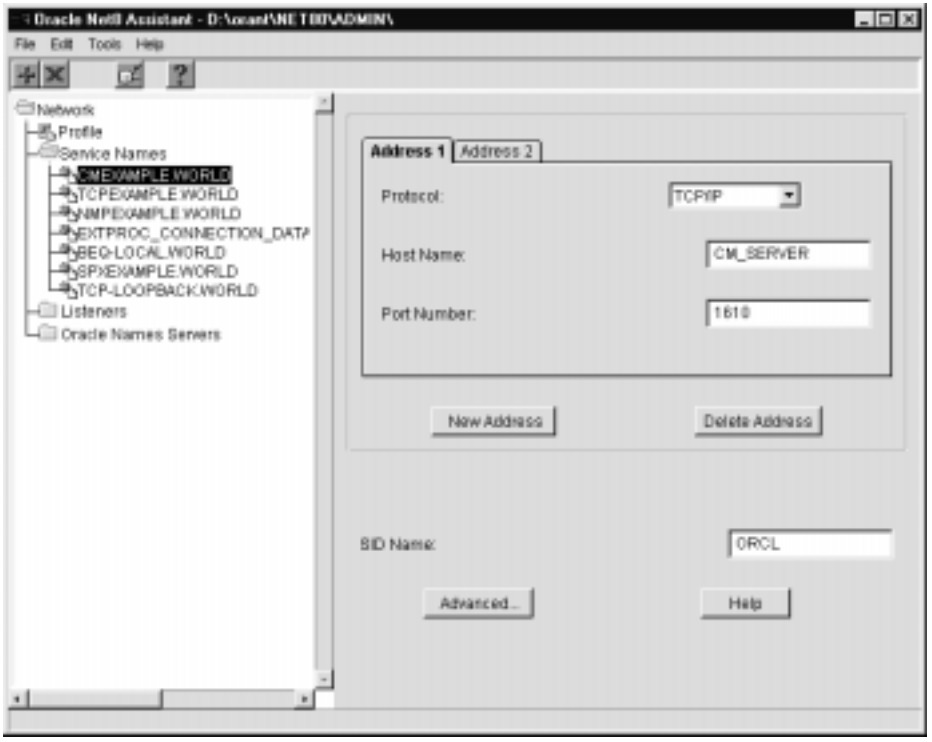
To modify the TNSNAMES.ORA file:

1. Choose Start > Programs > Oracle for Windows NT/Windows 95/98 - *HOME_NAME* > Oracle Net8 Assistant.

   The Oracle Net8 Assistant appears.

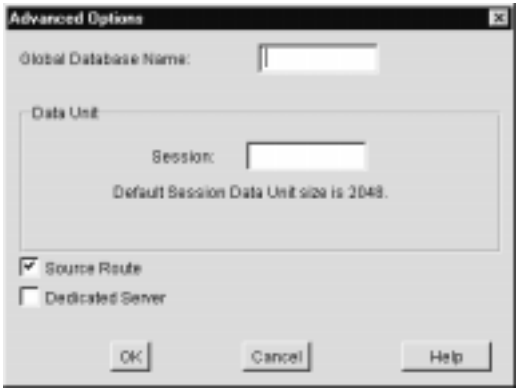
2. Select the Service Names folder.

The list of current service names appears:



3. Select CMEXAMPLE.WORLD:
4. Modify the Address 1 tab with the address information for the Oracle Connection Manager.
5. Click Advanced.

   The *Advanced Options* dialog box appears:



6. Ensure Source Route is checked, and click OK.

   This option creates a source route of addresses through all Oracle Connection Managers to the destination address.

7. Select the Address 2 tab and modify it with the address information for the server. The second address is used by the Oracle Connection Manager to connect to the server.

8. You can have multiple CMAN addresses in the ADDRESS_LIST if necessary. The Oracle Connection Managers basically act as routers, pointing the connection request to the next hop.

9. Choose Save Network Configuration from the File menu.

10. Choose Exit from the File menu to exit the Oracle Net8 Assistant.

Below is a comparison of a regular TNSNAMES.ORA file and a TNSNAMES.ORA file with an entry to use the Oracle Connection Manager (Connection Manager entries are shown in boldface text):

```
INVENTORYDB.WORLD=
   (DESCRIPTION=
        (ADDRESS=
              (PROTOCOL=TCP)
              (HOST=INVENTORY)
              (PORT=1521)
        )
       (CONNECT_DATA=
              (SID=ORCL)
       )
    )
```

```
INVENTORYDB.WORLD=
   (DESCRIPTION=
       (ADDRESS_LIST=
           (ADDRESS= <—CMAN address
               (PROTOCOL=TCP)
               (HOST=CMAN)
               (PORT=1610) <---must match  port in CMAN.ORA file
            )
           (ADDRESS=
               (PROTOCOL=TCP)
               (HOST=INVENTORY)
               (PORT=1521)
           )
        )
       (CONNECT_DATA=
              (SID=ORCL)
       )
      (SOURCE_ROUTE=YES)
    )
```

Enabling Multi-Protocol Support

Below is a TNSNAMES.ORA entry set up to use the Oracle Connection Manager with multiple protocols:

```
INVENTORYDB.WORLD=
   (DESCRIPTION=
       (ADDRESS_LIST=
           (ADDRESS=
                (PROTOCOL=SPX)
                (SERVICE=CMAN)
          (ADDRESS=
                (PROTOCOL=TCP)
                (HOST=INVENTORY)
                (PORT=1521)
          )
        )
       (CONNECT_DATA=
              (SID=ORCL)
       )
      (SOURCE_ROUTE=YES)
    )
```

In this example, the client will use SPX to connect to the CMAN, then the CMAN will use TCP/IP to connect to the server. This is the same functionality that was provided with the Oracle Multi-Protocol Interchange (MPI) of Oracle7.

Step 3: Configure Oracle Connection Manager

Configuration of the Oracle Connection Manager may require the modification of the CMAN.ORA file located in *ORACLE_HOME*\NET80\ADMIN if you are using protocol adapters other than TCP/IP or require additional features.

Non-TCP/IP Protocol Adapters

If you used protocols other than TCP/IP between the client and Oracle Connection Manager, you must modify the line beginning:

```
CMAN = (ADDRESS_LIST=
```

to listen to the protocols adapter address the same way you would modify LISTENER.ORA file.

Enabling Connection Concentration

Section 7.3.2, “Enabling Connection Concentration Features,” of the *Oracle Net8 Administrator’s Guide* explains how to enable multiplexing.

Enabling Specifying Network Access Control Rules

Section 7.3.3, “Enabling Connection Concentration Features,” of the *Oracle Net8 Administrator’s Guide* explains how to enable network access rules.

Enabling Optional Parameters

If you require other optional parameters, you must remove the ‘#’ preceding those parameters from the CMAN.ORA file.

Additional Information: See "Understanding the CMAN.ORA File" on page C-29 for a complete description of the CMAN.ORA file and its parameters.

Step 4: Configure the Server

To use the multiplexing, configure the server for Multi-Threaded Server (MTS) by setting MTS parameters in the *ORACLE_HOME*\DATABASE\INIT*SID*.ORA for each instance. See Appendix B, “Initialization Parameter Files”, in your *Getting Started* guide.

Testing the Configuration on the Server

Once you have configured the network, test the configuration by performing a loopback test on the server.

A loopback test uses Net8 to go from the server back to itself, bypassing the Interprocess Communication (IPC). Performing a successful loopback verifies that Net8 is functioning on the server side.

The steps to test the configuration are:

Step 1: Start Oracle Names Server

Step 2: Start the Network Listener

Step 3: Start Oracle Connection Manager

Step 4: Perform a Loopback Test

Step 1: Start Oracle Names Server

If you are using Oracle Names, start an Oracle Names Server on the computer where Oracle Names Server is installed and configured with the NAMESCTL80 control utility or the Control Panel:

Use the control utility NAMESCTL80...	Use the Windows NT Control Panel...

1. From the command line, enter:
`C:\> NAMESCTL80`
`NAMESCTL> STATUS`
If the STATUS command indicates the Oracle Names Server is running, go to Step 3. If the Oracle Names Server is not running, go to Step 2.
2. Start the Oracle Names Server. Enter:
`NAMESCTL> START`
3. Exit from the NAMESCTL utility. Enter:
`NAMESCTL> EXIT`
	1. From the *Control Panel* window, double-click Services.
	The *Services* window appears. Look for the Oracle*HOME_NAME*NamesService80 service. A blank in the Status column indicates that the service is not running. If the service is already running, close the window and go to the section "Step 2: Start the Network Listener" on page 6-33.
	2. Select the service, and click Start.
	The service starts.
	3. In the *Services* window, click Close.

Step 2: Start the Network Listener

For Net8 to accept connections on the server, a network listener must be started. If you have started an Oracle Names Server, the network listener upon startup automatically registers the databases specified in the SID_LIST_*LISTENER_NAME* section of the *ORACLE_HOME*\NET80\ADMIN\LISTENER.ORA file with the well-know Oracle Names Servers.

On the server, start the listener with the LSNRCTL80 control utility or the Control Panel:

Use the control utility LSNRCTL80...

1. From the command line enter:

   ```
   C:\> LSNRCTL80
   ```

   ```
   LSNRCTL> STATUS LISTENER_NAME
   ```

   where *LISTENER_NAME* is the name of the network listener defined in the LISTENER.ORA file with the alias LISTENER. It is not necessary to identify the network listener if you are using the default network listener, named LISTENER.

   If the STATUS command indicates the network listener is running, go to Step 2. If the network listener is not running, go to Step 3.

2. Even if the network listener is running, Oracle Corporation advises you to stop the network listener, and start it again. To stop the network listener, enter:

   ```
   LSNRCTL> SET PASSWORD
   PASSWORD
   ```

   ```
   LSNRCTL> STOP LISTENER_NAME
   ```

   SET PASSWORD is only required if the password is set in the LISTENER.ORA file. The password defaults to ORACLE.

3. Start the network listener. Enter:

   ```
   LSNRCTL> START LISTENER_NAME
   ```

   Oracle*HOME_NAME*TNSListener80*LSNR* is created if this command is run for the first time against a non-default network listener name.

4. Exit from the LSNRCTL80 utility. Enter:

   ```
   LSNRCTL> EXIT
   ```

Use the Windows NT Control Panel...

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

   The *Service*s window appears. Look for Oracle*HOME_NAME*TNSListener80 (the service name if you are using the default network listener name LISTENER) or Oracle*HOME_NAME*TNSListener80*LSNR* (where *LSNR* is the non-default network listener name). Oracle*HOME_NAME*TNSListener80*LSNR* is only created if the following command has been run:

   ```
   LSNRCTL80 START LISTENER_NAME
   ```

   A blank in the Status column indicates that the service is not running. If the service is already running, close the window and go to the section "Step 3: Start Oracle Connection Manager" on page 6-35.

2. Select the service, and click Start.

   The service starts.

3. In the *Services* window, click Close.

Step 3: Start Oracle Connection Manager

If you are using Oracle Connection Manager, start it on the computer where Oracle Connection Manager is installed and configured with the CMCTL80 control utility or the Control Panel:

Use the control utility CMCTL80...	Use the Windows NT Control Panel...

1. From the command line, enter:
`C:\> CMCTL80`
`CMCTL> START CMAN`
	1. From the *Control Panel* window, double-click Services.
	The *Services* window appears.

2. Exit from the CMCTL80 utility. Enter: `CMCTL> EXIT`	**2.** If you are using Oracle Names, select the Oracle*HOME_NAME*CMAdminService80 and click Start. If you are not using Oracle Names, do not start this service, and go to Step 3. The service starts.
	3. Select the Oracle*HOME_NAME*CManService80, and click Start. A blank in the Status column indicates that the service is not running. The service starts.
	4. In the *Services* window, click Close.

Step 4: Perform a Loopback Test

A loopback test is when the server makes a connection to a database on its own computer.

> **Note:** The instructions below only apply if you have configured using the local naming method. If you have not configured with the local naming method, connect to the database using the instructions in "Step 5: Connect to the Database" on page 7-7.

To perform the loopback test:

1. Choose Start > Programs > Oracle for Windows NT - *HOME_NAME* > Net8 Easy Configuration Tool.

   Oracle Net8 Easy Config starts.

2. Click Test.
3. Select a service name from the Existing Services list box you created in "Using the Local Naming Method" on page 6-6.
4. Click Next.

The *Connection Test* page appears:

5. Enter a valid user account user ID and password, such as SYSTEM and MANAGER, for the database you want to connect to, and click Test. The database administrator can provide this information.

   The status of the test appears in the field below the Test button. A successful test display the following message:

   ```
   The connection test was successful.
   ```

6. Click Done when the test is complete.

   The final page appears.

7. Click Finish to dismiss Net8 Easy Configuration Tool wizard.

Testing the Configuration on the Client

After performing a loopback test, use any of the mechanisms below to test client connections:

- Verify TCP/IP Network Connections (if you are using TCP/IP)
- Verify Oracle Database Connections Using TNSPING
- Verify Oracle Database Connection Using Oracle Net8 Easy Configuration Tool

Verify TCP/IP Network Connections

If you are using TCP/IP, follow the instructions below to specify the destination address for TCP/IP and use PING to see if the server is running.

Determine the Server's IP Address

Use PING

Most TCP/IP transports attempt to use the DNS. DNS is a mechanism used to translate the host name specified in the TNSNAMES.ORA file into the host internet address (IP). If a DNS is present on your network and the TCP/IP vendor supports DNS, the host name is successfully translated to the host address. The host IP address can be determined by using the Control Panel's Network utility to access DNS information.

Depending on your vendor, workstation configuration, and network configuration, your TCP/IP software can also use a *SYSTEMROOT*\SYSTEM32\DRIVERS\ETC\HOSTS file to map host names to Internet addresses if DNS is not detected or supported.

If DNS and the HOSTS file are unable to resolve the host name during a remote database connection, the following error message appears:

```
ORA-12545: TNS: name lookup failure
```

If your network administrator cannot resolve the problem, the solution to this error message is to go around DNS and the HOSTS file by modifying the (HOST = *SERVER_NAME*) section of the TNSNAMES.ORA, so *SERVER_NAME* is changed to the IP address of the server.

The following sections explain how to determine the server's IP address and verify that DNS and the HOSTS file are working correctly.

Determine the Server's IP Address

If you are not using TCP/IP, go to "Verify Oracle Database Connections Using TNSPING" on page 6-42.

To determine the server's TCP/IP internet address:

> **Note:** If you are not authorized for access on the server, ask your server administrator for assistance.

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

   The *Network* window appears.

2. Choose the Protocols tab.

   The *Protocols* view appears:

3. From the *Protocol* view, select the TCP/IP Protocol Adapter, and click Properties.

The *Microsoft TCP/IP Properties* dialog box appears with the IP Address view:

4. Obtain the IP address, and click Cancel to close the *Microsoft TCP/IP Properties* dialog box.
5. Click Cancel to close the *Network* window.
6. Continue to the next section, "Use PING".

Use PING

If you are using TCP/IP, PING allows you to determine if DNS or the HOSTS file are correctly set up and your network operating system is functioning correctly.

To use PING:

From the client, enter the following at the command prompt:

```
C:\> PING SERVER_NAME
```

where *SERVER_NAME* is the host name, alias, or Internet address of the server to which you are trying to connect.

If your network is functioning correctly, the following message appears:

```
Reply from SERVER_NAME: bytes=nn time=nnms
```

If there is a problem, this message appears:

```
Request timed out
```

Or:

```
Reply from SERVER_NAME: Destination host unreachable
```

The following is a partial list of reasons why a host is inaccessible:

- the server is not accessible through the network
- the remote host is not online
- the domain name server is not functioning
- a domain name server is not accessible through the network
- the server name does not exist in the HOSTS file

If PING returns an error message, ask your network administrator to help you resolve the problem. If the problem is not resolved, and you attempt to make a Net8 connection, you may receive one of the following error messages:

- ORA-12203: TNS: unable to connect to destination
- ORA-12535: TNS: Failure to redirect to destination
- ORA-12541: TNS: no listener

Verify Oracle Database Connections Using TNSPING

Use the TNSPING80 utility to determine whether or not you can reach the network listener service. TNSPING80, however, never actually connects with the network listener. A socket is never created and opened. TNSPING80 only checks to ascertain that a network listener is present on the server side.

When you connect to a network listener using TNSPING80, an estimate of the round trip time in milliseconds appears. If TNSPING80 fails, a network error message appears without the resource use of a database connection.

To use TNSPING80:

From the client, enter:

```
TNSPING80 SERVICE_NAME COUNT
```

where *SERVICE_NAME* is the service name (defined in the TNSNAMES.ORA) you created in "Using the Local Naming Method" on page 6-6 and *COUNT* is the number of times the program attempts to reach the server. *COUNT* is optional.

The output looks like:

```
TNS Ping Utility for 32-bit Windows: Version 8.0.6.0.0 - Production on 01 AUG-99
20:20:33

Copyright, 1999(c) Oracle Corporation 1999. All rights reserved.

Attempting to contact (ADDRESS=(COMMUNITY=tcp.world)(PROTOCOL=TCP)(Host=host_
name)(Port=1521))
OK (60 msec)
```

Verify Oracle Database Connection Using Oracle Net8 Easy Configuration Tool

> **Note:** The instructions below only apply if you have configured using the local naming method. If you have not configured with the local naming method, connect to the database using the instructions in "Step 5: Connect to the Database" on page 7-7.

Use the Oracle Net8 Easy Configuration Tool application to determine whether or not you can reach the network listener service.

To verify connectivity for a client computer:

1. Choose Start > Programs > Oracle for Windows NT - *HOME_NAME* > Net8 Easy Configuration Tool.

   Oracle Net8 Easy Config starts.

2. Click Test.
3. Select a service name from the Existing Services list box you created in "Using the Local Naming Method" on page 6-6.
4. Click Next.

The *Connection Test* page appears:

5. Enter a valid Username and Password, such as SYSTEM and MANAGER, for the database you want to connect to, and click Test.

   The status of the test appears in the field below the Test button. A successful test displays the following message:

   `The connection test was successful.`

6. Click Done when the test is complete.

   The final page appears.

7. Click Finish to save your configuration and dismiss the Net8 Easy Configuration Tool.

7

Connecting To a Database

This chapter describes how to connect to a database from a client computer.

Specific topics discussed are:

- Connection Overview
- Step 1: Start Oracle Names Server(s)
- Step 2: Start the Network Listener
- Step 3: Start Oracle Connection Manager(s)
- Step 4: Start Client Cache Service
- Step 5: Connect to the Database

Connection Overview

Client workstations and other servers connect to a network listener with a service name when logging onto an Oracle server. The appropriate Oracle Protocol Adapter is used when the database alias (or service name) used to request a connection specifies that protocol in the configuration file.

Step 1: Start Oracle Names Server(s)

If you are using Oracle Names, start an Oracle Names Server on the computer where Oracle Names Server is installed and configured with the NAMESCTL80 control utility or the Control Panel:

Use the control utility NAMESCTL80...	Use the Windows NT Control Panel...

1. Verify whether the Oracle Names Server is running or not running.
 	
From the command line, enter:
 	
`C:\> NAMESCTL80`
 	
`NAMESCTL> STATUS`
 	
If the `STATUS` command indicates the Oracle Names Server is running, go to Step 3. If the Oracle Names Server is not running, go to Step 2.
	1. From the *Control Panel* window, double-click Services.
	
	The *Services* window appears. Look for the Oracle*ORACLE_HOME*NamesService80 service. A blank in the Status column indicates that the service is not running. If the service is already running, close the window and go to "Step 2: Start the Network Listener" on page 7-3.

2. Start the Oracle Names Server. Enter: `NAMESCTL> START`	**2.** Select the service, and click Start. The service starts.
3. Exit from the NAMESCTL80 utility. Enter: `NAMESCTL> EXIT`	**3.** In the *Services* window, click Close.

Step 2: Start the Network Listener

For Net8 to accept connections on the server, a network listener must be started. If you have started an Oracle Names Server, the network listener upon startup automatically registers the databases specified in the SID_LIST_*LISTENER_NAME* section of the *ORACLE_HOME*\NET80\ADMIN\LISTENER.ORA file with the well-known Oracle Names Servers.

Note: Start Oracle SNMP support (if needed) after starting the network listener. See Chapter 9, "Using the Oracle SNMP Agent".

On the server, start the listener with the LSNRCTL80 control utility or the Control Panel:

Use the control utility LSNRCTL80...

1. From the command line enter:

   ```
   C:\> LSNRCTL80
   ```

   ```
   LSNRCTL> STATUS LISTENER_NAME
   ```

   where *LISTENER_NAME* is the name of the network listener defined in the LISTENER.ORA file with the alias LISTENER. It is not necessary to identify the network listener if you are using the default network listener, named LISTENER.

   If the STATUS command indicates the network listener is running, go to Step 2. If the network listener is not running, go to Step 3.

2. Even if the network listener is running, Oracle Corporation advises you to stop the network listener, and start it again. To stop the network listener, enter:

   ```
   LSNRCTL> SET PASSWORD PASSWORD
   ```

   ```
   LSNRCTL> STOP LISTENER_NAME
   ```

   SET PASSWORD is only required if the password is set in the LISTENER.ORA file. The password defaults to ORACLE.

3. Start the network listener. Enter:

   ```
   LSNRCTL> START LISTENER_NAME
   ```

   Oracle*ORACLE_HOME*TNSListener*LSNR* is created if this command is run for the first time against a non-default network listener name.

4. Exit from the LSNRCTL80 utility. Enter:

   ```
   LSNRCTL> EXIT
   ```

Use the Windows NT Control Panel...

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

   The *Service*s window appears. Look for Oracle*HOME_NAME*TNSListener80 (the service name if you are using the default network listener name LISTENER) or Oracle*HOME_NAME*TNSListener80*LSNR* (where *LSNR* is the non-default network listener name). Oracle*HOME_NAME*TNSListener80*LSNR* is only created if the following command has been run:

   ```
   LSNRCTL80 START LISTENER_NAME
   ```

   A blank in the Status column indicates that the service is not running. If the service is already running, close the window and go to "Step 3: Start Oracle Connection Manager(s)" on page 7-5.

2. Select the service, and click Start.

   The service starts.

3. In the *Services* window, click Close.

Step 3: Start Oracle Connection Manager(s)

If you are using Oracle Connection Manager, start it on the computer where Oracle Connection Manager is installed and configured with the CMCTL80 control utility or the Control Panel:

Use the control utility CMCTL80...	Use the Windows NT Control Panel...

1. From the command line, enter:
`C:\> CMCTL80`
`CMCTL> START CMAN`
2. Exit from the CMCTL80 utility. Enter:
`CMCTL> EXIT`
	1. From the *Control Panel* window, double-click Services.
	The *Services* window appears. If you are using Oracle Names, select the Oracle*HOME_NAME*CMAdminService80 to acquire information about available Oracle Names Servers, and click Start. If you are not using Oracle Names, do not start this service.
	The service starts.
	2. Select the Oracle*HOME_NAME*CManService80 to start the Oracle Connection Manager, and click Start.
	A blank in the Status column indicates that the service is not running.
	The service starts.
	3. In the *Services* window, click Close.

Step 4: Start Client Cache Service

If you are using Oracle Names, you may enable client caching on clients with the NAMESCTL80 control utility or the Control Panel (for Windows NT only). Client caching will update the SDNS.ORA file with the new Oracle Names Server information. If you do not want to update the SDNS.ORA file, it is not necessary to start this service.

Use the control utility NAMESCTL80	Use the Windows NT Control Panel...

1. At the client command prompt, enter:
`C:\> NAMESCTL80`
`NAMESCTL> START_CLIENT_CACHE`
2. Exit from the NAMESCTL utility. Enter:
`NAMESCTL> EXIT`
	Note: The Control Panel is not available for Windows 95/98 clients. You must use the NAMESCTL80 control utility.
	1. From the client *Control Panel* window, double-click Services.
	The *Services* window appears. Look for the Oracle*HOME_NAME*ClientCache80 service. A blank in the Status column indicates that the service is not running. If the service is already running, go to Step 3.
	2. Select the service, and click Start.
	3. In the *Services* window, click Close.

