

Oracle[®] Provider for OLE DB

User's Guide

Release 8.1.6

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Oracle Provider for OLE DB User's Guide, Release 8.1.6

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Contact Us!

Oracle Provider for OLE DB User's Guide, Release 8.1.6

Part No. A75235-01

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

Read the section...	If you...
How to Contact Oracle Technical Publications on page 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).

You can send comments regarding documentation in the following ways:

- Electronic mail - ntdoc@us.oracle.com
- FAX - (650) 506-7370 Attn: Oracle Windows Platforms Server Documentation
- Postal service:
Oracle Corporation
Windows Platforms Server Documentation Manager
500 Oracle Parkway, MS 1OP8,
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 <i>Oracle Customer Support Guide</i> in your kit.

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

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

- The hardware name on which your application is running.

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

- 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, Oracle8i 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?

- **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?

- 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
<p>Oracle Technology Network http://technet.oracle.com/</p>	<p>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.</p>
<p>Oracle Store http://oraclestore.oracle.com/</p>	<p>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.</p>
<p>Oracle Support Services' Support Web Center http://www.oracle.com/support/</p>	<p>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.</p> <p>Here are some of the resources available in the Support Web Center:</p>
<p>OracleMetaLink http://www.oracle.com/support/elec_sup/index.html</p>	<p><i>OracleMetaLink</i> is Oracle Support Services' premier Web support service. It is available to <i>Oraclemetals</i> customers (Gold, Silver, Bronze), 24 hours a day, seven days a week.</p>
<p>OracleLifecycle http://www.oracle.com/support/sup_serv/lifecycle/index.html</p>	<p><i>OracleLifecycle</i> 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.</p>
<p>ExpertONLINE http://www.oracle.com/support/sup_serv/online/index.html</p>	<p>Oracle Support Services has launched a new line of services called <i>ExpertONLINE</i>. These services provide online database administration for companies looking to supplement their existing DBA staff or fill a DBA role. Services range from <i>ExpertDETECT</i>, a monitoring, diagnostic, and recommendation service, to <i>ExpertDBA</i>, a full online database administration service.</p>
<p>Virtual Support Analyst (VSA) http://www.oracle.com/support/sup_serv/vsa_start.html</p>	<p>VSA is Oracle's Internet e-mail service; it is available to U.S. customers with an <i>Oraclemetals</i> 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.</p>

Information Source	Description
<p data-bbox="187 262 376 284">Customer Service</p> <p data-bbox="187 305 615 354">http://www.oracle.com/support/cus_serv/index.html</p>	<p data-bbox="729 262 1300 336">This site provides resources to make your interactions with Oracle as easy as possible. Among the things you can do are:</p> <ul data-bbox="682 357 1272 591" style="list-style-type: none"> <li data-bbox="682 357 1272 406">■ Learn what is a CPU Support Identification (CSI) number <li data-bbox="682 427 1272 449">■ Update your technical contact information <li data-bbox="682 470 1272 519">■ Find out whom to contact for invoice and collection issues <li data-bbox="682 539 1272 562">■ Request product update shipments <li data-bbox="682 583 1272 605">■ Access a glossary of Oracle Support Services terms
<p data-bbox="187 614 494 637">U.S. Customer Visit Program</p> <p data-bbox="187 657 615 706">http://www.oracle.com/support/cus_serv/cus_visit.html</p>	<p data-bbox="729 614 1315 689">This U.S.-based program has been established to help our customers understand and obtain maximum benefit from the support services they have purchased.</p> <p data-bbox="729 710 1279 840">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.</p>
<p data-bbox="187 862 486 885">Support Web Center Library</p> <p data-bbox="187 906 615 954">http://www.oracle.com/support/library/index.html</p>	<p data-bbox="729 862 1300 961">This site contains articles, guides, and other documentation to help you leverage the wealth of knowledge and reference material that Oracle Support Services produces.</p>

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](#)
- [Feature Coverage and Availability](#)
- [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 2.1 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*.

Feature Coverage and Availability

This guide contains information that describes the features and functionality of Oracle Provider for OLE DB. For information about Oracle8i features and options, see *Getting to Know Oracle8i*.

