Oracle® Provider for OLE DB

User’s Guide

Release 8.1.7

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Oracle Provider for OLE DB User's Guide, Release 8.1.7

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Contact Us!

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

Read the section...	If you...
How to Contact Oracle Technical Publications on page viii	Have issues with Documentation
How to Contact Oracle Support Services on page ix	Have issues with Software
Resources for Oracle Partners and Developers on page xiii	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 guide?
- Do you have suggestions for improvement? Please indicate the chapter, section, and page number (if available).

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  Redwood Shores, CA 94065
  USA

If you would like a reply, please provide your name, address, and telephone number.

How to Contact Oracle Support Services

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

Oracle Support Services can be reached at the following telephone numbers and Web sites. 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/contact_us/sup_hot_phone.html` Oracle Support Services telephone numbers are also listed in the *Oracle Customer Support Guide* in your kit.

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

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

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❑ The hardware name on which your application is running.

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

- To verify the operating system version on Windows NT, enter the following at the MS-DOS command prompt:

  ```
  C:\> winmsd
  ```

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

□ The release numbers of the Oracle Server and associated products involved in the current problem. For example, Oracle8*i* Enterprise Edition release 8.1.6.0.0 and Oracle Enterprise Manager release 2.1.0.0.0.

- To verify the release number of the Oracle Server, connect to the database using a tool such as SQL*Plus. The release number is displayed. For example:

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

□ The third-party software version you are using.

- To verify an application version, from the application’s Help menu, select About...

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

□ 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. In addition, what was happening when the problem occurred?

- **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.
- Did the problem affect one user, several users, or all users?
- Has anything changed? For example, if this is an operation that used to work and now fails, what is different? Can you undo any recent changes, to verify whether they are relevant to the issue?

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

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

To help analyze problems:

- Archive or delete old alert logs. When the database is started without an alert log, a new one is created. In some cases, if you force the problem to recur with a new alert log, the timestamps for the recorded events may indicate which events are relevant.

- Archive or delete old trace files. To check whether the file was modified, right-click and select Properties. The *Properties* dialog box displays the modification date.
- Check the operating system error logs, especially the System log and Application log. These files are relevant to the Oracle Server. To view these files, from the Start menu, choose Programs > Administrative Tools > Event Viewer, and choose System or Application from the Log main menu.

Resources for Oracle Partners and Developers

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

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

Information Source	Description
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/metalink/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.
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.

Information Source	Description
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.

Preface

Based on an open standard, Oracle Provider for OLE DB (OraOLEDB) allows access to Oracle databases. This documentation describes OraOLEDB's provider-specific features and properties. This Preface includes the following sections:

- Purpose of this Guide
- Audience
- How this Guide Is Organized
- Conventions Used in this Guide
- Documentation Library
- Related Documents

Purpose of this Guide

This guide provides a description of the provider-specific features supported by Oracle Provider for OLE DB (OraOLEDB).

Generic OLE DB information can be found in *OLE DB Programmer's Reference*, which is a part of the OLE DB SDK provided by Microsoft. Information about OLE DB and the OLE DB SDK is available at:

`http://www.microsoft.com/data/oledb/`

Audience

This guide is intended for programmers developing applications to access an Oracle database using Oracle Provider for OLE DB. This documentation is also valuable to systems analysts, project managers, and others interested in the development of database applications.

This document assumes that you are familiar with OLE DB and have a working knowledge of application programming using Microsoft C/C++, Visual Basic, or ActiveX Data Objects (ADO). In addition, some sections of this guide also assume a knowledge of the basic concepts of object-oriented programming. Knowledge of Component Object Model (COM) concepts are also useful.

Readers should also be familiar with the use of Structured Query Language (SQL) to access information in relational database systems. For information about SQL, refer to *Oracle8i SQL Reference* and *PL/SQL User's Guide and Reference*. For information about basic Oracle concepts, see *Oracle8i Concepts*.

How this Guide Is Organized

This guide contains the following chapters and appendices:

Chapter 1, "Introduction" This chapter discusses OLE DB, Oracle Provider for OLE DB (OraOLEDB), requirements, and installation.

Chapter 2, "OraOLEDB Features" This chapter discusses OraOLEDB components and describes how to use OraOLEDB to develop consumer applications.

Appendix A, "Provider-Specific Information" This appendix discusses OLE DB information that is specific to Oracle Provider for OLE DB.

Conventions Used in this Guide

The following conventions are used in this guide.

Convention	Example	Meaning
All uppercase plain	SQL> ALTER DATABASE	Indicates command names, SQL reserved words, and keywords.
Italic	Italic is used to indicate a variable: *filename*	Indicates a value that you must provide. For example, if a command asks you to type *filename*, you enter the actual name of the file. Italic is also used for emphasis in the text and to indicate the titles of other guides.
square brackets [ ]	`x:\[pathname]\oracle\home_name`	Encloses optional items. For example, when you create an Optimal Flexible Architecture (OFA)-compliant Oracle home directory, you can place an optional pathname before the `\oracle` pathname. Square brackets also indicate a function key, for example [Enter].
C:\>	C:\ORACLE>	Represents the Windows platforms command prompt of the current hard disk drive. Your prompt may differ and may, at times, reflect the subdirectory in which you are working. Referred to as the *MS-DOS command prompt* in this guide.
Backslash (\) before a directory name	`\bin`	Indicates that the directory is a subdirectory of the root directory.

Convention	Example	Meaning
oracle_home and *oracle_base*	Go to the `oracle_base\oracle_home\bin` directory.	In this Optimal Flexible Architecture (OFA)-compliant release, all subdirectories are no longer under a top level `oracle_home` directory. There is now a new top-level directory called `oracle_base` that by default is `c:\oracle`. The Oracle home directories are located directly under `oracle_base`. If you install Oracle8i release 8.1.7 on a computer where there is no other Oracle software on the computer, the default settings for the first Oracle home directory is `c:\oracle\ora81`. If you run Oracle Universal Installer again and install release 8.2.x, the second Oracle home directory is called `\ora82`. All directory path examples in this guide follow OFA conventions. For more information on OFA, see *Oracle8i Administrator's Guide for Windows NT*.
HOME_NAME	OracleHOME_NAMETNSListener	Represents the Oracle home name. The home name can be up to sixteen alphanumeric characters. The only special character allowed in the home name is the underscore.
HOME*ID*	HOME0, HOME1, HOME2	Represents a unique registry subkey for each Oracle home directory in which you install products. A new HOME*ID* is created and incremented each time you install products to a different Oracle home directory on one machine. Each HOME*ID* contains its own configuration parameter settings for installed Oracle products.

Convention	Example	Meaning
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.

Documentation Library

This guide is part of a larger library of Oracle documentation. The Oracle documentation library consists of two types of documentation:

Documentation Type	Describes...
Operating System-specific	Installation, configuration, and use of Oracle products in a Windows 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	Oracle database, Oracle networking, and Application Programming Interfaces information that is uniform across all operating system platforms. The 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 (or operating system) documentation for procedures specific to the Windows operating systems. To easily identify where these generic documentation references are described in your operating system documentation, 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.

Related Documents

For more information, see the following guides.

- *Oracle8i Installation Guide for Windows NT*
- *Oracle8i Release Notes for Windows NT*
- *Oracle8i Administrator's Guide for Windows NT*
- *Using Microsoft Transaction Server With Oracle8*
- *Oracle Enterprise Manager Administrator's Guide*
- *Oracle Parallel Server Administrator's Guide for Windows NT*
- *Net8 Administrator's Guide*
- *Getting to Know Oracle8i*
- *Oracle8i Concepts*
- *Oracle8i Reference*
- *Oracle8i Error Messages*

1

Introduction

This chapter introduces Oracle Provider for OLE DB (OraOLEDB). The following topics are discussed:

- Overview of OLE DB
- New and Updated Features for OraOLEDB
- System Requirements
- Installation

Overview of OLE DB

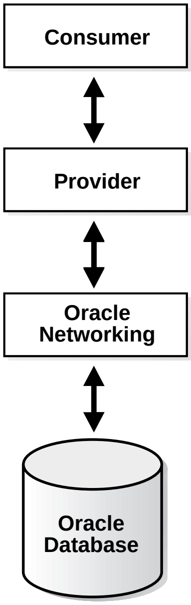
OraOLE DB is an open standard data access methodology which utilizes a set of COM interfaces for accessing and manipulating different types of data. These interfaces are available from various database providers.

Oracle Provider for OLE DB offers high performance and efficient access to Oracle data by OLE DB consumers.

OLE DB Design

OLE DB's design centers around the concept of a consumer and provider. Figure 1–1, "OLE DB Flow" is an illustration of the OLE DB system. The consumer represents the traditional client. The provider places data into a tabular format and returns it to the consumer.

Figure 1–1 OLE DB Flow



OLE DB Data Providers

OLE DB data providers are a set of COM components that transfer data from a data source to a consumer. The OLE DB Provider places that data in a tabular format in response to calls from a consumer. Providers can be simple or complex. A provider may return a table, it may allow the consumer to determine the format of that table, and it may perform operations on the data.

Each provider implements a standard set of COM interfaces to handle requests from the consumer. A provider may implement optional COM interfaces to provide additional functionality.

With the standard interfaces, any OLE DB consumer can access data from any provider. Because of COM components, consumers can access them in any programming language, such as C++, Visual Basic, and Java.

OLE DB Data Consumers

The OLE DB data consumer is any application or tool that utilizes OLE DB interfaces of a provider to access a broad range of data.

New and Updated Features for OraOLEDB

OraOLEDB now provides support for returning multiple rowsets. Consumers can use this feature to access all the REF CURSORs being returned by a stored procedure. See "Multiple Rowsets" on page 2-12.

OraOLEDB now provides support for the Unicode character set.

Using this feature, consumers can use OraOLEDB to access data in multiple languages on the same client machine. It can be especially useful in creating global Internet applications supporting as many languages as the Unicode standard entails. For example, one can write a single ASP page that accesses an Oracle8*i* database to dynamically generate content in Japanese, Arabic, English, and Thai. See "Unicode Support" on page 2-21 and "Datatype Mappings in Rowsets and Parameters" on page A-2.