Step 5: Connect to the Database

Two ways to make database connections are to:

- Use Server Manager
- Use SQL*Plus

Use Server Manager

To connect to a database using Server Manager:

1. Enter the following at the MS-DOS command prompt at any computer in the network:

   ```
   C:\>SVRMGR30
   ```

   The SVRMGR> prompt appears.

2. Connect to the database:

For...	Enter...
Host Naming method	`SVRMGR> CONNECT` *`USERNAME/PASSWORD@HOSTNAME`*[1]
Local Naming method	`SVRMGR> CONNECT` *`USERNAME/PASSWORD@SERVICE_NAME`*
Oracle Names method	`SVRMGR> CONNECT` *`USERNAME/PASSWORD@GLOBAL_DBNAME`* *GLOBAL_DBNAME* is the global database name and domain you defined in the LISTENER.ORA for the Oracle Names Server.
Bequeath Protocol Adapter	`SVRMGR> CONNECT SYSTEM/MANAGER`[2]

[1] If you cannot make a connection to the database, verify that the GLOBAL_DBNAME parameter in the LISTENER.ORA file specifies a complete name, including domain, for the server computer.

[2] Bequeath is from a server to itself.

   Server Manager returns a "*Connected*" message to the screen.

3. Issue SQL commands, such as:

   ```
   SELECT * FROM DUAL;
   ```

4. When done, enter:

```
SVRMGR> EXIT
```

Exiting Server Manager closes the database connection.

Use SQL*Plus

To connect to a remote database using SQL*Plus:

1. Choose Start > Programs > Oracle for Windows NT or Windows 95/98 > SQL*Plus 8.0.

   A Log On dialog box appears.

2. Connect to the database:

User Name	*USERNAME*
Password	*PASSWORD*
Host String	■ *HOSTNAME* for host naming method ■ *SERVICE_NAME* for local naming method ■ *GLOBAL_DBNAME* in the LISTENER.ORA for Oracle Names ■ blank for Bequeath

3. Click OK.

   The *Oracle SQL*Plus* window appears with a SQL> prompt.

4. Issue SQL commands, such as:

```
SQL> SELECT * FROM DUAL;
```

5. When done, enter:

```
SQL> EXIT
```

Exiting SQL*Plus closes the database connection.

8

Performing Advanced Configuration

This chapter describes optional advanced configuration:

Specific topics discussed are:

- Using the External Naming Method
- Configuring Authentication Adapters
- Configuring Security for the Named Pipes Protocol Adapter
- Configuring ANO
- Configuring External Procedure Calls

Using the External Naming Method

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

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

The NDS Native Naming Adapter for Windows NT and Windows 95 clients uses the NDS naming environment to store service names and addresses of Oracle7 NetWare Servers. This lets an NDS user view the entire network under a single NDS directory tree. You can use native name services in addition to, or instead of, Oracle Names or the TNSNAMES.ORA file.

If the NDS Authentication Adapter is also used, a single log on can access a multi-server and multi-database network.

Additional Information: See:

- *Oracle Advanced Networking Option Administrator's Guide* for more information about the Native Naming Adapter
- Novell NetWare documentation for further information about NDS
- Oracle8 NetWare documentation

NetWare Server Configuration

To configure the server:

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

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

Client Configuration

To configure a client:

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

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

   Note: To Support backward compatibility NOVELL is also supported in place of NDS.

Client Connection

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

Enter the following command at the MS-DOS command prompt to access an Oracle8 database for NetWare database:

```
C:\>SVRMGR30
SVRMGR> CONNECT USERNAME/PASSWORD@DATABASE_OBJECT_NAME
```

where *DATABASE_OBJECT_NAME* identifies the Oracle8 database in NDS.

Configuring Authentication Adapters

Net8 provides these authentication adapters:

- NDS Authentication Adapter
- Windows NT Native Authentication Adapter

NDS Authentication Adapter

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

The NDS Authentication Adapter allows client applications and users to access a NetWare server running Oracle using NDS. A user logged into an NDS directory tree can be automatically authenticated to use an Oracle8 database on a NetWare server in the same NDS directory tree. This lets a user access an Oracle8 database on NetWare without entering an additional user name and password.

If the NDS Naming Adapter is also used, an NDS user can view the entire network under a single NDS directory tree.

Additional Information: See:

- "Configuring Security for the Named Pipes Protocol Adapter" in this chapter for more information about ANO NDS Native Naming Adapter
- Novell NetWare documentation for more information about NDS
- Oracle8 NetWare documentation

NetWare Server Configuration

To configure the server:

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

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

Client Configuration

To configure a client:

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

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

Client Connection

To connect from a client with the NDS Authentication Adapter:

1. Log into the NDS tree.
2. Enter the following command to access an Oracle8 database for NetWare database:

```
C:\>SVRMGR30
SVRMGR> CONNECT /@SERVICE_NAME
```

Windows NT Native Authentication Adapter

The Windows NT Native Authentication Adapter (automatically installed with Net8 Server and Net8 Client) enables database user authentication through Windows NT. This enables client computers to make secure connections to an Oracle8 database on a Windows NT server. A secure connection is when a Windows NT client user name is retrieved on a Windows NT server through the Windows NT Native Authentication Adapter. The Windows NT server then permits the user name to perform the database actions on the server.

To configure the Windows NT Native Authentication Adapter:

1. For both clients and server, add the following entry to the SQLNET.ORA file:

```
SQLNET.AUTHENTICATION_SERVICES = (NTS)
```

2. Follow the instructions in “Connecting Without a Password as a Nonprivileged Database User” in Chapter 11, “Authenticating Database Users Through Windows NT”, of your *Getting Started* guide.

Configuring Security for the Named Pipes Protocol Adapter

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

Oracle Names Server creates a Names Pipe at startup time. The network listener tries to open the Named Pipe at startup. If it cannot, the network listener uses the default system account "Local System." The network listener service may not be able to open the Named Pipe created by the Oracle Names Server unless the OracleTNSListener80(*LSNR*) service has a valid user ID and password associated.

To set up the network listener permissions:

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

   The *Services* window appears.

2. Select the Oracle*HOME_NAME*TNSListener80(*LSNR*) service and double-click.

   The *Service* dialog box appears.

3. Choose the:

   - This Account option button
   - "..." button next to the This Account option button

   The *Add User* dialog box appears.

4. Select your log on ID (user ID) from the Names list box and choose the Add button.

   The user ID appears in the Add Name field.

5. Click OK.

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

6. Enter your password in the Password field.
7. Retype the same log on ID password in the Confirm Password field.
8. Click OK.

Configuring ANO

This section describes additional Windows NT and Windows 95 tasks that must be performed in order to run ANO that are not described in the *Oracle Advanced Networking Option Administrator's Guide* and the Oracle Net8 Assistant online help.

CyberSAFE Authentication Adapter

Before using the CyberSAFE Authentication Adapter, run the CyberSAFE Challenger Client to get your ticket-granting ticket.

Additional Information: See the CyberSAFE Application Security Toolkit documentation.

Identix Authentication Adapter

If during the installation of Oracle Enterprise Manager Biometrics Manager, you chose not to allow the Installer to set up your Identix TouchSafe II Device Driver, then you can configure it manually as follows.

To install the TouchSAFE II Encrypt device driver for Windows NT:

1. Change directory to *ORACLE_HOME*\IDENTIX
   - If you are using the default I/O port number 280 and the default Windows NT directory, go to Step 4.
   - If you are not using the default I/O port number 280, go to Step 2.
   - If you are not using the default Windows NT directory WINNT35\SYSTEM32\DRIVERS, go to Step 3.
2. Modify the IoPortAddress parameter in ETSIINT.INI to the current TouchSafe II Encrypt I/O port setting. For example:

   ```
   IoPortAddress = REG_DWORD 0x00000360  for I/O port 0x360
   ```

3. Modify the Windows NT directory setting in ETSIINT.BAT with your Windows NT directory.

   For example:

   ```
   copy etsiint.sys c:\winnt\system32\drivers
   -> copy etsiint.sys path\drivers
   ```

4. Run the batch file ETSIINT.BAT.

5. Use the SetKey utility in the Identix demo program to set a hash key in Hex. Set the key to C001BABY for example (do not use this value!). Make sure the hash key matches exactly the one set in the DEFAULT Security policy.
6. Reboot the system, and the device driver will start to work.
7. To make sure the device driver is running, check the Device Control Panel after reboot. The device ETSIINT should be started already.

Authentication Servers for Identix

If you are using the Identix Adapter you may need to use Non authentication between the Oracle8 database and the Identix Authentification server.On the Windows NT computer where the Oracle8 database is located, modify the TNSNAMES.ORA file located in *ORACLE_HOME*\NET80\ADMIN to include the following:

```
    (CONNECT_DATA =
      (SID = SID))
         (SECURITY=(AUTHENTICATION_SERVICES=NONE)
 ...
```

Kerberos Authentication Adapter

To use the Kerberos Authentication Adapter, you need to have the root drive:\USR\TMP subdirectory present.

SecurID Authentication Adapter

To use the SecurID Authentication Adapter, you need the following from your SecurID administrator:

- SDCONF.REC file present in the root drive:\VAR\ACE
- port numbers and service names present in the Windows NT SERVICES file

Configuring External Procedure Calls

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

The following cartridges also require external procedures:

- Image Cartridge
- Time Series Cartridge
- VIR Cartridge

Oracle8 External Procedures Requirements

Follow the procedures in the CD insert to install these products on your Windows NT server:

- Oracle8
- PL/SQL, from which external procedures are called, and the PL/SQL external procedure program (EXTPROC), which executes external procedures
- Net8 Client, Net8 Server, and Oracle Protocol Adapter

Configuring Net8 for External Procedures

External procedures entries should already be present in the LISTENER.ORA and TNSNAMES.ORA files if you have:

- a new Oracle8 installation
- migrated from SQL*Net release 2.*x* to Net8
- installed Net8 into the same Oracle home as your SQL*Net release 2.*x*.

For environments where the configuration files have been overwritten, edit the LISTENER.ORA and TNSNAMES.ORA files as follows:

1. Add a system identifier (SID) name and a program name for EXTPROC in the server's LISTENER.ORA file (entries are shown in boldface text):

```
 LISTENER =
        (ADDRESS_LIST =
                (ADDRESS =
                (PROTOCOL = IPC)
                (KEY = INVENTORY)
             )
                (ADDRESS =
                (PROTOCOL = IPC)
                (KEY = ORCL)
            )
                (ADDRESS =
                (PROTOCOL = IPC)
              (KEY = extproc)
                 )
                (ADDRESS =
                (PROTOCOL = TCP)
                (Host = INVENTORY)
                (PORT = 1521)
            )
        )
STARTUP_WAIT_TIME_LISTENER = 0
CONNECT_TIMEOUT_LISTENER = 10
TRACE_LEVEL_LISTENER = ADMIN
SID_LIST_LISTENER =
        (SID_LIST =
           (SID_DESC =
               (SID_NAME = ORCL)
           )
          (SID_DESC =
               (SID_NAME = extproc)
                       (PROGRAM = extproc)
             )
        )
```

2. Add a service name entry for EXTPROC in the server's TNSNAMES.ORA file (entries are shown in boldface text):

```
INVENTORYDB.WORLD =
        (DESCRIPTION =
                (ADDRESS =
                (PROTOCOL = TCP)
                (Host = INVENTORY)
                (PORT = 1521)
              )
                (CONNECT_DATA = (SID = ORCL))
         )
extproc_connection_data.world =
        (DESCRIPTION =
                (ADDRESS =
                (PROTOCOL = IPC)
                (KEY = ORCL)
            )
        (CONNECT_DATA = (SID=extproc))
)
```

Please note that the value for KEY must match the KEY value specified in the LISTENER.ORA file. In order to support a multiple Oracle home environment, the Oracle Installer automatically creates unique keys for the external procedures in different Oracle homes.

How Do External Procedure Calls Work?

The network listener now listens for databases services like External Procedure Calls. When a PL/SQL or SQL application calls an external procedure, the Net8 network listener launches a session-specific process called EXTPROC. Through the network listener service, PL/SQL passes the following information to EXTPROC.

- shared library name
- external procedure name
- parameters (if necessary)

EXTPROC then loads the shared library and invokes the external procedure.

9

Using the Oracle SNMP Agent

This chapter describes how to use the Oracle SNMP Agent.

Specific topics discussed are:

- What is the Purpose of SNMP?
- Oracle SNMP Agent
- Oracle SNMP Agent for Oracle Services
- Configuring Oracle SNMP Agent
- Controlling the Master Agent and the Encapsulator
- Understanding the MASTER.CFG File
- Understanding the ENCAPS.CFG File

What is the Purpose of SNMP?

SNMP (Simple Network Management Protocol) is a standard internet protocol enabling certain nodes in a network, the management stations or managing nodes, to query other network components or applications for information concerning their status and activities. Such a query is known as an SNMP *poll*. The items that can be so polled are called *managed elements*.

The software used by a management station is called a *management framework* or *management station*. The management station uses the SNMP protocol to request information from *subagents* on the nodes being managed, and those agents send back the appropriate responses. The agents can also, independently of the framework, transmit messages called *traps* to well–known addresses in response to specific events. This is done to enable quick and possibly automatic reactions to the specific conditions that the traps indicate.

All requests sent to a given network node are handled by the same *master agent*. This agent redirects the requests to the appropriate managed elements on the node, in some cases using subagents. The information that SNMP can obtain is described in a structure called a Management Information Base (MIB), which is located on the node of the managed element.

Oracle SNMP Agent

The Oracle SNMP Agent enables Oracle products to be located, identified, and monitored by any SNMP–based network management system.

Oracle SNMP Agent allows a database to be remotely monitored by any SNMP-capable management software in a TCP/IP network. This feature enables key Oracle products running anywhere on an enterprise's network to be located, identified, and monitored by a management station running at a centrally located node, in much the same way and using much the same tools as traditionally have been used to monitor the activity of the network itself. It thereby integrates the tasks of database administrators and of network administrators, enabling both to use some of the same tools and to better integrate their tasks.

Additional Information: For a complete description of SNMP concepts and terms, see the *Oracle SNMP Support Reference Guide*. It provides detailed listings of what the management information contains and suggestions on how to use it effectively in developing SNMP–based management applications.

Note: For this release, Oracle Networking products (Oracle Listener and Oracle Names) do not support SNMP. Therefore, the corresponding MIBs are not supported, but the Oracle8 8.0.5 and 8.0.6 servers support SNMP and the database MIB is supported.

Oracle SNMP Agent for Oracle Services

Oracle SNMP Agent allows you to configure an:

- OracleSNMPPeerMasterAgent
- OracleSNMPPeer Encapsulator

OracleSNMPPeerMasterAgent The OracleSNMPPeerMasterAgent is the process on a managed node that accepts queries from the management framework and communicates with the subagents to answer the query. It also can send SNMP traps independently in response to specific conditions. Only one master agent can exist on each managed node. Any node that does not have an agent will not be able to respond to SNMP requests.

OracleSNMPPeerEncapsulator If you are currently using an incompatible agent, such as Microsoft SNMP, you must install the Encapsulator to encapsulate the Microsoft master agent such that all SNMP requests from a Network Management Station (NMS) are sent to OracleSNMPPeerMasterAgent, which then forwards the relevant requests to the encapsulated master agent through the encapsulator. If the encapsulator is not configured, Microsoft SNMP will not work.

Note: MIB files for Oracle products are installed in *ORACLE_HOME*\NET80\DOCS directory. The Oracle SNMP agent can be installed in only one Oracle home on a system.

Configuring Oracle SNMP Agent

> **Note:** Oracle SNMP Agent is installed with the Installer. For information on how to install the product, see "Typical Installation Results" on page 3-2.

This section briefly describes the major tasks that the network administrator must perform to enable the Oracle SNMP Agent.

To configure Oracle SNMP support on a managed node:

1. Specify the port where master agent is listening.

   The port is specified in the TRANSPORT section of the MASTER.CFG file located at *ORACLE_HOME*\NET80\ADMIN.

   For example, add the following section to the file:

```
TRANSPORT       ordinary        SNMP
                OVER UDP SOCKET
                AT PORT 161
```

   > **Note:** It is recommended to use port 161 for OracleSNMPPeerMasterAgent since it is the default port for SNMP communication. However, you may specify a different port available as long as the management application on your NMS can be configured to send SNMP requests to the master agent listening on this port.

2. Specify the authentication in the COMMUNITY section of the MASTER.CFG file:

```
COMMUNITY    public
             ALLOW ALL OPERATIONS
             USE NO ENCRYPTION
```

   Continue to Step 3 if the Encapsulator is to be used.

3. Specify an unused port where the encapsulated agent, Microsoft SNMP Service, should be listening.

   The port is specified in SERVICES file located at *NT_HOME*\SYSTEM32\DRIVERS\ETC.

   For example, make sure you have the following line in the file:

   ```
   snmp            1161/udp    snmp
   ```

   Note: If there has already been an entry for SNMP in the file, change the port from 161 (default number) to something else that is available (1161 in this example).

4. Edit the Encapsulator configuration file, ENCAPS.CFG, located at *ORACLE_HOME*\NET80\ADMIN to specify which non-PEER master agents are to be encapsulated.

   You must at least add an AGENT entry, including MIB subtrees manageable by NMS, for the encapsulated master agent.

   For example, you should have a section like the following in the file:

   ```
   AGENT AT PORT 1161 WITH COMMUNITY public
   SUBTREES

   1.3.6.1.2.1.1,
   1.3.6.1.2.1.2,
   1.3.6.1.2.1.3,
   1.3.6.1.2.1.4,
   1.3.6.1.2.1.5,
   1.3.6.1.2.1.6,
   1.3.6.1.2.1.7,
   1.3.6.1.2.1.8,
   1.3.6.1.2.1.77

   FORWARD ALL TRAPS;
   ```

   Note: The port (1161 in this example) must match the one you specified in Step 3.

Controlling the Master Agent and the Encapsulator

Starting the Master Agent

You may start the master agent from the command line or from the Windows NT Control Panel's Services dialog box. Both ways are described next.

To start the master agent from the command line:

Invoke the master agent as follows:

```
C:\> CD ORACLE_HOME\BIN
C:\> AGENT CONFIGURATION_FILE TEMPORARY_FILE
```

where *CONFIGURATION_FILE* is the name of the master configuration file and *TEMPORARY_FILE* is a temporary file where storage information is to be stored. The master configuration file name is defaulted to MASTER.CFG.

Note: *CONFIGURATION_FILE* and *TEMPORARY_FILE* are mandatory.

To start the master agent:

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

   The Services window appears. Look for the OracleSNMPPeerMasterAgent service. A blank in Status column indicates that the service is stopped.

   If the master is running, skip to Step 3. If the master is not running, continue to Step 2.

2. Select the OracleSNMPPeerMasterAgent service, and click Start.

   The master agent is started.

3. In the Services window, choose the Close button.

Starting the Encapsulator

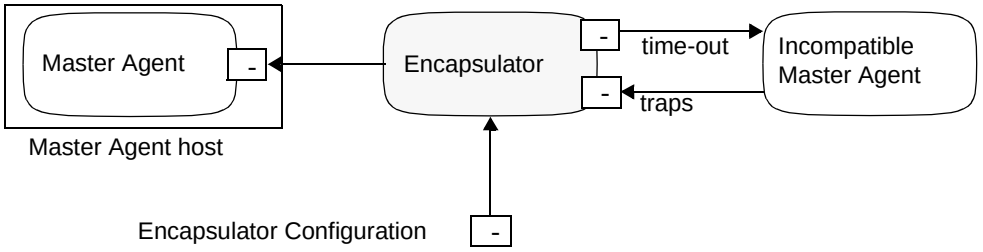
You may start the encapsulator from the command line or from the Windows NT Control Panel's Services dialog box. Both ways are described below.

Note: If the Encapsulator is to be used, the master agent must be started first. See "Starting the Master Agent" on page 9-6.

To start the encapsulator from the MS-DOS command prompt:

```
C:\> CD ORACLE_HOME\BIN
C:\> ENCAPS [options]
```

There are six command line options as shown below:



The options are:

-T *PORT*	Specifies the incoming trap port where the encapsulator listens to receive SNMP traps sent by encapsulated master agents. Default: no traps forwarded
-S *PORT*	Specifies the port from which the encapsulator sends SNMP requests to encapsulated agents, and to which the encapsulated agents send their responses. Default: assigned by the host
-H *HOST*	Specifies the master agent's host address, that is, the host where the master agent resides. This may or may not be the host of the encapsulated agent, specified in the ENCAPS.CFG file. Default: localhost
-P *PORT*	Specifies the master agent's listening SMUX port, that is, the port to which the encapsulator sends its SMUX traffic. Default: 199
-W *WAIT*	Specifies the SNMP response time-out (in seconds) from the encapsulated master agent. Default: 2 seconds
-C *FILE*	Specifies the encapsulator's configuration file. This file is defaulted to ENCAPS.CFG.

To start the encapsulator from the Control Panel Window:

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

   The Services window appears. Look for the OracleSNMPPeerEncapsulator service. A blank in Status column indicates that the service is stopped.

   If the master is running, skip to Step 3. If the master is not running, continue to Step 2.

2. Select the OracleSNMPPeerEncapsulator service, and click Start.

   The encapsulator is started.

3. In the Services window, choose the Close button.

Understanding the MASTER.CFG File

The MASTER.CFG file controls several aspects of the OracleSNMPPeerMaster Agent, including:

- choice of transport protocols
- community-based access control
- community-based naming

> **Note:** The MASTER.CFG file is automatically installed on the server at *ORACLE_HOME*\NET80\ADMIN.

A sample file is shown in Figure 9–1:

Figure 9–1 MASTER.CFG Configuration File

```
################################################################################
# Default Agent Configuration File
#
#       This file allows MANAGERS to be specified.  This is used to
#       specify which managers will be receiving which traps.
#
#       Also, COMMUNITYs can be specified. This allows that agent to
#       be configured such that it will only except requests from
#       certain managers and with certain community strings.
#
# Syntax
# TRANSPORT <name>  SNMP
#                     [OVER UDP SOCKET]
#                     [AT <addr>]
# COMMUNITY <communityName>
#                 ALLOW <op> [,<op>]*  [OPERATIONS]
#                      [AS ENTITY <entityName>]
#                      [MEMBERS <addrs> [,<addrs>] ]
TRANSPORT    ordinary        SNMP
   OVER UDP SOCKET
   AT PORT 161
COMMUNITY    public
   ALLOW ALL OPERATIONS
   USE NO ENCRYPTION
```

Below is a description of the TRANSPORT and COMMUNITY parameters.

TRANSPORT	Defines an interface over which the master agent listens for SMUX connections from subagents or SNMP requests.
COMMUNITY	Provides a form of authentication for access to information. **Note:** This parameter is not the same as the COMMUNITY parameter in the TNSNAMES.ORA file.

Understanding the ENCAPS.CFG File

The ENCAPS.CFG configuration file specifies which incompatible agents are to be encapsulated and what to make visible to the Network Management Station (NMS).

