

Oracle® Call Interface

Getting Started

Release 8.0.6 for Windows NT and Windows 95/98

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ORACLE

Oracle Call Interface Getting Started, Release 8.0.6 for Windows NT and Windows 95/98

Part No. A69521-01

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Contributors: Eric Belden, Joseph Garcia, Lisa Giambruno, Michael Hussey, Eng Khor, Helen Slattery, Jeff Stein

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Contact Us!

Oracle Call Interface Getting Started, Release 8.0.6 for Windows NT and 95/98

Part No. A69521-01

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

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

How to Contact Oracle Technical Publications

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

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

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

How to Contact Oracle Support Services

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

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

Oracle Support Call... Services In...

All locations The telephone number for your country is listed at the following Web site:

http://www.oracle.com/support/contact_us/sup_hot_phone.html

Oracle Support Services telephone numbers are also listed in the *Oracle Customer Support Guide* in your kit.

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

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

- The hardware name on which your application is running.

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

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

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

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

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

- A description of the issue, including:

- **What happened?** For example, the command used and its result.

-
- **When did it happen?** For example, during peak system load, or after a certain command, or after an operating system upgrade.

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

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

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

Resources for Oracle Partners and Developers

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

| Information Source | Description |
|--|---|
| Oracle Corporation Home Page http://www.oracle.com | This Web site is the starting point for general information on Oracle Corporation. |
| Alliance Online http://alliance.oracle.com | Oracle provides leading-edge technology, education, and technical support that enables you to effectively integrate Oracle into your business. By joining the Oracle Partner Program, you demonstrate to customers that you are committed to delivering innovative Oracle-based solutions and services. The greater your commitment to Oracle, the more we can help you grow your business. It's that simple. The value you derive is associated directly with your level of commitment. |
| Oracle Education http://education.oracle.com/ | Customers come to Oracle Education with a variety of needs. You may require a complete curriculum based on your job role to enable you to implement new technology. Or you may seek an understanding of technology related to your key area of responsibility to help you meet technical challenges. You may be looking for self-paced training that can be used as an ongoing resource for reference and hands-on practice. Or, you may be interested in an overview of a new product upgrade. Whatever your training need, Oracle Education has the solution. |
| Oracle Technology Network http://technet.oracle.com/ | The Oracle Technology Network is your definitive source for Oracle technical information for developing for the Internet platform. You will be part of an online community with access to free software, Oracle Technology Network-sponsored Internet developer conferences, and discussion groups on up-to-date Oracle technology. Membership is free. |
| Oracle Store http://oraclestore.oracle.com/ | This is Oracle's online shopping center. Come to this site to find special deals on Oracle software, documentation, publications, computer-based training products, and much more. |

| Information Source | Description |
|--|---|
| <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><i>OracleMetalink</i> 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><i>OracleLifecycle</i> 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><i>ExpertONLINE</i> 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> |
| <p>Customer Service http://www.oracle.com/support/cus_serv/index.html</p> | <p>This site provides resources to make your interactions with Oracle as easy as possible. Among the things you can do are</p> <ul style="list-style-type: none"> ■ Learn what is a CPU Support Identification (CSI) number ■ Update your technical contact information ■ Find out whom to contact for invoice and collection issues ■ Request product update shipments ■ Access a glossary of Oracle Support Services terms |

| Information Source | Description |
|--|---|
| U.S. Customer Visit Program http://www.oracle.com/support/cus_serv/cus_visit.html | This U.S.-based program has been established to help our customers understand and obtain maximum benefit from the support services they have purchased. The visit typically offers a customized orientation presentation, a comprehensive overview and demonstration of Oracle's electronic services, and helpful tips on working more effectively with Oracle Support Services. |
| Support Web Center Library http://www.oracle.com/support/library/index.html | This site contains articles, guides, and other documentation to help you leverage the wealth of knowledge and reference material that Oracle Support Services produces. |
| Product Availability infowin@us.oracle.com | Send an e-mail to request information on future product releases on Oracle for Windows NT and Windows 95/98. |



Preface

This guide provides introductory information for the Oracle Call Interface running under the Microsoft for Windows NT and Windows 95/98. Specific topics discussed in this preface are:

- [Prerequisites](#)
- [Intended Audience](#)
- [How This Guide Is Organized](#)
- [Conventions](#)
- [Documentation Library](#)
- [Related Documents](#)

Prerequisites

This guide assumes that you are familiar with:

- How to compile and link a C program.
- Your Microsoft for Windows NT and Windows 95/98 operating system.