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.
<i>Italic</i>	Italic is used to indicate a variable: <i>filename</i>	Indicates a value that you must provide. For example, if a command asks you to type <i>filename</i> , 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 <i>MS-DOS command prompt</i> in this guide.
Backslash (\) before a directory name	\bin	Indicates that the directory is a subdirectory of the root directory.

Convention	Example	Meaning
<i>oracle_home</i> and <i>oracle_base</i>	Go to the <i>oracle_base\oracle_home\bin</i> directory.	<p>In this Optimal Flexible Architecture (OFA)-compliant release, all subdirectories are no longer under a top level <i>oracle_home</i> directory. There is now a new top-level directory called <i>oracle_base</i> that by default is <i>c:\oracle</i>. The Oracle home directories are located directly under <i>oracle_base</i>.</p> <p>If you install Oracle8i release 8.1.6 on a computer where there is no other Oracle software on the computer, the default settings for the first Oracle home directory is <i>c:\oracle\ora81</i>. If you run Oracle Universal Installer again and install release 8.2.x, the second Oracle home directory is called <i>\ora82</i>.</p> <p>All directory path examples in this guide follow OFA conventions. For more information on OFA, see <i>Oracle8i Administrator's Guide for Windows NT</i>.</p>
<i>HOME_NAME</i>	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.
<i>HOMEID</i>	HOME0, HOME1, HOME2	Represents a unique registry subkey for each Oracle home directory in which you install products. A new <i>HOMEID</i> is created and incremented each time you install products to a different Oracle home directory on one machine. Each <i>HOMEID</i> 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	<p>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.</p>
Generic	<p>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.</p> <p>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:</p> <p>generic documentation references</p> <p>All generic documentation references described in this guide appear under this index entry.</p>

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. The following topics are discussed:

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

Overview of OLE DB

OLE 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.

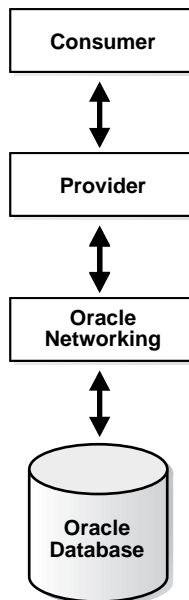
Oracle Provider for OLE DB offers high performance and efficient access to Oracle data by OLE DB consumers.

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 durable 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.

System Requirements

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

- Windows 98 or Windows NT 4.0
- Access to an Oracle Server (release 7.3.4 or later)
- Net8 Client (release 8.1.6)
- Redistributable files provided with Microsoft Data Access Components (MDAC) 2.1 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 8.1.5.0.1 or later). This item is required for consumers using Microsoft Transaction Server (MTS).

Installation

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

During the installation process, the following files are installed on the system:

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

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](#)
- [Example: Using OraOLEDB with Visual Basic](#)

OraOLEDB Provider Specific Features

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

- [Data Source Objects](#)
- [Sessions](#)
- [Commands](#)
- [Rowsets](#)
- [LOB Support](#)
- [Errors](#)

Additional provider-specific information is provided in [Appendix A, "Provider-Specific Information"](#).

Data Source Objects

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 and 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 displaying 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 the same way as the Provider and User ID are set. The provider-specific connection string attributes are:

- `FetchSize` - specifies the size of the fetch array in rows. See "[OraOLEDB-specific Connection String Attributes for Rowsets](#)" on page 2-14.
- `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 2-14.

- **ChunkSize** - specifies the size of LONG or LONG RAW column data stored in provider-specific cursor. See "[OraOLEDB-specific Connection String Attributes for Rowsets](#)" on page 2-14.
- **OSAuthent** - specifies whether OS Authentication will be used when connecting to an Oracle database. See "[OraOLEDB-specific Connection String Attributes for Data Source Objects](#)" on page 2-4.
- **PLSQLRSet** - enables or disables parsing of PL/SQL stored procedures to check if a PL/SQL stored procedure returns a rowset. See "[OraOLEDB-Specific Connection String Attributes for Commands](#)" on page 2-8.
- **PwdChgDlg** - enables or disables displaying the password change dialog box when the password expires. See "[OraOLEDB-specific Connection String Attributes for Data Source Objects](#)" on page 2-4.

