

Oracle[®] Provider for OLE DB

Developer's Guide

Release 9.2

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ORACLE[®]

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Oracle Provider for OLE DB Developer's Guide, Release 9.2

Part No. A95498-01

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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 manual describes only the features of Oracle9i for Windows software that apply to the Windows NT, Windows 2000, Windows XP, and Windows 98 operating systems. Information on Oracle9i Personal Edition software on Windows 98 is not covered in this manual.

This preface contains these topics:

- [Audience](#)
- [Organization](#)
- [Related Documentation](#)
- [Conventions](#)
- [Documentation Accessibility](#)

Audience

Oracle Provider for OLE DB Developer's 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.

To use this document, you must be familiar with OLE DB and have a working knowledge of application programming using Microsoft C/C++, Visual Basic, or ActiveX Data Objects (ADO). 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.

Organization

This document contains:

Chapter 1, "Introduction to Oracle Provider for OLE DB"

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

Chapter 2, "Features of OraOLEDB"

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.

Glossary

Related Documentation

For more information, see these Oracle resources:

- *Oracle9i Database Installation Guide for Windows*
- *Oracle9i Database Release Notes for Windows*
- *Oracle9i Database Administrator's Guide for Windows*

- *Oracle Services for Microsoft Transaction Server Developer's Guide*
- *Oracle Enterprise Manager Administrator's Guide*
- *Oracle9i Net Services Administrator's Guide*
- *Oracle9i Database New Features*
- *Oracle9i Database Concepts*
- *Oracle9i Database Reference*
- *Oracle9i Database Error Messages*
- *Oracle9i Database Globalization Support Guide*

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<http://otn.oracle.com/admin/account/membership.html>

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

<http://otn.oracle.com/docs/index.htm>

To access the database documentation search engine directly, please visit

<http://tahiti.oracle.com>

For additional information, see:

www.microsoft.com/data/oledb/

Conventions

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

- [Conventions in Text](#)
- [Conventions in Code Examples](#)
- [Conventions for Windows Operating Systems](#)

Conventions in Text

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

| Convention | Meaning | Example |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bold | Bold typeface indicates terms that are defined in the text or terms that appear in a glossary, or both. | When you specify this clause, you create an index-organized table . |
| <i>Italics</i> | Italic typeface indicates book titles or emphasis. | <i>Oracle9i Database Concepts</i> Ensure that the recovery catalog and target database do <i>not</i> reside on the same disk. |
| UPPERCASE monospace (fixed-width) font | Uppercase monospace typeface indicates elements supplied by the system. Such elements include parameters, privileges, datatypes, RMAN keywords, SQL keywords, SQL*Plus or utility commands, packages and methods, as well as system-supplied column names, database objects and structures, usernames, and roles. | You can specify this clause only for a NUMBER column. You can back up the database by using the BACKUP command. Query the TABLE_NAME column in the USER_TABLES data dictionary view. Use the DBMS_STATS.GENERATE_STATS procedure. |

| Convention | Meaning | Example |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| lowercase monospace (fixed-width) font | Lowercase monospace typeface indicates executables, filenames, directory names, and sample user-supplied elements. Such elements include computer and database names, net service names, and connect identifiers, as well as user-supplied database objects and structures, column names, packages and classes, usernames and roles, program units, and parameter values. Note: Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown. | Enter <code>sqlplus</code> to open SQL*Plus. The password is specified in the <code>orapwd</code> file. Back up the datafiles and control files in the <code>/disk1/oracle/dbs</code> directory. The <code>department_id</code> , <code>department_name</code> , and <code>location_id</code> columns are in the <code>hr.departments</code> table. Set the <code>QUERY_REWRITE_ENABLED</code> initialization parameter to <code>true</code> . Connect as <code>oe</code> user. The <code>JRepUtil</code> class implements these methods. |
| lowercase italic monospace (fixed-width) font | Lowercase italic monospace font represents placeholders or variables. | You can specify the <i>parallel_clause</i> . Run <i>Uold_release</i> .SQL where <i>old_release</i> refers to the release you installed prior to upgrading. |