A sample file is shown in Figure 9–2:

Figure 9–2 ENCAPS.CFG Configuration File

```
################################################################################
#
#       THIS IS AN EXAMPLE OF AN ENCAPSULATOR CONFIGURATION FILE.
#
#       USING THIS FILE, ENCAPSULATOR WILL ENCAPSULATE A NON-PEER
#       MIB2 AGENT ON THE SAME PROCESSOR, THAT'S LISTENING FOR SNMP
#       REQUESTS AT PORT 1161.
#
#       IT ALLOWS THE NETWORK MANAGEMENT STATION TO VIEW THE 8 SUBTREES
#       MANAGED BY THAT AGENT, AND TO RECEIVE ALL THE TRAPS EMITTED BY
#       THAT AGENT.  ALL THE REQUESTS AND TRAPS PASS THROUGH THE PEER
#       AGENT AND ENCAPSULATOR.  AT THE SAME TIME THAT THE PEER AGENT
#       IS HANDLING ENCAPSULATOR, IT ALSO HANDLES ALL SUB-AGENTS THAT
#       WERE DEVELOPED WITH THE PEER TOOLKIT TO MANAGE OTHER MIBS.
# Syntax:
# [
# AGENT  [ON HOST <ip>]  [AT PORT <port>]  [WITH COMMUNITY <community>]
# SUBTREES <treelist>
# [FORWARD <traplist> TRAPS]
# ;
# ]+
#
```

```
AGENT AT PORT 1161 WITH COMMUNITY public
SUBTREES

1.3.6.1.2.1.1,
1.3.6.1.2.1.2,
1.3.6.1.2.1.3,
1.3.6.1.2.1.4,
1.3.6.1.2.1.5,
1.3.6.1.2.1.6,
1.3.6.1.2.1.7,
1.3.6.1.2.1.8,
1.3.6.1.4.1.77


FORWARD ALL TRAPS;
```

AGENT	Defines which incompatible master agents are encapsulated. Each AGENT entry defines which port the encapsulated master agent is listening for incoming SNMP requests and which community string Oracle Peer SNMP should use on SNMP requests sent to that agent.
SUBTREES	Identifies which of the subtrees managed by the encapsulated agent should be made visible to the NMS by listing the object identifiers.
FORWARD TRAPS	Defines which traps sent by encapsulated agents on a host will be forwarded by Oracle Peer SNMP to encapsulator's master agent.

10

Performing Administration Tasks

This chapter discusses some common network administration tasks that may need to be performed on the server and client.

Specific topics discussed are:

- Performing Oracle Names Server Administration Tasks
- Performing Server Administration Tasks
- Performing Oracle Connection Manager Administration Tasks
- Performing Client Administration Tasks
- Enabling Tracing

Performing Oracle Names Server Administration Tasks

Common administration tasks to perform on the Oracle Names Server include:

- Starting Oracle Names Server
- Stopping Oracle Names Server

Starting Oracle Names Server

If you are using Oracle Names, start an Oracle Names Server on the computer where Oracle Names Server is installed and configured with the NAMESCTL80 control utility or the Control Panel:

Use the control utility NAMESCTL80...

1. Verify whether the Oracle Names Server is running or not running.

   From the command line, enter:

   ```
   C:\> NAMESCTL80
   ```

   ```
   NAMESCTL> STATUS
   ```

   If the STATUS command indicates the Oracle Names Server is running, go to Step 3. If the Oracle Names Server is not running, go to Step 2.

2. Start the Oracle Names Server. Enter:

   ```
   NAMESCTL> START
   ```

3. Exit from the NAMESCTL80 utility. Enter:

   ```
   NAMESCTL> EXIT
   ```

Use the Windows NT Control Panel...

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

   The *Services* window appears. Look for the Oracle*HOME_NAME*NamesService80 service. A blank in the Status column indicates that the service is not running. If the service is already running, go to Step 3.

2. Select the Oracle*HOME_NAME*NamesService80 service, and click Start.

   The service starts.

3. In the *Services* window, click Close.

Stopping Oracle Names Server

Stop an Oracle Names Server (if you are using it) when you have completed database connections.

Use the control utility NAMESCTL80...	Use the Windows NT Control Panel...

1. From the command line, enter:
`C:\> NAMESCTL80`
`NAMESCTL> STOP`
2. Exit from the NAMESCTL80 utility. Enter:
`NAMESCTL> EXIT`
	1. From the *Control Panel* window, double-click Services.
	The *Services* window appears. Look for the Oracle*HOME_NAME*NamesService80 service. A blank in the Status column indicates that the service is not running. If the service is not running, go to Step 3.
	2. Select the Oracle*HOME_NAME*NamesService80 service, and click Stop.
	The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service.
	3. Click Yes to acknowledge the message, and click Close to exit the *Services* window.

Performing Server Administration Tasks

Common administration tasks to perform on the server side include:

- Starting the Network Listener
- Stopping the Network Listener

Starting the Network Listener

The following table explains how to start the network listener using either the control utility LSNRCTL80 or the Windows NT Control Panel:

Note: Start Oracle SNMP support (if needed) after starting the network listener. See Chapter 9, "Using the Oracle SNMP Agent".

Using the control utility LSNRCTL80...

1. Verify whether the network listener is running or not running.

   From the command line enter:

   ```
   C:\> LSNRCTL80
   ```

   ```
   LSNRCTL> STATUS LISTENER_NAME
   ```

   where *LISTENER_NAME* is the name of the network listener defined in the LISTENER.ORA file with the alias LISTENER. It is not necessary to identify the network listener if you are using the default network listener, named LISTENER.

   If the STATUS command indicates the network listener is running, go to Step 2. If the network listener is not running, go to Step 3.

2. Even if the network listener is running, Oracle Corporation advises you to stop the network listener, and start it again. To stop the network listener, enter:

   ```
   LSNRCTL> SET PASSWORD PASSWORD
   ```

   ```
   LSNRCTL> STOP LISTENER_NAME
   ```

   SET PASSWORD is only required if the password is set in the LISTENER.ORA file. The password defaults to ORACLE.

3. Start the network listener. Enter:

   ```
   LSNRCTL> START LISTENER_NAME
   ```

   Oracle*HOME_NAME*TNSListener*LSNR* is created if this command is run for the first time against a non-default network listener name.

4. Exit from the LSNRCTL80 utility. Enter:

   ```
   LSNRCTL> EXIT
   ```

Use the Windows NT Control Panel...

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

   The *Service*s window appears. Look for Oracle*HOME_NAME*TNSListener80 (the service name if you are using the default network listener name LISTENER) or Oracle*HOME_NAME*TNSListener80*LSNR* (where *LSNR* is the non-default network listener name). Oracle*HOME_NAME*TNSListener80*LSNR* is only created if the following command has been run:

   ```
   LSNRCTL80 START LISTENER_NAME
   ```

   A blank in the Status column indicates that the service is not running. If the service is already running, go to Step 3.

2. Select the Oracle*HOME_NAME*TNSListener80 or Oracle*HOME_NAME*TNSListener80*LSNR* service, and click Start.

   The service starts.

3. In the *Services* window, click Close.

Stopping the Network Listener

Stop the network listener when all database connections have completed, and the Oracle Names Server has been stopped.

Using the control utility LSNRCTL80...	Use the Windows NT Control Panel...

1. From the command line, enter:
`C:\> LSNRCTL80`
`LSNRCTL> SET PASSWORD PASSWORD`
`LSNRCTL> STOP LISTENER_NAME`
where *LISTENER_NAME* is the name of the network listener defined in the LISTENER.ORA file. It is not necessary to define the network listener if you are using the default network listener name, LISTENER.
SET PASSWORD is only required if the password is set in the LISTENER.ORA file. The password defaults to ORACLE.
	1. From the *Control Panel* window, double-click Services.
	The *Services* window appears. Look for OracleTNSListener80 (the service name if you are using the default network listener name LISTENER) or OracleTNSListener80*LSNR* (where *LSNR* is the non-default network listener name). OracleTNSListene80*LSNR* is only created if the following command has been run:
	`LSNRCTL80 START LISTENER_NAME`
	A blank in the Status column indicates that the service is not running. If the service is not running, go to Step 3.

2. Exit from the LSNRCTL80 utility. Enter: `LSNRCTL> EXIT`	**2.** Select the OracleTNSListener80 or OracleTNSListener80*LSNR* service, and click Stop. The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service. **3.** Click Yes to confirm the message, and click Close to exit the *Services* window.

Performing Oracle Connection Manager Administration Tasks

Common administration tasks to perform on the Oracle Connection Manager computer include:

- Starting Oracle Connection Manager(s)
- Stopping Oracle Connection Manager(s)

Starting Oracle Connection Manager(s)

Note: Start Oracle Names (if you are using it) and the network listener before starting Oracle Connection Manager.

The table below explains how to start an Oracle Connection Manager using either the command line utility CMCTL80 or the Windows NT Control Panel.

To start	Use the control utility CMCTL80...	Use the Windows NT Control Panel...

...in an Oracle Names environment	**1.** From the command line, enter:
	`C:\> CMCTL80`
	`CMCTL> START CMAN`
	2. Exit from the CMCTL80 utility. Enter:
	`CMCTL> EXIT`
		1. From the *Control Panel* window, double-click Services.
		The *Services* window appears.
		2. Look for the Oracle*HOME_NAME*CMAdminService80 and Oracle*HOME_NAME*CManService80 services. A blank in the Status column indicates that a service is not running. If these service are already running, go to Step 4.
		3. Select the Oracle*HOME_NAME*CMAdminService80 service to acquire information about available Oracle Names Servers, and click Start.
		The service starts.
		4. Select the Oracle*HOME_NAME*CManService80 service to start the Oracle Connection Manager and click Start. A blank in the Status column indicates that the service is not running.
		The service starts.
		5. In the *Services* window, click Close.

To start	Use the control utility CMCTL80...	Use the Windows NT Control Panel...

...in a non-Oracle Names environment	**1.** From the command line, enter:
	`C:\> CMCTL80`
	`CMCTL> START CM`
	2. Exit from the CMCTL80 utility. Enter:
	`CMCTL> EXIT`
		1. From the *Control Panel* window, double-click Services.
		The *Services* window appears. Look for the OracleCManService80service. A blank in the Status column indicates that the service is not running. If this service is already running, go to Step 3.
		2. Select the OracleCManService80 service to start the Oracle Connection Manager, and click Start.
		The service starts.
		3. In the *Services* window, click Close.

Stopping Oracle Connection Manager(s)

Stop the Oracle Connection Manager when the Oracle Names Server and network listener have been stopped:

To stop	Use the control utility CMCTL80...	Use the Windows NT Control Panel...

...in an Oracle Names environment	1. From the command line, enter:
	`C:\> CMCTL80`
	`CMCTL> STOP CMAN`
	2. Exit from the CMCTL80 utility. Enter:
	`CMCTL> EXIT`
		1. From the *Control Panel* window, double-click Services.
		The *Services* window appears. Look for the OracleCMAdminService80 and OracleCManService80 services. A blank in the Status column indicates that the service is not running. If these service are already stopped, go to Step 4.
		2. Select OracleCMAdminService80 from the list of services, and click Stop.
		The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service.
		3. Click Yes to acknowledge the message.
		4. Select OracleCManService80, and click Stop.
		The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service.
		5. Click Yes to acknowledge the message, and click Close to exit the *Services* window.

To stop	Use the control utility CMCTL80...	Use the Windows NT Control Panel...

...in a non-Oracle Names environment	**1.** From the command line, enter:
	`C:\> CMCTL80`
	`CMCTL> STOP CM`
	2. Exit from the CMCTL80 utility. Enter:
	`CMCTL> EXIT`
		1. From the *Control Panel* window, double-click Services.
		The *Services* window appears. Look for the OracleCManService80 service. A blank in the Status column indicates that the service is not running. If this service is already stopped, go to Step 3.
		2. Select OracleCManService80, and click Stop.
		The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service.
		3. Click Yes to acknowledge the message, and click Close to exit the *Services* window.

Performing Client Administration Tasks

After testing the server side configuration, perform client side administration tasks by:

- Starting the Client Cache Service
- Specifying Naming Methods
- Modifying Service Names and Addresses

Starting the Client Cache Service

If you are using Oracle Names, you may enable client caching on clients with the NAMESCTL80 control utility or the Control Panel (for Windows NT only). Client caching will update the SDNS.ORA file with the new Oracle Names Server information. If you do not want to update the SDNS.ORA file, it is not necessary to start this service.

Use the control utility NAMESCTL80...	Use the Windows NT Control Panel...

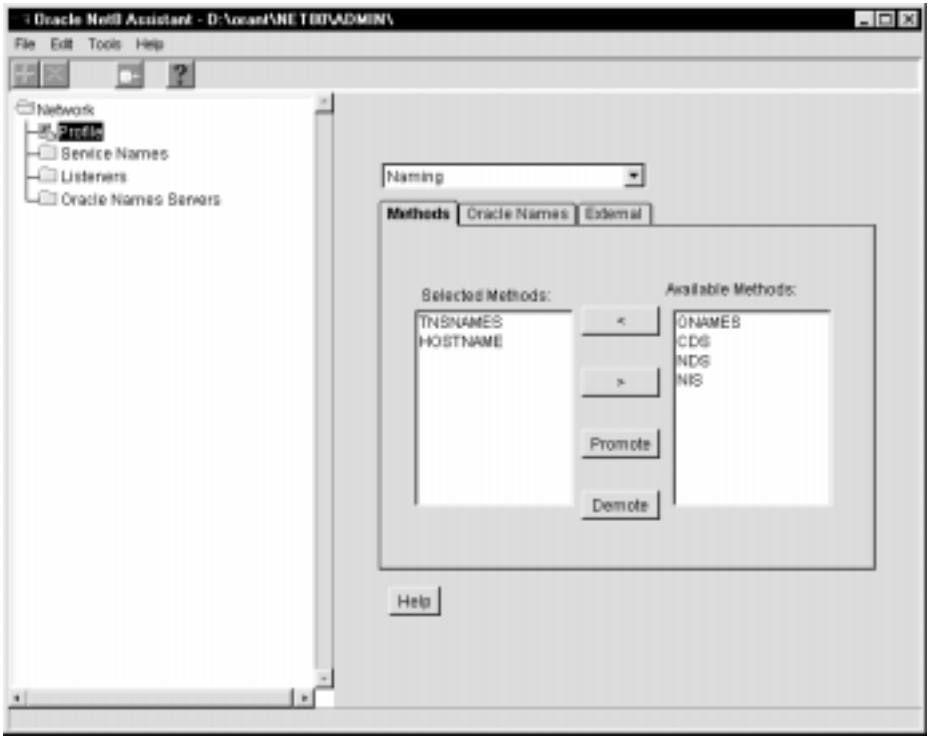
1. At the command prompt, enter:
`C:\> NAMESCTL80`
`NAMESCTL> START_CLIENT_CACHE`
2. Exit from the NAMESCTL utility. Enter:
`NAMESCTL> EXIT`
	Note: The Control Panel is not available for Windows 95/98 clients. You must use the NAMESCTL80 control utility.
	1. From the *Control Panel* window, double-click Services.
	The *Services* window appears. Look for the Oracle*HOME_NAME*ClientCache80 service. A blank in the Status column indicates that the service is not running. If the service is already running, go to Step 3.
	2. Select the Oracle*HOME_NAME*ClientCache80 service, and click Start.
	3. In the *Services* window, click Close.

Specifying Naming Methods

To specify the type of names resolution you want to use:

1. Choose Start > Programs > Oracle for Windows NT/Windows 95/98 > Oracle Net8 Assistant.
2. Select the Profile folder.

   The profile details appear on the right side of the page.



3. Choose Naming from the drop-down list.
4. Click the Methods tab.

5. Choose from the Available Methods list which naming method you want to use:

Naming Method	Description
ONAMES	Oracle Names Service names are resolved centrally, through a Names Server. You may need to set a Preferred Names Server (using the Oracle Net8 Assistant). See the Oracle Net8 Assistant online help for more information. See “Using the Oracle Names Method” in Chapter 6, "Configuring the Network".
TNSNAMES	Local Naming Service names are resolved using the TNSNAMES.ORA file which resides on the client. See “Using the Local Naming Method” in Chapter 6, "Configuring the Network"
HOSTNAME	Host Naming Service names are resolved using the Host Naming Adapter. Certain criteria must be met to use host naming names resolution. See “Using the Host Naming Method” in Chapter 6, "Configuring the Network"
CDS	Cell Directory Services This naming method is available with the Advanced Networking Option (ANO). See Chapter 7, "Connecting To a Database" and *Oracle Advanced Networking Option Administrator's Guide*.
NDS	NetWare Directory Services (NDS)

6. Order the naming methods according to which method you want Net8 to try first when resolving service names. Select the naming method in the Selected Methods list, and use the Promote or Demote button to move the selection up or down in the list.
7. Choose Save Network Configuration from the File menu.
8. Choose Exit from the File menu to exit the Oracle Net8 Assistant application.

Modifying Service Names and Addresses

If you configured the network using the local naming method, you may:

- Modify a Service Name
- Delete a Protocol Address
- Delete a Service Name
- Add an Additional Address

These changes are saved to the TNSNAMES.ORA file.

Modify a Service Name

To modify a service name:

1. From a server or client computer, choose Start > Programs > Oracle for Windows NT/Windows 95/98 - *HOME_NAME* > Oracle Net8 Easy Config.

   Oracle Service Name Wizard page displays.

2. Select Modify.
3. Select the service name from the list box on the right side of the page, and click Next.
4. Select the network protocol you want to use (this protocol adapter must also installed on the clients), and click Next.
5. Enter the appropriate information for your chosen protocol in the fields, and click Next.
6. Enter the name of the system ID (SID) of the database to which you want to connect in the Database SID field, and click Next. The default SID is ORCL.
7. Click Test Service to test the simple network you have just configured.
8. Enter a valid User name and Password, such as SYSTEM and MANAGER, for the database you want to connect to, and click Test.
9. Click Done when the test is complete.

   The final window appears.

10. Click Finish to save your configuration and dismiss the Oracle Net8 Easy Config application.

    Oracle Net8 Easy Config modifies the service name in the TNSNAMES.ORA located in *ORACLE_HOME*\NET80\ADMIN.

Delete a Protocol Address

To delete a protocol address from a service name in the TNSNAMES.ORA file:

1. From the server or client computer, choose Start > Programs > Oracle for Windows NT/Windows 95/98 - *HOME_NAME* > Oracle Net8 Assistant from the taskbar.

   The Oracle Net8 Assistant displays.

2. Double-click the Service Names folder to expand the directory of existing service names.

3. Select the service name from which you want to delete the protocol address, and click Delete Address.

4. Choose Save Network Configuration from the File menu.

   The TNSNAMES.ORA file is re-created.

5. Choose Exit from the File menu.

   The Oracle Net8 Assistant application exits.

Delete a Service Name

To delete a service name from the TNSNAMES.ORA file:

1. From the server or client computer, choose Start > Programs > Oracle for Windows NT/Windows 95/98 - *HOME_NAME* > Oracle Net8 Easy Config.

   Oracle Service Name Wizard page displays.

2. Select Delete.

3. Select the service name from the list box on the right side of the window, and click Next.

   A message appears asking you to confirm your decision to delete the service name.

4. Click OK to confirm.

   The final page appears.

5. Click Finish to save your modifications, and exit the Oracle Net8 Assistant application. Click Cancel to abandon your changes, and exit the Oracle Net8 Assistant application.

   If you click Finish, the service name is deleted, and the TNSNAMES.ORA file is re-created.

Add an Additional Address

If you configured the network using the local naming method, you can add an address to an existing service name.

To add an additional protocol address for a service name:

1. From the server or client computer, choose Start > Programs > Oracle for Windows NT/Windows 95/98 - *HOME_NAME* > Oracle Net8 Assistant.

   Oracle Net8 Assistant appears.

2. Double-click the Service Names folder to expand the directory of existing service names.
3. Select the service name you want to add the additional address to, and click New Address.
4. Enter the Protocol, Host Name, Port Number, and SID.
5. Choose Save Network Configuration from the File menu.

   The TNSNAMES.ORA file is re-created.

6. Choose Exit from the File menu.

   The Oracle Net8 Assistant application exits.

Enabling Tracing

> **Note:** The trace facility uses a large amount of disk space and may have a significant impact upon system performance. Therefore, you should enable tracing only when necessary.

The trace facility produces a detailed sequence of statements that describe network events as they are executed. Tracing an operation allows you to obtain more information on the internal operations of the components of Net8 than is provided in a log file. This information is output to files that can be evaluated to identify the events that led to an error.

Tracing assists you in diagnosing and troubleshooting networking performance and problems. Components that can be traced using the trace facility are:

- network listener
- Net8 components on the client and server
- Oracle Connection Manager
- Oracle Names Server

Default trace file names are:

- Client — SQLNET.TRC or SQLNET*THREAD_ID*.TRC if the TRACE_UNIQUE_CLIENT parameter is used
- Server — SERVER*THREAD_ID*.TRC
- Listener—LISTENER.TRC
- Oracle Names Server—NAMES.TRC
- Oracle Connection Manager—CMAN.TRC

Tracing is enabled by:

- Using the Oracle Net8 Assistant
- Manually Adding Parameters
- Using the Control Utilities

Using the Oracle Net8 Assistant

The Oracle8 Net8 Assistant can be used to enable:

- SQLNET.ORA Tracing
- LISTENER.ORA Tracing

SQLNET.ORA Tracing

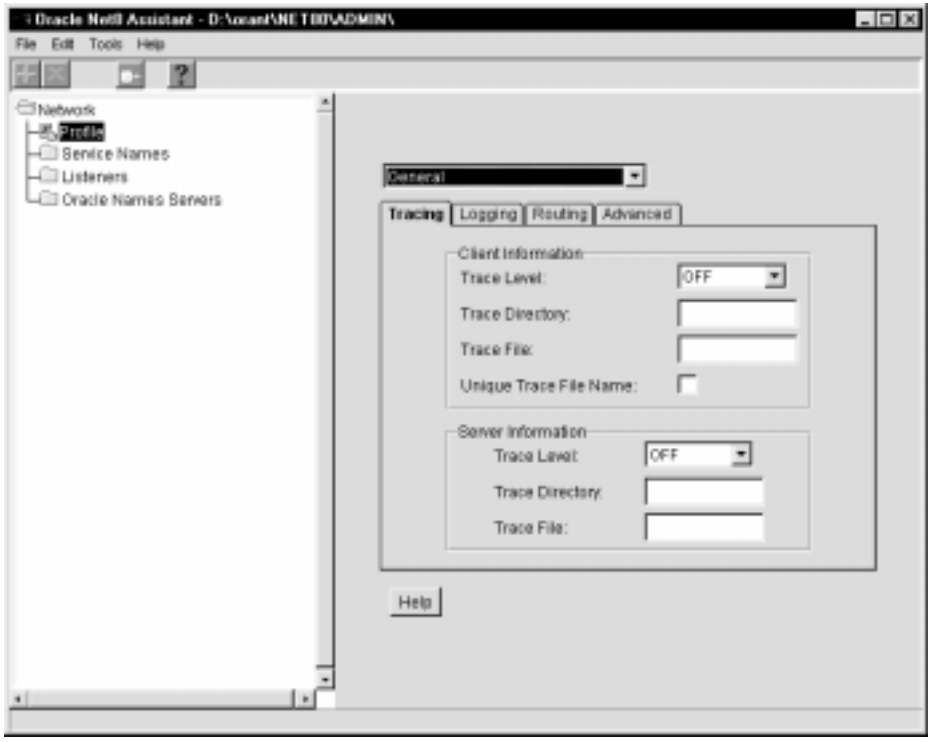
The Oracle8 Net8 Assistant enables tracing for client and / or server by setting parameters in the SQLNET.ORA file. When Net8 is run, SQLNET.TRC is created in *ORACLE_HOME* \ NET80 \ TRACE.

To enable SQLNET.ORA tracing for a particular client or server:

1. From the taskbar, choose Start > Programs > Oracle for Windows NT / Windows 95 / 98 - *HOME_NAME* > Oracle Net8 Assistant.
2. Select Profiles.

   The profile details appear on the right side of the screen.
3. Select General from the drop-down list.
4. Click the Tracing tab.

The fields for tracing display:



5. Specify your tracing settings for the client and/or server:

Tracing Setting	Description
Trace Level	Determines the detail of trace: OFF—Tracing is not enabled. OFF is the default setting. USER—Tracing is set to a level appropriate for users. Traces to identify user-induced error conditions. ADMIN—Tracing is set to a level appropriate to database administrators. Traces to identify installation-specific problems. SUPPORT—Tracing is set to a level appropriate for customer support.

Tracing Setting	Description
Trace Directory	Specify the directory to which the trace file will be written. The default directory is *ORACLE_HOME*\NET80\TRACE.
Trace Filename	Specify the name of the trace file. You may enter any valid filename. The default filename is TRACE.TRC.
Unique Trace File	Select this checkbox to create unique trace files named SQLNET*THREAD_ID*.TRC.