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. Note that these attributes cannot be changed through the OLE DB property interfaces. After they are set at connection time, they cannot be changed during the lifetime of the session.

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;"
```

OraOLEDB-specific Connection String Attributes for Data Source Objects

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

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"

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 ADODB.Connection
Set con = 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 ADODB.Connection
Set con = NEW ADODB.Connection
con.Provider = "OraOLEDB.Oracle"
con.Open "MyOraDb", "scott", "tiger"
```

Connect and set provider specific attributes

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

OS Authenticated connect using OSAuthent

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

Password Expiration

Oracle8i 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*.

Sessions

OraOLEDB session object represents a single connection to an Oracle Server. 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 8.1.5.0.1 or later to be able to participate in Microsoft Transaction Server transactions or to enlist in a global 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 both the ANSI SQL supported by Oracle and the ODBC SQL syntax.

Stored Procedures

When executing an Oracle 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.

The following limitations apply to the use of command parameters:

- NLOB, NCHAR, and NVARCHAR2 data types are not supported for command parameters. BLOB and CLOB data types are not supported for PL/SQL stored procedure parameters.
- OraOLEDB supports only positional binding.

OraOLEDB-Specific Connection String Attributes for Commands

The PLSQLRSet attribute specifies whether OraOLEDB needs to parse the PL/SQL stored procedures to determine if a PL/SQL stored procedure returns a rowset. If any of the PL/SQL blocks that the consumer is going to execute returns a rowset, PLSQLRSet needs to be set to 1.

This parsing process incurs processing overhead of at least one round trip to the database. If none of the PL/SQL stored procedures return a rowset within a particular session, PLSQLRSet should be set to 0. The default value of this attribute is 0.

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 can return up to one rowset per PL/SQL stored procedure or function call.

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 the first 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. If the stored function does not return a Ref cursor, the rowset is returned for the first Ref cursor argument in the stored function.

To use this feature, stored procedures or functions must be called in the ODBC SQL escape sequence. This feature also requires stored procedures and functions to be in a specific format:

- A package must be created to define all the cursors used in the procedure or function.
- The procedure or function is created using the defined cursors.

Example: Stored Procedure Returning Result Set

The following sample code shows an ADO program calling a PL/SQL stored procedure returning a result set.

PL/SQL Package

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

    PROCEDURE GetEmpRecords(p_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,
                           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;

    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 Cmd As New ADODB.Command
Dim Pm1 As New ADODB.Parameter
Dim Pm2 As New ADODB.Parameter

Con.Provider = "OraOLEDB.Oracle"
Con.ConnectionString = "PLSQLRSet=1;Data Source=MyOraDb;" & _
    "User ID=scott;Password=tiger;"

Con.Open
Cmd.ActiveConnection = Con
Set Pm1 = Cmd.CreateParameter("Pm1", adSmallInt, adParamInput, , 30)
Cmd.Parameters.Append Pm1
Set Pm2 = Cmd.CreateParameter("Pm2", adSmallInt, adParamOutput)
Cmd.Parameters.Append Pm2

' Although Employees.GetEmpRecords() takes three parameters, only
' two need to be bound because Ref cursor parameters are automatically
' bound by the provider.
' Stored Procedures returning result sets must be called using the
' ODBC escape sequence for calling stored procedures.
Cmd.CommandText = "{CALL Employees.GetEmpRecords(?, ?)}"
Set Rst1 = Cmd.Execute

' Just as in a stored procedure, the Ref cursor return value must
' not be bound in a stored function.
' Stored Functions returning result sets must be called using the
' ODBC escape sequence for calling stored functions.
Cmd.CommandText = "{CALL Employees.GetDept(?, ?)}"
Set Rst2 = Cmd.Execute

```

Rowsets

Note: Dynamic and Keyset cursors are not supported by Oracle Provider for OLE DB.

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 that are created using queries with JOINS are not updatable by Oracle Provider for OLE DB. However, these rowsets could be made updatable for ADO users by specifying `CursorLocation` as `adUseClient`.

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** - is currently reserved.
- **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 *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 "db815", "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
```

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.