Conventions in Code Examples

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

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

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

| Convention | Meaning | Example |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| [] | Brackets enclose one or more optional items. Do not enter the brackets. | <code>DECIMAL (digits [, precision])</code> |
| { } | Braces enclose two or more items, one of which is required. Do not enter the braces. | <code>{ENABLE DISABLE}</code> |
| | A vertical bar represents a choice of two or more options within brackets or braces. Enter one of the options. Do not enter the vertical bar. | <code>{ENABLE DISABLE}</code> <code>[COMPRESS NOCOMPRESS]</code> |

| Convention | Meaning | Example |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| ... | Horizontal ellipsis points indicate either: <ul style="list-style-type: none"> ■ That we have omitted parts of the code that are not directly related to the example ■ That you can repeat a portion of the code | <pre>CREATE TABLE ... AS subquery; SELECT col1, col2, ... , coln FROM employees;</pre> |
| . . . | Vertical ellipsis points indicate that we have omitted several lines of code not directly related to the example. | <pre>SQL> SELECT NAME FROM V\$DATAFILE; NAME ----- /fsl/dbs/tbs_01.dbf /fsl/dbs/tbs_02.dbf . . . /fsl/dbs/tbs_09.dbf 9 rows selected.</pre> |
| Other notation | You must enter symbols other than brackets, braces, vertical bars, and ellipsis points as shown. | <pre>acctbal NUMBER(11,2); acct CONSTANT NUMBER(4) := 3;</pre> |
| <i>Italics</i> | Italicized text indicates placeholders or variables for which you must supply particular values. | <pre>CONNECT SYSTEM/system_password DB_NAME = database_name</pre> |
| UPPERCASE | Uppercase typeface indicates elements supplied by the system. We show these terms in uppercase in order to distinguish them from terms you define. Unless terms appear in brackets, enter them in the order and with the spelling shown. However, because these terms are not case sensitive, you can enter them in lowercase. | <pre>SELECT last_name, employee_id FROM employees; SELECT * FROM USER_TABLES; DROP TABLE hr.employees;</pre> |
| lowercase | Lowercase typeface indicates programmatic elements that you supply. For example, lowercase indicates names of tables, columns, or files. Note: Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown. | <pre>SELECT last_name, employee_id FROM employees; sqlplus hr/hr CREATE USER mjones IDENTIFIED BY ty3MU9;</pre> |

Conventions for Windows Operating Systems

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

| Convention | Meaning | Example |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Choose Start > | How to start a program. For example, to start Database Configuration Assistant, you must click the Start button on the taskbar and then choose Programs > Oracle - <i>HOME_NAME</i> > Configuration and Migration Tools > Database Configuration Assistant. | Choose Start > Programs > Oracle - <i>HOME_NAME</i> > Configuration and Migration Tools > Database Configuration Assistant |
| File and Directory Names | File and directory names are not case sensitive. The special characters <, >, :, ;, ", /, , and - are not allowed. The special character \ is treated as an element separator, even when it appears in quotes. If the file name begins with \\, Windows assumes it uses the Universal Naming Convention. | c:\winnt\"\"system32 is the same as C:\WINNT\SYSTEM32 |
| C:\> | Represents the Windows command prompt of the current hard disk drive. The escape character in a command prompt is "^". Your prompt reflects the subdirectory in which you are working. Referred to as the command prompt in this manual. | C:\oracle\oradata> |
| Special characters | The backslash special character (\) is sometimes required as an escape character for the double quote (") special character at the Windows command prompt. Parentheses and the single quote (') do not require an escape character. See your Windows operating system documentation for more information on escape and special characters. | C:\>exp scott/tiger TABLES=emp QUERY=\"WHERE job='SALESMAN' and sal<1600\" C:\>imp SYSTEM/password FROMUSER=scott TABLES=(emp, dept) |
| <i>HOME_NAME</i> | Represents the Oracle home name. The home name can be up to 16 alphanumeric characters. The only special character allowed in the home name is the underscore. | C:\> net start Oracle <i>HOME_NAME</i> TNSListener |