System Requirements

The following items are required on a system to use Oracle Provider for OLE DB:

- Windows 95, 98, 2000, or Windows NT 4.0
- Access to an Oracle Server (release 7.3.4 or later)
- Net8 Client (release 8.1.7)
- Redistributable files provided with Microsoft Data Access Components (MDAC) 2.1 or higher are required by the provider. These files are available at the Microsoft Web site:

  `www.microsoft.com/data/oledb`

- Oracle Services for Microsoft Transaction Server (version 8.1.7 or later). This item is required for consumers using Microsoft Transaction Server (MTS) or COM+.

Note: With the Oracle Services for Microsoft Transaction Server installed, OraOLEDB supports MTS against database versions Oracle8*i* (8.1.5 or higher) and Oracle8 (8.0.6 or higher).

Installation

Review Oracle Provider for OLE DB release notes for detailed instructions on installing the OraOLEDB product.

During the installation process, the files listed in Table 1–1 are installed on the system.

Table 1–1 Oracle Provider for OLE DB Files

File	Description	Location
OraOLEDB.dll	Oracle Provider for OLE DB	*oracle_base*\oracle_home\bin
OraOLEDBrfc.dll	Oracle rowset file cache manager	*oracle_base*\oracle_home\bin
OraOLEDBrmc.dll	Oracle rowset memory cache manager	*oracle_base*\oracle_home\bin
OraOLEDBrst.dll	Oracle rowset	*oracle_base*\oracle_home\bin
OraOLEDBgmr.dll	Oracle ODBC SQL parser	*oracle_base*\oracle_home\bin
OraOLEDB*lang*.dll	Language-specific resource DLL	*oracle_base*\oracle_home\bin
OraOLEDBpus.dll	Property descriptions	*oracle_base*\oracle_home\bin
OraOLEDButl.dll	OraOLEDB utility DLL	*oracle_base*\oracle_home\bin
OraOLEDB.tlb	OraOLEDB type library	*oracle_base*\oracle_home\bin
OraOLEDB.h	OraOLEDB header file	*oracle_base*\oracle_home\oledb\include
OraOLEDB.lib	OraOLEDB library file	*oracle_base*\oracle_home\oledb\lib
OraOLEDB*lang*.msb	Language-specific message file	*oracle_base*\oracle_home\oledb\mesg
readme and documentation files	Release notes and online documentation	*oracle_base*\oracle_home\oledb\doc
sample files	Sample code	*oracle_base*\oracle_home\oledb\samples

2 OraOLEDB Features

This chapter discusses components of Oracle Provider for OLE DB (OraOLEDB) and how to use the components to develop OLE DB consumer applications. The following topics are discussed:

- OraOLEDB Provider Specific Features
- Using OraOLEDB with Visual Basic: Example

OraOLEDB Provider Specific Features

Provider-specific features of OraOLEDB objects are described in the following sections:

- Data Source
- Sessions
- Commands
- Rowsets
- LOB Support
- Unicode Support
- Errors

Additional provider-specific information is provided in Appendix A, "Provider-Specific Information".

Data Source

A data source object in OraOLEDB is responsible for establishing the first connection to the Oracle database. To establish the initial connection, the consumer must use the `CoCreateInstance` function to create an instance of the data source object. This function requires important information about the provider: class ID of the provider and executable context. The class ID of OraOLEDB is CLSID_ OraOLEDB.

OraOLEDB is an in-process server. When calling `CoCreateInstance`, use the CLSCTX_INPROC_SERVER macro. For example:

```
// create an instance of OraOLEDB data source object and
// obtain the IDBInitialize interface
hr = CoCreateInstance(CLSID_OraOLEDB, NULL,
                      CLSCTX_INPROC_SERVER, IID_IDBInitialize,
                     (void**)&pIDBInitialize);
```

Note: OraOLEDB does not support persistent data source objects.

After the successful creation of an instance of a data source object, the consumer application can initialize the data source and create sessions.

OraOLEDB supports connections to Oracle databases release 7.3.4 and higher. To connect to a specific database, the consumer is required to set the following properties of the DBPROPSET_DBINIT property set:

- DBPROP_AUTH_USERNAME with the user ID, such as *scott*
- DBPROP_AUTH_PASSWORD with the password, such as *tiger*
- DBPROP_INIT_DATASOURCE with the Net8 connect string, such as *myOraDb*

The consumer could also populate DBPROP_INIT_PROMPT with DBPROMPT_PROMPT which causes the provider to display a logon box for the user to enter the connect information.

Using DBPROMPT_NOPROMPT disables display of the logon box. In this case, incomplete logon information causes the provider to return a logon error. However, if this property is set to DBPROMPT_COMPLETE or DBPROMPT_COMPLETEREQUIRED, the logon box will only be displayed if the logon information is incomplete.

Connecting to an Oracle Database

To connect to an Oracle database using OraOLEDB, the OLE DB connection string must be as follows:

```
"Provider=OraOLEDB.Oracle;User ID=user;Password=pwd;Data Source=constr;"
```

When connecting to a remote database, `Data Source` must be set to the appropriate Net8 connect string which is the alias in the `tnsnames.ora` file. For more information on Net8, refer to *Net8 Administrator's Guide*.

OraOLEDB-specific Connection String Attributes

OraOLEDB offers provider-specific Connection String attributes, which are set in the same way as the Provider and User ID are set. The provider-specific connection string attributes are:

- CacheType - specifies the type of cache used to store the rowset data on the client. See "OraOLEDB-specific Connection String Attributes for Rowsets" on page 2-17.
- ChunkSize - specifies the size of LONG or LONG RAW column data stored in the provider's cache. See "OraOLEDB-specific Connection String Attributes for Rowsets" on page 2-17.
- DistribTX - enables or disables distributed transaction enlistment capability. See "Distributed Transactions" on page 2-4.

- FetchSize - specifies the size of the fetch array in rows. See "OraOLEDB-specific Connection String Attributes for Rowsets" on page 2-17.
- OSAuthent - specifies whether OS Authentication will be used when connecting to an Oracle database. See "OS Authentication" on page 2-4.
- PLSQLRSet - enables or disables the return of a rowset from PL/SQL stored procedures. See "OraOLEDB Custom Properties for Commands" on page 2-8.
- PwdChgDlg - enables or disables displaying the password change dialog box when the password expires. See "Password Expiration" on page 2-5.

Default Attribute Values

The default values for these attributes are located under the \\HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\OLEDB registry key.

The registry default values are read by OraOLEDB from the registry when the provider is loaded into memory. If Oracle-specific connection string attributes are not provided at connection time, the default registry values are used. However, if the attributes are provided, these new values override the default registry values.

These attributes can be set by setting the DBPROP_INIT_PROVIDERSTRING property, provided in the DBPROPSET_DBINIT property set. For example:

```
"FetchSize=100;CacheType=Memory;OSAuthent=0;PLSQLRSet=1;"
```

Distributed Transactions

The DistribTX attribute specifies whether sessions are enabled to enlist in distributed transactions. Valid values are 0 (disabled) and 1 (enabled). The default is 1 which indicates that sessions are enabled for distributed transaction enlistments.

Applications using Microsoft Transaction Server must have DistribTX set to 1, the default.

OS Authentication

The OSAuthent attribute specifies whether OS authentication will be used when connecting to an Oracle database. Valid values are 0 (disabled) and 1 (enabled). The default is 0 which indicates that OS authentication is not used.

OS authentication is the feature by which Oracle uses the security mechanisms of the operating system to authorize users. For more information on this subject and how to set it up on Windows NT clients, refer to the information on authenticating database users on Windows NT in *Oracle8i Administrator's Guide for Windows NT*.

After the Windows NT client has been set up properly for OS authentication, this feature may be enabled by OraOLEDB clients by setting any of the following:

- DBPROP_AUTH_USERNAME to "/"
- DBPROP_INIT_PROVIDERSTRING to "OSAuthent=1;"
- OSAuthent in the registry to "1"

Password Expiration

Oracle8*i* provides a Password Expiration feature which allows database administrators to force users to change their passwords regularly. The PwdChgDlg attribute enables or disables the displaying of the password change dialog, whenever a logon fails due to an expired password. When enabled, the provider displays the dialog to change the password. When disabled, the logon fails with an error message. The valid values are 0 (disabled) and 1 (enabled). The default is 1 (enabled). For more information on the Password Expiration feature, see *Oracle8i Administrator's Guide.*

Example: Connecting to an Oracle Database Using ADO

The following are examples illustrating how to connect to an Oracle database using OraOLEDB and ADO.

> **Note:** If the Data Source, User ID, and Password are provided with the Open method, ADO ignores those ConnectionString attributes.

Connect using ConnectionString

```
Dim con As New ADODB.Connection
con.ConnectionString = "Provider=OraOLEDB.Oracle;Data Source=MyOraDb;" & _
                     "User ID=scott;Password=tiger;"
con.Open
```

Connect without using ConnectionString

```
Dim con As New ADODB.Connection
con.Provider = "OraOLEDB.Oracle"
con.Open "MyOraDb", "scott", "tiger"
```

Connect and set provider specific attributes

```
Dim con As New ADODB.Connection
con.Provider = "OraOLEDB.Oracle"
con.ConnectionString = "FetchSize=200;CacheType=Memory;" & _
                       "OSAuthent=0;PLSQLRSet=1;Data Source=MyOraDb;" & _
                       "User ID=scott;Password=tiger;"
con.Open
```

OS Authenticated connect setting user id to "/"

```
Dim con As New ADODB.Connection
con.Provider = "OraOLEDB.Oracle"
con.Open "MyOraDb", "/", ""
```

OS Authenticated connect using OSAuthent

```
Dim con As New ADODB.Connection
con.Provider = "OraOLEDB.Oracle"
con.ConnectionString = "Data Source=MyOraDb;OSAuthent=1;"
con.Open
```

Sessions

OraOLEDB session object represents a single connection to an Oracle Database. The session object exposes the interfaces that allow data access and manipulation.

The first session created on the initialized data source inherits the initial connection established by `IDBInitialize::Initialize()`. Subsequent sessions that are created establish their own independent connections to the particular Oracle server specified by the data source properties.

Each session object also defines a transaction space for a data source. All command and rowset objects created from a particular session object are part of the transaction of that session.

After all references to the session object are released, the session object is removed from memory and the connection is dropped.