6. Choose Save Network Configuration from the File menu.
7. Choose Exit from the File menu to exit the Oracle Net8 Assistant.

   The Oracle Net8 Assistant application exits.

LISTENER.ORA Tracing

The Oracle8 Net8 Assistant enables tracing for client and/or server by setting parameters in the SQLNET.ORA file. When Net8 is run, LISTENER.TRC is created in *ORACLE_HOME*\NET80\TRACE.

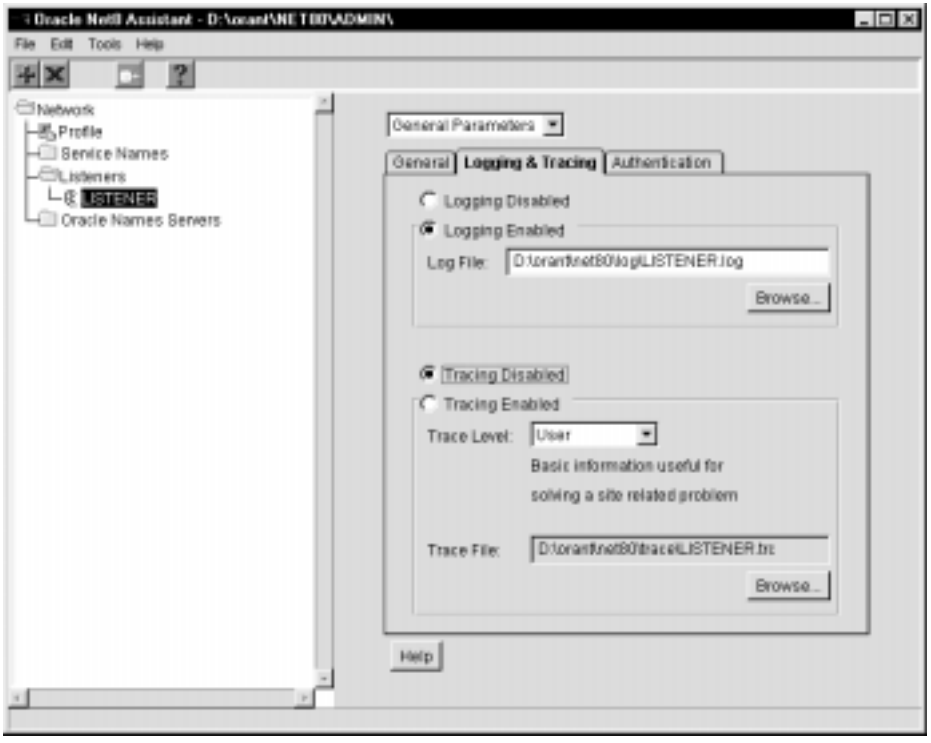
To enable LISTENER.ORA tracing:

1. From the taskbar, choose Start > Programs > Oracle for Windows NT - *HOME_NAME* > Oracle Net8 Assistant on the server.
2. Select Listeners.

   The available network listeners display.
3. Select a network listener.

   The network listener details appear on the right side of the screen.
4. Select General Parameters from the drop-down list.
5. Click the Logging and Tracing tab.

The fields for logging and tracing display:



6. Select Tracing Enabled.
7. Specify your tracing settings:

Trace Setting	Description
Trace Level	Determines the detail of trace: OFF—Tracing is not enabled. OFF is the default setting. USER—Tracing is set to a level appropriate for users. Traces to identify user-induced error conditions. ADMIN—Tracing is set to a level appropriate to database administrators. Traces to identify installation-specific problems. SUPPORT—Tracing is set to a level appropriate for customer support.
Trace Directory	Specify the directory to which the trace file will be written. The default directory is *ORACLE_HOME*\NET80\TRACE.
Trace File	Specify the name and directory of the trace file. You may enter any valid filename. The default filename is TRACE.TRC and the default directory is *ORACLE_HOME*\NET80\TRACE.

8. Choose Save Network Configuration from the File menu.
9. Choose Exit from the File menu to exit the Oracle Net8 Assistant.

   The Oracle Net8 Assistant application exits.

Manually Adding Parameters

To set SQLNET.ORA and LISTENER.ORA tracing parameters using component configuration files:

1. Set trace parameters in the configuration files:

For this type of tracing:	Modify this file...	By adding the following...	To create the following trace file:
Client and Server	SQLNET.ORA LISTENER.ORA	TRACE_LEVEL_CLIENT/LISTENER/SERVER=0/4/10/16 TRACE_DIRECTORY_CLIENT/LISTENER/SERVER=*directory_name* LOG_DIRECTORY_CLIENT/LISTENER/SERVER=*directory_name*	SQLNET.TRC LISTENER.TRC
Oracle Names Server	NAMES.ORA	NAMES.TRACE_LEVEL=0/4/10/16	NAMES.TRC
Oracle Connection Manager	CMAN.ORA	TRACING = YES	CMAN.TRC

2. If you modified the configuration files while the component was running, start or restart the component to enable the changed parameters.

Using the Control Utilities

To set trace parameters using component control utilities:

1. For the network listener LSNRCTL80 utility, use the TRACE command to set the trace level while the network listener is running.
2. For Oracle Names NAMESCTL80 utility, use the NAMES.TRACE_LEVEL command to set the trace level while the Names Server is running.

Analyzing Trace Files

Use Trace Assistant to interpret your *.TRC files.

Follow the instructions in section “10.4.3 Using the Trace Assistant to Examine Your Trace Files”, in the *Oracle Net8 Administrator’s Guide* to run the Trace Assistant.

A

Directory Structure

This appendix describes the directory structure and files of Net8. If any files are missing, see your CD-ROM insert for (re)installation instructions.

Specific topic discussed is:

- Net8 Directory Structure

Net8 Directory Structure

Oracle Installer places all Oracle Networking Products products into subdirectories of *ORACLE_HOME*.

Directory Name	Contains
\NET80	files for Oracle Network Products release 8.0 \NET80 also contains the following subdirectories
\ADMIN	configuration files used by Net8
\ADMIN\SAMPLE	sample configuration files
\DOC	networking README files
\LOG	log files placed here by default
\ERROR	error files
\NAMES	Oracle Names files
\NET8ASST	Oracle Net8 Assistant files
\TNSAPI	Net8 API files
\TRACE	Net8 trace files placed here by default

B

Modifying and Adding Configuration Parameters

This appendix describes how to edit and add Oracle-related settings.

Specific topics discussed are:

- Understanding Net8 Registry Parameter and Subkeys
- Modifying a Registry Value
- Understanding Optional Configuration Parameters
- Adding Optional Configuration Parameters

Understanding Net8 Registry Parameter and Subkeys

Net8 contains the following registry entries:

- Net80 Parameter
- Net8 Service Subkeys

Net80 Parameter

Description	Default Value Entry
Specifies the location of the Net8 directory.	*ORACLE_HOME*\NET80

NET80 is Located in...	If You Have...
HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE	One home directory
HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME*ID* where *ID* is incremented for each additional Oracle home directory on your computer (for example, HOME1 is for a second directory, HOME2 is for a third directory, etc.).	Two or more home directories

Net8 Service Subkeys

HKEY_LOCAL_MACHINE\SYSTEM\CURRENTCONTROLSET\SERVICES contains subkeys that correspond to services. Depending upon what is installed, possible Net8 services are:

- Oracle*HOME_NAME*ClientCache80
- Oracle*HOME_NAME*CMAdminService80
- Oracle*HOME_NAME*CManService80
- Oracle*HOME_NAME*Names80
- Oracle*HOME_NAME*TNSListener80

Each service subkey contains the following parameters:

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

Modifying a Registry Value

Caution: Do not edit your registry unless it is absolutely necessary. If there is an error in your registry, your Oracle8 database may become nonfunctional.

To edit the Oracle-related settings:

1. Start the registry in one of the following ways:

On Windows NT:	■ From the command prompt, enter: `C:\>REGEDT32` ■ Choose *Start* > *Run*, enter `REGEDT32` in the Open field, and click *OK*.
On Windows 95/98:	■ From the command prompt, enter: `C:\>REGEDIT` ■ Choose *Start* > *Run*, enter `REGEDIT` in the Open field, and click *OK*.

The *Registry Editor* window appears:

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

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

3. Double-click the parameter you want to edit.

An editor dialog box appears:

4. Make any necessary edits, and click *OK*.

5. Choose Exit from the Registry menu.

Understanding Optional Configuration Parameters

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

- LOCAL
- TNS_ADMIN
- USE_SHARED_SOCKET

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

LOCAL

You can add the LOCAL parameter to make a connection without specifying a connect string service name. The value for LOCAL is the service name in the TNSNAMES.ORA file located in the *ORACLE_HOME*\NET80\ADMIN directory.

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

```
SVRMGR> CONNECT SCOTT/TIGER
```

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

TNS_ADMIN

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

USE_SHARED_SOCKET

You can set the USE_SHARED_SOCKET parameter to TRUE to enable the use of shared sockets. It this parameter is set to TRUE, the network listener passes the socket descriptor for a client connections to the database thread. The result is 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, and this may be useful if you are setting up third-party proxy servers.

Enabling this option, however, does not allows you to bring the network listener up and down if any database connection spawned by the network listener is active. You may need to shut down all the databases serviced by a network listener before you can bring down and restart a network listener. This is because shared sockets implementation in WINSOCK2 does not allow a thread to a network listener on a port number reliably if some other connections are active on the port.

This parameter only works in a dedicated server mode in a TCP/IP environment.

Adding Optional Configuration Parameters

You can add these optional configuration parameters in three ways:

- Using the Registry
- Using the Control Panel on Windows NT
- Using the command line with the SET command:

  `C:\>SET LOCAL=`*`SERVICE_NAME`*
  This method only lasts for the current login session.

Using the Registry

The parameters must have a value class of REG_EXPAND_SZ and be located:

Parameter is Located in...	If You Have...
HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE	One Oracle home directory
HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOME*ID* where *ID* is incremented for each additional Oracle home directory on your computer.	Two or more Oracle home directories

The instructions below explain how to add a parameter entry to the registry.

To add a parameter to the registry:

1. Start the registry in one of the following ways:

On Windows NT:	■ From the command prompt, enter: `C:\>REGEDT32` ■ Choose *Start* > *Run*, enter `REGEDT32` in the Open field, and click *OK*.
On Windows 95/98:	■ From the command prompt, enter: `C:\>REGEDIT` ■ Choose *Start* > *Run*, enter `REGEDIT` in the Open field, and click *OK*.

   The *Registry Editor* window appears.

2. Navigate to the proper key.
3. Choose the Add Value option in the Edit menu.

The *Add Value* dialog box appears:

4. In the Value Name field, enter the name that you want to assign to the currently selected key.
5. In the Data Type box, select the REG_EXPAND_SZ value class.
6. Click OK.

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

7. Enter the value for the parameter, and click OK.

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

   The registry exits.

Using the Control Panel on Windows NT

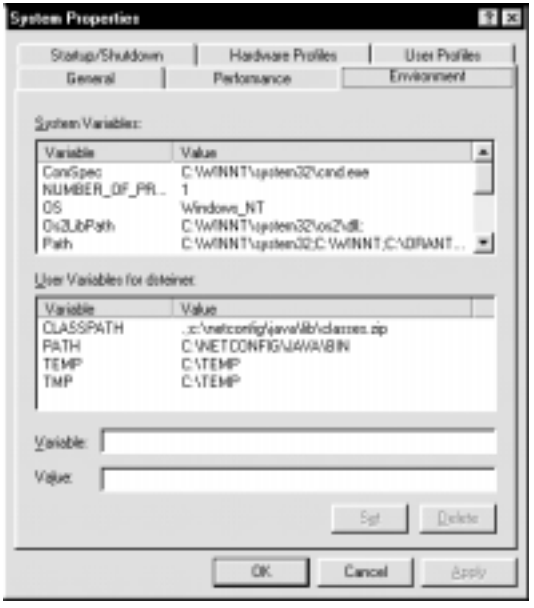
The instructions below explain how to add a parameter entry to the Control Panel *System Properties* window. This functionality is only available on Windows NT.

To add a parameter:

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

   The *System Properties* window appears.
2. Choose the Environment tab.

The *Environment* view appears:



3. Click in the System Variables list box.
4. Enter the parameter name in the Variable field and its value in the Value field.
5. Click Set.

   The parameter is added to the System Variables list box.
6. Click OK.
7. Log out and log back in for the changes to take effect.

C

Configuration Files

This appendix describes the configuration files.

Specific topics discussed are:

- Understanding the Configuration Files
- Understanding the TNSNAMES.ORA File
- Understanding the SQLNET.ORA File
- Understanding the LISTENER.ORA File
- Understanding the CMAN.ORA File

Understanding the Configuration Files

Oracle Network Products use the following configuration files:

On Your Server	On Your Client
CMAN.ORA	SQLNET.ORA
LISTENER.ORA	TNSNAMES.ORA
SQLNET.ORA	
TNSNAMES.ORA	

Below is a description of the configuration files:

Configuration File	Description
CMAN.ORA	Contains Oracle Connection Manager parameters.
LISTENER.ORA	Includes service names and addresses of all network listeners on a computer, the system IDs (SIDs) of the databases for which they listen, and various control parameters used by the network listener.
NAMES.ORA	Contains control parameters for preferred Oracle Names Servers. This file is not needed for well-known Oracle Names Servers.
SQLNET.ORA	Includes optional diagnostic parameters, client information about Oracle Names Servers, and can contain other optional parameters.
TNSNAMES.ORA	Includes a list of service names of network databases mapped to connect descriptors.

Note: It is possible to have system and local versions of TNSNAMES.ORA and SQLNET.ORA files. Any service name or parameter is first searched in the local version of the configuration file. If the service name or parameters is not found in the local version, it is searched in the system version.

The system version is located in the *ORACLE_HOME*\NET80\ADMIN directory. A local version can exist in the current working directory where the application is running. For example, if you start SQL*Plus in *ORACLE_HOME*\BIN, then Net8 looks for a local TNSNAMES.ORA in ORAWIN\BIN. If you start SQL*Plus in \PLUS, then Net8 looks for a local TNSNAMES.ORA in \PLUS.

A consequence of this is that you can have multiple local files in the various directories from which you start applications. In most cases, it is recommended that only one TNSNAMES.ORA file exist and that it be located in the default *ORACLE_HOME*\NET80\ADMIN directory.

A description of how the files are created is described below:

This file...	Is created...
CMAN.ORA	during installation on the server
LISTENER.ORA	during installation on the server
NAMES.ORA	on the server by Oracle Net8 Assistant when configuring preferred Oracle Names Servers
SQLNET.ORA	during installation on the clients and server, and regenerated on the client by Oracle Net8 Assistant.
TNSNAMES.ORA	on the clients and server by Oracle Net8 Easy Config or Oracle Net8 Assistant

Understanding the TNSNAMES.ORA File

The TNSNAMES.ORA file is used by clients and distributed database servers to identify potential server destinations. It stores the service names of databases addresses.

> **Note:** The Oracle Net8 Assistant creates TNSNAMES.ORA in *ORACLE_HOME*\NET80\ADMIN on the clients. TNSNAMES.ORA must be manually added on the server for server-to-server connections.

A sample file is shown in Figure C–1:

Figure C–1 TNSNAMES.ORA Configuration File

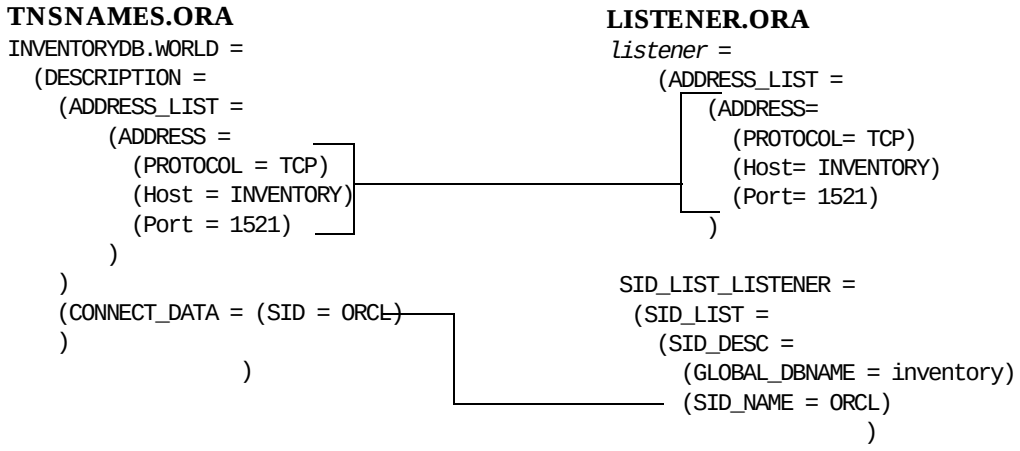
```
################
# Filename......: tnsnames.ora
# Name..........: LOCAL_REGION.world
# Date..........: 04-DEC-96 13:50:40
################
INVENTORYDB.WORLD = <---INVENTORYDB is the service name; WORLD is the domain
  (DESCRIPTION =
    (ADDRESS_LIST =
        (ADDRESS = <---listener address
          (PROTOCOL = TCP)
          (Host = INVENTORY) <---or, use IP address of NT server
          (Port = 1521)  <---must match port in LISTENER.ORA file
        )
    )
    (CONNECT_DATA = (SID = ORCL)
    )
  )
```

Connect Descriptor

Relationship To Other Configuration Files

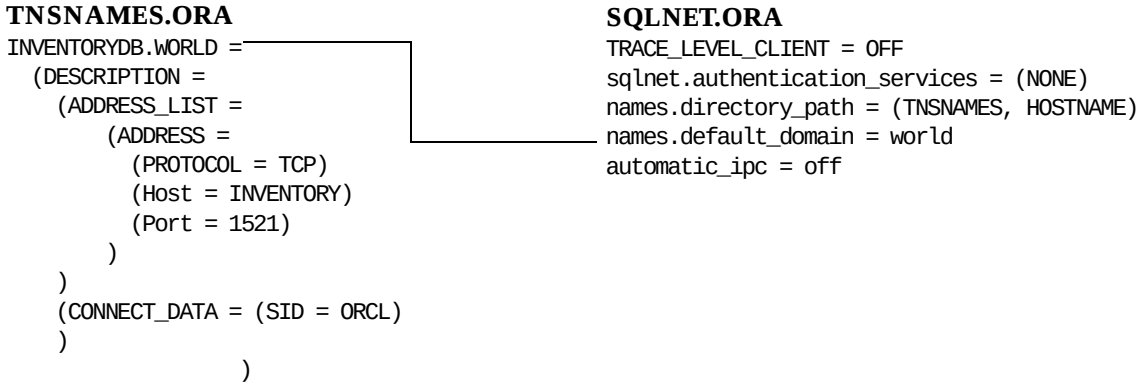
The address of the server in TNSNAMES.ORA is the same as the address of the network listener for a server in LISTENER.ORA. Similarly, the address in the TNSNAMES.ORA file includes the SID which is required (as SID_NAME) in the LISTENER.ORA file. Figure C–2 shows the matching elements:

Figure C–2 TNSNAMES.ORA and LISTENER.ORA



The domain added to the service name in TNSNAMES.ORA is the same as the domain defined in the NAMES.DIRECTORY_PATH parameter in the SQLNET.ORA. Figure C–3 shows the relationship:

Figure C–3 TNSNAMES.ORA and SQLNET.ORA



Please note that the default domain WORLD appended to the service name if the server name does not have the *.DOMAIN* extension in a connect string. For example, the connect string SCOTT/TIGER@INVENTORYDB gets searched in the TNSNAMES.ORA as INVENTORYDB.WORLD because the SQLNET.ORA has a NAMES.DEFAULT_DOMAIN = WORLD. If the connect string has the *DOMAIN* extension, (such as SCOTT/TIGER@HR.US), the default domain is not appended.

TNSNAMES.ORA is comprised of two parts:

- Specifying Service Names
- Specifying Connect Descriptors

These parts are described in the following subsections.

Specifying Service Names

The user specifies the service name (up to 64 characters), an easy to remember database alias name, with Net8 Easy Configuration Tool or Oracle Net8 Assistant—a single word rather than the lengthier connect descriptor—to identify the service to which to connect. The TNSNAMES.ORA file consists of a series of service names mapped to TNS connect descriptors.

If you are using Oracle Names Server, the service name for a database must be exactly the same as the global database name defined by the system administrator. Net8 limits the total length of a global database name to 64 characters. Of these, up to eight are the DB_NAME as defined by the database administrator, and the remainder show the service's place in the domain hierarchy (DB_DOMAIN). The name part of the service name can be longer than eight characters only if the DBA changes the name of the database using the RENAME GLOBAL_NAME parameter of the ALTER DATABASE statement. The total global database name, or service name, must remain at or below 64 characters.

Alternate service names can be assigned to a database service through the TNSNAMES.ORA file. The alternate service names can be names you choose because you find them convenient and easy to remember. For example, if a database is used by two different divisions of a company, Human Resources and Finance, you can map two different service name aliases, *hr* and *finance* to the database. The TNSNAMES.ORA file has three separate entries:

- service name that is the same as the global database name
- two aliases, mapped to the same connect descriptor

Specifying Connect Descriptors

All service name are assigned a connect descriptors in the TNSNAMES.ORA file. For a database, a connect descriptor describes the location of the network listener and the SID of the database to which to connect. For an Oracle Connection Manager, a connect descriptor describes the location of the Oracle Connection Manager, the location of the network listener, and the SID of the database to which to connect.

After the service name is listed, a database connect descriptor starts with a DESCRIPTION parameter which indicates the beginning definition of a database listening address. After DESCRIPTION, a connect descriptor contains two sections:

- ADDRESS
- CONNECT_DATA

ADDRESS

ADDRESS contains the information required to reach the application within a given protocol environment. It includes the

- protocol it uses
- protocol-specific parameters

Oracle Net8 Assistant and Net8 Easy Configuration Tool automatically provide the correct protocol specific parameters for common protocols, but you must provide the appropriate values. For information about the parameter values of a given protocol, see the section "Configuring TNSNAMES.ORA for Oracle Protocol Adapters" on page C-10.

Note: If you specify a TCP/IP address prefixed with a *0*, it is assumed to be an octal number, not a decimal number. For example, 39.223.72.44 is a decimal number, but 039.223.72.44 is an octal number.

CONNECT_DATA

CONNECT_DATA denotes the SID of the remote database. When Net8 on the server side receives the connection request, TNS passes the CONNECT_DATA contents to the network listener, which identifies the desired database.

A sample CONNECT_DATA section looks like:

```
(CONNECT_DATA =
   (SID = ORCL)
```

Keyword	Description
CONNECT_DATA	Indicates that application-specific data is supplied at connect time.
SID	Specifies the SID of the database server. You must specify the SID in the CONNECT_DATA section of the connect descriptor

If the network contains an Oracle Connection Manager, an additional SOURCE_ROUTE parameter is required. This parameter creates a source route through all Oracle Connection Managers to the destination database:

```
(CONNECT_DATA =
   (SID = ORCL)
(SOURCE_ROUTE = YES)
```

Connect Descriptor Syntax

Below is the connect descriptor syntax of the TNSNAMES.ORA file:

```
SERVICE_NAME.world =
  (DESCRIPTION =
    (ADDRESS_LIST =
        (ADDRESS =
        (protocol adapter information)
        )
    )
    (CONNECT_DATA =
      (SID = SID)
        )
  )
```

See "Configuring TNSNAMES.ORA for Oracle Protocol Adapters" on page C-10 for a description of the keywords.

Configuring TNSNAMES.ORA for Oracle Protocol Adapters

This section describes the address format used in a client's TNSNAMES.ORA file for the following Oracle Protocol Adapters:

- TCP/IP Addresses
- SPX Addresses
- Named Pipes Addresses
- LU6.2 Addresses
- Bequeath Addresses

TNSNAMES.ORA defines the location of Oracle8 Server computers to which a client can connect.

The table below describes the parameters used by the Oracle Protocol Adapters. Refer to this table for definitions as you review the syntax examples provided throughout this section.