| Convention | Meaning | Example |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <i>ORACLE_HOME</i> and <i>ORACLE_BASE</i> | <p>In releases prior to Oracle8i release 8.1.3, when you installed Oracle components, all subdirectories were located under a top level <i>ORACLE_HOME</i> directory that by default was:</p> <ul style="list-style-type: none"> ■ C:\orant for Windows NT ■ C:\orawin98 for Windows 98 <p>or whatever you called your Oracle home.</p> <p>This release complies with Optimal Flexible Architecture (OFA) guidelines. All subdirectories are not under a top level <i>ORACLE_HOME</i> directory. There is a top level directory called <i>ORACLE_BASE</i> that by default is C:\oracle. If you install the latest Oracle release on a computer with no other Oracle software installed, then the default setting for the first Oracle home directory is C:\oracle\orann where <i>nn</i> is the latest release number. The Oracle home directory is located directly under <i>ORACLE_BASE</i>.</p> <p>All directory path examples in this manual follow OFA conventions.</p> <p>See <i>Oracle9i Database Getting Started for Windows</i> for additional information on OFA compliance and for information on installing Oracle products in non-OFA compliant directories.</p> | Go to the <i>ORACLE_BASE\ORACLE_HOME\rdms\admin</i> directory. |

Documentation Accessibility

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What's New in OraOLEDB?

The following sections describe the new features in OraOLEDB:

- [New Features in Oracle Provider for OLE DB for Release 9.2](#)
- [New Features in Oracle Provider for OLE DB for Release 9.0.1](#)
- [New Features in Oracle Provider for OLE DB for Release 8.1.7](#)

New Features in Oracle Provider for OLE DB for Release 9.2

This section contains these topics:

- **Support for using OraOLEDB with OLE DB .NET Data Provider**

ADO.NET applications developers can use OraOLEDB through the OLE DB .NET Data Provider. A connection attribute, `OLEDB .NET`, can be set at connection time for OraOLEDB to be compatible with OLE DB .NET Data Provider. See ["OLE DB .NET Data Provider Compatibility"](#) on page 2-24

New Features in Oracle Provider for OLE DB for Release 9.0.1

This section contains these topics:

- **Using Oracle9i on Windows 2000**

There are some differences between using Oracle9i on Windows 2000 and Windows NT 4.0.

See Also: *Oracle9i Database Getting Started for Windows*

New Features in Oracle Provider for OLE DB for Release 8.1.7

Oracle8i release 8.1.7 included the following:

- **Support for returning multiple rowsets.**

Consumers can use this feature to access all the `REF CURSORS` returned by a stored procedure. See ["Multiple Rowsets"](#) on page 2-12.

- **Support for the Unicode character set.**

Using this feature, consumers can use OraOLEDB to access data in multiple languages on the same client computer. 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 Active Server Page (ASP) that accesses an Oracle8i database to dynamically generate content in Japanese, Arabic, English, and Thai. See ["Unicode Support"](#) on page 2-22 and ["Datatype Mappings in Rowsets and Parameters"](#) on page A-2.

Introduction to Oracle Provider for OLE DB

This chapter introduces Oracle Provider for OLE DB (OraOLEDB).

This chapter contains these topics:

- [Overview of OLE DB](#)
- [Overview of OraOLEDB](#)
- [System Requirements](#)
- [OraOLEDB Installation](#)

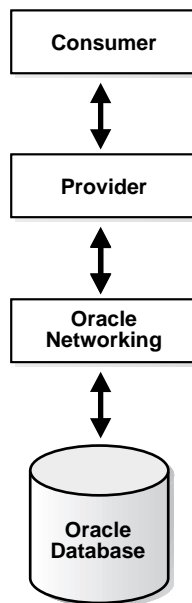
Overview of OLE DB

OLE DB is an open standard data access methodology which utilizes a set of **Component Object Model (COM)** interfaces for accessing and manipulating different types of data. These interfaces are available from various database providers.

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**. An 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 that supports COM, 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.

Overview of OraOLEDB

Oracle Provider for OLE DB (OraOLEDB) is an OLE DB data provider that offers high performance and efficient access to Oracle data by OLE DB consumers.

In general, this developer's guide assumes that you are using OraOLEDB through OLE DB or ADO.

For sample code, the latest patches, and other technical information on the Oracle Provider for OLE DB, go to

http://otn.oracle.com/tech/windows/ole_db

With the advent of the .NET framework, support has been provided for using the OLE DB .NET Data Provider with OraOLEDB. With the proper connection attribute setting, an OLE DB .NET Data Provider can utilize OraOLEDB to access Oracle.

See Also: ["OLE DB .NET Data Provider Compatibility"](#) on page 2-24 for further information on support for OLE DB .NET Data Provider

System Requirements

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

- Windows 98, Windows NT 4.0, Windows 2000, or Windows XP
- Access to an Oracle Server (release 8 or later)
- **Oracle Net Services**
- 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 (release 9.0). 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 Oracle9i release 1 (9.0.1), Oracle8i (8.1.5 or higher) and Oracle8 (8.0.6 or higher).