Transactions

OraOLEDB supports local and distributed transactions which provide explicit commit and abort.

OraOLEDB does not support nested transactions. In addition, a local transaction cannot be started if the session is currently enlisted in a distributed transaction. This also applies to distributed transactions if the session is currently enlisted in a local transaction.

Local Transactions OraOLEDB supports the ITransactionLocal interface for explicit transactions. By default, OraOLEDB is in an autocommit mode, meaning that each unit of work done on the database is automatically or implicitly committed. With the use of ITransactionLocal interface, consumers may explicitly start a transaction for a particular session, allowing a unit of work to be explicitly committed or aborted by the consumer.

OraOLEDB supports the Read Committed (Cursor Stability) isolation level. In this level, the changes made by other transactions are not visible until those transactions are committed.

Distributed Transactions OraOLEDB consumers must install Oracle Services for Microsoft Transaction Server (MTS) release 8.1.7.0.0 or later to be able to participate in Microsoft Transaction Server (or COM+) transactions or to enlist in a distributed transaction coordinated by Microsoft Distributed Transaction Coordinator (MS DTC). For setup and configuration information on Oracle Services for MTS, see *Using Microsoft Transaction Server With Oracle8*.

OraOLEDB ignores IsoLevel, IsoFlags, and pOtherOptions parameters when `ITransactionJoin::JoinTransaction()` is called. These options must be provided when the consumer acquires a transaction object from MS DTC with the `ITransactionDispenser::BeginTransaction()` method call.

However, if IsoFlags is non-zero, XACT_E_NOISORETAIN is returned.

Commands

OraOLEDB supports ANSI SQL as supported by Oracle and the ODBC SQL syntax.

Stored Procedures

When executing an Oracle PL/SQL stored procedure using a command, use Oracle native syntax or the ODBC procedure call escape sequence in the command text:

- Oracle native syntax: `BEGIN credit_account(123, 40); END;`
- ODBC syntax: {`CALL credit_account(123, 40)`}

Preparing Commands

OraOLEDB validates and fetches the metadata only for SELECT SQL statements.

Command Parameters

When using Oracle ANSI SQL, parameters in the command text are preceded by a colon. In ODBC SQL, parameters are indicated by a question mark ("?").

OraOLEDB supports input, output, and input/output parameters for PL/SQL stored procedures and stored functions. OraOLEDB supports input parameters for SQL statements.

Note: OraOLEDB supports only positional binding.

OraOLEDB Custom Properties for Commands

OraOLEDB custom properties for Commands are grouped under the custom property set ORAPROPSET_COMMANDS. It provides these properties:

▪ PLSQLRSet	(ORAPROP_PLSQLRSet for C++ users)
▪ NDatatype	(ORAPROP_NDatatype for C++ users)
▪ SPPrmsLOB	(ORAPROP_SPPrmsLOB for C++ users)

PLSQLRSet

This property is similar to the PLSQLRSet Connection string attribute.

The property specifies whether OraOLEDB needs to return a rowset from the PL/SQL stored procedure. If the stored procedure, provided by the consumer, returns a rowset, PLSQLRSet needs to be set to TRUE (enabled). This property should be set to FALSE after the command has been executed. By default, the property is set to FALSE (disabled).

Consumers should use the property over the attribute, as the property can be set at the Command object rather than at the Session. By setting it at the Command object, the consumer is able to set the property only for the Command object executing stored procedures which are returning rowsets. With the attribute, the consumer needed to set it even if only one of many stored procedures being executed by the ADO application returned a rowset. The use of this property should provide a performance boost to applications making use of the attribute previously.

Example: Setting the Custom Property PLSQLRSet

```
Dim objCon As NEW ADODB.Connection
Dim objCmd As NEW ADODB.Command
....
objCmd.ActiveConnection = objCon
objCmd.CommandType = adCmdText

’ Enabling the PLSQLRSet property indicates to the provider
’ that the command returns one or more rowsets
objCmd.Properties("PLSQLRSet") = TRUE

’ Assume Employees.GetEmpRecords() has a REF CURSOR as
’ one of the arguments
objCmd.CommandText = "{ CALL Employees.GetEmpRecords(?,?) }"

’ Execute the SQL
objCmd.Execute

’ It is a good idea to disable the property after execute as the
’ same command object may be used for a different SQL statement
objCmd.Properties("PLSQLRSet") = FALSE
```

NDatatype

This property allows the consumers to specify whether any of the parameters bound to the command are of Oracle’s N datatypes (NCHAR, NVARCHAR or NCLOB). This information is required by OraOLEDB to detect and bind the parameters appropriately. This property should not be set for commands executing SELECT statements. However, this property needs to be set for all other SQLs such as INSERT, UPDATE, and DELETE.

The use of this property should be limited to SQLs containing parameters of N datatype as setting it incurs a processing overhead of at least one roundtrip to the database. By default, this property is set to FALSE.

Note: OraOLEDB does not support parameters of N datatypes in the WHERE clause of SQL statements.

Note: Consumers are required to use the ODBC procedure call escape sequence to call stored procedures or functions having N datatype parameters.

Example: Setting the Custom Property NDatatype

```
Dim objCon As NEW ADODB.Connection
Dim objCmd As NEW ADODB.Command
Dim prEmpno As NEW ADODB.Parameter
Dim prEname As NEW ADODB.Parameter
...
objCmd.ActiveConnection = objCon
objCmd.CommandType = adCmdText

' Create and append the parameters to the command object
Set prEmpno = objCmd.CreateParameter("prEmpno", adSmallInt, adParamInput, ,8521)
' prEname is bound to a NVARCHAR column in the EMP table
Set prEname = objCmd.CreateParameter("prEname", adBSTR, adParamInput, , "Joe")
objCmd.Parameters.Append prEmpno
objCmd.Parameters.Append prEname

' Enabling the NDatatype property indicates to the provider
' that one or more of the bound parameters is of N datatype
objCmd.Properties("NDatatype") = TRUE

' Assume column ENAME in table EMP is of NVARCHAR type
objCmd.CommandText = "INSERT INTO EMP (EMPNO, ENAME) VALUES (?, ?)"

' Execute the SQL
objCmd.Execute

' It is a good idea to disable the property after execute as the same command
' object may be used for a different SQL statement
objCmd.Properties("NDatatype") = FALSE
```

SPPrmsLOB

This property allows the consumer to specify whether one or more of the parameters bound to the stored procedures are of Oracle's LOB datatype (CLOB, BLOB, or NCLOB). OraOLEDB requires this property to be set to TRUE, in order to fetch the parameter list of the stored procedure prior to execution. The use of this property limits the processing overhead to stored procedures having one or more LOB datatype parameters. This property should be set to FALSE after the command has been executed. By default, the property is set to FALSE.

Note: Consumers are required to use the ODBC procedure call escape sequence to call stored procedures or functions having LOB datatype parameters.

Example: Setting the Custom Property SPPrmsLOB

```
Dim objCon As NEW ADODB.Connection
Dim objCmd As NEW ADODB.Command
Dim prCLOB As NEW ADODB.Parameter
...
objCmd.ActiveConnection = objCon
objCmd.CommandType = adCmdText

 Create and append the parameters to the command object
Set prCLOB = objCmd.CreateParameter("prCLOB", adLongVarchar, adParamOutput, _
                                                10000)
objCmd.Parameters.Append prCLOB

' Enabling the SPPrmsLOB property indicates to the provider
' that one or more of the bound parameters is of LOB datatype
objCmd.Properties("SPPrmsLOB") = TRUE

' Assume the Stored Procedure requires a CLOB parameter
objCmd.CommandText = "{ call storedproc(?) }"

'Execute the SQL
objCmd.Execute

' It is a good idea to disable the property after execute as the
' same command object may be used for a different SQL statement
objCmd.Properties("SPPrmsLOB") = FALSE
```

Stored Procedures and Functions Returning Rowsets

Oracle Provider for OLE DB allows consumers to execute a PL/SQL stored procedure with an argument of REF CURSOR type or a stored function returning a REF CURSOR.

OraOLEDB returns a rowset for the REF CURSOR bind variable. Because there is no predefined datatype for REF CURSORs in the OLE DB specification, the consumer must not bind this parameter.

If the PL/SQL stored procedure has one or more arguments of REF CURSOR type, OraOLEDB binds these arguments appropriately and returns a rowset for each argument of REF CURSOR type.

If the PL/SQL stored function returns a REF CURSOR or has an argument of REF CURSOR type, OraOLEDB binds these appropriately and returns a rowset for each REF CURSOR bound in the stored function.

To use this feature, stored procedures or functions must be called in the ODBC procedure call escape sequence.

The stored procedure or functions being called could be either standalone or packaged. However, the REF CURSOR being returned must be explicitly defined in a package in the database.

Multiple Rowsets

OraOLEDB supports returning more than one rowset from a stored procedure. Consumers can use this feature to access all the REF CURSORs being returned by a stored procedure.