Oracle Protocol Adapter	Parameter	Description
All	PROTOCOL	Indicates the type of network on which the TNS-based application resides.
All	SID	Identifies the Oracle system ID of the database server to which to connect. The TNSNAMES.ORA file uses the same SID defined in the server's LISTENER.ORA file.
TCP/IP	HOST and PORT	Identifies the server and its network listener port number for TNS-based application on the network. Ask your network administrator for the host names and port numbers of TNS-based applications on your TCP/IP network.
SPX	SERVICE	Defines the name of the TNS-based application on the network. (Mandatory for server and client.) Speak to your network administrator to learn the service names of TNS-based applications on your network.
Named Pipes	SERVER	Indicates the name of your Oracle8 Server computer.

Oracle Protocol Adapter	Parameter	Description
Named Pipes	PIPE	Indicates the pipe name you use to connect to your Oracle8 Server (the same PIPE keyword you specified on your Oracle8 Server with Named Pipes). This name can be any arbitrary name.
Bequeath	PROGRAM	Identifies the Oracle8 executable.
Bequeath	ARGV0	Identifies the Oracle system ID (SID).
Bequeath	ARGS	Identifies the source of the connection (local client).
LU6.2	LU_NAME	Identifies the Oracle8 Server; must be a fully-qualified name.
LU6.2	LLU or LOCAL_LU	Identifies the local LU alias. This parameter cannot be used with LLU_NAME.
LU6.2	LLU_NAME or LOCAL_ LU_NAME	Specifies the local LU name; must be a fully qualified name. This parameter cannot be used with LLU.
LU6.2	MODE or MDN	Identifies the log mode entry of the LU6.2 session; the value is typically ORAPLU62.
LU6.2	PLU or PARTNER_LU_ NAME	Identifies the Oracle8 Server; must be a fully qualified name.This parameter cannot be used with PLU_LA.
LU6.2	PLU_LA or PARTNER_ LU_LOCAL_ALIAS	Identifies the partner LU alias of the Oracle7 Server. This parameter cannot be used with PLU.
LU6.2	TP_NAME or TPN	Identifies the transaction program name of the host computer. This parameter is not required for a connection to an MVS host.

TCP/IP Addresses

When using the Oracle TCP/IP Protocol Adapter, specify the address of a TNS-based application in the following format:

```
(ADDRESS =
(PROTOCOL = TCP)
(HOST = SERVER_NAME)
(PORT = PORT_NUMBER))
```

Net8 Example on a TCP/IP Network

The entry below is taken from a client computer that connects to an Oracle8 database with a SID of ORCL on a host name of INVENTORY by using the service name INVENTORYDB on a TCP/IP network.

```
INVENTORYDB.WORLD =
  (DESCRIPTION =
    (ADDRESS_LIST =
        (ADDRESS =
          (PROTOCOL = TCP)
          (Host = INVENTORY)
          (Port = 1521)
        )
    )
    (CONNECT_DATA = (SID = ORCL)
    )
  )
```

SPX Addresses

When using the Oracle SPX Protocol Adapter, specify the address as follows:

```
(ADDRESS =
  (PROTOCOL = SPX)
  (SERVICE = TNS_APPLICATION)
)
```

Net8 Example on a SPX Network

The entry below is taken from a client computer that connects to an Oracle8 database with a SID of ORCL and network listener service name of INVENTORY_LSNR by using the service name INVENTORYDB on an SPX network.

```
INVENTORYDB.WORLd =
  (DESCRIPTION =
    (ADDRESS_LIST =
        (ADDRESS =
          (PROTOCOL = SPX)
          (Service = INVENTORY_LSNR)
        )
    )
    (CONNECT_DATA = (SID = ORCL)
    )
  )
```

Named Pipes Addresses

When using the Oracle Named Pipes Protocol Adapter, specify the address of a TNS-based application as follows:

```
(ADDRESS =
  (PROTOCOL = NMP)
  (SERVER = COMPUTER_NAME)
  (PIPE = PIPE _NAME)
)
```

Net8 Example on a Named Pipes Network

The entry below is taken from a client computer that connects to an Oracle8 database with a SID of ORCL on a computer name of NT_INVENTORY_BOX by using the service name INVENTORYDB on a Named Pipes network.

```
INVENTORYDB.WORLD =
  (DESCRIPTION =
    (ADDRESS_LIST =
        (ADDRESS =
          (PROTOCOL = NMP)
          (Server = NT_INVENTORY_BOX)
          (Pipe = ORAPIPE)
        )
    )
    (CONNECT_DATA = (SID = ORCL)
    )
  )
```

LU6.2 Addresses

When using the Oracle LU6.2 Protocol Adapter for Windows NT, specify the address of a TNS-based application as follows:

```
(ADDRESS =
  (COMMUNITY= LU62.world)
  (PROTOCOL=LU62)
  (TPN= TPN_NAME)
  (MODE=ORAPLU62)
  (PARTNER_LU_NAME = "PARTNER_LU_NAME")
  (LLU_NAME = LOCAL_LU_NAME)
)
```

Note: LLU and PARTNER_LU_LOCAL_ALIAS can be used in place of LLU_NAME and PARTNER_LU_NAME.

Additional Information: See the *Administrator's Guide* in the Microsoft SNA Server Documentation folder for LU6.2 setup information.

Net8 Examples on an LU6.2 Network

Example to connect to an IBM MVS instance:

```
mvs.world = (DESCRIPTION =
               (ADDRESS =
                 (COMMUNITY= LU62.world)
                 (PROTOCOL=LU62)
                 (TPN=RECVTP)
                 (MODE=ORAPLU62)
                 (PARTNER_LU_NAME = "ORACLE.TNSORAK")
                 (LLU = SENDLU)
               )
               (CONNECT_DATA=(SID=ORCL)
               )
             )
```

Example to connect to a Windows NT network listener:

```
nt.world = (DESCRIPTION =
               (ADDRESS =
                 (COMMUNITY= LU62.world)
                 (PROTOCOL=LU62)
                 (TPN=RECVTP)
                 (MODE=ORAPLU62)
                 (PARTNER_LU_NAME = "ORACLE.HQEW001")
                 (LLU = SENDLU)
               )
               (CONNECT_DATA=(SID=ORCL)
               )
             )
```

Bequeath Addresses

When using the Bequeath Protocol Adapter, specify the address of a TNS-based application as follows:

```
(ADDRESS =
  (PROTOCOL = BEQ)
  (PROGRAM = oracle80)
  (ARGV0 = oracle80SID)
  (ARGS = '(DESCRIPTION=(LOCAL=YES)(ADDRESS=(PROTOCOL=beq)))')
)
```

Net8 Example on a Bequeath Network

The entry below is taken from a client computer that connects to a single Oracle8 database.

```
Beq-local.world =
  (DESCRIPTION =
    (ADDRESS_LIST =
        (ADDRESS =
          (PROTOCOL = BEQ)
          (PROGRAM = oracle80)
          (ARGV0 = oracle80ORCL)
          (ARGS = '(DESCRIPTION=(LOCAL=YES)(ADDRESS=(PROTOCOL=beq)))')
        )
    )
    (CONNECT_DATA = (SID = ORCL)
    )
  )
```

Understanding the SQLNET.ORA File

The SQLNET.ORA file contains optional parameters used by clients and the server (when acting as client) on the network, such as logging, tracing, and security parameters.

> **Note:** The SQLNET.ORA file is automatically installed on the server and the clients in *ORACLE_HOME*\NET80\ADMIN.

A sample file is shown in Figure C–4:

Figure C–4 SQLNET.ORA Configuration File

```
TRACE_LEVEL_CLIENT = OFF  <---set this to 16 if tracing is required
sqlnet.authentication_services = (NONE)
names.directory_path = (TNSNAMES, HOSTNAME)
names.default_domain = world
automatic_ipc = off
```

This section covers the following SQLNET.ORA configuration issues:

- Specifying Dead Connection Detection
- Using SQLNET.ORA Logging and Tracing Parameters
- Understanding Client Parameters for Use with Oracle Names Server
- Understanding the IPC Parameter
- Understanding Authentication, Encryption, and Checksumming Parameters

Specifying Dead Connection Detection

The optional server parameter, SQLNET.EXPIRE_TIME, determines how often the network listener sends a probe to verify that a client/server connection is still active. If a client is abnormally terminated, a connection remains open indefinitely unless identified and closed by the system. If you specify this parameter, the network listener sends a probe periodically to determine whether there is an invalid connection to terminate. If the network listener finds a dead connection, or a connection no longer in use, it returns an error, causing the server process to exit. This parameter must be set in the SQLNET.ORA file on the server.

> **Note:** The time set in this parameter is not necessarily the amount of time a dead connection remains. This parameter sets the time between probes for dead connections. Depending on the underlying protocol, shutting down a dead process can take longer.

Dead connection detection has costs associated with it:

- Additional network traffic is generated to probe for dead connections. A probe packet is very small, but one is sent on each connection at the interval specified in the SQLNET.EXPIRE_TIME parameter in the SQLNET.ORA file.
- When dead connection detection is enabled, the Oracle8 database needs to do additional processing to distinguish the connection probing event from other events. You can test the performance of your application with or without the dead connection detection feature enabled.
- For some protocols, the generic Net8 dead connection detection feature is no better than the native mechanism available in the underlying transport protocol. In that case, it is not necessary to enable it. For example, the native keep-alive mechanism provided by the TCP/IP stack is enabled by default, and it can be tuned by changing registry values, as explained in operating system documentation.

In short, evaluate carefully whether you benefit from enabling the dead connection detection feature.

Using SQLNET.ORA Logging and Tracing Parameters

The following SQLNET.ORA logging and tracing parameters are available:

Parameter	Description
LOG_FILE_CLIENT LOG_FILE_SERVER	Sets the name of the log file. By default the log name is SQLNET.LOG.
LOG_DIRECTORY_CLIENT LOG_DIRECTORY_SERVER	Establishes the destination directory for log files. By default, the client directory is the current working directory. By default the server directory is *ORACLE_HOME*\NET80\LOG.

Parameter	Description
TRACE_LEVEL_CLIENT TRACE_LEVEL_SERVER	Indicates the level of detail the trace facility records. The trace level value can either be a value within the range of 0 to 16 (where 0 is no tracing and 16 represents the maximum amount of tracing) or a value of OFF, ADMIN, USER, or SUPPORT. ■ OFF (equivalent to 0) provides no tracing. ■ USER (equivalent to 4) traces to identify user-induced error conditions. ■ ADMIN (equivalent to 6) traces to identify installation-specific problems. ■ SUPPORT (equivalent to 16) provides trace information for troubleshooting information for support.
TRACE_FILE_CLIENT TRACE_FILE_SERVER	Establishes the name of the file to which trace information is written. By default, the client trace file name is SQLNET.TRC. By default the server trace file is SERVER*THREAD_ID*.TRC.
TRACE_DIRECTORY_CLIENT TRACE_DIRECTORY_SERVER	Sets the directory where the trace file is placed. By default, the client directory is the current working directory. By default, the server directory is *ORACLE_HOME*\NET80\TRACE.
TRACE_UNIQUE_CLIENT	This parameter determines whether or not a unique trace file is created for each client. By default, the value is OFF. The same trace file name is used for every client. If the value is OFF, when a new trace file is created for a client, it overwrites the existing file. If the value is set to ON, a thread identifier is appended to the name of each trace file generated so that several can coexist. This parameter creates unique trace files named SQLNET*THREAD_ID*.TRC.

All errors that occur in Net8 are written to log files, while detailed sequences of events as they happen are written to trace files. Trace files provide more information than log files.

You can also manually add the following optional tracing parameters for the TNSPING utility to SQLNET.ORA. TNSPING determines whether or not a service (such as a database, an Oracle Names Server, or other TNS services) on a Net8 network can be successfully reached.

- TNSPING.TRACE_LEVEL
- TNSPING.TRACE_DIRECTORY

Additional Information: See the *Oracle Net8 Administrator's Guide* for more information about the logging and tracing parameters in SQLNET.ORA.

Understanding Default Domains

The NAMES.DEFAULT_DOMAIN parameter indicates the domain from which the client most often requests names. When this parameter is set, the domain name is automatically appended to the service name in a connect string. For example, the connect string SCOTT/TIGER@INVENTORYDB gets searched in the TNSNAMES.ORA as INVENTORYDB.WORLD, because the SQLNET.ORA has a NAMES.DEFAULT_DOMAIN = WORLD. If the connect string has the *DOMAIN* extension, (such as SCOTT/TIGER@HR.US), the default domain is not appended.

Understanding Client Parameters for Use with Oracle Names Server

If you use preferred (not well-known) Oracle Names Server, another parameter, NAMES.PREFERRED_SERVERS, is required. This parameter includes one or more addresses of the Names servers in the order the client prefers to use them.

Additional Information: See the *Oracle Net8 Administrator's Guide.*

Understanding the IPC Parameter

The IPC interprocess communication parameter, AUTOMATIC_IPC, determines if Net8 attempts to connect to a database using IPC or through the network first. If the parameter is set to ON (it's set to OFF by default), Net8 tries to connect using a service name as an IPC key. If it fails, it resolves the service name (using the TNSNAMES.ORA file or an Oracle Names Server) and uses it for connection. If the parameter is set to OFF, Net8 does not look for an IPC address and goes directly to the network.

Understanding Authentication, Encryption, and Checksumming Parameters

Authentication, data encryption, and checksumming parameters ensure secure transmission of data over networks. Authentication is available with or without the Advanced Networking Option (ANO). Encryption and checksumming parameters are only available with ANO.

Additional Information: See the *Oracle Advanced Networking Option Administrator's Guide* for specific configuration information on these parameters.

Understanding the LISTENER.ORA File

The LISTENER.ORA file is the configuration file for the network listener. It resides on the server and defines:

- the network listener address
- the SID of the database for which it listens
- parameters that influence the network listener's behavior, including tracing and logging

A sample file is shown in Figure C–5:

Note: The LISTENER.ORA file is automatically installed on the server in *ORACLE_HOME*\NET80\ADMIN.

Figure C–5 LISTENER.ORA Configuration File

```
#################
# Filename......: listener.ora
# Node..........: local.world
# Date..........: 24-MAY-97 13:23:20
#################
LISTENER =
  (ADDRESS_LIST =
        (ADDRESS=
          (PROTOCOL= IPC)  <---IPC is the internal protocol
          (KEY= oracle.world)
        )
        (ADDRESS=
          (PROTOCOL= IPC)
          (KEY= ORCL)
        )
        (ADDRESS=
          (PROTOCOL= NMP)
          (SERVER= inventory.com)
          (PIPE= ORAPIPE)
        )
        (ADDRESS=
          (PROTOCOL= TCP)
          (Host= INVENTORY) <---or, use the IP address of server
          (Port= 1521)
        )
        (ADDRESS=
```

```
          (PROTOCOL= TCP)
          (Host= INVENTORY)
          (Port= 1526)
        )
        (ADDRESS=
          (PROTOCOL= TCP)
          (Host= 127.0.0.1)
          (Port= 1521)
        )
  )
STARTUP_WAIT_TIME_LISTENER = 0
CONNECT_TIMEOUT_LISTENER = 10
TRACE_LEVEL_LISTENER = 0
SID_LIST_LISTENER =
  (SID_LIST =
    (SID_DESC =
      (GLOBAL_DBNAME = inventory.com)
      (SID_NAME = ORCL)  <---Database system identifier, default is ORCL
    )
    (SID_DESC =
      (SID_NAME = extproc)
      (PROGRAM=extproc)
    )
  )
PASSWORDS_LISTENER = (oracle)
```

This section covers the following LISTENER.ORA configuration issues:

- Defining the Network Listener Name
- Defining the Network Listener Address
- Describing the Databases on the Network Listener
- Using LISTENER.ORA Control Parameters
- Using Oracle Names
- Using the Host Naming

Defining the Network Listener Name

You can create connections to multiple databases in two ways, using one or multiple network listeners:

- you specifically configure one network listener to multiple databases
- you configure multiple network listeners, each for a specific database. All the network listeners on a single computer share one LISTENER.ORA file.

The default network listener name is LISTENER, which is the recommended name in a standard installation that requires only one network listener on a computer. The network listener name must be unique on the computer running Oracle8 database. If you have more than one network listener on a computer, each requires a unique name.

The TURTLE node, for example, might have three network listeners with the names:

- LSNR1_TURTLE
- LSNR2_TURTLE
- LSNR3_TURTLE

Note: The listener name is limited to 45 character for the first installed multiple Oracle home. For subsequent Oracle homes, the character length is limited to 45 characters for the home name and listener name combined.

Defining the Network Listener Address

The network listener usually listens both for internal connection requests and for connection requests from across the network.

IPC Addresses for the Network Listener (Windows NT Only)

The network listener listens for IPC calls if IPC addresses are in the LISTENER.ORA file.

The IPC address format, which is the same across platforms, is as follows:

```
(ADDRESS=
   (PROTOCOL=IPC)
   (KEY=string)
)
```

Net8 Easy Configuration Tool and Oracle Net8 Assistant create two IPC addresses for each database for which a network listener queries. In one, the key value is equal to the service name. This IPC address is used for connections from applications on the same node. Service names are described in the section "Understanding the TNSNAMES.ORA File" in this appendix. In the other IPC address, the key value is equal to the database SID.

LU6.2 Addresses

The network listener must have a fully qualified local LU name rather than a partner LU name (that may be specified in the TNSNAMES.ORA). Below is a sample LU6.2 address:

```
(ADDRESS=
  (PROTOCOL= LU62)
  (TPN = RECVTP)
  (LLU_NAME = "ORACLE.HQEW001")
  (MODE = ORAPLU62)
)
```

Configuring the Listener to Handle Larger Volumes of Connection Requests

If you expect the listener to handle large volumes of connection requests, you may specify a queue for the process. This will allow the listener to dynamically handle larger numbers of concurrent connection requests.

To specify a queue size for a listener, enter a value to the QUEUESIZE keyword at the end of any listening address in your listener configuration file.

A typical listener configuration file with the queue size specified.

```
LISTENER =
  (ADDRESS_LIST =
       (ADDRESS=
         (PROTOCOL= TCP)
         (HOST= INVENTORY)
         (PORT= 1521)
         (QUEUESIZE = 20)
       )
```

Note: Currently, you can only configure the queue size for listeners operating on TCP/IP. The default queue size is 5 for the Windows NT 4.0 Workstation and 50 for the Windows NT 4.0 Server. Queue size for the NT 4.0 server can be increased however, the queue size for the NT 4.0 workstation cannot be increased due to operating system limitations.

Describing the Databases on the Network Listener

The LISTENER.ORA file describes the database SIDs for which the network listener queries. These are the same SIDs listed in the client's TNSNAMES.ORA file. LISTENER.ORA is made up of keyword-value pairs.

```
SID_LIST_LISTENER_NAME=
   (SID_LIST =
      (SID_DESC =
         (SID_NAME = SID)
      )
   )
```

The SID is the Oracle SID of the database server.

```
      (SID_NAME = ORCL)
```

Defining Listener Prespawned Dedicated Server Processes

This release does not support Prespawned Dedicated Server Processes by the listener. Do not include the following parameters in each SID_DESC of the LISTENER.ORA file:

- PRESPAWN_MAX
- PROTOCOL
- POOL_SIZE
- TIMEOUT

Using LISTENER.ORA Control Parameters

The following parameters control the behavior of the network listener:

Parameter	Description
LOG_FILE_*LISTENER_NAME*	Sets the name of the log file for the network listener. By default, the log name is SQLNET.LOG.
LOG_DIRECTORY_*LISTENER_NAME*	Establishes the destination directory for the log file that is automatically generated for network listener events. By default, the directory is *ORACLE_HOME*\NET80\ADMIN\LOG.
PASSWORDS_*LISTENER_NAME*	Allows one or more passwords. If this optional parameter specifies one or more passwords, then the use of one of these passwords is required to perform DBA tasks against the network listener using the Listener Control Utility.
STARTUP_WAITTIME_*LISTENER_NAME*	Sets the number of seconds that the network listener sleeps before responding to the first network listener control status command.
TRACE_LEVEL_*LISTENER_NAME*	Indicates the level of detail the trace facility records. The trace level value can either be a value within the range of 0 to 16 (where 0 is no tracing and 16 represents the maximum amount of tracing) or a value of OFF, ADMIN, USER, or SUPPORT. ■ OFF (equivalent to 0) provides no tracing. ■ USER (equivalent to 4) traces to identify user-induced error conditions. ■ ADMIN (equivalent to 6) traces to identify installation-specific problems. ■ SUPPORT (equivalent to 16) provides trace information for troubleshooting information for support.
TRACE_FILE__*LISTENER_NAME*	Establishes the name of the file to which trace information is written.
TRACE_DIRECTORY__*LISTENER_NAME*	Sets the directory where the trace file is placed.

Using Oracle Names

Clients do not need a TNSNAMES.ORA file if an Oracle Names Server is used. If the TNSNAMES.ORA is created, the client may use it to resolve the service name before resolving it through the Names Servers. Oracle Names requires the following entries in the LISTENER.ORA file for a network listener to register itself as a service to a well-known Oracle Names Server:

```
SID_LIST_LISTENER_NAME=
   (SID_LIST =
      (SID_DESC =
         (SID_NAME = ORCL)
         (GLOBAL_DBNAME = ORCL.world)
        )
   )
```

where *LISTENER_NAME* is the name of the network listener. LISTENER is the name of the default network listener.

Additionally, the Oracle Names allows databases to automatically register with Oracle Names Servers and allows clients to automatically find Oracle Names Servers. Oracle Names requires the following entry in the LISTENER.ORA file:

```
USE_PLUG_AND_PLAY_LISTENER_NAME=ON
```

GLOBAL_DBNAME	This is the name with which the network listener registers the database instance with an Oracle Names Server (in this example ORCL) and the name by which the Oracle Names Server identifies a database. When clients request the connect information for a database from an Oracle Names Server, this is the alias they use. WORLD is the domain. Domain is defined in the SQLNET.ORA file by the NAMES.DEFAULT_DOMAIN parameter.
USE_PLUG_AND_PLAY	Instructs the network listener to find and register with a well-known Oracle Names Server. When the network listener starts, it looks for hosts with the well-known host names, tries to gather connection information from the Oracle Names Server, and registers its SID(s) with it.

Using the Host Naming

Clients do not need a TNSNAMES.ORA file if the host naming adapter is used. A Oracle8 server requires the following entry in the LISTENER.ORA file to use host naming names resolution:

```
SID_LIST_LISTENER_NAME=
   (SID_LIST =
      (SID_DESC =
         (SID_NAME = ORCL)
         (GLOBAL_DBNAME = HOSTNAME)
        )
```

where

- *LISTENER_NAME* is the name of the network listener. LISTENER is the name of the default network listener.
- *HOSTNAME* is the TCP/IP host name of the server computer.

Understanding the CMAN.ORA File

The CMAN.ORA file is the configuration file for the Oracle Connection Manager on the server.

A sample file is shown in Figure C–6:

Figure C–6 CMAN.ORA Configuration File

```
#
# Connection Manager config file
# cman.ora
#
#
# cman's listening addresses
#

cman = (ADDRESS_LIST=
          (ADDRESS=(PROTOCOL=tcp)(HOST=inventory.com)(PORT=1610))
          (ADDRESS=(PROTOCOL=tcp)(HOST=inventory.com)(PORT=1620))
       )
#
# cman's configurable params
#
#         MAXIMUM_RELAYS              defaults to 8
#         LOG_LEVEL                   defaults to 0
#         TRACING                     defaults to no
#         RELAY_STATISTICS            defaults to no
#         SHOW_TNS_INFO               defaults to no
#         USE_ASYNC_CALL (for nscall/nsanswer/nsaccept calls)
#                                     defaults to yes
#         AUTHENTICATION_LEVEL        defaults to 0
#         MAXIMUM_CONNECT_DATA        defaults to 1024
#         ANSWER_TIMEOUT              defaults to 0
#

cman_profile = (parameter_list=
                  (MAXIMUM_RELAYS=1024)
                  (LOG_LEVEL=1)
                  (TRACING=yes)
                  (RELAY_STATISTICS=yes)
                  (SHOW_TNS_INFO=yes)
                  (USE_ASYNC_CALL=yes)
                  (AUTHENTICATION_LEVEL=1)
               )
```

```
#
#=========================================================================
# cman is used as a TCP fire wall proxy IF AND ONLY IF "cman_rules" exists
#=========================================================================
#

#cman_rules = (rule_list=
#                (rule=(src=spcstn)(dst=x)(srv=x)(act=accept))
#             )
```

The CMAN.ORA consists of following sections:

CMAN	Contains the listening address for the Oracle Connection Manager.
CMAN_PROFILE	Contains CMAN configuration parameters.
CMAN_RULES	Contains the rules for filtering incoming connection requests.

