Oracle® Database

Database Instant Client Installation Guide

19c for Apple Mac OS X (Intel)

F21305-03
October 2020

Oracle Database Database Instant Client Installation Guide, 19c for Apple Mac OS X (Intel)

F21305-03

Copyright © 2015, 2020, Oracle and/or its affiliates.

Primary Author: Sunil Surabhi

Contributors: Bharathi Jayathirtha, Prakash Jashnani

Contributors: Neha Avasthy, Dilip Nutakki, Vijay Lakkundi, Mark Bauer, David Austin, Rohitash Panda, Subhranshu Banerjee, Janelle Simmons, Robert Chang, Jonathan Creighton, Sudip Datta, Thirumaleshwara Hasandka, Joel Kallman, George Kotsovolos, Simon Law, Shekhar Vaggu, Richard Long, Rolly Lv, Padmanabhan Manavazhi, Sreejith Minnanghat, Krishna Mohan, Rajendra Pingte, Hanlin Qian, Roy Swonger, Ranjith Kundapur, Aneesh Khandelwal , Barb Lundhild, Barbara Glover, Binoy Sukumaran, Prasad Bagal, Martin Widjaja, Ajesh Viswambharan, Eric Belden, Sivakumar Yarlagadda, Rudregowda Mallegowda , Matthew McKerley, Trivikrama Samudrala, Akshay Shah, Sue Lee, Sangeeth Kumar, James Spiller, Saar Maoz, Rich Long, Mark Fuller, Sunil Ravindrachar, Sergiusz Wolicki, Eugene Karichkin, Joseph Francis, Srinivas Poovala, David Schreiner, Neha Avasthy, Dipak Saggi, Sudheendra Sampath, Mohammed Shahnawaz Quadri, Shachi Sanklecha, Zakia Zerhouni, Jai Krishnani, Darcy Christensen., Kevin Flood, Clara Jaeckel, Emily Murphy, Terri Winters

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs (including any operating system, integrated software, any programs embedded, installed or activated on delivered hardware, and modifications of such programs) and Oracle computer documentation or other Oracle data delivered to or accessed by U.S. Government end users are "commercial computer software" or "commercial computer software documentation" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, reproduction, duplication, release, display, disclosure, modification, preparation of derivative works, and/or adaptation of i) Oracle programs (including any operating system, integrated software, any programs embedded, installed or activated on delivered hardware, and modifications of such programs), ii) Oracle computer documentation and/or iii) other Oracle data, is subject to the rights and limitations specified in the license contained in the applicable contract. The terms governing the U.S. Government’s use of Oracle cloud services are defined by the applicable contract for such services. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Inside are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Epyc, and the AMD logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Contents

Preface

Audience v
Documentation Accessibility v
Related Documentation v
Command Syntax vi
Typographic Conventions vi

1 Overview of Oracle Database Instant Client Installation

Planning Your Installation 1-1
Installation Considerations 1-1
Oracle Database Instant Client Installation Types 1-2
Oracle Database Instant Client and Oracle Database Interoperability 1-3
Simplified Patching of Timestamp with Time Zone Data Type 1-3

2 Oracle Database Instant Client Preinstallation Tasks

Checking the Hardware Requirements 2-1
- Memory Requirements 2-1
- System Architecture 2-1
- Disk Space Requirements 2-2

Checking the Software Requirements 2-2
- Instant Client Light Requirements 2-3

3 Installing and Removing Oracle Database Instant Client

Installing Non-Notarized Oracle Instant Client Software Using Zip Files 3-1
Installing Notarized Oracle Instant Client Software Using DMG Files 3-1
Removing the Oracle Database Instant Client Software 3-2

4 Oracle Database Instant Client Postinstallation Tasks

Using Oracle Database Instant Client 4-1

Required Product-Specific Postinstallation Tasks 4-2
Configuring Oracle Precompilers 4-2
Configuring Pro*C/C++ 4-2
Recommended Postinstallation Tasks 4-2
Connecting Instant Client or Instant Client Light to an Oracle Database 4-2
Specifying a Connection by Using the Easy Connect Naming Method 4-3
Specifying a Connection Using an Empty Connect String and TWO_TASK 4-4
Setting the NLS_LANG Environment Variable 4-4
Updating Instant Client 4-4

Preface

This guide provides instructions about installing and configuring Oracle Database Client for Apple Mac OS X (Intel) (64-bit).