Example: Stored Procedure Returning Multiple Rowsets

PL/SQL Package

```
CREATE OR REPLACE PACKAGE Employees AS
  TYPE empcur IS REF CURSOR;

  PROCEDURE GetEmpRecords(p_cursor OUT empcur,
                          q_cursor OUT empcur,
                          indeptno IN NUMBER,
                          p_errorcode OUT NUMBER);

  FUNCTION GetDept(inempno IN NUMBER,
                   p_errorcode OUT NUMBER)
    RETURN empcur;
END Employees;

CREATE OR REPLACE PACKAGE BODY Employees AS

  PROCEDURE GetEmpRecords(p_cursor OUT empcur,
                          q_cursor OUT empcur,
                          indeptno IN NUMBER,
                          p_errorcode OUT NUMBER) IS
  BEGIN
    p_errorcode := 0;
    OPEN p_cursor FOR
      SELECT *
      FROM emp
      WHERE deptno = indeptno
      ORDER BY empno;

OPEN q_cursor FOR
```

```
      SELECT empno
      FROM emp
      WHERE deptno = indeptno
      ORDER BY empno;

  EXCEPTION
    WHEN OTHERS THEN
      p_errorcode:= SQLCODE;

  END GetEmpRecords;

  FUNCTION GetDept(inempno IN NUMBER,
                   p_errorcode OUT NUMBER)
    RETURN empcur IS
      p_cursor empcur;
  BEGIN
    p_errorcode := 0;
    OPEN p_cursor FOR
      SELECT deptno
      FROM emp
      WHERE empno = inempno;
    RETURN (p_cursor);

  EXCEPTION
    WHEN OTHERS THEN
      p_errorcode:= SQLCODE;

  END GetDept;

END Employees;
```

ADO Program

```
Dim Con   As New ADODB.Connection
Dim Rst1  As New ADODB.Recordset
Dim Rst2  As New ADODB.Recordset
Dim Rst3  As New ADODB.Recordset
Dim Cmd   As New ADODB.Command
Dim Prm1  As New ADODB.Parameter
Dim Prm2  As New ADODB.Parameter

Con.Provider = "OraOLEDB.Oracle"
Con.ConnectionString = "Data Source=MyOraDb;" & _
                       "User ID=scott;Password=tiger;"
```

```
Con.Open
Cmd.ActiveConnection = Con

’ Although Employees.GetEmpRecords() takes four parameters, only
’ two need to be bound because Ref cursor parameters are automatically
’ bound by the provider.

Set Prm1 = Cmd.CreateParameter("Prm1", adSmallInt, adParamInput, , 30)
Cmd.Parameters.Append Prm1
Set Prm2 = Cmd.CreateParameter("Prm2", adSmallInt, adParamOutput)
Cmd.Parameters.Append Prm2

’ Enable PLSQLRSet property
Cmd.Properties ("PLSQLRSet") = TRUE

’ Stored Procedures returning resultsets must be called using the
’ ODBC escape sequence for calling stored procedures.
Cmd.CommandText = "{CALL Employees.GetEmpRecords(?, ?)}"

’ Get the first recordset
Set Rst1 = Cmd.Execute

’ Disable PLSQLRSet property
Cmd.Properties("PLSQLRSet") = FALSE

’ Get the second recordset
Set Rst2 = Rst1.NextRecordset

’ Just as in a stored procedure, the REF CURSOR return value must
’ not be bound in a stored function.
Prm1.Value = 7839
Prm2.Value = 0

’ Enable PLSQLRSet property
Cmd.Properties("PLSQLRSet") = TRUE

’ Stored Functions returning resultsets must be called using the
’ ODBC escape sequence for calling stored functions.
Cmd.CommandText = "{CALL Employees.GetDept(?, ?)}"

’ Get the rowset
Set Rst3 = Cmd.Execute

’ Disable PLSQLRSet
Cmd.Properties ("PLSQLRSet") = FALSE
```

```
' Clean up
Rst1.Close
Rst2.Close
Rst3.Close
```

Rowsets

Creating Rowsets

OraOLEDB supports `IOpenRowset::OpenRowset` and `ICommand::Execute` for creating rowsets.

Creating a Rowset with IOpenRowset::OpenRowset

When using `IOpenRowset::OpenRowset`, note the following guidelines:

- The pTableID parameter must contain a DBID structure that specifies a base table or a view.
- The DBID structure's eKind member must be set to DBKIND_GUID_NAME, DBKIND_NAME, or DBKIND_PGUID_NAME.
- The DBID structure's uName member must specify the base table or view name as a Unicode character string. It cannot be NULL.
- The pIndexID parameter of OpenRowset must be NULL.

Creating a Rowset with ICommand::Execute

OraOLEDB supports SQL SELECT statements that return rowsets. OraOLEDB also supports returning rowsets from PL/SQL stored procedures and functions.

By default, ADO creates a non-updatable rowset from a command object. An updatable rowset can be created by setting the `Updatability` and `IRowsetChange` properties on the command object. The `Updatability` property can be set to the following values:

1	update
2	delete
3	update and delete
4	insert
5	insert and update

6	insert and delete
7	insert, delete, and update

The following ADO code sample sets the `Updatability` property on a command object to allow insert, delete, and update operations on the rowset object.

```
Dim Cmd As New ADODB.Command
Dim Rst As New ADODB.Recordset
Dim Con As New ADODB.Connection
...
Cmd.ActiveConnection = Con
Cmd.CommandText = "SELECT * FROM emp"
Cmd.CommandType = adCmdText
cmd.Properties("IRowsetChange") = TRUE
Cmd.Properties("Updatability") = 7
’ creates an updatable rowset
Set Rst = cmd.Execute
```

Updatability

OraOLEDB supports both immediate and deferred update mode. However, insert and update operations cannot be deferred when the operation changes a non-scalar column, such as LONGs, BLOBs, or CLOBs. When non-scalar column values are changed in a deferred update mode, the entire row is transmitted to the database as though the operation was in an immediate update mode. In addition, these operations cannot be undone with the Undo method (ADO) or `IRowsetUpdate::Undo()`. But if they are in a transaction, they can be rolled back with RollbackTrans method (ADO) or `ITransactionLocal::Abort()`.

Rowsets created using queries with JOINs are updatable by OraOLEDB only with the Client Cursor Engine enabled. C/C++ OLE DB consumers must enable this service to make these rowsets updatable. ADO consumers must specify the CursorLocation as adUseClient to make these rowsets updatable.

For example:

```
Dim objCon As New ADODB.Connection
Dim objRst As New ADODB.Recordset

objCon.Provider = "OraOLEDB.Oracle"
objCon.Open "MyOraDb", "scott", "tiger"
objRst.CursorLocation = adUseClient       ’ADO Client Cursor
objRst.Open "select ename, dname " & _
       "from emp, dept " & _
       "where emp.deptno = dept.deptno", _
       objCon, adOpenStatic, adLockOptimistic, adCmdText

'Recordset created is updatable. Please note that CursorLocation
'needs to be explicitly set to adUseClient for this join recordset
'to be updatable.
```

Server Data on Insert Property

If DBPROP_SERVERDATAONINSERT (Server Data on Insert) is set to TRUE using OraOLEDB, the consumer can obtain defaults, sequences, and triggered column values from newly inserted and updated rows, provided that the insert and update operations are made through the rowset.

Having DBPROP_SERVERDATAONINSERT set to TRUE may degrade performance for both insert and update executions using a rowset because OraOLEDB fetches row data from the database for the newly inserted and updated row. However, if DBPROP_SERVERDATAONINSERT is set to its default value of FALSE, only the explicitly provided values for insert and update operations get returned when column values are requested for those rows.

If the base table from which the rowset was created does not contain any defaults, sequences, or triggers, it is highly recommended that DBPROP_SERVERDATAONINSERT retain its default value of FALSE.

The DBPROP_SERVERDATAONINSERT property does not affect the performance of insert and update executions using the command object.

Searching for Rows with IRowsetFind::FindNext

OraOLEDB only supports searches performed on CHAR, DATE, FLOAT, NUMBER, RAW, and VARCHAR2 columns. Otherwise, DB_E_NOTSUPPORTED is returned.

When a search is done with a NULL value, only the DBCOMPAREOPS_EQ and DBCOMPAREOPS_NE compare operations are supported. Otherwise, DB_E_NOTSUPPORTED is returned.

OraOLEDB-specific Connection String Attributes for Rowsets

OraOLEDB-specific connection string attributes which affect the performance of the rowset are:

- CacheType - specifies the type of caching used by the provider to store rowset data. OraOLEDB provides two caching mechanisms:

    - *Memory* - The provider stores all the rowset data in-memory. This caching mechanism provides better performance at the expense of higher memory utilization. The default is *Memory*.
    - *File* - The provider stores all the rowset data on-disk. This caching mechanism limits the memory consumption at the expense of performance.
- ChunkSize - This attribute specifies the size, in bytes, of the data in LONG and LONG RAW columns fetched and stored in the provider cache. Providing a high value for this attribute improves performance, but requires more memory to store the data in the rowset. Valid values are 1 to 65535. The default is 100.
- FetchSize - specifies the number of rows the provider will fetch at a time (fetch array). It must be set appropriately depending on the data size and the response time of the network. If the value is set too high, this could result in more wait time during the execution of the query. If the value is set too low, this could result in many more round trips to the database. Valid values are 1 to 429,496,296. The default is 100.

The default attributes values are set in the registry. For more information, see "Default Attribute Values" on page 2-4. The following ADO code example overrides the default attribute values:

```
Dim con As ADODB.Connection
Set con = NEW ADODB.Connection
con.ConnectionString = "Provider=OraOLEDB.Oracle;User ID=scott;" & _
                          "Password=tiger;Data Source=MyOraDB;" & _
                          "FetchSize=200;CacheType=File;"
con.Open
```

Tips for ADO Programmers

Setting the ADO Rowset property LockType to adLockPessimistic is not supported by Oracle Provider for OLE DB. If LockType is set to adLockPessimistic, OraOLEDB behaves similar to when set as adLockOptimistic. This behavior occurs because OraOLEDB does not perform explicit locks on the rows being modified. However, when the new data is submitted to the database, it only performs the update if the rowset data was not already updated by another user, which means that dirty writes are not allowed. LockType values adLockReadOnly, adLockBatchOptimistic, and adLockOptimistic are supported by OraOLEDB.

Setting ADO Rowset property CursorType to adOpenKeyset or adOpenDynamic is not supported by Oracle Provider for OLE DB. OraOLEDB does not support either of the two as Oracle supports *Statement Level Read Consistency*, which ensures that the data returned by a query contains only committed data as of the time the query was executed. CursorType values adOpenStatic and adOpenForwardOnly are supported by OraOLEDB.

Schema Rowsets

The schema rowsets available through Oracle Provider for OLE DB are:

- DBSCHEMA_COLUMNS
- DBSCHEMA_INDEXES
- DBSCHEMA_SCHEMATA
- DBSCHEMA_VIEWS
- DBSCHEMA_TABLES
- DBSCHEMA_PROVIDER_TYPES (forward scroll only)
- DBSCHEMA_FOREIGN_KEYS
- DBSCHEMA_PRIMARY_KEYS
- DBSCHEMA_PROCEDURES
- DBSCHEMA_PROCEDURE_PARAMETERS

Date Formats

The date format for the Oracle session cannot be set using ALTER SESSION SET NLS_DATE_FORMAT command. In Visual Basic, the date formats are controlled by the Regional Settings properties in the Windows Control Panel. For more information on Visual Basic date formats, refer to your Visual Basic documentation.