OraOLEDB Installation

Oracle Provider for OLE DB is included as part of your Oracle installation. It contains the features and demos that illustrate how to use this product to solve real-world problems.

See Also: The *Oracle9i Database Installation Guide for Windows* for installation instructions

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 |
| OraOLEDBlang.dll | Language-specific resource DLL where <i>lang</i> is the appropriate language | 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 |

Table 1–1 Oracle Provider for OLE DB Files

| File | Description | Location |
|------------------------------------------------------------|----------------------------------------|---------------------------------------|
| OraOLEDBlang.msb where lang is the appropriate language | 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 |

Features of OraOLEDB

This chapter describes components of Oracle Provider for OLE DB (OraOLEDB) and how to use the components to develop OLE DB consumer applications.

This chapter contains these topics:

- [OraOLEDB Provider Specific Features](#)
- [Using OraOLEDB with Visual Basic](#)

OraOLEDB Provider Specific Features

The following sections describe provider-specific features of OraOLEDB:

- [Data Source](#)
- [OraOLEDB Sessions](#)
- [Commands](#)
- [Rowsets](#)
- [LOB Support](#)
- [Unicode Support](#)
- [Using OraOLEDB with Visual Basic](#)
- [OLE DB .NET Data Provider Compatibility](#)

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 net service name, 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 net service name which is the alias in the `tnsnames.ora` file. For more information, refer to *Oracle9i Net Services 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 2-18.
- `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 2-18.
- `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 2-18.
- `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.
- `OLEDB.NET` - enables or disables compatibility with OLE DB .NET Data Provider. See ["OLE DB .NET Data Provider Compatibility"](#) on page 2-24.

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 *Oracle9i Security and Network Integration Guide*.

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

Oracle9i 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 *Oracle9i Database 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;PLSQLSet=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
```

OraOLEDB Sessions

An 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 9.0.1 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 *Oracle Services for Microsoft Transaction Server Developer's Guide*.

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 nonzero, `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:

Table 2–1 Custom Properties for Commands

| For Visual Basic Users | For C++ Users |
|------------------------|-------------------|
| PLSQLRSet | ORAPROP_PLSQLRSet |
| NDatatype | ORAPROP_NDatatype |
| SPPrmsLOB | ORAPROP_SPPrmsLOB |

PLSQLRSet

This property is similar to the `PLSQLRSet` Connection string attribute.

The property specifies whether OraOLEDB must return a rowset from the PL/SQL stored procedure. If the stored procedure, provided by the consumer, returns a rowset, `PLSQLRSet` must 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 objRes As NEW ADODB.Recordset
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
set objRes = 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 must 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 round-trip 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 CURSOR** 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** type.

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

The stored procedure or function 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

To Create Rowsets

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

To Create Rowsets 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`.

To Create Rowsets 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:

Table 2–2 Possible Values for Updatability Property

| Value | Description |
|-------|----------------------------|
| 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 LONG, BLOB, or CLOB. 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, if 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.

To Search 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 must 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, and so forth) 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 *Oracle9i 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 computer. 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 Active Server Page (ASP) that accesses an Oracle9i database to dynamically generate contents in Japanese, Arabic, English, and Thai.

Types of Unicode Encoding

The Oracle 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 is 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 *Oracle9i Database Administrator's Guide* for more information.

See Also:

Oracle9i Database Globalization Support Guide for general information

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 must 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
```

OLE DB .NET Data Provider Compatibility

The OLE DB .NET Data Provider can utilize OraOLEDB as the OLE DB Provider for accessing Oracle.

To make OraOLEDB compatible with OLE DB .NET Data Provider, set the connection string attribute `OLEDB.NET` to `True`.

Setting the `OLEDB.NET` attribute to `False` disables .NET compatibility.

Note: The `OLEDB.NET` connection string attribute must not be used in ADO applications.