- Audience
- Documentation Accessibility
- Related Documentation
- Command Syntax
- Typographic Conventions

Audience

This guide is intended for anyone responsible for installing Oracle Database Client for Apple Mac OS X (Intel) (64-bit). Additional platform-specific installation guides for Oracle Database, Oracle Real Application Clusters, Oracle Clusterware, Oracle Database Examples, and Oracle Enterprise Manager Grid Control are available on the relevant installation media.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Related Documentation

The related documentation for Oracle Database 19c products includes the following manuals:

- *Oracle Database Installation Guide*
- *Oracle Grid Infrastructure Installation Guide*
- *Oracle Real Application Clusters Installation Guide for Linux and UNIX*
- *Oracle Database Error Messages*
- *Oracle Database Sample Schemas*

Command Syntax

UNIX command syntax appears in `monospace` font. The dollar character ($), number sign (#), or percent character (%) are UNIX command prompts. Do not enter them as part of the command. The following command syntax conventions are used in this guide:

Convention	Description

backslash \	A backslash is the UNIX command continuation character. It is used in command examples that are too long to fit on a single line. Enter the command as displayed (with a backslash) or enter it on a single line without a backslash:
	`dd if=/dev/rdsk/c0t1d0s6 of=/dev/rst0 bs=10b \`
	`count=10000`

braces { }	Braces indicate required items: `.DEFINE {macro1}`
brackets [ ]	Brackets indicate optional items: `cvtcrt` *`termname`* `[`*`outfile`*`]`
ellipses ...	Ellipses indicate an arbitrary number of similar items: `CHKVAL fieldname value1 value2 ... valueN`
italics	Italic type indicates a variable. Substitute a value for the variable: *`library_name`*
vertical line |	A vertical line indicates a choice within braces or brackets: `FILE` *`filesize`* `[K|M]`

Typographic Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1

Overview of Oracle Database Instant Client Installation

This chapter describes the different installation types of Oracle Database Instant Client and issues to consider before you install Oracle Database Instant Client.

- Planning Your Installation
- Installation Considerations
- Oracle Database Instant Client Installation Types
- Oracle Database Instant Client and Oracle Database Interoperability
- Simplified Patching of Timestamp with Time Zone Data Type

Planning Your Installation

The Oracle Database installation process consists of the following phases:

1. **Review the licensing information:** Although the installation media in your media pack contain many Oracle components, you are permitted to use only those components for which you have purchased licenses.

   Oracle Support Services does not provide support for components for which licenses have not been purchased.

   > **See Also:**
   >
   > *Oracle Database Licensing Information*

2. **Plan the installation:** This chapter describes the Oracle products that you can install and issues that you must consider before starting the installation.
3. **Complete preinstallation tasks:** Oracle Database Instant Client Preinstallation Tasks describes preinstallation tasks that you must complete before installing the product.
4. **Install the software:** Installing and Removing Oracle Database Instant Client describes how to install Oracle Database Instant Client.
5. **Complete postinstallation tasks:** Oracle Database Instant Client Postinstallation Tasks describes recommended and required postinstallation tasks.

Installation Considerations

This section contains hardware and software certification information that you should consider before deciding to install this product.