For Oracle Provider for OLE DB, NLS_DATE_FORMAT is fixed for the session to 'YYYY-MM-DD HH24:MI:SS' by the provider. If you pass the date to Oracle as a string, the date needs to be in the 'YYYY-MM-DD HH24:MI:SS' format. For example:

```
SELECT * FROM EMP WHERE HIREDATE > '1981-06-15 17:32:12'
```

To use a different format, you need to use the SQL function, TO_DATE(), to specify the format for dates passed as strings. For example:

```
SELECT * FROM EMP WHERE HIREDATE > TO_DATE('15-JUN-81', 'DD-MON-YY')
```

However, for dates passed as parameters, the date format is controlled by ADO, which is controlled by the Regional Settings in the Windows Control Panel. In this case, TO_DATE() should not be used. For example:

```
Private Sub Command1_Click()
  Dim objCon As New ADODB.Connection
  Dim objCmd As New ADODB.Command
  Dim objRst  As New ADODB.Recordset
  Dim pDate As New ADODB.Parameter

  objCon.Provider = "OraOLEDB.Oracle"
  objCon.Open "MyOraDb", "scott", "tiger"
  Set pDate = objCmd.CreateParameter("pDate", adDate, adParamInput)
  objCmd.Parameters.Append pDate
  objCmd.CommandText = _
         "SELECT * FROM EMP WHERE HIREDATE > ?"
  objCmd.ActiveConnection = objCon
  objCmd.CommandType = adCmdText
  pDate.Value = "06/15/1981"
  Set objRst = objCmd.Execute

    ...
End Sub
```

Case of Object Names

The names of all objects (tables, columns, views, etc.) in Oracle are case-sensitive. This allows the two objects EMP and emp to exist in the same namespace in the database.

The query, `SELECT ename FROM emp`, executes correctly even though the table name is EMP (all uppercase) in the database. However, if you want to specify object names in mixed case, you can do so by enclosing the name in double quotes. For example:

```
SELECT ename FROM "Emp"
```

will execute successfully if the table name in the database is Emp. Double quotes preserve the case of the object names in Oracle.

LOB Support

The ISequentialStream interface is supported for all LONG, LONG RAW, and LOB (BLOB, CLOB, NCLOB, and BFILE) columns. The consumer can use this interface to read and write to all the LOB columns, except BFILE which is read-only. To have read and write access to these columns, the SELECT SQL statement used to create the rowset should not contain a JOIN.

Note: Although most of the LOB columns in an Oracle database support up to 4 GB of data storage, ADO limits the maximum column size to 2 GB.

Columns having the BFILE datatype are not updatable in the Rowset interface. However, these columns can be updated using the Command interface, if the update is limited to modifying the directory and name of the external file pointed to by the BFILE column. For example:

```
INSERT INTO topomaps (areanum, topomap)
VALUES (158, BFILENAME('mapdir', 'topo158.tps'))
```

For more information on LOBs, see *Oracle8i Application Developer's Guide* - *Large Objects (LOBs).*

Unicode Support

OraOLEDB supports the Unicode character set. Using this feature, consumers can use OraOLEDB to access data in multiple languages on the same client machine. It can be especially useful in creating global Internet applications supporting as many languages as the Unicode standard entails. For example, you can write a single ASP page that accesses an Oracle8*i* database to dynamically generate contents in Japanese, Arabic, English, and Thai.

Types of Unicode Encoding

The Oracle8*i* and Oracle8 databases store the Unicode data in the UTF8 encoding scheme, which is an ASCII compatible multibyte encoding of Unicode. Microsoft Windows 2000 and NT 4.0 use the UCS2 encoding, which is a 2-byte fixed width encoding scheme. OraOLEDB transparently converts the data between the two encoding schemes allowing the consumers to deal with only UCS2.

Note: The Unicode support is transparent to ADO consumers. OLE DB consumers using C/C++ need to explicitly specify DBTYPE_WSTR in their datatype bindings when Unicode data in involved.

How Oracle Unicode Support Works

OraOLEDB works in two modes, Unicode mode and non-Unicode mode. When the client character set is not a superset of the server character set, OraOLEDB automatically enables the Unicode mode. In this mode, OraOLEDB stores the data in its cache in the UCS2 encoding scheme. The user should ensure that the database's character set is UTF8 in order to prevent any data loss.

If the client character set is a superset of the server's, the provider operates in the non-Unicode mode. This mode provides slightly better performance as it does not have to deal with larger character buffers required by the UCS2 encoding.

The detection of the client's and the server's character set is performed during logon.

> **Note:** OraOLEDB no longer requires the client character set to be set to UTF8 to enable the Unicode mode. The provider still supports such setups but no longer requires it.

See "Datatype Mappings in Rowsets and Parameters" on page A-2 for further information.

Unicode Support Setup

In order to prevent any data loss, the database character set should be UTF8. Other than this, there is no other setup required for the Unicode support.

Database Setup You must ensure that the Oracle database is configured to store the data in the UTF8 character set. The character set configuration is typically specified during database creation. To check the character set setting of your database, execute the following query in SQL*Plus:

```
SQL> SELECT parameter, value FROM nls_database_parameters
     WHERE parameter = 'NLS_CHARACTERSET';
```

If the character set of your database is not UTF8, you need to create a new database with the UTF8 character set and import your data into it. See *Oracle8i Administrator's Guide* for more information.

See Also:

- *Oracle8i National Language Support Guide* for general information
- *Oracle8i Installation Guide for Windows NT* for information on how to set the NLS_LANG parameter on Windows

Errors

OLE and COM objects report errors through the HRESULT return code of the object member functions. An OLE/COM HRESULT is a bit-packed structure. OLE provides macros that dereference structure members. OraOLEDB exposes IErrorLookup to retrieve information about an error.

All objects support extended error information. For this, the consumer needs to instantiate the OLE DB Extended Error object followed by calling the method `GetErrorDescription()` to get the error text.

```
// Instantiate OraOLEDBErrorLookup and obtain a pointer to its
//   IErrorLookup interface
CoCreateInstance(CLSID_OraOLEDBErrorLookup, NULL, CLSCTX_INPROC_SERVER,
                 IID_IErrorLookup, (void **)&pIErrorLookup)
//Call the method GetErrorDescription() to get the full error text
pIErrorLookup->GetErrorDescription()
```

The OraOLEDB provider returns the entire error stack in one text block.

For ADO users, the following example applies:

```
Dim oerr As ADODB.Error
For Each oerr in con.Errors
    MsgBox "Error: " & oerr.Description & vbCrLf _
        & "Source: " & oerr.Source
Next
```

Using OraOLEDB with Visual Basic: Example

This simple example illustrates how to use Oracle Provider for OLE DB with Visual Basic 6.0 to connect to an Oracle database and execute PL/SQL stored procedures and functions.

Setting Up the Oracle Database

This example assumes that the Oracle database has the demonstration table EMP under the user account SCOTT. The SCOTT account is included in the Oracle starter database. If the account does not exist on your database, create the account before running the sample program. If your database does not contain the EMP table, you can use the `demobld.sql` script to create the demonstration tables.

This example also uses *exampledb* as the database network alias when connecting to the Oracle database. You will need to change this network alias to match your system.

Step 1 Build the sample tables:

1. Start SQL*Plus.
2. Connect as user name SCOTT with the password TIGER.
3. Run the `demobld.sql` script:

   ```
   SQL> @oracle_base\oracle_home\dbs\demobld.sql;
   ```

After the EMP table has been created in the SCOTT account, you need to create the PL/SQL package that contains the stored procedure and function that are run in the Visual Basic example.

Step 2 To create the PL/SQL package:

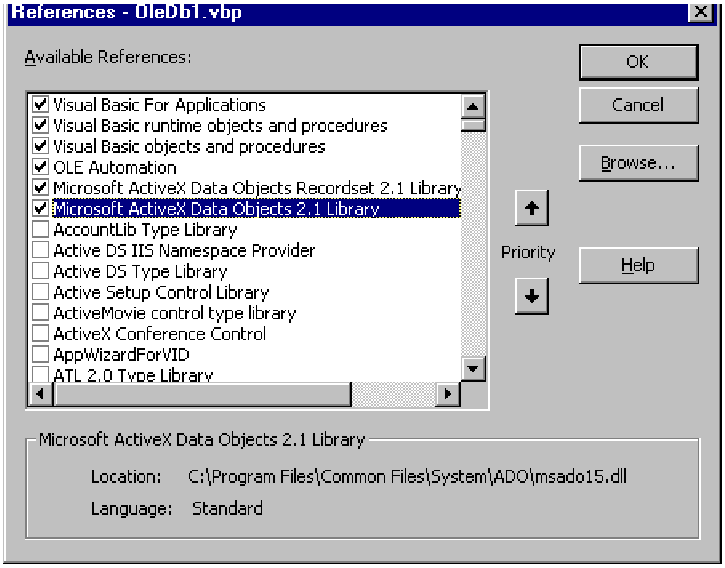
1. Start SQL*Plus.
2. Connect as user name SCOTT with the password TIGER.
3. Create the PL/SQL packages shown in "PL/SQL Package" on page 2-12.

> **Note:** When creating PL/SQL packages the / character is used as a terminator and must be added on a separate line following each CREATE PACKAGE...END block.

Setting Up the Visual Basic Project

After the Oracle database setups are completed, you can create the Visual Basic 6.0 project.

1. Start Visual Basic 6.0 and create a new project.
2. Make sure that the Microsoft ActiveX Data Objects 2.1 Library and Microsoft ActiveX Data Objects Recordset 2.1 Library are included as Project References.