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

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

Example: Using OraOLEDB with Visual Basic

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.

To 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.

To create the PL/SQL package:

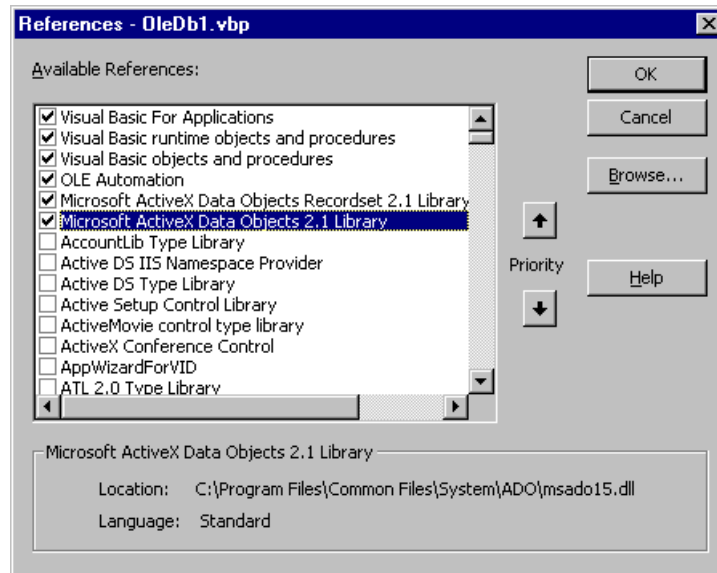
1. Start SQL*Plus.
2. Connect as user name SCOTT with the password TIGER.
3. Create the PL/SQL packages shown in "PL/SQL Package" on page 2-10.

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.

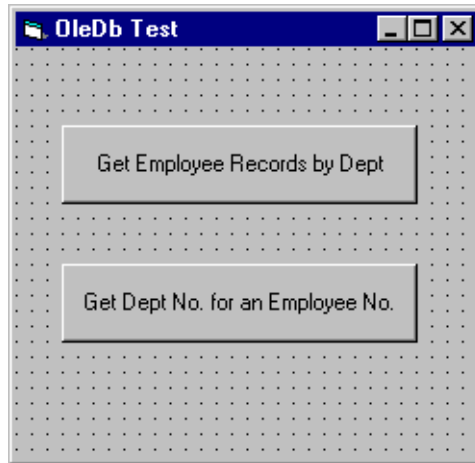
Setting up the Visual Basic Project

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=examplepdb;" & _
```

```

        "User ID=scott;" & _
        "Password=tiger;" & _
        "PLSQLSet=1;"

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

cmd.CommandText = "{CALL Employees.GetDept(?, ?)}"
Set recset = cmd.Execute
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;" & _
    "PLSQLSet=1;"

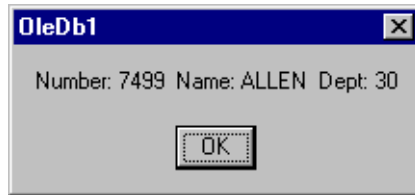
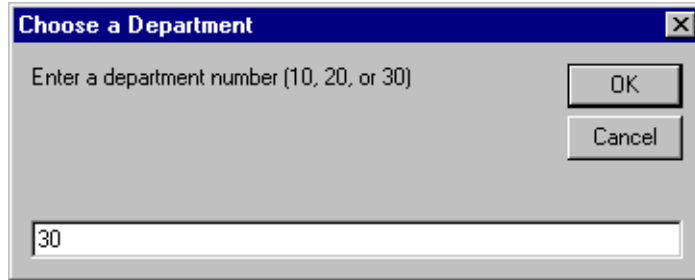
Oracon.Open
Set cmd = New ADODB.Command
Set cmd.ActiveConnection = Oracon
Set param1 = cmd.CreateParameter("param1", adSmallInt, adParamInput, ,
    DeptValue)
cmd.Parameters.Append param1
Set param2 = cmd.CreateParameter("param2", adSmallInt, adParamOutput)
cmd.Parameters.Append param2

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



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 *OLE DB Programmer's Reference Guide*.