Using the OLEDB.NET Attribute in a Connection String

When using OraOLEDB with the OLE DB .NET Data Provider, the `OLEDB.NET` connection attribute must be set to `True` as shown in the following examples:

```
// in VB.NET
Dim con As New OleDbConnection()
con.ConnectionString = "Provider=OraOLEDB.Oracle;User Id=scott;" & _
    "Password=tiger;Data Source=Oracle;OLEDB.NET=True;"
```

```
con.Open

// in C#
...
OleDbConnection con = new OleDbConnection();
con.ConnectionString = "Provider=OraOLEDB.Oracle;User Id=scott;" +
    "Password=tiger;Data Source=Oracle;OLEDB.NET=true;"
con.Open();
...
```

Using OraOLEDB Custom Properties

ADO allows OraOLEDB provider-specific properties to be set at the object level. The OraOLEDB-specific properties `SPPrmsLOB` and `NDatatype` can only be set at the ADO command object level, as shown in the following example:

```
// in VB
Dim cmd as new ADO.Command
...
cmd.Properties("SPPrmsLOB") = True
cmd.Properties("NDatatype") = True
...
```

However, the OLE DB .NET Data Provider cannot expose OLE DB provider-specific properties at the object level. Therefore, the `SPPrmsLOB` and `NDatatype` properties can only be set as connection string attributes when OraOLEDB is used by OLE DB .NET Data Provider:

```
// in VB.NET
Dim con As New OleDbConnection()
con.ConnectionString = "Provider=OraOLEDB.Oracle;User Id=scott;" & _
    "Password=tiger;Data Source=Oracle;OLEDB.NET=True;" & _
    "SPPrmsLOB=False;NDatatype=False;"
con.Open()
```

Both `SPPrmsLOB` and `NDatatype` connection string attributes are set to `False` by default if they are not specified.

Setting either of these connection string attributes to `True` incurs additional processing overhead when executing commands with parameters. For this reason,

before setting either attribute to `True`, see "[OraOLEDB Custom Properties for Commands](#)" on page 2-8.

Updating Oracle with DataTable Changes

In order for the `OleDbDataAdapter.Update()` method to properly update Oracle with changes made in the `DataTable`, the `DataTable` must contain a primary key of a database table. If the database table does not contain a primary key, the `ROWID` must be selected explicitly when populating the `DataTable`, so that the `ROWID` can be used to uniquely identify a row when updating a row in the database.

Do not select the `ROWID` from database tables that contains a primary key. If the `ROWID` is selected along with a primary key, the `ROWID` will be the only column marked as the primary key.