References - OleDb1.vbp

Available References:

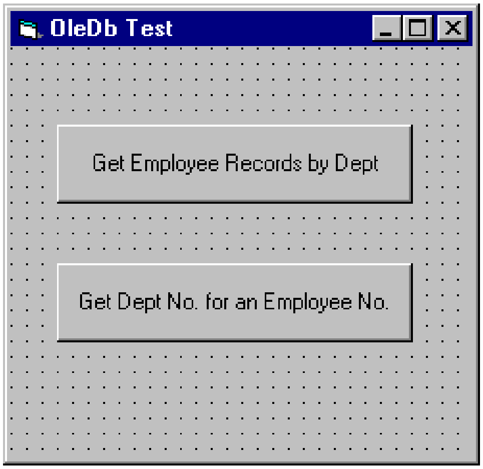
☑ Visual Basic For Applications
☑ Visual Basic runtime objects and procedures
☑ Visual Basic objects and procedures
☑ OLE Automation
☑ Microsoft ActiveX Data Objects Recordset 2.1 Library
☑ Microsoft ActiveX Data Objects 2.1 Library
□ AccountLib Type Library
□ Active DS IIS Namespace Provider
□ Active DS Type Library
□ Active Setup Control Library
□ ActiveMovie control type library
□ ActiveX Conference Control
□ AppWizardForVID
□ ATL 2.0 Type Library

Microsoft ActiveX Data Objects 2.1 Library

Location: C:\Program Files\Common Files\System\ADO\msado15.dll

Language: Standard

3. Add two commands buttons to the form. One of the buttons will run the code to execute the PL/SQL procedure GetEmpRecords. The other will run the code to execute the PL/SQL function GetDept.


OleDb Test
Get Employee Records by Dept
Get Dept No. for an Employee No.

4. Add the following code to Click subroutine of the button that will run the code to execute the PL/SQL procedure GetEmpRecords.

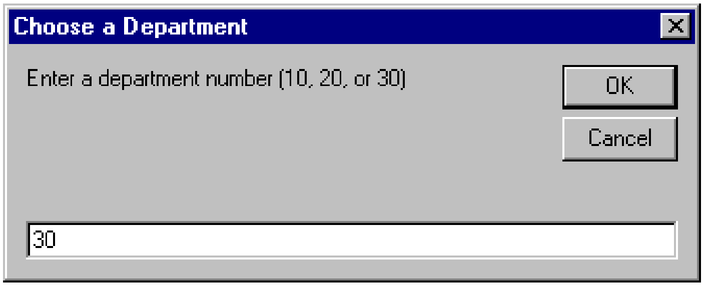
```
Dim Oracon As ADODB.Connection
Dim recset As New ADODB.Recordset
Dim cmd As New ADODB.Command
Dim param1 As New ADODB.Parameter
Dim param2 As New ADODB.Parameter
Dim objErr As ADODB.Error
Dim Message, Title, Default, EmpNoValue

Message = "Enter an employee number (5000 - 9000)"
Title = "Choose an Employee"
Default = "7654"

On Error GoTo err_test

EmpNoValue = InputBox(Message, Title, Default)
If EmpNoValue = "" Then Exit Sub
If EmpNoValue < 5000 Or EmpNoValue > 9000 Then EmpNoValue = 7654

Set Oracon = CreateObject("ADODB.Connection")
Oracon.ConnectionString = "Provider=OraOLEDB.Oracle;" & _
                          "Data Source=exampledb;" & _
                          "User ID=scott;" & _
                          "Password=tiger;" & Oracon.Open

Set cmd = New ADODB.Command
Set cmd.ActiveConnection = Oracon
Set param1 = cmd.CreateParameter("param1", adSmallInt, adParamInput, ,
                                 EmpNoValue)
cmd.Parameters.Append param1
Set param2 = cmd.CreateParameter("param2", adSmallInt, adParamOutput)
cmd.Parameters.Append param2

’ Enable PLSQLRSet property
Cmd.Properties ("PLSQLRSet") = TRUE

cmd.CommandText = "{CALL Employees.GetDept(?, ?)}"
Set recset = cmd.Execute

’ Disable PLSQLRSet property
Cmd.Properties ("PLSQLRSet") = FALSE

MsgBox "Number: " & EmpNoValue & "  Dept: " & recset.Fields("deptno").Value

Exit Sub

err_test:
    MsgBox Error$
    For Each objErr In Oracon.Errors
        MsgBox objErr.Description
    Next
    Oracon.Errors.Clear
    Resume Next
```

5. Add the following code to Click subroutine of the button that will run the code to execute the PL/SQL function GetDept.

```
Dim Oracon As ADODB.Connection
Dim recset As New ADODB.Recordset
Dim cmd As New ADODB.Command
Dim param1 As New ADODB.Parameter
Dim param2 As New ADODB.Parameter
Dim objErr As ADODB.Error

Dim Message, Title, Default, DeptValue
Message = "Enter a department number (10, 20, or 30)"
Title = "Choose a Department"
Default = "30"

On Error GoTo err_test
DeptValue = InputBox(Message, Title, Default)
```

```
If DeptValue = "" Then Exit Sub
If DeptValue < 10 Or DeptValue > 30 Then DeptValue = 30

Set Oracon = CreateObject("ADODB.Connection")
Oracon.ConnectionString = "Provider=OraOLEDB.Oracle;" & _
                          "Data Source=exampledb;" & _
                          "User ID=scott;" & _
                          "Password=tiger;" &
Oracon.Open
Set cmd = New ADODB.Command
Set cmd.ActiveConnection = Oracon
Set param1 = cmd.CreateParameter("param1", adSmallInt, adParamInput, ,
                                DeptValue)
cmd.Parameters.Append param1
Set param2 = cmd.CreateParameter("param2", adSmallInt, adParamOutput)
cmd.Parameters.Append param2

’ Enable PLSQLRSet property
Cmd.Properties ("PLSQLRSet") = TRUE

cmd.CommandText = "{CALL Employees.GetEmpRecords(?, ?)}"
Set recset = cmd.Execute

’ Disable PLSQLRSet property
Cmd.Properties ("PLSQLRSet") = FALSE

Do While Not recset.EOF
   MsgBox "Number: " & recset.Fields("empno").Value & "  Name: " &
   recset.Fields("ename").Value & "  Dept: " & recset.Fields("deptno").Value
   recset.MoveNext
Loop

Exit Sub

err_test:
    MsgBox Error$
    For Each objErr In Oracon.Errors
        MsgBox objErr.Description
    Next
    Oracon.Errors.Clear
    Resume Next
```

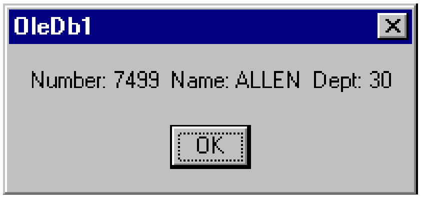
6. Run the project and check the results. For example, if you choose the Get Employee Records by Dept button, you would get a dialog box requesting that you enter a department number.



Enter a department number (10, 20, or 30)

30

Once you have entered a department number and OK, another dialog box displays employee names and numbers from that department.



Number: 7499 Name: ALLEN Dept: 30

A

Provider-Specific Information

This appendix discusses OLE DB information that is specific to Oracle Provider for OLE DB. For generic OLE DB information that includes a detailed listing of all OLE DB properties and interfaces, see the Microsoft *OLE DB Programmer's Reference Guide*.

Datatype Mappings in Rowsets and Parameters

This section lists the datatype mappings between Oracle datatypes and OLE DB-defined types. Oracle Provider for OLE DB represents Oracle datatypes by using certain OLE DB-defined datatypes in the rowset as well as in parameters. OLE DB-defined types are also mapped to an Oracle datatype when creating tables.

Each Oracle datatype is mapped to a specific OLE DB datatype, as shown in Table A–1. This correspondence is used when datatype information is retrieved from an Oracle database.

Table A–1 Datatype Mappings

Oracle Datatype	OLE DB Datatype - Regular (Non Unicode) Mode	OLE DB Datatype - Unicode Mode
BFILE	DBTYPE_BYTES	DBTYPE_BYTES
BLOB	DBTYPE_BYTES	DBTYPE_BYTES
CHAR	DBTYPE_STR	DBTYPE_WSTR
CLOB	DBTYPE_STR	DBTYPE_WSTR
DATE	DBTYPE_DBTIMESTAMP	DBTYPE_DBTIMESTAMP
FLOAT	DBTYPE_R8	DBTYPE_R8
LONG	DBTYPE_STR	DBTYPE_WSTR
LONG RAW	BTYPE_BYTES	DBTYPE_BYTES
NCHAR	DBTYPE_STR	DBTYPE_WSTR
NCLOB	DBTYPE_STR	DBTYPE_WSTR
NUMBER	DBTYPE_VARNUMERIC	DBTYPE_VARNUMERIC
NUMBER(p,s)	DBTYPE_NUMERIC	DBTYPE_NUMERIC
NVARCHAR2	DBTYPE_STR	DBTYPE_WSTR
RAW	DBTYPE_BYTES	DBTYPE_BYTES
ROWID	DBTYPE_STR	DBTYPE_STR
VARCHAR	DBTYPE_STR	DBTYPE_WSTR

Properties Supported

This section lists the properties supported by Oracle Provider for OLE DB. The read / write status and initial values are noted.