CMAN

The listening address is a combination of the service name and address. The format of the address is similar to the listening addresses in the LISTENER.ORA file, except for the exclusion of the CONNECT_DATA segment.

In the example below, the Oracle Connection Manager is listening on two addresses, SPX and TCP/IP. The Oracle Connection Manager can listen on any protocol that Oracle supports on the platform the Oracle Connection Manager is running on.

```
CMAN=
    (ADDRESS_LIST=
       (ADDRESS=
            (PROTOCOL=SPX)
            (SERVICE=CMAN)
       )
       (ADDRESS=
           (PROTOCOL=TCP)
           (HOST=CMAN.US.ORACLE.COM)
           (PORT=1610)
       )
    )
```

CMAN_PROFILE

The CMAN_PROFILE section defines Oracle Connection Manager parameters:

```
CMAN_PROFILE=
    (PARAMETER_LIST=
        (MAXIMUM_RELAYS=64)
        (LOG_LEVEL=0)
        (TRACING=YES)
        (RELAY_STATISTICS=YES)
        (SHOW_TNS_INFO=NO)
        (USE_ASYNC_CALL=YES)
        (AUTHENTICATION_LEVEL=0)
    )
```

Parameter	Description
ANSWER_TIMEOUT	Determines the timeout for connections to the Oracle Connection Manager. ■ 0 is the default ■ range is 0 to *n*
AUTHENTICATION_LEVEL	1 instructs the CMAN to reject connect requests that are not using Secure Network Services. Secure Network Services is part of the Oracle Advanced Networking Option. 0 is the default, which means Secure Network Services is not required
MAXIMUM_CONNECT_DATA	Determines the maximum number of concurrent connections allowed. ■ default is 1024 ■ range is 257-4096
MAXIMUM_RELAYS	Determines the maximum number of concurrent connections allowed. ■ default is 8 ■ range is 0 to 10240
LOG_LEVEL	Determines the level of logging performed by the CMAN. ■ default is 0, which means no logging is performed ■ range is 0 to 4

Parameter	Description
RELAY_STATISTICS	YES instructs the CMAN to maintain statistics pertaining to relay I/O activities such as: ■ number of IN bytes ■ number of OUT bytes ■ number of IN packets ■ number of out packets Default is NO.
SHOW_TNS_INFO	Yes instructs the CMAN to include TNS events in the log file Default is NO
TRACING	YES enables tracing for the Oracle Connection Manager. Default is NO
USE_ASYNC_CALL	YES instructs the CMAN to use all asynchronous functions while in the answering, accepting, or calling phase of establishing a connection Default is NO **Note:** CMAN supports out-of-band breaks, it will forward it on to the server.

CMAN_RULES

The CMAN_RULES section defines access control rules:

In order to have access control on your database server, you need to specify whom to accept or reject in the RULES configuration parameter. The rules specification involves these elements:

- source hostname(s) for designated incoming clients
- destination hostname(s) for designated servers
- the destination database — SID
- whether to accept or reject if the session request matches the first three rules

You can specify several rules for a single access control to fine tune whom accesses your database server.

```
CMAN_RULES=
   (RULE_LIST=
        (RULE=
            (SRC = shost)
            (DST = dhost)
            (SRV = service)
            (ACT = ACCEPT | REJECT)
        )
     )
```

Where	Description
SHOST	source host name or IP address of session request (client)
DHOST	destination host name or IP address (server)
SERVICES	SID name
ACCEPT | REJECT	accept or reject the incoming requests based on the above three parameters.

Multiple RULEs can be defined within the RULE_LIST. The rules in the first matched RULE are applied to the request. When CMAN_RULES exists, the Oracle Connection Manager adheres to the principle “that which is not expressly permitted is prohibited.” If the CMAN_RULES are not defined, then everything is permitted.

D

Troubleshooting

This appendix describes how to resolve problems that may arise when you use Net8 products.

Specific topics discussed are:

- Diagnosing Net8
- Net8 Logging and Tracing
- Resolving Common Error Messages
- Resolving Oracle Names Server Problems
- Resolving Improper Configuration of External Procedures
- Net8 Troubleshooting Hints and Tips from the Field
- Contacting Oracle Services Support

Diagnosing Net8

If you have just completed installing and configuring your Net8 product and an attempt to make a basic peer-to-peer (single protocol / single community network) connection returns an ORA ERROR, this section may help you diagnose the cause of the problem. Any underlying fault, noticeable or not, is reported by Net8 with an error number or message that is not always indicative of the actual problem.

This section helps you determine which parts of Net8 do function properly rather than the parts that do not work. This section helps you determine if the problem is:

- Oracle software
- other network layers
- operating system layer

A problem can be identified if you progressively test various network layers.

For more information on specific error messages or technical bulletins on errors received when performing these diagnostics test, please check the following resources available to you:

- Bulletins through the GSX Problem / Solution Database Oracle Metalink Web Site at *http://support.oracle.com*. If this is your first visit:
  1. Click “registration page” and complete the registration form.
  2. Back at *http://support.oracle.com*, select the Java or non-Java version of MetaLink.
  3. Enter your user name and password.
  4. Enter relevant search terms in the text box at the top of the page.
  5. Click SUBMIT, or use the ADVANCED button for search tips.
- *Oracle Net8 Administrator’s Guide*
- Oracle Support Services

Understanding Proper Net8 Installation

Net8 is Oracle Corporation's remote data access software. It enables both client / server and server / server communication (with applications residing on different computers communicating as peer applications) across any network.

The architecture of TNS is comprised of two software components that need to be installed on both the server and all the client computers:

- Net8 Client or Server version
- Protocol Specific Adapter (If you are using TCP / IP, install the Oracle TCP / IP Protocol Adapter, etc.)

Note: A supported third party network transport layer must be also installed and tested.

To verify proper installation:

Follow the instructions in "Verifying Installation and Setup" on page 3-4.

Server Diagnostics

Note: You may need assistance from the server administrator to follow the instructions in this section.

Answer the questions below:

- Is any other system (workstations / servers) able to connect to the server using Net8?
- Have server, database, or network listener configuration remained the same for some time?

If you answer yes to any of the above questions / statements, skip this section and continue to "Client Diagnostics" on page D-5. If you are not sure or answered no to any of the above questions, please continue.

Diagnosing Net8 on the server involves:

- Step 1: Verify the Database Is Running
- Step 2: Perform a Loopback Test

Step 1: Verify the Database Is Running

To check that the database is up:

Log on to the database using SQL*Plus or Server Manager and connect with a valid username/password. For example:

```
C:\> SQLPLUS SYSTEM/MANAGER
```

A message appears, confirming that you are connected with the database. If you receive the following errors, ask your database administrator to assist you:

- `ORA-1017: invalid U/P`
- `ORA-1034: Oracle not available`

Step 2: Perform a Loopback Test

To perform a loopback test:

1. Check that the LISTENER.ORA, TNSNAMES.ORA, and SQLNET.ORA files exist in the *ORACLE_HOME*\NET80\ADMIN folder.
2. Follow the instructions in "Testing the Configuration on the Server" on page 6-31 to perform a loopback test.

   If the loopback test continues to fail, continue to Step 3.

   If the loopback test passes, skip to "Client Diagnostics" on page D-5.
3. Check the Problem/Solution Database Web site at *http://support.oracle.com* for more specific information on the error received or contact Oracle Support Services.

Client Diagnostics

At this point, you know the Net8 server side network listener is functioning properly, because you were able to answer Yes to any of the following statements:

- I verified a loopback test on the server, and the connection worked.
- I have other computers (servers, workstation) connecting to this same Oracle8 Server using Net8.
- Connections from this workstation worked previous to making changes on this computer (for example, installed new products or modified the network configuration).

To perform diagnostics on the client:

1. Check that you have installed the appropriate Oracle Protocol Adapter.
2. Check base connectivity for underlying network transport. You may need the assistance of the network administrator.

   Net8 technology depends upon the underlying network for a successful connection.

Protocol	Verify that you can...
TCP/IP	Use file transfer or terminal emulation utilities (FTP, TELNET, and PING) from the workstation to the server where the network listener and database reside.
SPX	Perform a Netware login to the computer that the database is running on. Ensure you can map drives or use other Novell services such as Print Servers and File Servers on the Network. Check that the network listener service is broadcasting by doing a DISPLAY SERVERS from the Novell Server or any Novell File Server on the SPX network.
Named Pipes	See other computers or servers on the MSFT network. Ensure you are able to share drives within the MSFT network.

3. Ensure all Net8 software has been installed by following the instructions in "Understanding Proper Net8 Installation" on page D-3 to ensure both the Net8 Client and the appropriate Oracle Protocol Adapter are installed.

4. Ensure the client computer has the TNSNAMES.ORA and the SQLNET.ORA files in the *ORACLE_HOME*\NET80\ADMIN directory.

   The search order for SQLNET.ORA and TNSNAMES.ORA is as follows:

   - current working directory from where an application is executed
   - TNS_ADMIN environment variable
   - TNS_ADMIN parameter in the registry if the TNS_ADMIN environment variable is not defined
   - *ORACLE_HOME*\NETWORK\ADMIN if TNS_ADMIN is not defined

   If you have any other working client computers connecting to your selected Oracle8 database using Net8, back up your existing files and copy both the working TNSNAMES.ORA and SQLNET.ORA files from the working computer onto the non-working client workstations. This eliminates the possibility of errors in the files.

5. Test the Net8 layer with SQL*Plus or Server Manager, as described in "Testing the Configuration on the Client" on page 6-38.

   It is advised not to use TNSPNG80. TNSPNG80 works just like the TCP/IP PING utility. A socket is never created and open. The TNSPNG80 never connects with the network listener. It just ensures network listener is present at the server side.

6. If the connection still fails:

   - Use tracing as described in the next section, "Net8 Logging and Tracing" on page D-7.
   - Check the Problem/Solution Database Web site at *http://support.oracle.com* for a specific diagnostics bulletin on the error received.
   - Contact Oracle Support Services.

Net8 Logging and Tracing

Both log and trace files are available for you to use in troubleshooting your network problems.

This section covers:

- Logging
- Tracing
- Tracing for an Oracle Names Server
- Oracle Trace for Net8
- Trace Assistant

For server and network listener, log files are by default located in *ORACLE_HOME*\NET80\LOG and trace files are by default located in *ORACLE_HOME*\NET80\TRACE. For client, log and trace files are by default located in the current working directory.

Logging

All errors encountered in Oracle network products are appended to a log file for evaluation by a network or database administrator. The log file provides additional information for an administrator when the error message on the screen is inadequate to understand the failure. The log file, by way of the error stack, shows the state of the software at various layers.

The default log file names are:

- Client or Server — SQLNET.LOG
- Listener — LISTENER.LOG (if you are using the default network listener name LISTENER) or LISTENER*LSNR*.LOG (if the network listener name is not LISTENER)
- Connection Manager—CMAN.LOG
- Oracle Names —NAMES.LOG

Tracing

Tracing can be used to examine and diagnose application connections across the network. The trace facility allows a network or database administrator to obtain more information on the internal operations of the components of an Oracle application network than is provided in a log file. Tracing an operation produces a detailed sequence of statements that describe the events as they are executed. All trace output is directed to trace output files that can be evaluated to identify the event that led to an error.

Default trace file names are:

- Client — SQLNET.TRC or SQLNET*THREAD_ID*.TRC if the TRACE_UNIQUE_CLIENT parameter is used
- Server — SERVER*THREAD_ID*.TRC
- Listener—LISTENER.TRC (if you are using the default network listener name LISTENER) or LISTENER*LSNR*.TRC (if the network listener name is not LISTENER)
- Oracle Names Server—NAMES*THREAD_ID*.TRC
- Connection Manager—CMAN.TRC

When a client application establishes the first Net8 connection, the Net8 parameters are read from SQLNET.ORA file and initialized. Subsequently, if the same client application establishes some more Net8 connections, the SQLNET.ORA file is not read and any changes that were made to the SQLNET.ORA file after the first Net8 connection will not be used. For the new changes to the SQLNET.ORA file to take effect, you have to exit the client application and bring it up again. The behavior on the server side does not change from the previous versions. Any changes to the SQLNET.ORA file will be reflected in subsequent connections.

Client side tracing

If the TRACE_UNIQUE_CLIENT parameter in SQLNET.ORA file is not enabled, then all client applications will share the same trace file. If the TRACE_UNIQUE_CLIENT parameter is enabled in SQLNET.ORA file, then each client application will have a unique trace file. In both the above cases, the trace statements will have a prefix in the form of (x), where 'x' is some number. All the trace statements belonging to one connection will have the same prefix.

The Difference Between Logging and Tracing

Logging is used to log important events for Oracle components. For example, the network listener log file logs version number, protocols it is listening for, connection establishments, errors, and so on. However, tracing describes *all* software events as they occur; that is, even when an error is not occurring. Information is posted into the trace file to show what is happening in the software. Thus, tracing provides additional information about events whether or not there is an error.

> **Additional Information:** For more specific details about SQL*Net logging and tracing, see Chapter 10, "Troubleshooting Net8", of the *Oracle Net8 Administrator's Guide.*

Tracing and logging parameters are added to the SQLNET.ORA and LISTENER.ORA files. These parameters are described in "Using SQLNET.ORA Logging and Tracing Parameters" on page C-17 and "Using LISTENER.ORA Control Parameters" on page C-26.

Tracing for an Oracle Names Server

In some situations, it may be necessary to set tracing on for the Oracle Names Server. Tracing is set on by adding the parameter NAMES.TRACE_LEVEL = 16 in the NAMES.ORA file on the server (this file is located in *ORACLE_HOME*\NET80\ADMIN).

The next time the Names Server is started, a trace file named NAMES*THREAD_ID*.TRC is created in directory *ORACLE_HOME*\NET80\TRACE.

If a client connection is not properly established, client tracing can give more information. Client tracing is set by adding the TRACE_LEVEL_CLIENT = 16 parameter to the SQLNET.ORA file.

Oracle Trace for Net8

Oracle Trace allows your trace information to be managed through an Oracle Enterprise Manager console in an Oracle Trace repository.

Oracle Trace is a general-purpose data collection product that is part of the Oracle Enterprise Manager systems management product family. Oracle Trace allows Oracle products to collect data for a variety of uses, such as performance monitoring, diagnostics, and auditing.

Additional Information: See the *Oracle Enterprise Manager Oracle Trace User's Guide* for information about using Oracle Trace.

Trace Assistant

Use Trace Assistant to interpret your *.TRC files.

This utility will help you diagnose and troubleshoot network problems by giving you a better understanding of:

- the source and destination of trace files
- the flow of packets between network nodes
- which component of Net8 is failing
- pertinent error codes

Follow the instructions in section “10.4.3 Using the Trace Assistant to Examine Your Trace Files”, in the *Oracle Net8 Administrator’s Guide* to run the Trace Assistant.

Resolving Common Error Messages

The error messages most commonly experienced by Oracle networking product users are:

- `ORA-12154: TNS: Could not resolve service name`
- `ORA-12203:TNS:unable to connect to destination`
- `ORA-3113: end of file communication channel`
- `ORA-3121: No interface driver connection - function not performed`

If you are using the Oracle Names Server, go to "Resolving Oracle Names Server Problems" on page D-16.

ORA-12154: TNS: Could not resolve service name

Cause: Net8 could not find the connect descriptor specified in the TNSNAMES.ORA file.

Action: After verifying that the database is turned on, check the following:

1. Make sure the domain specified by the *SERVICE_NAME.domain* parameter in the TNSNAMES.ORA file matches the value for the NAMES.DEFAULT_DOMAIN parameter in the SQLNET.ORA file.
2. Try setting the TNS_ADMIN parameter in the registry to the directory where the configuration files are stored.
3. If connecting from a login dialog box, do not begin the field for the connect string with an @ sign. Only use the @ sign if specifying the connect string in command line mode:

   ```
   SQLPLUS SCOTT/TIGER@SERVICE_NAME
   ```

4. Make sure you have a TNSNAMES.ORA file on the client if you are not using an Oracle Names Server.
5. Make sure your TNSNAMES.ORA file is the same on both the server and the client.
6. Check for multiple copies of the TNSNAMES.ORA file.

   By default, TNSNAMES.ORA is located in *ORACLE_HOME*\NET80\ADMIN.
7. In the TNSNAMES.ORA file, verify:
   - The service name matches the one you are specifying in the connect string.
   - There are no syntax errors, especially stray characters and mismatched parentheses.
8. Make sure that there are no duplicate copies of SQLNET.ORA.
9. Turn on client tracing and re-execute the operation.

   The client trace file shows a secondary error code. To turn on client tracing, add or modify the variable TRACE_LEVEL_CLIENT in the *ORACLE_HOME*\NET80\ADMIN\SQLNET.ORA file to TRACE_LEVEL_CLIENT = 16.

ORA-12203:TNS:unable to connect to destination

ORA-12203 error is a generic error that often shields secondary errors. For this reason, check the latest SQLNET.LOG file located in *ORACLE_HOME*\NET80\LOG directory for secondary ORA messages. If after analyzing the log file you determine there are no secondary errors, determine if the problem may be caused by on the following scenarios:

Cause: The incorrect Oracle Protocol Adapter for the selected networking protocol is installed.

Action: Ensure the correct DLL is installed by viewing the RGS file in the *ORACLE_HOME*\ORAINST directory:

File	Operating System
WIN95.RGS	Windows 95
NT.RGS	Windows NT

A missing protocol adapter driver usually produces the following errors in the SQLNET.LOG or any client trace file:

- ORA-12203
- ORA-12538
- ORA-00508

Cause: An invalid service name was supplied in the connect string.

Action: Verify that the service name supplied in your connect string exists in your TNSNAMES.ORA file and the ADDRESS information for that TNS service name is valid:

- Is the HOST or SERVICE name correct?
- Is the PORT specified correct?

Cause: Net8 could not find the connect descriptor specified in the TNSNAMES.ORA file.

Action: After verifying that the database is running, check the following:

1. Verify the Net8 network listener is running. Enter:

```
LSNRCTL80
LSNRCTL> STATUS LISTENER_NAME
```

where *LISTENER_NAME* is the name of the network listener defined in the LISTENER.ORA file. It is not necessary to identify the network listener if you are using the default network listener, named LISTENER.

If the output indicates the network listener is not running, try starting it with the command:

```
LSNRCTL> START LISTENER_NAME
```

2. Ensure the TNSNAMES.ORA file is in the correct location.

   By default, TNSNAMES.ORA is located in *ORACLE_HOME*\NET80\ADMIN.

Cause: The destination system's network listener is not listening.

Action: Verify that the remote system's network listener is running. Enter:

```
C:\> LSNRCTL80
LSNRCTL> STATUS LISTENER_NAME
```

where *LISTENER_NAME* is the name of the network listener defined in the server's LISTENER.ORA file. It is not necessary to identify the network listener if you are using the default network listener, named LISTENER.

If the output indicates the network listener is not running, try starting it with the command:

```
LSNRCTL> START LISTENER_NAME
```

Cause: There are underlying network transport problems.

Action: Verify with utilities supplied with the networking protocol being used that the protocol itself is functional. For example, with TCP/IP, try to PING the remote system.

Cause: TNSNAMES.ORA file is not located in the proper directory.

Action: Make sure the TNSNAMES.ORA file is located in *ORACLE_HOME*\NET80\ADMIN (the default) directory or an alternative path, as explained in "Client Diagnostics" on page D-5.

Cause: The (HOST=*SERVER_NAME*) for TCP/IP or (SERVICE=*TNS_APPLICATION*) for SPX are not consistent on the clients and server computers.

Action: Ensure the (HOST=*SERVER_NAME*) for TCP/IP or (SERVICE=*TNS_APPLICATION*) for SPX are the same on the server and client workstations.

For TCP/IP setups, make sure that the HOST parameter in the LISTENER.ORA on the server and the TNSNAMES.ORA file on the client point to the same name, or at least to names that are then translated to the

same IP address by each system. This is especially important for servers with multiple IP addresses assigned to the various network interfaces on the server.

For SPX setups, the name must be the same on the server and client workstations.

Cause: The descriptor in the TNSNAMES.ORA file for the Oracle LU6.2 Protocol Adapter does not have the value for PLU_LA in upper case. This is irrespective of the case used in the SIDEINFO.NSD file for the symbolic destination name. For example:

```
os2=
        (DESCRIPTION=
            (ADDRESS=(PROTOCOL=LU62)
                     (PLU_LA=os2)))
```

results in this error.

Action: Change the value to uppercase. For example:

```
os2=
        (DESCRIPTION=
            (ADDRESS=(PROTOCOL=LU62)
                     (PLU_LA=OS2)))
```

where os2 is defined as the SYMBOLIC DESTINATION NAME in the SIDEINFO.NSD file.

ORA-3113: end of file communication channel

An ORA-3113 means that communications were lost for an unexpected reason. It is usually followed by a:

```
ORA-3114: not connected to ORACLE
```

Cause: The Oracle shadow process on the server died unexpectedly.

Action: Check if the *SID*ALRT.LOG file in *ORACLE_HOME*\RDBMS80\TRACE on the server to see if any other Oracle errors occurred.

Cause: Computer crash or network failure at the server side.

Cause: Two servers with the same host names or IP addresses on the same network.

Action: To find the duplicate addresses turn off the computer that is receiving the error, PING its IP address. If the PING responds, then you have to find the offending computer.

Cause: The TOKEN RING card has the Shared RAM size set to 8KB rather than 16KB.

Action: If you are using a TOKEN RING card, check the shared buffer size and try increasing it.

Cause: An unexpected end–of–file was processed on the communication channel. The TCP/IP retransmission count on Windows 95 and Windows NT has a default value of 5. This means that the send side retransmits the packet five times or until it gets an acknowledgment. The timeout for each retransmission is two times the timeout for the previous retransmission (exponential backoff). With the default value of 5, the send side retransmits 5 times (approximately 15 seconds) and if it does not get an acknowledgment, it assumes that the other side is down and closes the connection. If the link goes down for a minute or two the Net8 client receives this error.

Action: Modify the retransmission count.

Please see your Microsoft-specific operating system manual for more information on tuning the Microsoft TCP/IP software.

ORA-3121: No interface driver connection - function not performed

Cause: This is caused from using a SQL*Net version 1 prefix in the connect string.

Action: Do not use the following prefixes in the connect string.

- T:
- X:
- P:

Cause: If you only specify the user name and password from a client computer with no local Oracle database installed.

Action: Specify a connect string.

Resolving Oracle Names Server Problems

Problems with Oracle Names Server occur because:

- Client Connections Not Established
- Service Is Not Resolved

Client Connections Not Established

The NAMESCTL80 utility provides the QUERY command, which queries the existence or contents of an object (for example, a database) stored in the Names Server. This command can be useful in situations where a client connection is not properly established.

For example, you can query an Oracle Names Server for INVENTORYDB.WORLD alias through the NAMESCTL80 utility:

```
C:\> NAMESCTL80
NAMESCTL> QUERY INVENTORYDB.WORLD *
```

The sample output looks like:

```
Total response time:   0.01
Response status:       normal, successful completion
Authoritative answer:  yes
Number of answers:     1
TTL:                   1 day
        ...(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=
INVENTORY)(PORT=1526)))(CONNECT_DATA=(SID=ORCL)))
```

The "a.smd" data type that stores the address for INVENTORYDB.WORLD allows you to determine if the address is correct (that is, for TCP/IP the host name and the port number must be the same as the ones defined in the LISTENER.ORA file on the server).