Intended Audience

This guide is necessary for anyone who wants to use the Oracle Call Interface under the Microsoft for Windows NT and Windows 95/98 operating system.

How This Guide Is Organized

This guide is organized as follows:

Chapter 1, "Introducing the Oracle Call Interface"

Provides introductory information to help you get started with the Oracle Call Interface.

Chapter 2, "Building OCI Applications"

Provides an overview of how to build Oracle database applications using OCI.

Conventions

The following conventions are used in this guide.

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

| Convention | Example | Meaning |
|---------------------------------------|---|---|
| Oracle database | | The database component of Oracle8. |
| C:\> | C:\ORANT\DATABASE> | Represents the Windows NT or Windows 95 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 | \DATABASE | Indicates that the directory is a subdirectory of the root directory. |
| Oracle home | Go to the <i>ORACLE_HOME</i> \DATABASE directory. | Oracle home is represented as the hard drive letter and the top level directory where your Oracle software is installed. In this guide, the convention <i>ORACLE_HOME</i> is used to indicate your Oracle home directory, which may be: C:\ORANT for Windows NT C:\ORAWIN95 for Windows 95 C:\ORAWIN98 for Windows 98 or whatever you may have called your Oracle home. |
| HOMEID | HOME0, HOME1, HOME2 | Represents a unique registry subkey for each Oracle home directory in which you install products. A new HOMEID is created and incremented each time you install products to a different Oracle home directory on one machine. Each HOMEID 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 for Windows NT and Windows 95/98 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 for Windows NT and Windows 95/98 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 manuals.

- *Oracle8 Enterprise Edition for Windows NT Installation CD-ROM Insert*
- *Oracle8 Enterprise Edition Release Notes*
- *Oracle8 Enterprise Edition Getting Started for Windows NT*
- *Oracle Enterprise Manager Configuration Guide*
- *Oracle Enterprise Manager Administrator's Guide*
- *Net8 Getting Started for Windows NT and Windows 95*
- *Net8 Administrator's Guide*
- *Oracle8 Parallel Server Concepts and Administrator's Guide*
- *Oracle Parallel Server Management User's Guide*
- *Oracle8 Concepts*
- *Oracle8 Server Reference Manual*
- *Oracle8 Error Messages*
- *Oracle Call Interface Programmer's Guide*

Introducing the Oracle Call Interface

This chapter provides introductory information to help you get started with the Oracle Call Interface for Windows NT and Windows 95/98. Specific topics discussed are:

- [What is the Oracle Call Interface?](#)
- [What is Included in the OCI Package?](#)
- [Oracle Directory Structure](#)
- [Sample Programs](#)

What is the Oracle Call Interface?

The Oracle Call Interface (OCI) is an application programming interface (API) that allows applications written in C to interact with one or more Oracle Servers. OCI gives your programs the capability to perform the full range of database operations that are possible with Oracle8 Server, including SQL statement processing and object manipulation.

Additional Information: See the *Oracle Call Interface Programmer's Guide* for detailed information about using OCI, including function descriptions.

What is Included in the OCI Package?

The Oracle Call Interface for Windows NT and Windows 95/98 package includes:

- Oracle Call Interface for Windows NT and Windows 95/98
- Required Support Files (RSFs)
- Oracle Installer
- header files for compiling OCI applications
- library files for linking OCI applications
- sample programs for demonstrating how to build OCI applications

For additional information, see the Getting Started guide and Release Notes provided with the product.

Oracle Directory Structure

When you install the Oracle Call Interface for Windows NT and Windows 95/98, Oracle Installer creates an Oracle home directory on the hard drive of your computer. The default Oracle home directory is \ORANT for Windows NT, \ORAWIN95 for Windows 95, and \ORAWIN98 for Windows 98.

The OCI files are located in the Oracle home directory, as are the library files needed to link and run OCI applications, and link with other Oracle for Windows NT products, such as Oracle Forms.