See Also: For further information on using the OLE DB .NET Data Provider

- Microsoft .NET Documentation
- Microsoft .NET Framework Class Library

Using OraOLEDB with Visual Basic

The following simple example illustrates how to use Oracle Provider for OLE DB with ADO in 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 username `scott` with the password `tiger`.
3. Run the `demobld.sql` script:

```
SQL> @ORACLE_BASE\ORACLE_HOME\sqlplus\demo\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 Create the PL/SQL package:

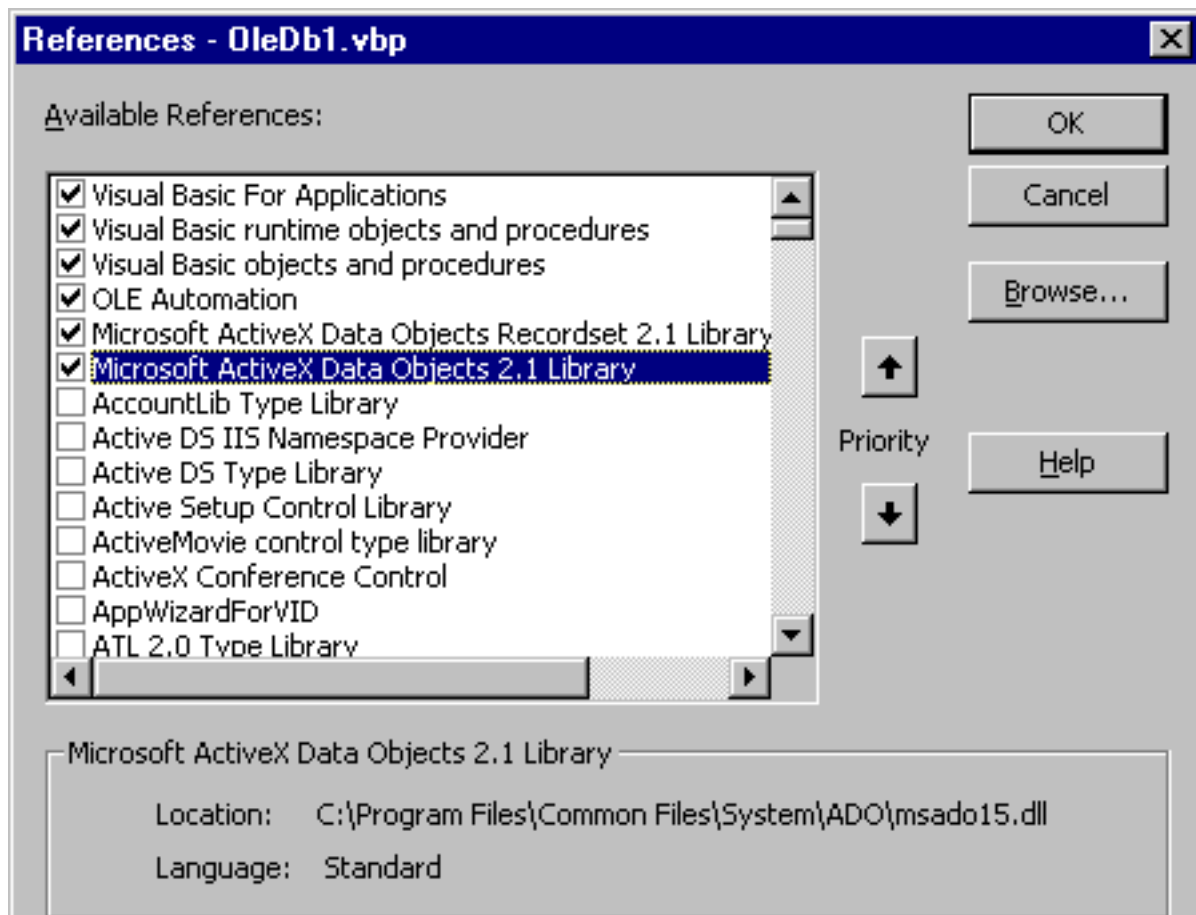
1. Start SQL*Plus.
2. Connect as username `scott` with the password `tiger`.
3. Create the PL/SQL packages shown in "[PL/SQL Package](#)" on page 2-13.

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.

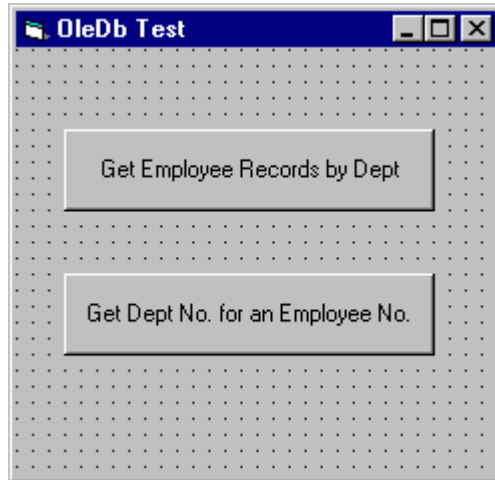
Setting Up the Visual Basic Project

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.



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`.



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.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=exampleldb;" & _
    "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

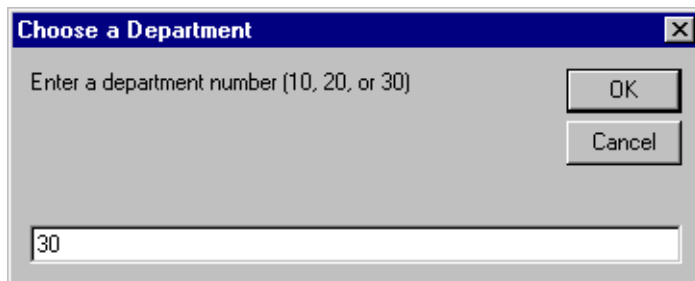
' Disable PLSQLRSet property
Cmd.Properties ("PLSQLRSet") = FALSE

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

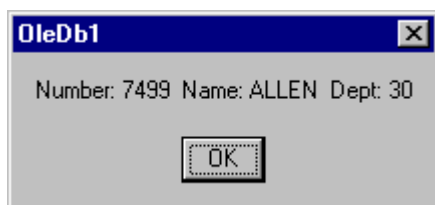
Exit Sub

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.



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



Provider-Specific Information

This appendix describes 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*.

This appendix contains these topics:

- [Datatype Mappings in Rowsets and Parameters](#)
- [Properties Supported](#)
- [Interfaces Supported](#)
- [MetaData Columns Supported](#)
- [OraOLEDB Tracing](#)

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_ASYNCCTXNABORT | READ-ONLY | VARIANT_FALSE |
| DBPROP_ASYNCCTXNCOMMIT | 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 |
| DBPROP_DATASOURCENAME | READ-ONLY | " ", set at runtime |
| DBPROP_DATASOURCEREADONLY | READ-ONLY | VARIANT_FALSE |

Table A-3 DBPROPSET_DATASOURCEINFO Properties

| Property | Status | Initial Value |
|------------------------------------|------------|------------------------------------------------|
| 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_IDENTIFIER_CASE | 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 |
| DBPROP_PROVIDEROLEDBVER | READ-ONLY | "02.01" |

Table A–3 DBPROPSET_DATASOURCEINFO Properties

| Property | Status | Initial Value |
|-----------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| 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_SUPPORTEDTXNDL | 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 |
| DBPROP_INIT_HWND | READ/WRITE | Window handle for prompt |

Table A–4 DBPROPSET_DBINIT Properties

| Property | Status | Initial Value |
|---------------------------|------------|------------------------|
| 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_CACHEDDEFERRED | READ-ONLY | VARIANT_FALSE |
| DBPROP_CANFETCHBACKWARDS | READ/WRITE | VARIANT_FALSE |
| DBPROP_CANHOLDROWS | READ/WRITE | VARIANT_FALSE |