Service Is Not Resolved

When a service is not resolved through an Oracle Names Server:

1. Make sure that the parameter USE_PLUG_AND_PLAY_*LISTENER_NAME* (is defaulted to LISTENER) is set to TRUE in the LISTENER.ORA file on the server.
2. Make sure that the parameter GLOBAL_DBNAME is set for each database in the SID_LIST_*LISTENER_NAME* (*LISTENER_NAME* is defaulted to LISTENER) section in the LISTENER.ORA file on the server.
3. Use the LSNRCTL80 STAT command to see if the database you are trying to connect to is registered with the Names Server. The database is registered with the Names Server if the word `Registered` appears next to the database SID in the Services Summary section of the output.

   The LSNRCTL80 STAT output looks something like:

```
LSNRCTL80 for 32-bit Windows: Version 8.0.4.0.0 - Production on 25-NOV-97
18:51:15

(c) Copyright 1997 Oracle Corporation. All rights reserved.

Connecting to (ADDRESS=(PROTOCOL=IPC)(KEY=oracle.world))
STATUS of the LISTENER
------------------------
Alias                     LISTENER
Version                   TNSLSNR80 for 32-bit Windows: Version 8.0.4.0.0 -
Production
Start Date                24-NOV-97 14:30:27
Uptime                    1 days 4 hr. 20 min. 50 sec
Trace Level               off
Security                  ON
SNMP                      OFF
Listener Parameter File   D:\orant\NET80\admin\listener.ora
Listener Log File         D:\orant\NET80\log\listener.log
Services Summary...
```

```
  ORCL has 1 service handler(s)
  extproc has 1 service handler(s)
The command completed successfully
```

4. Query the Names Server through the NAMESCTL80 utility for the Net8 service you are using. In the output, check the address for the service you are using and make sure it is correct. See "Client Connections Not Established" on page D-16.

Resolving Improper Configuration of External Procedures

You receive the following error message if external procedures are not correctly configured for 3GL programming language in a PL/SQL environment, the Image Cartridge, the Time Series Cartridge, or the VIR Cartridge.

```
ORA-28575: unable to open RPC connection to external procedure agent
ORA-06512: at "APPLICATIONS.OSEXEC", line 0
ORA-06512: at "APPLICATIONS.TEST", line 4
ORA-06512: at line 2
```

Ensure external procedures are properly configured, these error messages display. Follow the procedures in "Configuring External Procedure Calls" on page 8-9.

Net8 Troubleshooting Hints and Tips from the Field

Below are some Net8 tips you may find helpful when you are having difficulty diagnosing the problem:

- Try using the node or network address during configuration instead of the name of the server computer.

  This eliminates any internal lookup problems (and make the connection slightly faster).

  For TCP/IP — Use the internet address, for example, 198.32.3.5

  Change the (HOST =*SERVER_NAME*) line in TNSNAMES.ORA with internet address, for example, (HOST=198.32.3.5).

- Understand SPX/IX connection issues.

  The workstation that is requesting a connection to be made with a remote network listener must first learn the location of that SPX service in the NetWare IPX network.

  The client workstation issues a lookup request for the SPX service. If the service can not be found, an error is sent back to the workstation.

- Perform a loopback test on the server and FTP the files TNSNAMES.ORA and SQLNET.ORA to the client.
- Comment out unnecessary SQLNET.ORA parameters.

  The SQLNET.ORA file may have parameters required for more enhanced uses, such as Dead Connection Detection. Older SQLNET.ORA files can have the Advanced Networking Option (ANO) parameters that do not work for SQL*Net. If these features are not fully configured, a basic connection can fail. The following parameters can be commented out:

  SQLNET.AUTHENTICATION_SERVICES (ANO Parameter)

  SQLNET.EXPIRE_TIME (Dead Connection Detection Parameter)

  SQLNET.CRYPTO_SEED (ANO Parameter)
- Check what is between you and the server. If it is a wide area network(WAN), identify any intermediate systems that are not working correctly. If all computers are fine, the problem may be a timing issue. Timing issues are associated with ORA-12203, ORA-12535, or ORA-12547 errors in the client log files.

  To resolve this, try speeding up the connection by using exact addresses instead of names and increase the CONNECT_TIMEOUT_LISTENER parameter in the LISTENER.ORA file. The default value for this parameter is 10 seconds.
- Determine which Oracle applications are failing. SQL*Plus may work, but CASE tools may not. If you determine the problem is a data volume issue, try to transfer a large (5 MB) file with the base connectivity.

Questions to Ask When Troubleshooting

Below are some questions to ask yourself when diagnosing a problem:

- Do all computers have a problem, or is it just one?

  If one computer works and another does not, and you are confident that the same software (Oracle and third-party products) is installed, swap over the network cables (if they are close enough) to see if the problem moves. This indicates the problem is something between the client / server and not locally on the PC.
- What kind of links are between the client and the server, for example, X.25, ISDN, Token Ring, or leased line?

Sniffers and Lan Analyzers are useful for intermittent failing connections or detecting time-outs and resent packets. You can also see what side of the conversation is waiting for a response.

- Does the third party application fail, but Oracle applications work?

Contacting Oracle Services Support

If after reading this appendix, you still cannot resolve your problems, call Oracle Services Support to report the error. Please have the following information at hand:

- The hardware and operating system release number on which your application(s) is running.
- The release numbers (up to five digits in release) of all Oracle networking products involved in the current problem.
- The third-party vendor and version you are using.
- The kind of links that are between the client and server.
- A description of what does work.
- The exact error message.
- A Net8 trace if possible. If not, the log file is sufficient.

E

Net8 Services and Port Numbers

This appendix describes the services and port numbers used by Net8.

Specific topics discussed are:

- Services
- Port Numbers

Services

Product	Windows NT Service Name	How to Start	How to Stop
Network Listener	Oracle*HOME*_*NAME*TNSListener80 (the service name if you are using the default network listener name LISTENER) or Oracle*HOME*_*NAME*TNSListener80*LSNR* (where *LSNR* is the non-default network listener name) Oracle*HOME*_*NAME*TNSListener80*LSNR* is only created if the following command has been run: `LSNRCTL80 START LISTENER_NAME`	From the Windows NT Control Panel: 1. Double-click Services. The *Services* dialog box appears. 2. Select Oracle*HOME*_*NAME*TNSListener80 or Oracle*HOME*_*NAME*TNSListener80*LSNR*. 3. Click Start. 4. In the *Services* window, click the Close button.	From the Windows NT Control Panel: 1. Double-click Services. The *Services* dialog box appears. 2. Select Oracle*HOME*_*NAME*TNSListener80 or Oracle*HOME*_*NAME*TNSListener80*LSNR*. 3. Click Stop. The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service. 4. Click Yes to acknowledge the message, and click Close to exit the *Services* window.
SNMP	OracleSNMPPeerEncapsulator OracleSNMPPeerMasterAgent	From the Windows NT Control Panel: 1. Double-click Services. The *Services* dialog box appears. 2. Select OracleSNMPPeerEncapsulator or OracleSNMPPeerMasterAgent. 3. Click Start. 4. In the *Services* window, click the Close button.	From the Windows NT Control Panel: 1. Double-click Services. The *Services* dialog box appears. 2. Select OracleSNMPPeerEncapsulator or OracleSNMPPeerMasterAgent. 3. Click Stop. The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service. 4. Click Yes to acknowledge the message, and click Close to exit the *Services* window.

Product	Windows NT Service Name	How to Start	How to Stop
Oracle Names	Oracle*HOME_NAME*NamesService80	From the Windows NT Control Panel: 1. Double-click Services. The *Services* dialog box appears. 2. Select Oracle*HOME_NAME*NamesService80. 3. Click Start. 4. In the *Services* window, click the Close button.	From the Windows NT Control Panel: 1. Double-click Services. The *Services* window appears. 2. Select Oracle*HOME_NAME*NamesService80 from the listing. 3. Click Stop. 4. The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service. 5. Click Yes to acknowledge the message, and click Close to exit the *Services* window.
Client Cache Service	Oracle*HOME_NAME*ClientCache80	From the Windows NT Control Panel: 1. Double-click Services. The *Services* dialog box appears. 2. Select the service. 3. Click Start. 4. In the *Services* window, click the Close button.	From the Windows NT Control Panel: 1. Double-click Services. The *Services* dialog box appears. 2. Select the service. 3. Click Stop. The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service. 4. Click Yes to acknowledge the message, and click Close to exit the *Services* window.

Product	Windows NT Service Name	How to Start	How to Stop
Oracle Connection Manager	Oracle*HOME*_*NAME*CManService80 Oracle*HOME*_*NAME*CMAdminService80	From the Windows NT Control Panel: **1.** Double-click Services. The *Services* dialog box appears. **2.** Select Oracle*HOME*_*NAME*CMAdminService80 **3.** Click Start. **4.** Select Oracle*HOME*_*NAME*CManService80 from the listing. **5.** Click Start. **6.** In the *Services* window, click the Close button.	From the Windows NT Control Panel: **1.** Double-click Services. The *Services* dialog box appears. **2.** Select Oracle*HOME*_*NAME*CMAdminService80 **3.** Click Stop. The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service. **4.** Click Yes to acknowledge the message. **5.** Select Oracle*HOME*_*NAME*CManService80 from the listing. **6.** Click Stop. The *Services* confirmation dialog box appears, prompting you if it is OK to stop the service. **7.** Click Yes to acknowledge the message, and click Close to exit the *Services* window.

Port Numbers

Product	Default Port Number	How and Where to Change the Port Number?
Network Listener	1521 1526	Modify the LISTENER.ORA and TNSNAMES.ORA files using the Oracle Net8 Assistant or a text editor.
SNMP	161	Modify the MASTER.ORA and ENCAPS.ORA files using the Oracle Net8 Assistant or a text editor.
Oracle Names	1575	Use the Oracle Net8 Assistant.
Oracle Connection Manager	1610 1620	Modify the CMAN.ORA configuration file using an ASCII text editor.

Glossary

Note the following special terms when using this guide:

client

A client is a system that runs an Oracle-supported application and connects to the shared database(s) on an Oracle8 Server.

connect descriptor

A connect descriptor is a specially formatted description of the destination for a network connection. Connect descriptors are constructed using a set of keywords and values mapped to service names. For example, an Oracle Tool would use a service name representing a connect descriptor to initiate a TNS connection with an Oracle8 Server. Each connect descriptor is assigned a service name in the network definition and stored in the TNSNAMES.ORA network configuration file, in an Oracle Names database, or in a native naming service.

DNS

Domain Name System is a computer used to translate the host name specified in the TNSNAMES.ORA file into the host internet address (IP).

External Naming

External naming refers to service name resolution by using a supported third-party naming service.

external procedure

Function or procedure written in a third-generation language (3GL) that can be called from PL/SQL code. Only C is supported for Oracle8 external procedures.

global database name

The global database name specifies the name by which the network listener registers the database instance with an Oracle Names Server and the name by which the Oracle Names Server identifies a database. You can use any alias, but Oracle Corporation recommends setting the global database name to the value of the INITSID.ORA's DB_NAME and DB_DOMAIN parameters. The default global database name is ORACLE.WORLD. DB_DOMAIN can be overwritten by the NAMES.DEFAULT_DOMAIN parameter in SQLNET.ORA file.

HOME_NAME

Represents the Oracle home name if you use multiple Oracle homes. This convention is not applicable for the first Oracle home. The home name can be up to sixteen alphanumeric characters. The only special character allowed in the home name is the underscore.

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.

Host Naming

Resolves service names through a TCP/IP network's Domain Name System (DNS) or in the /ETC/HOSTS file. This method is recommended for simple TCP/IP environments.

instance

Combination of processes and threads that begins each time a database is started. Identified with a unique SID. A default SID, ORC*x*, is installed during installation of the Oracle8 database.

When you install Oracle8 database for the first time on a computer, your SID is typically ORCL. For each subsequent Oracle8 database installation into a different Oracle home on the same computer, ORCL is automatically incremented by one (that is, for a second Oracle8 database installation, the SID is ORC1, for a third Oracle8 database installation, the SID is ORC2, etc.).

The background threads and memory areas required to access an Oracle8 database. A database system requires one instance and one database. Every Oracle8 instance has a single system global area (SGA); a multiple-user instance also requires several background threads.

listener

A listener enables an Oracle8 Server to accept connections from client computers over Net8. Also, referred to as *network listener.*

Local Naming

Resolves service names to network addresses by using information configured and stored on each individual client. Local Naming is most appropriate for simple distributed networks with a small number of services that change infrequently.

loopback

A loopback uses Net8 to go from the server right back to itself.

MIB

Management Information Base. The collection of variables that can be queried to describe attributes of an object, such as the use, performance, and initialization parameters of a database server.

Net8

The Oracle client/server communication software that offers transparent operation to Oracle tools or databases over any type of network protocol and operating system.

network listener

An executable program that enables an Oracle8 server to accept connections from client computers over Net8.

Oracle8 Database

Known formally as either Oracle8 Enterprise Edition or Oracle8, the Oracle8 database is an Object Relational Database Management System (ORDBMS).

Oracle8 Server

See *server.*

Oracle Names

Oracle Names stores names and addresses of all database services on a network on a Names Server. Connection requests are routed through the Names Server, which resolves the service name to a network address. The information is then returned to the client

Oracle Names Server

A server that uses Oracle Names to store a service's network address along with its simple name sot that client applications can request connection with simple names, rather than lengthy addresses.

OracleSNMPPeerMasterAgent

The Oracle Peer SNMP Master Agent is the process on a managed node that accepts queries from the management framework and communicates with the subagents to answer the query.

OracleSNMPPeerEncapsulator

The OracleSNMPPeerEncapsulator allows you to encapsulate the Microsoft master agent so that all SNMP requests from a Network Management Station (NMS) are sent to Oracle Peer SNMP Master Agent.

Oracle Protocol Adapters

A set of products which map Net8 functionality to industry-standard protocols used in client-server connections.

ORANT

Default Oracle home directory where Oracle Installer installs the Oracle8 database on Windows NT.

ORAWIN95

Default Oracle home directory where Oracle Installer installs the Oracle8 database on Windows 95.

region

A collection of Names Servers which share a common service registry.

server

A server is a host system that runs a multi-user Oracle8 Object Relational Database Management System (ORDBMS) and maintains at least one database that can be shared by remote clients. Server refers to the ORDBMS that is using Net8 and is capable of serving any Oracle client.

service name

A service name is a short, convenient name mapped to a network address contained in a TNS connect descriptor. Users need only know the appropriate service name to

make a TNS connection. Service names are created with the Oracle Net8 Easy Config or Oracle Net8 Assistant.

SID

A unique name for an Oracle database 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 the LISTENER.ORA file. Also known as *system ID*.

SQL

SQL is Structured Query Language—the internationally accepted standard for defining and manipulating relational databases.

SQL*Net

SQL*Net is the Oracle7 client / server communication software that offers transparent operation to Oracle tools or databases over any type of network protocol and operating system.

system ID

A synonym for instance identifier. Often abbreviated to SID.

TNS

Transparent Network Substrate (TNS) is the Oracle networking technology that provides a single application interface to all industry-standard networking protocols.

TNS-based application

A TNS-based application uses the common functions of the TNS interface to transmit data across one or more networks. Net8 is a TNS-based application.

well-known address

Address for Names Server(s) hardcoded into the Names Server and related clients. Names Server(s) become available at this well-known address(es), eliminating need for specification of address in configuration files.

Index

Symbols

"Enabling Tracing", 2-12

Numerics

1521 port, E-5
1526 port, E-5
1575 port, E-5
1610 port, E-5
1620 port, E-5

A

ACT parameter, C-33
adapters
  supported vendors, 2-8
ADDRESS parameter, C-7
  configuring for IPC, C-23
addresses
  for Bequeath Protocol Adapter, C-15
  for LU6.2 Protocol Adapter, C-14
  for Named Pipes Protocol Adapter, C-13
  for SPX Protocol Adapter, C-12
  for TCP/IP Protocol Adapter, C-12
  specifying, C-10
ADMIN directory, A-2
administration, 10-1 to 10-25
  client, 10-12
  Oracle Connection Manager, 10-7
  Oracle Names Server, 10-2
  server, 10-4
Advanced Program-to-Program Communication (APPC), 2-4
ALRT.LOG file, D-15
ANSWER_TIMEOUT parameter, C-31
APPC architecture, 2-4
Application Programming Interface. *See* API
architecture, described, 1-4
ARGS parameter, C-11
ARGV0 parameter, C-11
authentication adapters
  described, 2-7
  supported platforms, 2-2
  using, 8-4
authentication servers, non-NT support, 8-8
AUTHENTICATION_LEVEL parameter, C-31
AUTOMATIC_IPC parameter, 6-24, C-19

B

Bequeath Protocol Adapter
  address specification, C-15
  connecting with Server Manager, 7-7, 7-8
  described, 2-5
  Oracle7 client connections, 4-4
  supported platforms, 2-2

C

client administration, 10-12
client connection, 1-3, 7-2
client parameters, C-19
client troubleshooting, D-5
client, defined, Glossary-1
CMAN.ORA file, 6-23, C-2
  CMAN, C-30
  CMAN_PROFILE, C-31

CMAN_RULES, C-33
overview, C-29
CMAN.TRC file, 10-18, D-8
CMCTL80 utility, 6-35, 7-5, 10-8, 10-9, 10-10, 10-11
coexistence, 4-1 to 4-10
configuration files, 4-12
defined, 4-3
installation, 4-10
listener, 4-10
SQL*Net and Net8, 4-10
configuration, 6-1
configuration files
CMAN.ORA, 6-23, C-2, C-29
content, C-1 to C-33
LISTENER.ORA, 6-2, 6-3, C-2, C-21
NAMES.ORA, C-2
SDNS.ORA, 6-3, 6-13
SQLNET.ORA, 6-3, C-2, C-16
TNSNAMES.ORA, 6-2, 6-3, C-2, C-4
ENCAPS.CFG, 9-10
MASTER.CFG, 9-9
configuration parameters, D-19
ACT, C-33
adding to System Properties, B-9
ADDRESS, C-7
ANSWER_TIMEOUT, C-31
ARGS, C-11
ARGV0, C-11
AUTHENTICATION_LEVEL, C-31
AUTOMATIC_IPC, 6-24, C-19
CONNECT_DATA, C-8
CONNECT_TIMEOUT_LISTENER, D-19
DB_DOMAIN, C-7
DESCRIPTION, C-7
DST, C-33
GLOBAL_DBNAME, C-27
HOST, C-10
KEY, 4-10
LLU, C-11
LLU_NAME, C-11
LOCAL, B-6
LOCAL_LU, C-11
LOCAL_LU_NAME, C-11
LOG_DIRECTORY, C-26
LOG_DIRECTORY_CLIENT, C-17
LOG_DIRECTORY_
CLIENT/LISTENER/SERVER, 10-24
LOG_FILE, C-26
LOG_FILE_CLIENT, C-17
LOG_LEVEL, C-31
LU_NAME, C-11
MAXIMUM_CONNECT_DATA, C-31
MAXIMUM_RELAYS, C-31
MDN, C-11
MODE, C-11
modifying or adding, B-1 to B-10
NAMES.DEFAULT_DOMAIN, C-6, C-19, D-11, Glossary-2
NAMES.DIRECTORY_PATH, 6-22, 8-2
NAMES.PREFERRED_SERVICES, C-19
NAMES.TRACE_LEVEL, 10-24, D-9
PARTNER_LU_LOCAL_ALIAS, C-11
PARTNER_LU_NAME, C-11
PASSWORD, C-26
PIPE, C-11
PLU, C-11
PLU_LA, C-11, D-14
POOL_SIZE, C-25
PORT, C-10
PRESPAWN_MAX, C-25
PROGRAM, C-11
PROTOCOL, C-10, C-25
RELAY_STATISTICS, C-32
REMOTE, B-6
RENAME GLOBAL_NAME, C-7
SERVER, C-10
SERVICE, C-10
SHOW_TNS_INFO, C-32
SID, C-10
SID_LIST_LISTENER_NAME, 6-33, 7-3
SOURCE_ROUTE, 6-28, C-8
SQLNET.AUTHENTICATION_SERVICES, 8-4, 8-5, D-19
SQLNET.CRYPTO_SEED, D-19
SRC, C-33
SRV, C-33
STARTUP_WAITTIME, C-26
TIMEOUT, C-25
TNS_ADMIN, 4-12, B-7, D-6, D-11
TNSPING.TRACE_DIRECTORY, C-19

TNSPING.TRACE_LEVEL, C-19
TP_NAME, C-11
TPN, C-11
TRACE_DIRECTORY, C-26
TRACE_DIRECTORY_CLIENT, C-18
TRACE_DIRECTORY_
CLIENT/LISTENER/SERVER, 10-24
TRACE_FILE, C-26
TRACE_FILE_CLIENT, C-18
TRACE_LEVEL, C-26
TRACE_LEVEL_CLIENT, C-18, D-11
TRACE_LEVEL_
CLIENT/LISTENER/SERVER, 10-24
TRACE_UNIQUE_CLIENT, C-18
TRACING, 10-24, C-32
USE_ASYNC_CALL, C-32
USE_PLUG_AND_PLAY, C-27
USE_PLUG_AND_PLAY_LISTENER_
NAME, D-17
USE_SHARED_SOCKET, B-7
configuring
advanced, 8-1 to 8-11
an additional address, 10-17
authentication adapters, 8-4
externa naming, 6-3
external naming, 8-2
external procedures, 8-9
Host Naming, 6-3, 6-4
listener addresses, C-10
Local Naming, 6-3, 6-6
Named Pipes Protocol Adapter, 8-6
naming methods, 6-22, 10-13
NDS Authentication Adapter, 8-4, 10-14
networking files for Oracle Protocol
Adapters, C-10
Oracle Advanced Networking Option, 8-7
Oracle Connection Manager, 6-23
Oracle Names, 6-3, 6-11
overview, 6-2
testing on the client, 6-38
testing on the server, 6-31
the network, 6-1
Windows NT Native Authentication
Adapter, 8-5
with Oracle Names, 6-2
without Oracle Names, 6-2
connect descriptor
defined, Glossary-1
identified by service names, C-7
specifying, C-7
use of, C-7
connect string, 1-2
CONNECT_DATA
definition of, C-8
example of, C-8
syntax, C-9
use of, C-8
CONNECT_DATA keyword, C-7
CONNECT_DATA parameter, C-8
CONNECT_DATA, Oracle Connection
Manager, C-30
CONNECT_TIMEOUT_LISTENER
parameter, D-19
connecting
Bequeath Protocol Adapter, 7-7, 7-8
client request, 1-3
external naming, 8-3
Host Naming, 7-7, 7-8
Local Naming, 7-7, 7-8
LOCAL parameter, B-6
multiple, C-23
NDS Authentication Adapter, 8-5
Oracle Names, 7-7, 7-8
Oracle Net8 Easy Config, 6-43
Oracle7 connections to Oracle8 databases, 4-3
Oracle8 connections to Oracle7 databases, 4-5
REMOTE parameter, B-6
server response, 1-3
specify destination address for TCP/IP, 6-38
TNSPING, 6-42
to a database, 7-1 to 7-8
to multiple databases, C-23
use PING, 6-40
verify, 6-42
with NDS Native Naming Adapter, 8-2
connection
concurrent, increasing number of, C-24
connection concentration, 2-6, 2-14
connection pooling, 2-14
Customer Support

contacting, xvi
CyberSAFE Authentication Adapter
supported platforms, 2-3
supported vendors, 2-9
using, 8-7