- Data Source Properties
- Data Source Info Properties
- Initialization and Authorization Properties
- Session Properties
- Rowset Properties

Data Source Properties

Table A–2 DBPROPSET_DATASOURCE Properties

Property	Status	Initial Value
DBPROP_CURRENTCATALOG	READ-ONLY	null

Data Source Info Properties

Table A–3 DBPROPSET_DATASOURCEINFO Properties

Property	Status	Initial Value
DBPROP_ACTIVESESSIONS	READ-ONLY	0, Unlimited sessions
DBPROP_ASYNCTXNABORT	READ-ONLY	VARIANT_FALSE
DBPROP_ASYNCTXNCOMMIT	READ-ONLY	VARIANT_FALSE
DBPROP_BYREFACCESSORS	READ-ONLY	VARIANT_TRUE
DBPROP_CATALOGLOCATION	READ-ONLY	DBPROPVAL_CL_END
DBPROP_CATALOGTERM	READ-ONLY	"Database link"
DBPROP_CATALOGUSAGE	READ-ONLY	DBPROPVAL_CU_DML_STATEMENTS
DBPROP_COLUMNDEFINITION	READ-ONLY	DBPROPVAL_CD_NOTNULL
DBPROP_CONCATNULLBEHAVIOR	READ-ONLY	DBPROPVAL_CB_NON_NULL
DBPROP_CONNECTIONSTATUS	READ-ONLY	DBPROPVAL_CS_INITIALIZED

Property	Status	Initial Value
DBPROP_DATASOURCENAME	READ-ONLY	" ", set at runtime
DBPROP_DATASOURCEREADONLY	READ-ONLY	VARIANT_FALSE
DBPROP_DBMSNAME	READ-ONLY	" ", set at runtime
DBPROP_DBMSVER	READ-ONLY	set at runtime
DBPROP_DSOTHREADMODEL	READ/WRITE	DBPROPVAL_RT_FREETHREAD
DBPROP_GROUPBY	READ-ONLY	DBPROPVAL_GB_CONTAINS_SELECT
DBPROP_HETEROGENEOUSTABLES	READ-ONLY	DBPROPVAL_HT_DIFFERENT_CATALOGS
DBPROP_IDENTIFIERCASE	READ-ONLY	DBPROPVAL_IC_UPPER
DBPROP_MAXINDEXSIZE	READ-ONLY	0, limit unknown - depends on blocksize
DBPROP_MAXOPENCHAPTERS	READ-ONLY	0, not supported
DBPROP_MAXORSINFILTER	READ-ONLY	0, not supported
DBPROP_MAXROWSIZE	READ-ONLY	0, No limit
DBPROP_MAXROWSIZEINCLUDESBLOB	READ-ONLY	VARIANT_FALSE
DBPROP_MAXSORTCOLUMNS	READ-ONLY	0, not supported
DBPROP_MAXTABLESINSELECT	READ-ONLY	0, no limit
DBPROP_MULTIPLEPARAMSETS	READ-ONLY	VARIANT_TRUE
DBPROP_MULTIPLERESULTS	READ-ONLY	DBPROP_MR_SUPPORTED | DBPROPVAL__MR_CONCURRENT
DBPROP_MULTIPLESTORAGEOBJECTS	READ-ONLY	VARIANT_FALSE
DBPROP_MULTITABLEUPDATE	READ-ONLY	VARIANT_FALSE
DBPROP_NULLCOLLATION	READ-ONLY	DBPROPVAL_NC_HIGH
DBPROP_OLEOBJECTS	READ-ONLY	DBPROPVAL_OO_BLOB
DBPROP_ORDERBYCOLUMNSINSELECT	READ-ONLY	VARIANT_FALSE
DBPROP_OUTPUTPARAMETERAVAILABILITY	READ-ONLY	DBPROPVAL_OA_ATEXECUTE
DBPROP_PERSISTENTIDTYPE	READ-ONLY	DBPROPVAL_PT_NAME
DBPROP_PREPAREABORTBEHAVIOR	READ-ONLY	DBPROPVAL_CB_PRESERVE
DBPROP_PREPARECOMMITBEHAVIOR	READ-ONLY	DBPROPVAL_CB_PRESERVE
DBPROP_PROCEDURETERM	READ-ONLY	"PL/SQL Stored Procedure"
DBPROP_PROVIDERFRIENDLYNAME	READ-ONLY	"Oracle Provider for OLE DB"
DBPROP_PROVIDERNAME	READ-ONLY	OraOLEDB.dll

Property	Status	Initial Value
DBPROP_PROVIDEROLEDBVER	READ-ONLY	"02.01"
DBPROP_PROVIDERVER	READ-ONLY	set to current OraOLEDB version
DBPROP_QUOTEDIDENTIFIERCASE	READ-ONLY	DBPROPVAL_IC_SENSITIVE
DBPROP_ ROWSETCONVERSIONSONCOMMAND	READ-ONLY	VARIANT_TRUE
DBPROP_SCHEMATERM	READ-ONLY	"Owner"
DBPROP_SCHEMAUSAGE	READ-ONLY	DBPROPVAL_SU_DML_STATEMENTS | DBPROPVAL_SU_TABLE_DEFINITION | DBPROPVAL_SU_INDEX_DEFINITION | DBPROPVAL_SU_PRIVILEGE_DEFINITION
DBPROP_SERVERNAME	READ-ONLY	" ", set at runtime
DBPROP_SORTONINDEX	READ-ONLY	VARIANT_FALSE
DBPROP_SQLSUPPORT	READ-ONLY	DBPROPVAL_SQL_ODBC_MINIMUM | DBPROPVAL_SQL_ANSI92_ENTRY | DBPROPVAL_SQL_ESCAPECLAUSES
DBPROP_STRUCTUREDSTORAGE	READ-ONLY	DBPROPVAL_SS_ISEQUENTIAL_STREAM
DBPROP_SUBQUERIES	READ-ONLY	DBPROPVAL_SQ_CORRELATEDSUBQUERIES
DBPROP_SUPPORTEDTXNDDL	READ-ONLY	DBPROPVAL_TC_DDL_COMMIT
DBPROP_SUPPORTEDTXNISOLEVELS	READ-ONLY	DBPROPVAL_TI_CURSORSTABILITY | DBPROPVAL_TI_READCOMMITTED
DBPROP_SUPPORTEDTXNISORETAIN	READ-ONLY	DBPROPVAL_TR_DONTCARE
DBPROP_TABLETERM	READ-ONLY	"Table"
DBPROP_USERNAME	READ-ONLY	" ", set at runtime

Initialization and Authorization Properties

Table A–4 DBPROPSET_DBINIT Properties

Property	Status	Initial Value
DBPROP_AUTH_PERSIST_SENSITIVE_ AUTHINFO	READ-ONLY	VARIANT_FALSE
DBPROP_AUTH_USERID	READ / WRITE	User ID
DBPROP_INIT_DATASOURCE	READ / WRITE	Connect string

Property	Status	Initial Value
DBPROP_INIT_HWND	READ / WRITE	Window handle for prompt
DBPROP_INIT_LCID	READ / WRITE	LCID of system
DBPROP_INIT_OLEDBSERVICES	READ / WRITE	DBPROPVAL_OS_ENABLEALL
DBPROP_INIT_PROMPT	READ / WRITE	DBPROMPT_NOPROMPT

Session Properties

Table A–5 DBPROPSET_SESSION Properties

Property	Status	Initial Value
DBPROP_SESS_AUTOCOMMITISOLEVELS	READ-ONLY	DBPROPVAL_TI_CURSORSTABILITY | DBPROPVAL_TI_READCOMMITTED

Rowset Properties

Table A–6 DBPROPSET_ROWSET Properties

Property	Status	Initial Value
DBPROP_ABORTPRESERVE	READ / WRITE	VARIANT_TRUE
DBPROP_ACCESSORORDER	READ-ONLY	DBPROP_AO_RANDOM
DBPROP_APPENDONLY	READ-ONLY	VARIANT_FALSE
DBPROP_BLOCKINGSTORAGEOBJECTS	READ-ONLY	VARIANT_FALSE
DBPROP_BOOKMARKINFO	READ-ONLY	0
DBPROP_BOOKMARKS	READ / WRITE	VARIANT_FALSE
DBPROP_BOOKMARKSKIPPED	READ / WRITE	VARIANT_TRUE
DBPROP_BOOKMARKTYPE	READ-ONLY	DBPROP_BMK_NUMERIC
DBPROP_CACHEDEFERRED	READ-ONLY	VARIANT_FALSE
DBPROP_CANFETCHBACKWARDS	READ / WRITE	VARIANT_FALSE
DBPROP_CANHOLDROWS	READ / WRITE	VARIANT_TRUE
DBPROP_CANSCROLLBACKWARDS	READ / WRITE	VARIANT_FALSE
DBPROP_CHANGEINSERTEDROWS	READ-ONLY	VARIANT_TRUE

Property	Status	Initial Value
DBPROP_CLIENTCURSOR	READ / WRITE	VARIANT_TRUE
DBPROP_COLUMNRESTRICT	READ-ONLY	VARIANT_FALSE
DBPROP_COMMANDTIMEOUT	READ / WRITE	0, currently not operational
DBPROP_COMMITPRESERVE	READ / WRITE	VARIANT_TRUE
DBPROP_DEFERRED	READ-ONLY	VARIANT_FALSE
DBPROP_DELAYSTORAGEOBJECTS	READ-ONLY	VARIANT_FALSE, no delayed update
DBPROP_FINDCOMPAREOPS	READ-ONLY	DBPROPVAL_CO_EQUALITY | DBPROPVAL_CO_STRING | DBPROPVAL_CO_CASESENSITIVE | DBPROPVAL_CO_CASEINSENSITIVE | DBPROPVAL_CO_CONTAINS | DBPROPVAL_CO_BEGINSWITH
DBPROP_HIDDENCOLUMNS	READ-ONLY	0
DBPROP_IACCESSOR	READ-ONLY	VARIANT_TRUE
DBPROP_ICOLUMNSINFO	READ-ONLY	VARIANT_TRUE
DBPROP_ICOLUMNSROWSET	READ / WRITE	VARIANT_TRUE
DBPROP_ICONNECTIONPOINTCONTAINER	READ-ONLY	VARIANT_TRUE
DBPROP_ICONVERTTYPE	READ-ONLY	VARIANT_TRUE
DBPROP_IMMOBILEROWS	READ-ONLY	VARIANT_TRUE
DBPROP_IMULTIPLERESULTS	READ / WRITE	VARIANT_TRUE
DBPROP_IROWSET	READ-ONLY	VARIANT_TRUE
DBPROP_IROWSETCHANGE	READ / WRITE	VARIANT_FALSE
DBPROP_IROWSETFIND	READ / WRITE	VARIANT_FALSE
DBPROP_IROWSETIDENTITY	READ-ONLY	VARIANT_TRUE
DBPROP_IROWSETINFO	READ-ONLY	VARIANT_TRUE
DBPROP_IROWSETLOCATE	READ / WRITE	VARIANT_FALSE
DBPROP_IROWSETREFRESH	READ / WRITE	VARIANT_FALSE
DBPROP_IROWSETSCROLL	READ / WRITE	VARIANT_FALSE
DBPROP_IROWSETUPDATE	READ / WRITE	VARIANT_FALSE
DBPROP_ISEQUENTIALSTREAM	READ / WRITE	VARIANT_TRUE
DBPROP_ISUPPORTERRORINFO	READ / WRITE	VARIANT_TRUE
DBPROP_LITERALBOOKMARKS	READ-ONLY	VARIANT_FALSE