The Oracle home directory contains the following directories that are relevant to OCI:

| Directory Name | Contents |
|--|---|
| \BIN | Executable and help files |
| \DBS | SQL scripts and other utility files |
| \OCI80 | Oracle Call Interface for Windows NT and Windows 95/98 files. \OCI80 contains the following subdirectories: |
| <ul style="list-style-type: none"> ■ \LIB | Library files, for Borland and Microsoft, that link into OCI applications |
| <ul style="list-style-type: none"> ■ \INCLUDE | Header files, such as OCIDFN.H and OCIAPR.H |
| <ul style="list-style-type: none"> ■ \SAMPLES | Sample programs for Borland and Microsoft |
| \ORAINST | Files used by Oracle Installer |

Sample Programs

Oracle Installer copies a set of sample programs and their corresponding project files into the \SAMPLES subdirectory. Oracle recommends that you build and run these sample programs to verify that OCI has been successfully installed and to familiarize yourself with the steps involved in developing OCI applications.

To build a sample, run a batch file (MAKE.BAT) at the MS-DOS command prompt. For example, to build the CDEMOM1.C sample, enter the following command:

```
MAKE CDEMOM1
```

After you finish using these sample programs, you can delete them if you choose.

A sample OCI application specific to Windows NT and Windows 95/98 is included. CDEMOMT.C demonstrates OCI multithreading which is the thread safety feature of Oracle8 is also included on the Windows NT and Windows 95/98 platforms. This sample program requires the EMP table from the default database. This program spawns two simultaneous threads that attempt to insert different employee names with the same ID numbers. Automatic mutexing is demonstrated.

Additional Information: For more information on multithreading, see the *Oracle Call Interface Programmer's Guide*.

Building OCI Applications

This chapter provides an overview of how to build Oracle database applications using OCI. Specific topics discussed are:

- [Writing OCI Applications](#)
- [Compiling OCI Applications](#)
- [Linking OCI Applications](#)
- [Running OCI Applications](#)
- [Using the Object Type Translator and the INTYPE File Assistant](#)

Writing OCI Applications

The general goal of an OCI application is to connect to an Oracle Server, engage in some sort of data exchange, and perform necessary data processing. While some flexibility exists in the order in which specific tasks can be performed, every OCI application needs to accomplish particular steps.

The basic programming structure used by the OCI is as follows:

1. Initialize the OCI programming environment and processes.
2. Allocate necessary handles, and establish a server connection and a user session.
3. Issue SQL statements to the server, and perform necessary application data processing.
4. Free statements and handles not to be reused or reexecute prepared statements again, or prepare a new statement.
5. Terminate user session and server connection.

Additional Information: See the *Oracle Call Interface Programmer's Guide* for detailed information about writing OCI applications.

Compiling OCI Applications

When you compile an OCI application, you must include the appropriate OCI header files. The header files are located in the `ORACLE_HOME\OCI80\INCLUDE` directory.

Additional Information: See your compiler's documentation for specific information about compiling your application and special compiler options.

Linking OCI Applications

The OCI calls are implemented in dynamic link libraries (DLLs) that Oracle provides. The DLLs are located in the `ORACLE_HOME\BIN` directory and are part of the Required Support Files.

To use the Oracle DLLs to make OCI calls, you must link your application with one of the OCI libraries:

- [OCI.LIB](#)
- [OCIW32.LIB](#)

You do not have to indicate any special link options.

Note: Other libraries may be necessary, such as `MSVCRT.LIB` for Microsoft and `BIDSFT.LIB` for Borland. These depend on the compiler.

OCI.LIB

Release 8.0.6 of the Oracle Call Interface for Windows NT, 95, or 98 includes a library called `OCI.LIB`. Oracle has removed any version number from the library name. You do not have to relink applications every time there is a release of OCI.

OCIW32.LIB

`OCIW32.LIB` is included for backward compatibility with Oracle7. This library contains only the 7.x OCI functions.

This DLL dynamically loads the Oracle client DLL that is available on user systems. However, this DLL only contains the 7.x OCI calls. With Release 8 installed, `OCIW32.DLL` loads `ORA806.DLL` and passes the functions to the DLL described in the implementation below.

`OCIW32.DLL` attempts to translate the registry variable `ORAOCI`.