D

database connections, 7-1 to 7-8
DB_DOMAIN parameter, 6-16, C-7
DB_NAME parameter, 6-16
DCE Integration
described, 2-11
supported platforms, 2-3
supported vendors, 2-9
dead connection detection, C-16, C-17
default domains, C-21
DESCRIPTION parameter, C-7
diagnosing
client, D-5
external procedures, D-18
Oracle Names, D-16
server, D-3
directory, A-2
ADMIN, A-2
ERROR, A-2
LOG, A-2
NAMES, A-2
NET80, A-2
SAMPLE, A-2
TNSAPI, A-2
directory structure, A-1 to A-2
DisplayName parameter, B-3
DNS, 1-2, 6-3
DNS, defined, Glossary-1, Glossary-2
documentation
generic, xxv
Domain Name System, 1-2, 6-3, Glossary-2
DST parameter, C-33
Dynamic Discovery Option, 6-14

E

encapsulator
OracleSNMPPeerEncapsulator, 9-3
ERROR directory, A-2
error messages
resolving, xvi, D-1 to D-20
external naming, 8-2
client configuration, 8-3
connecting with Server Manager, 8-3
defined, Glossary-1
described, 2-13, 6-3
NDS Native Naming Adapter, 8-2
server configuration, 8-2
using, 8-2
external procedures
configuring, 8-9
defined, Glossary-1
requirements, 8-9
troubleshooting, D-18

F

firewall support, 2-6

G

generic document references
Defining the Network Listener Name, C-23
TNSNAMES.ORA, C-10
generic documentation references
Client Discovery of Names Servers, 6-13
CMCTL, 6-35
Configuring TNSNAMES.ORA, C-10
CONNECT command, 7-1
connect string, 7-1
Conventions, xxii
Defining the Network Listener Address, C-23
Defining the Network Listener Name, C-23
LISTENER.ORA, C-26
Logging, D-7
LSNRCTL, 6-34
NAMESCTL, 6-20
NAMES.LOG, D-7
Net8 Products, 2-2
ORA-3113
end of file communication channel, D-15
Oracle Advanced Networking Option
Products, 2-10

ORACLE_HOME, xxiii
Server Configuration, 6-6
Specifying Service Names, C-6
Tracing, D-8
Using SQLNET.ORA Logging and Tracing Parameters, C-17
global, 6-16
global database name, defined, 6-16, Glossary-2
GLOBAL_DBNAME parameter, C-27
configuration parameters
GLOBAL_DBNAME, 6-5, 6-17
GLOBAL_DBNAME parameter, with Host Naming, 6-5
GLOBAL_DBNAME parameter, with Oracle Names, 6-17

H

HOME_NAME, defined, xxiii, Glossary-2
HOMEID, defined, xxiv, Glossary-2
Host Naming
client configuration, 6-5
connecting with Server Manager, 7-7
connecting with SQL*Plus, 7-8
defined, Glossary-2
described, 2-13, 6-3
LISTENER.ORA, C-28
requirements, 6-4
server configuration, 6-5
supported vendors, 2-8
using, 6-4
HOST parameter, C-10
HOSTS file, 6-38

I

Identix (Biometric) Authentication Adapter
supported platforms, 2-3
supported vendors, 2-9
using, 8-7
Image Cartridge, external procedures, 8-9, D-18
ImagePath parameter, B-3
INITSID.ORA configuration file
listener load balancing configuration, 2-6, 2-14, 2-15
installation, 3-1 to 3-4
results, 3-2
verifying, 3-4
instance, defined, Glossary-2
IP addresses
determining, 6-39
specifying, C-8
IPC
connection, 4-10, 5-5
KEY, 4-10

K

Kerberos Authentication Adapter
supported platforms, 2-3
supported vendors, 2-9
using, 8-8
KEY parameter, 4-10
keywords
specifying for Oracle Protocol Adapters, C-10

L

listener
1521 port, E-5
1526 port, E-5
ADDRESS, C-7
default name, C-23
defined, Glossary-3
describing databases, C-25
handling concurrent connections, C-24
increasing queue size, C-24
LSNRCTL80, 6-34, 7-4, 10-5, 10-6, D-12
OOracleHOME_NAMETNSListener80 service, 10-5
OracleHOME_NAMETNSListener80 service, 6-16, 6-34, 7-4, 10-6, E-2
OracleHOME_NAMETNSListener80LSNR service, 6-34, 7-4, 10-5, 10-6, E-2
starting from the command line, 6-34, 7-4, 10-5, D-12
starting from the Control Panel, 6-16, 6-34, 7-4, 10-5
stopping from the command line, 10-6
stopping from the Control Panel, 10-6

listener address, C-23
Bequeath Protocol Adapter address, C-15
LU6.2 Protocol Adapter address, C-14
Named Pipes Protocol Adapter address, C-13
SPX Protocol Adapter address, C-12
TCP/IP Protocol Adapter address, C-12
listener address configuration, C-10
listener load balancing, 2-15
LISTENER.LOG file, D-7, D-8
LISTENER.ORA file, 6-2, 6-3, C-2
Connection Manager, C-30
Host Naming, C-28
listener address, C-23
listener name definition, C-23
Oracle Names, C-27
overview, C-21
relationship to TNSNAMES.ORA, C-5
LISTENER.TRC file, 10-18, D-8
LLU parameter, C-11
LLU_NAME parameter, C-11
Local Naming
client configuration, 6-10
connecting with Server Manager, 7-7
connecting with SQL*Plus, 7-8
defined, Glossary-3
described, 2-13, 6-3
server configuration, 6-6
using, 6-6
LOCAL parameter, B-6
LOCAL_LU parameter, C-11
LOCAL_LU_NAME parameter, C-11
LOG directory, A-2
log files, D-7
LISENER.LOG, D-7, D-8
SQLNET.LOG, C-17, D-7
LOG_DIRECTORY parameter, C-26
LOG_DIRECTORY_CLIENT parameters, C-17
LOG_DIRECTORY_CLIENT/LISTENER/SERVER parameter, 10-24
LOG_FILE parameter, C-26
LOG_FILE_CLIENT parameter, C-17
LOG_LEVEL parameter, C-31
logging
listener, D-7, D-8
SQL*Net, C-17, D-7
loopback test, 6-36, 6-43, D-4
loopback, defined, Glossary-3
LSNRCTL80 utility, 6-34, 7-4, 10-5, 10-6, D-12
starting from the Control Panel, 9-6, 9-8
LU_NAME parameter, C-11
LU6.2 Protocol Adapter
address specification, C-14
described, 2-4
description, 2-4
supported platforms, 2-2
supported vendors, 2-8
supporting networks, 2-4
supporting topologies, 2-4

M

master agent
Oracle SNMPPeerMasterAgent, 9-3
MAXIMUM_CONNECT_DATA parameter, C-31
MAXIMUM_RELAYS parameter, C-31
MDN parameter, C-11
MIB, defined, Glossary-3
migration, 4-1 to 4-9
defined, 4-3
file names, 4-9
installation, 4-7
Oracle service names, 4-9
SQL*Net and Net8, 4-7
migration issues, 4-7
MODE parameter, C-11
MTS, 2-15
multiple configuration files, C-3
multiple Oracle homes, 5-1 to 5-6
CMCTL80, 5-2
control utilities, 5-2
defined, 5-2
listener, 5-5
listener startup mode, 5-5
LSNRCTL80, 5-2
NAMESCTL80, 5-2
Oracle Connection Manager, 5-6
Oracle Names Server, 5-6
port numbers, 5-5
service names, 5-4
multiplexing, 2-6

multi-protocol interchange, 2-6, 4-2
multi-protocol support, 2-6, 4-2
multi-threaded server parameters, 6-30
multi-threaded server support, 2-15

N

Named Pipes Protocol Adapter
address specification, C-13
addresses for, C-13
described, 2-4
description, 2-4
supported platforms, 2-2
supported vendors, 2-8
with an Oracle Names Server, 8-6
NAMES directory, A-2
NAMESCTL80 utility, 6-20, 6-32, 7-2, 10-2, 10-3
discovering Oracle Names Servers, 6-20, 6-21
Oracle Names
NAMESCTL80, 7-6
NAMES.DEFAULT_DOMAIN parameter, C-6, C-19, D-11, Glossary-2
NAMES.DIRECTORY_PATH parameter, 6-22, 8-2
NAMES.ORA file, C-2
NAMES.PREFERRED_SERVICES parameter, C-19
NAMESthread_id.TRC file, D-8
NAMES.TRACE_LEVEL parameter, 10-24, D-9
NAMES.TRC file, 10-18
naming method
External Naming, 8-2
external naming, 6-3, 8-2
Host Naming, 6-3, 6-4, 10-14
Local Naming, 6-3, 6-6, 10-14
Oracle Names, 6-3, 6-11, 10-14
naming methods, 10-13
NDS Authentication Adapter
client configuration, 8-5
connecting with Server Manager, 8-5
described, 2-7
NetWare Server configuration, 8-4, 8-5
supported platforms, 2-2
supported vendors, 2-8
using, 8-4, 10-14
NDS Native Naming Adapter
described, 2-7
description, 2-7
establishing connections with, 8-2
supported vendors, 2-8
using, 8-2
Net8
architecture, 1-4
coexistence with SQL*Net V2, 4-10
concept described, 1-3
defined, Glossary-3
described, 1-4
differences from SQL*Net, 4-2, 4-9
introducing, 1-1 to 1-5
migration from SQL*Net, 4-7
overview, 1-1 to 1-5
products described, 2-1 to 2-16
service names, 4-9
Net8 Client
described, 2-3
supported platforms, 2-2
Net8 OPEN described, 2-16
Net8 Server
described, 2-3
supported platforms, 2-2
Net8, configuration changes to enable coexistence with SQL*Net Version 2, 4-10
NET80 directory, A-2
NET80 parameter, B-2
NetWare Directory Services (NDS) Native Naming Adapter, supported platforms, 2-2
network
topologies supporting LU6.2 protocol, 2-4
network access control, 2-6, 2-15
network configuration
centralized management, 6-2
localized management, 6-2
network listener, defined, Glossary-3
network protocols, described, 1-5
Network Security and Single Sign-On, supported platforms, 2-3
Network Security, described, 2-10

O

ObjectName parameter, B-3
Open Systems Interconnect (OSI) model, 2-4

ORA-00508, D-12
ORA-06512, D-18
ORA-12154, D-11
ORA-12203, 6-41, D-12, D-19
ORA-1253, D-19
ORA-12535, 6-41
ORA-12538, D-12
ORA-12541, 6-41
ORA-12545, 6-38
ORA-12547, D-19
ORA-28575, D-18
ORA-3113, D-15
ORA-3114, D-15
ORA-3121, D-16
Oracle Advanced Networking Option
components described, 2-10
configuring, 8-7
described, 2-7
NDS Native Naming Adapter, 2-7
supported platforms, 2-3
Oracle Connection Manager, C-30
1610 port, E-5
1620 port, E-5
administration, 10-7
client configuration, 6-25
CMAN.ORA file, C-29
CMCTL80, 6-35, 7-5, 10-8, 10-9, 10-10, 10-11
configuration, 6-23
connection concentration, 6-23, 6-30
Connection Manager configuration, 6-29
described, 2-6
multi-protocol support, 6-23, 6-29
network access control, 6-23, 6-30, C-33
non-TCP/IP protocol adapters, 6-29
optional parameters, 6-30
OracleHOME_NAMECMAdminService80 service, 6-35, 10-8, 10-10, E-4
OracleHOME_NAMECManService80 service, 6-35, 10-8, 10-9, 10-10, 10-11, E-4
requirements, 6-24
server configuration, 6-30
starting from the command line, 6-35, 7-5, 10-8, 10-9, 10-11
starting from the Control Panel, 6-35, 10-8, 10-9, 10-11
stopping from the command line, 10-10
stopping from the Control Panel, 10-10
supported platforms, 2-2
TNSNAMES.ORA file, 6-28
tracing, 10-18
Oracle Home Selector, 5-3
Oracle home, defined, xxiii
Oracle Names, C-19
1575 port, E-5
administration, 10-2
client discovery of Names Servers, 6-13
configure clients and servers, 6-21
configuring, 6-11
connecting with Server Manager, 7-7, 7-8
connection not established, D-16
create SDNS.ORA file, 6-20
create well-known Oracle Names Server, 6-18
defined, Glossary-3
described, 2-13, 6-3
differences between versions, 6-14
discovering Oracle Names Servers, 6-20
Dynamic Service Registration, 6-12
LISTENER.ORA, C-27
Named Pipes Protocol Adapter, 8-6
NAMESCTL80, 6-20, 6-32, 7-2, 10-2, 10-3
Oracle Names Server configuration, 6-19
OracleHOME_NAMEClientCache80, E-3
OracleHOME_NAMEClientCache80 service, 7-6, 10-12, E-3
OracleHOME_NAMENamesService80, E-3
OracleHOME_NAMENamesService80 service, 6-32, 7-2, 10-2, 10-3, E-3
server configuration, 6-16
service not resolved, D-17
starting client cache from the command line, 7-6, 10-12
starting client cache from the Control Panel, 7-6, 10-12
starting from the command line, 6-20, 6-32, 7-2, 10-2
starting from the Control Panel, 6-20, 6-32, 7-2, 7-5, 10-2
stopping from the command line, 10-3
stopping from the Control Panel, 10-3
supported platforms, 2-2

trace files, D-9
tracing, 10-18
troubleshooting, D-16
using, 6-11
Oracle Names Server
defined, Glossary-4
described, 2-6
supported platforms, 2-2
Oracle Net8 Administrators Guide
TNSNAMES.ORA, C-10
Oracle Net8 Assistant, 4-2
adding an address, 10-17
configuring Oracle Connection Manager, 6-25
creating and configuring Oracle Names Servers, 6-20
described, 2-5, 2-12
discovering Oracle Names Servers, 6-21
naming methods, 6-22, 10-13
supported platforms, 2-2
tracing, 10-19
Oracle Net8 Easy Config, 4-2
creating a service name, 6-6
deleting a protocol address, 10-16
deleting a service name, 10-16
described, 2-5
loopback test, 6-36, 6-43
modifying a service name, 10-15
supported platforms, 2-2
Oracle Network Manager, 2-12, 4-2, 4-4
Oracle Protocol Adapters
defined, Glossary-4
described, 1-5, 2-4
overview, 1-5, 2-7
supported, 1-5
Oracle Security Server
described, 2-15
overview, 2-15
Oracle TCP/IP Protocol Adapter
addresses for, C-12
Oracle Trace, D-9
Oracle8 database, defined, Glossary-3
Oracle8 Server, defined, Glossary-3
OracleHOME_NAMEClientCache80 key, B-2
OracleHOME_NAMEClientCache80 service, 3-3, 6-13, 7-6, 10-12, E-3
OracleHOME_NAMECMAdminService80 key, B-2
OracleHOME_NAMECMAdminService80 service, 3-3, 6-24, 6-35, 10-8, 10-10, E-4
OracleHOME_NAMECManService80 key, B-2
OracleHOME_NAMECManService80 service, 3-3, 6-35, 10-8, 10-9, 10-10, 10-11, E-4
OracleHOME_NAMENames80 key, B-2
OracleHOME_NAMENamesService80 service, 3-3, 6-20, 6-32, 7-2, 10-2, 10-3, E-3
OracleHOME_NAMETNSListener80 key, B-2
OracleHOME_NAMETNSListener80 service, 3-3, 6-16, 6-34, 7-4, 8-6, 10-5, 10-6, E-2
OracleHOME_NAMETNSListener80LSNR service, 6-16, 6-34, 7-4, 10-5, 10-6, E-2
OracleSNMPPeerEncapsulator, defined, Glossary-4
OracleSNMPPeerMasterAgent, defined, Glossary-4
ORANT, defined, Glossary-4
ORAWIN95, defined, Glossary-4
overview
of TNSNAMES.ORA file, 9-9, 9-10

P

PARTNER_LU_LOCAL_ALIAS parameter, C-11
PARTNER_LU_NAME parameter, C-11
PASSWORD parameter, C-26
PATH, 5-2
changing at command line, 5-3
changing at system level, 5-3
changing from Oracle Home Selector, 5-3
PING
testing TCP/IP, 6-40
PIPE parameter, C-11
PLU parameter, C-11
PLU_LA parameter, C-11, D-14
POOL_SIZE parameter, C-25
port numbers, E-1 to E-5
PORT parameter, C-10
PRESPAWN_MAX parameter, C-25
Prespawned Dedicated Server Processes, C-25
PROGRAM parameter, C-11
PROTOCOL parameter, C-10, C-25
protocol stack vendors, 2-8

R

README files, A-2
region, defined, 6-19, Glossary-4
registry
  adding parameters, B-1 to B-10
  DisplayName, B-3
  editing for Windows NT, B-8
  ImagePath, B-3
  modifying parameters, B-1 to B-10
  NET80 parameter, B-2
  ObjectName, B-3
  OracleHOME_NAMEClientCache80 key, B-2
  OracleHOME_NAMECMAdminService80 key, B-2
  OracleHOME_NAMECManService80 key, B-2
  OracleHOME_NAMENames80 key, B-2
  OracleHOME_NAMETNSListener80 key, B-2
  REGEDIT, B-3, B-8
  REGEDT32, B-3, B-8
RELAY_STATISTICS parameter, C-32
RENAME GLOBAL_NAME parameter, C-7
REORDER_NS, 6-20, 6-21

S

SAMPLE directory, A-2
SDNS.ORA file, 6-3, 6-13, 6-20
SecurID Authentication Adapter
  supported platforms, 2-3
  supported vendors, 2-9
  using, 8-8
server
  defined, Glossary-4
  loopback test, 6-43
  troubleshooting, D-3
server administration, 10-4
Server Manager, 7-7
SERVER parameter, C-10
SERVERthread_id.TRC file, 10-18, C-18, D-8
service
  how to start and stop, E-2
  listed, E-2
service names, 1-2, 6-2, E-1 to E-5
  adding an address, 10-17
  creating, 6-6
  defined, Glossary-4
  deleting, 10-16
  modifying, 10-15
  more than one for an SID, C-7
  Net8, 4-9
  relation to global database name, C-7
  requirements, C-7
  selecting, C-7
  SQL*Net, 4-9
  TNSNAMES.ORA, C-7
service names, differences between SQL*Net V2.x and Net8, 4-9
SERVICE parameter, C-10
SHOW_TNS_INFO parameter, C-32
SID, 6-2, C-10
  as part of CONNECT_DATA, C-8
  defined, Glossary-5
  definition of, C-25
SID_DESC keyword
  use of, 6-5, 6-17, C-25, C-27, C-28
SID_LIST_LISTENER_NAME parameter, 6-33, 7-3
SIDALRT.LOG file, D-15
SIDEINFO.NSD file, D-14
single log on
  for accessing servers and databases, 8-2, 8-7
Single Sign-On, described, 2-10
SNA, 2-4
SOURCE_ROUTE parameter, 6-28, C-8
Special terms, Glossary-1
SPX Protocol Adapter
  address specification, C-12
  described, 2-4
  supported platforms, 2-2
  supported vendors, 2-8
SQL (Structured Query Language), defined, Glossary-5
SQL*Net
  coexistence with Net8, 4-10
  configuration changes to enable coexistence with Net8, 4-10
  defined, Glossary-5
  differences from Net8, 4-9
  introducing, 1-2
  migration to Net8, 4-7

service names, 4-9
SQL*Net and Net8 differences, 4-2
SQL*Net Easy Configuration, 2-12, 4-2, 4-4
SQL*Plus, 7-8
SQLNET.AUTHENTICATION_SERVICES parameter, 8-4, 8-5, D-19
SQLNET.CRYPTO_SEED parameter, D-19
SQLNET.EXPIRE_TIME parameter, D-19
SQLNET.LOG file, C-17, D-7
SQLNET.ORA file, 6-3, C-2
authentication, C-20
checksumming, C-20
client parameters, C-19
contents of, C-16
dead connection detection, C-16
default domains, C-21
encryption, C-20
multiple copies, C-3
overview, C-16
purpose of, C-16
relationship to TNSNAMES.ORA, C-6
SQLNETthread_id.TRC file, 10-18, 10-21, C-18, D-8
SQLNET.TRC file, 10-18, 10-21, C-18, D-8
SRC parameter, C-33
SRV parameter, C-33
START_CLIENT_CACHE, 7-6, 10-12
STARTUP_WAITTIME parameter, C-26
SVRMGR30, 7-7
system ID, 6-2
defined, Glossary-5
System Network Architecture (SNA), 2-4

T

TCP/IP Protocol Adapter
address specification, C-12
described, 2-4
supported platforms, 2-2
supported vendors, 2-8
TCP/IP transport, 6-38
terminology, Glossary-1
testing the configuration on the client, 6-38
testing the configuration on the server, 6-31
testing with Oracle Net8 Easy Config, 6-36
testing with PING, 6-40
testing with TNSPING, 6-42
The, C-23
third party applications, 4-4
Time Series Cartridge, external procedures, 8-9, D-18
TIMEOUT parameter, C-25
TNS, 1-4, 1-5
defined, Glossary-5
TNS_ADMIN parameter, 4-12, B-7, D-6, D-11
TNSAPI directory, A-2
TNS-based application, defined, Glossary-5
TNSNAMES.ORA file, 6-2, 6-3, C-2, C-3, C-4
connect descriptors, C-7
CONNECT_DATA SID keyword, C-8
descriptor syntax, C-9
listener address, C-7
listener address configuration, C-10
overview, 9-9, 9-10, C-4
purpose of, C-4
relationship to LISTENER.ORA, C-5
relationship to SQLNET.ORA, C-6
service names, C-7
using service names, C-7
TNSPING
using, 6-42
TNSPING80 utility, 6-42
TNSPING.TRACE_DIRECTORY parameter, C-19
TNSPING.TRACE_LEVEL parameter, C-19
TP_NAME parameter, C-11
TPN parameter, C-11
TRACE, A-2
Trace Assistant, D-10
described, 2-12
TRACE directory, A-2
trace files, C-18, D-7
CMAN.TRC, 10-18, D-8
LISTENER.TRC, 10-18, D-8
NAMESthread_id.TRC, D-8
NAMES.TRC, 10-18
SERVERthread_id.TRC, 10-18, C-18, D-8
SQLNETthread_id.TRC, 10-18, 10-21, C-18, D-8
SQLNET.TRC, 10-18, 10-21, C-18, D-8
tracing on server
SQL*Net, 10-18, D-8
tracing on the Oracle Names Server, D-8

TRACE_DIRECTORY parameter, C-26
TRACE_DIRECTORY_CLIENT parameter, C-18
TRACE_DIRECTORY_
CLIENT/LISTENER/SERVER
parameter, 10-24
TRACE_FILE parameter, C-26
TRACE_FILE_CLIENT parameter, C-18
TRACE_LEVEL parameter, C-26
TRACE_LEVEL_CLIENT, D-11
TRACE_LEVEL_CLIENT parameter, C-18, D-11
TRACE_LEVEL_CLIENT/LISTENER/SERVER
parameter, 10-24
TRACE_UNIQUE_CLIENT parameter, C-18
tracing, 10-18
analyze files, 10-25
control utilities, 10-24
LISTENER.ORA, 10-21
Oracle Names, D-9
Oracle Net8 Assistant, 10-19
parameters, 10-24
SQLNET.ORA, 10-19
tracing on client, 10-18, 10-21, C-18, D-8
tracing on Oracle Connection Manager, D-8
tracing on Oracle Names Server, 10-18
tracing on server, 10-18, C-18, D-8
tracing on the Oracle Connection Manager, 10-18
TRACING parameter, 10-24, C-32
Transparent Network Substrate, 1-4
described, 1-5
troubleshooting, xvi, D-1 to D-20
client, D-5
external procedures, D-18
Oracle Names, D-16
questions, D-19
server, D-3
TTL, 6-13

U

USE_ASYNC_CALL parameter, C-32
USE_PLUG_AND_PLAY parameter, C-27
USE_PLUG_AND_PLAY_LISTENER_NAME
parameter, D-17
USE_SHARED_SOCKET parameter, B-7

V

VIR Cartridge, external procedures, 8-9, D-18

W

well-known address, definition of, Glossary-5
well-known Oracle Names Server, 6-18
Windows NT Native Authentication Adapter
described, 2-7
supported platforms, 2-2
supported vendors, 2-9
using, 8-5
WINSOCK2 support, 2-15, B-7