Property	Status	Initial Value
DBPROP_LITERALIDENTITY	READ-ONLY	VARIANT_TRUE
DBPROP_LOCKMODE	READ-ONLY	DBPROPVAL_LM_NONE
DBPROP_MAXOPENROWS	READ / WRITE	0, No limit
DBPROP_MAXPENDINGROWS	READ-ONLY	0, No limit
DBPROP_MAXROWS	READ / WRITE	0
DBPROP_MAXROWSIZE	READ-ONLY	0
DBPROP_MAXROWSIZEINCLUDESBLOB	READ-ONLY	VARIANT_FALSE
DBPROP_NOTIFICATIONGRANULARITY	READ / WRITE	DBPROPVAL_NT_MULTIPLEROWS
DBPROP_NOTIFICATIONPHASES	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER | DBPROPVAL_NP_FAILEDTODO | DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYCOLUMNSET	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER | DBPROPVAL_NP_FAILEDTODO | DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWDELETE	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER | DBPROPVAL_NP_FAILEDTODO | DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWFIRSTCHANGE	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO
DBPROP_NOTIFYROWINSERT	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER | DBPROPVAL_NP_FAILEDTODO | DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWRESYNCH	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER
DBPROP_NOTIFYROWSETRELEASE	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER
DBPROP_ NOTIFYROWSETFETCHPOSITIONCHANGE	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER

Property	Status	Initial Value
DBPROP_NOTIFYROWUNDOCHANGE	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER | DBPROPVAL_NP_FAILEDTODO | DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWUNDODELETE	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER | DBPROPVAL_NP_FAILEDTODO | DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWUNDOINSERT	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER | DBPROPVAL_NP_FAILEDTODO | DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWUNDOUPDATE	READ / WRITE	DBPROPVAL_NP_OKTODO | DBPROPVAL_NP_ABOUTTODO | DBPROPVAL_NP_SYNCHAFTER | DBPROPVAL_NP_FAILEDTODO | DBPROPVAL_NP_DIDEVENT
DBPROP_ORDEREDBOOKMARKS	READ-ONLY	VARIANT_TRUE
DBPROP_OTHERINSERT	READ-ONLY	VARIANT_FALSE
DBPROP_OTHERUPDATEDELETE	READ-ONLY	VARIANT_FALSE
DBPROP_OWNINSERT	READ-ONLY	VARIANT_TRUE
DBPROP_OWNUPDATEDELETE	READ-ONLY	VARIANT_TRUE
DBPROP_QUICKRESTART	READ / WRITE	VARIANT_FALSE
DBPROP_REENTRANTEVENTS	READ-ONLY	VARIANT_FALSE
DBPROP_REMOVEDELETED	READ-ONLY	VARIANT_TRUE
DBPROP_REPORTMULTIPLECHANGES	READ-ONLY	VARIANT_FALSE
DBPROP_RETURNPENDINGINSERTS	READ / WRITE	VARIANT_TRUE
DBPROP_ROWRESTRICT	READ / WRITE	VARIANT_FALSE
DBPROP_ROWTHREADMODEL	READ-ONLY	DBPROPVAL_RT_FREETHREAD
DBPROP_SERVERCURSOR	READ / WRITE	VARIANT_FALSE
DBPROP_SERVERDATAONINSERT	READ / WRITE	VARIANT_TRUE
DBPROP_STRONGIDENTITY	READ / WRITE	VARIANT_TRUE
DBPROP_TRANSACTEDOBJECT	READ-ONLY	VARIANT_TRUE

Property	Status	Initial Value
DBPROP_UNIQUEROWS	READ/WRITE	VARIANT_FALSE
DBPROP_UPDATABILITY	READ/WRITE	DBPROPVAL_UP_CHANGE | DBPROPVAL_UP_DELETE | DBPROPVAL_UP_INSET

Rowset Property Implications

Oracle Provider for OLE DB sets other necessary properties if a particular property is set to VARIANT_TRUE.

- If DBPROP_IROWSETLOCATE is set to VARIANT_TRUE, the following properties are also set to VARIANT_TRUE:
  - DBPROP_IROWSETIDENTITY
  - DBPROP_CANHOLDROWS
  - DBPROP_BOOKMARKS
  - DBPROP_CANFETCHBACKWARDS
  - DBPROP_CANSCROLLBACKWARDS
- If DBPROP_IROWSETSCROLL is set to VARIANT_TRUE, the following properties are also set to VARIANT_TRUE:
  - DBPROP_IROWSETIDENTITY
  - DBPROP_IROWSETLOCATE
  - DBPROP_CANHOLDROWS
  - DBPROP_BOOKMARKS
  - DBPROP_CANFETCHBACKWARDS
  - DBPROP_CANSCROLLBACKWARDS
- If DBPROP_IROWSETUPDATE is to VARIANT_TRUE, the following properties are also set to VARIANT_TRUE:
  - DBPROP_IROWSETCHANGE

Interfaces Supported

This section identifies the OLE DB interfaces that are supported by Oracle Provider for OLE DB.

- Data Source
- Session
- Command
- Rowset
- Multiple Results
- Transaction Options
- Custom Error Object

Data Source

```
CoType TDataSource {
   interface IDBCreateSession;
   interface IDBInitialize;
   interface IDBProperties;
   interface IPersist;
   interface IDBInfo;
   interface ISupportErrorInfo;
}
```

Session

```
CoType TSession {
   interface IGetDataSource;
   interface IOpenRowset;
   interface ISessionProperties;
   interface IDBCreateCommand;
   interface IDBSchemaRowset;
   interface ISupportErrorInfo;
   interface ITransactionJoin;
   interface ITransactionLocal;
   interface ITransaction;
}
```

Command

```
CoType TCommand {
   interface IAccessor;
   interface IColumnsInfo;
   interface ICommand;
   interface ICommandProperties;
   interface ICommandText;
   interface IConvertType;
   interface IColumnsRowset;
   interface ICommandPrepare;
   interface ICommandWithParameters;
   interface ISupportErrorInfo;
}
```

Rowset

```
CoType TRowset {
   interface IAccessor;
   interface IColumnsInfo;
   interface IConvertType;
   interface IRowset;
   interface IRowsetInfo;
   interface IColumnsRowset;
   interface IConnectionPointContainer;
   interface IRowsetChange;
   interface IRowsetFind;
   interface IRowsetIdentity;
   interface IRowsetLocate;
   interface IRowsetRefresh;
   interface IRowsetScroll;
   interface IRowsetUpdate;
   interface ISupportErrorInfo;
}
```

Multiple Results

```
CoType TMultipleResults {
   interface IMultipleResults;
   interface ISupportErrorInfo;
}
```

Transaction Options

```
CoType TTransactionOptions {
   interface ITransactionOptions;
   interface ISupportErrorInfo;
}
```

Custom Error Object

```
CoType TCustomErrorObject {
   interface IErrorLookup;
}
```

MetaData Columns Supported

The following metadata columns are supported by OraOLEDB's column rowset:

- DBCOLUMN_IDNAME
- DBCOLUMN_GUID
- DBCOLUMN_PROPID
- DBCOLUMN_NAME
- DBCOLUMN_NUMBER
- DBCOLUMN_TYPE
- DBCOLUMN_TYPEINFO
- DBCOLUMN_COLUMNSIZE
- DBCOLUMN_PRECISION
- DBCOLUMN_SCALE
- DBCOLUMN_FLAGS
- DBCOLUMN_BASECATALOGNAME
- DBCOLUMN_BASECOLUMNNAME
- DBCOLUMN_BASESCHEMANAME
- DBCOLUMN_BASETABLENAME
- DBCOLUMN_COMPUTEMODE

- DBCOLUMN_ISAUTOINCREMENT
- DBCOLUMN_ISCASESENSITIVE
- DBCOLUMN_ISSEARCHABLE
- DBCOLUMN_OCTETLENGTH
- DBCOLUMN_KEYCOLUMN

OraOLEDB Tracing

OraOLEDB provides the ability to trace the interface calls for debugging purposes. This feature has been provided to assist Oracle WorldWide Support in debugging customer issues.

The provider can be configured to record the following information:

- For OLE DB Interface method entry and exit:
  - Parameter value(s) supplied (entry)
  - Return value; HRESULT (exit)
  - Thread ID (entry and exit)
- For Distributed transaction enlistment and delistment:
  - Session object information
  - Transaction ID

Note: In order to record global transaction enlistment and delistment information, the TraceLevel value must be set to session object. See "TraceLevel" on page A-15.

Registry Setting for Tracing Calls

In order to trace the interface calls, you must configure the following registry values for HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\OLEDB\:

- TraceFileName

  Valid Value: Any valid path and file name

  TraceFileName specifies the file name that is to be used for logging trace information. If TraceOption is set to 0, the name is used as is. However, if

TraceOption is 1, the thread ID is appended to the file name provided. See "TraceOption" below for more information.

- TraceCategory

  Valid Values:

  - 0 = None
  - 1 = OLEDB Interface method entry
  - 2 = OLEDB Interface method exit
  - 4 = Distributed Transaction Enlistment and Delistment

  TraceCategory specifies the information that is to be traced. Combinations of different tracing categories can be made by simply adding the valid values. For example, set TraceCategory to 3 to trace all OLE DB interface method entries and exits.

- TraceLevel

  Valid Values:

  - 0 = None
  - 1 = Data Source object
  - 2 = Session object
  - 4 = Command object
  - 8 = Rowset object
  - 16 = Error object
  - 64 = Multiple Results Object

  TraceLevel specifies the OLE DB objects to be traced. Because tracing all the entry and exit calls for all the OLE DB objects can be excessive, TraceLevel is provided to limit tracing to a single or multiple OLE DB objects. To obtain tracing on multiple objects, simply add the valid values. For example, if TraceLevel is set to 12 and TraceCategory is set to 3, the trace file will only contain method entry and exit for Command and Rowset objects.

  The TraceLevel value must be set to session object (2) to trace global transaction enlistment and delistment information.

- TraceOption

  Valid Values:

  - 0 = Single trace file
  - 1 = Multiple trace files

  TraceOption specifies whether to log trace information in single or multiple files for each Thread ID. If a single trace file is specified, the file name specified in TraceFileName is used. If multiple trace file is requested, a Thread ID is appended to the file name provided to create a trace file for each thread.

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