- If the variable exists, its value is expected to be the name of an Oracle client DLL: `ORA806.DLL`, `ORA805.DLL`, `ORA804.DLL`, `ORA803.DLL`, `ORA73.DLL`, `ORA72.DLL`, `ORANT71.DLL`, or `ORA70.DLL`.
- If the variable does not exist, or if using its value to call `LoadLibrary` fails, then `OCIW32.DLL` continues to search through a predefined list of known Oracle client DLL names in the order most recent to least recent RSFs. If no Oracle client DLLs are found, an error is returned.

Note: The registry variables ORAOCI and ORAOCI_DEBUG should be set in the HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\HOMEID subkey, where *ID* indicates the home in which OCIW32.DLL is installed.

Next, OCIW32.DLL fills in a table of function pointers, one for each OCI call. Obsolete OCI functions are not immediately loaded since they are most likely not to be used and may be omitted in future OCI releases. These are loaded on demand at runtime instead. No errors are returned when attempting to load function pointers.

When a user calls a function in OCIW32.DLL, the function in OCIW32.DLL checks to see if the corresponding function in the Oracle client DLL exists.

- If the function does exist, it is called by OCIW32.DLL.
- If the function does not exist, the error "ORA-1010: Invalid OCI Operation" is returned by OCIW32.DLL.

Note: A debug mode is available. Set ORAOCI_DEBUG to any value, and a number of informational messages boxes are raised.

Loading of Client DLLs When LoadLibrary() is Used

The following directories are searched in this order by LoadLibrary:

- directory from which the application is loaded
- current directory
- on Windows NT:
 - the 32-bit Windows system directory (SYSTEM32). Use the `GetWindowsDirectory` function to obtain the path of this directory.
 - the 16-bit Windows directory (SYSTEM). There is no Win32 function that obtains the path of this directory, but it is searched.
- on Windows 95 or Windows 98:
 - the Windows directory. Use the `GetWindowsDirectory` function to obtain the path of this directory.
 - the directories that are listed in the PATH environment variable

Note: If no Oracle client DLL can be loaded, the DllMain() function of OCIW32.DLL will return FALSE and the application will fail to load. If the operating system does not provide an adequate error message to detect this, set ORAOCI_DEBUG.

Running OCI Applications

To run an OCI application, ensure that the entire corresponding set of RSFs is installed on the machine that is running your OCI application.

Using the Object Type Translator and the INTYPE File Assistant

The Object Type Translator (OTT) is used to create C-struct representations of Abstract Data Types that have been created and stored in an Oracle8 database.

Note: As on the Solaris platform, OTT on Windows NT can be invoked from the command line. See the *Oracle Call Interface Programmer's Guide* for more information. Additionally, a configuration file may be named on the command line. For Windows NT, the configuration file is:
ORACLE_HOME\OTT80\OTTCFG.CFG.

To take advantage of objects run OTT against the database, and a header file is generated that includes the C structs. For example, if a PERSON type has been created in the database, OTT can generate a C struct with elements corresponding to the attributes of PERSON. In addition, a null indicator struct is created that represents null information for an instance of the C struct.

The INTYPE file tells the OTT which object types should be translated. This file also controls the naming of the generated structs. The INTYPE File Assistant is a wizard that helps developers to create the INTYPE file.

Note that the CASE specification inside the INTYPE files, such as CASE=LOWER, applies only to C identifiers that are not specifically listed, either through a TYPE or TRANSLATE statement in the INTYPE file. It is important to provide the type name with the appropriate cases, such as TYPE Person and Type PeRsOn, in the INTYPE file.

The INTYPE File Assistant generates type names in the INTYPE file with the same case as in the database. By default, all of the types in the database are created in

upper case. In order to preserve the case, use double quotes when creating types in the database. For example:

```
CREATE TYPE "PeRsOn" AS OBJECT...
```

Object type dependencies are not checked by the Oracle INTYPE File Assistant. When adding an object type for inclusion in the INTYPE file, the INTYPE File Assistant does not add other object types with dependency relationships.

The INTYPE File Assistant requires explicit translations for object types or attributes whose names contain non-ASCII characters. These object types or attributes are indicated by the predefined tag Identifier in the fields where the translations would be entered. Users are required to override this tag with the C identifier translation for the corresponding object type or attribute. The INTYPE File Assistant does not create the INTYPE file until all required translations have been entered.

Additional Information: See the *Oracle Call Interface Programmer's Guide* for more information about OTT and INTYPE files. In addition, see the online help for OTT.

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