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

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 particular OLE DB datatype. This correspondence is used when datatype information is retrieved from an Oracle database. Oracle types are mapped to OLE DB types as follows:

Oracle datatype	OLE DB datatype
BFILE	DBTYPE_BYTES
BLOB	DBTYPE_BYTES
CHAR	DBTYPE_STR
CLOB	DBTYPE_STR
DATE	DBTYPE_DBTIMESTAMP
FLOAT	DBTYPE_R8
LONG	DBTYPE_STR
LONG RAW	BTYPE_BYTES
NCHAR	DBTYPE_STR
NCLOB	DBTYPE_STR
NUMBER	DBTYPE_VARNUMERIC
NUMBER(p,s)	DBTYPE_NUMERIC
NVARCHAR2	DBTYPE_STR
RAW	DBTYPE_BYTES
ROWID	DBTYPE_STR
VARCHAR	DBTYPE_STR

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-1 DBPROPSET_DATASOURCE Properties

Property	Status	Initial Value
DBPROP_CURRENTCATALOG	READ-ONLY	null

Data Source Info Properties

Table A-2 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

Properties Supported

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_NOTSUPPORTED
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"

Property	Status	Initial Value
DBPROP_PROVIDERSERVER	READ-ONLY	"08.01.05.00.00"
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-3 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

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-4 DBPROPSET_SESSION Properties

Property	Status	Initial Value
DBPROP_SESS_AUTOCOMMITISOLEVELS	READ-ONLY	DBPROPVAL_TI_CURSORSTABILITY DBPROPVAL_TI_READCOMMITTED

Rowset Properties

Table A-5 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_CANSROLLBACKWARDS	READ/WRITE	VARIANT_FALSE
DBPROP_CHANGEINSERTEDROWS	READ-ONLY	VARIANT_TRUE
DBPROP_CLIENTCURSOR	READ/WRITE	VARIANT_TRUE

Property	Status	Initial Value
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_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_TRUE
DBPROP_LOCKMODE	READ-ONLY	DBPROPVAL_LM_NONE

Properties Supported

Property	Status	Initial Value
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_ABOUTTODD DBPROPVAL_NP_SYNCHAFTEH DBPROPVAL_NP_FAILEDTODD DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWUNDDDELETE	READ/WRITE	DBPROPVAL_NP_OKTODO DBPROPVAL_NP_ABOUTTODD DBPROPVAL_NP_SYNCHAFTEH DBPROPVAL_NP_FAILEDTODD DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWUNDDINSERT	READ/WRITE	DBPROPVAL_NP_OKTODO DBPROPVAL_NP_ABOUTTODD DBPROPVAL_NP_SYNCHAFTEH DBPROPVAL_NP_FAILEDTODD DBPROPVAL_NP_DIDEVENT
DBPROP_NOTIFYROWUNDDUPDATE	READ/WRITE	DBPROPVAL_NP_OKTODO DBPROPVAL_NP_ABOUTTODD DBPROPVAL_NP_SYNCHAFTEH DBPROPVAL_NP_FAILEDTODD DBPROPVAL_NP_DIDEVENT
DBPROP_ORDEREDBOOKMARKS	READ-ONLY	VARIANT_TRUE
DBPROP_OTHERINSERT	READ-ONLY	VARIANT_FALSE
DBPROP_OTHERUPDATEDELETE	READ-ONLY	VARIANT_FALSE
DBPROP_OWNINGINSERT	READ-ONLY	VARIANT_TRUE
DBPROP_OWNINGUPDATEDELETE	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_TRANSACTIONEDOBJECT	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_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 Objects](#)
- [Sessions](#)
- [Commands](#)
- [Rowsets](#)
- [Transaction Options](#)
- [Custom Error Objects](#)

Data Source Objects

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

Sessions

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

Commands

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

Rowsets

```
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;
}
```

Transaction Options

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

Custom Error Objects

```
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

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