| DBPROP_CANSROLLBACKWARDS | READ/WRITE | VARIANT_FALSE |
| DBPROP_CHANGEINSERTEDROWS | READ-ONLY | VARIANT_TRUE |
| DBPROP_CLIENTCURSOR | READ/WRITE | VARIANT_TRUE |
| DBPROP_COLUMNRESTRICT | READ-ONLY | VARIANT_TRUE |

Table A–6 DBPROPSET_ROWSET Properties

| Property | Status | Initial Value |
|----------------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DBPROP_COMMANDTIMEOUT | READ/WRITE | 0, currently not operational |
| DBPROP_COMMITPRESERVE | READ/WRITE | VARIANT_TRUE |
| DBPROP_DEFERRED | READ-ONLY | VARIANT_TRUE |
| DBPROP_DELAYSTORAGEOBJECTS | READ-ONLY | VARIANT_TRUE, 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 |
| DBPROP_LITERALIDENTITY | READ-ONLY | VARIANT_FALSE |

Table A–6 DBPROPSET_ROWSET Properties

| Property | Status | Initial Value |
|----------------------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 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 |

Table A–6 DBPROPSET_ROWSET Properties

| 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_OTHERUPDETEDELETE | READ-ONLY | VARIANT_FALSE |
| DBPROP_OWNINGINSERT | READ-ONLY | VARIANT_TRUE |
| DBPROP_OWNINGUPDETEDELETE | 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 |

Table A–6 DBPROPSET_ROWSET Properties

| Property | Status | Initial Value |
|-------------------------|------------|----------------------------------------------------------------------|
| DBPROP_TRANSACTEDOBJECT | READ-ONLY | VARIANT_TRUE |
| 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_CANSROLLBACKWARDS
- 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_CANSROLLBACKWARDS
- If DBPROP_IROWSETUPDATE is set 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 Support Services 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 filename

`TraceFileName` specifies the filename 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 filename provided. See ["TraceOption"](#) 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 filename specified in `TraceFileName` is used. If multiple trace file is requested, a Thread ID is appended to the filename provided to create a trace file for each thread.

Glossary

Component Object Model (COM)

A binary standard that enables objects to interact with other objects, regardless of the programming language that each object was written in.

consumer

A consumer is any application or tool that calls to a data source or the interfaces of provider to access data. See **provider**.

Oracle Net Services

The Oracle client/server communication software that offers transparent operation to Oracle tools or databases over any type of network protocol and operating system.

PL/SQL

Oracle Corporation's procedural language extension to SQL.

provider

A provider is an interface or set of components that provides data to a consumer. As the term is used with Oracle Provider for OLE DB, a data provider is a set of COM components that transfer data from a data source to consumer, by place the data in a tabular format when called for. See **consumer**.

stored procedure

A stored procedure is a PL/SQL block that Oracle stores in the database and can be called by name from an application.

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