The platform-specific hardware and software requirements included in this guide were current when this guide was published. However, because new platforms and operating system software versions might be certified after this guide is published, review the certification matrix on the My Oracle Support website for the most up-to-date list of certified hardware platforms and operating system versions. The My Oracle Support website is available at

https://support.oracle.com/

You must register online before using My Oracle Support. After logging in, from the menu options, select the **Certifications** tab. On the **Certifications** page, use the **Certification Search** options to search by Product, Release, and Platform. You can also search using the **Certification Quick Links** options such as Product Delivery and Lifetime Support.

Oracle Database Instant Client Installation Types

In Oracle Database Instant Client 19c, Instant Client and Instant Client Light are the only supported installation types.

The Instant Client installation type enables you to install only the shared libraries required by Oracle Call Interface (OCI), Oracle C++ Call Interface (OCCI), Pro*C, or Java Database Connectivity (JDBC) OCI applications.

> **See Also:**
>
> *Oracle Call Interface Programmer's Guide*

The Instant Client Light (English) version of Instant Client further reduces the disk space requirements of the client installation. The size of the library has been reduced by removing error message files for languages other than English and leaving only a few supported character set definitions out of around 250.

This Instant Client Light version is geared toward applications that use either US7ASCII, WE8DEC, WE8ISO8859P1, WE8MSWIN1252, or a Unicode character set. There is no restriction on the `LANGUAGE` and the `TERRITORY` fields of the `NLS_LANG` setting, so the Instant Client Light operates with any language and territory settings. Because only English error messages are provided with the Instant Client Light, error messages generated on the client side, such as Net connection errors, are always reported in English, even if `NLS_LANG` is set to a language other than `AMERICAN`. Error messages generated by the database side, such as syntax errors in SQL statements, are in the selected language provided the appropriate translated message files are installed in the Oracle home of the database instance.

Instant Client Light supports the following client character sets:

- Single-byte
  - US7ASCII
  - WE8DEC
  - WE8MSWIN1252
  - WE8MSWIN1252
  - WE8ISO8859P1

- Unicode
  - UTF8
  - AL16UTF16
  - AL32UTF8
- Instant Client Light can connect to databases having one of these database character sets:
  - US7ASCII
  - WE8DEC
  - WE8MSWIN1252
  - WE8ISO8859P1
  - WE8EBCDIC37C
  - WE8EBCDIC1047
  - UTF8
  - AL32UTF8

  The advantage of using Instant Client Light is that it has a smaller footprint than the regular Instant Client. The shared libraries, which an application must load, are only 34 MB as opposed to the 110 MB that regular Instant Client uses. Therefore, the applications use less memory.

Oracle Database Instant Client and Oracle Database Interoperability

For information about interoperability between Oracle Database Instant Client and Oracle Database releases, see Note 207303.1 on the My Oracle Support website at

`https://support.oracle.com/CSP/main/article?cmd=show&type=NOT&id=207303.1`

Simplified Patching of Timestamp with Time Zone Data Type

Starting with Oracle Database 12*c* Release 1 (12.1), the patching process of `TIMESTAMP WITH TIMEZONE` data type values is simplified.

> **See Also:**
>
> *Oracle Database Globalization Support Guide*

2

Oracle Database Instant Client Preinstallation Tasks

This chapter describes the tasks that you must complete before you install Oracle Instant Client.

- Checking the Hardware Requirements
- Checking the Software Requirements

Checking the Hardware Requirements

The system must meet the following minimum hardware requirements for Oracle Database Instant Client 19c:

- Memory Requirements
- System Architecture
- Disk Space Requirements

Memory Requirements

The following are the memory requirements for Oracle Database Instant Client 19c:

- At least 512 MB of RAM.

  To determine the physical RAM size, use System Profiler (`/Applications/Utilities/System Profiler`) or enter the following command:

  ```
  $ /usr/sbin/system_profiler SPHardwareDataType | grep Memory
  ```

  If the size of the physical RAM is less than the required size, then you must install more memory before continuing.

The following are the RAM requirements:

- Up to 512 MB
- Between 513 MB and 726 MB
- More than 726 MB

To determine the available RAM, enter the following command:

```
$ free
```

https://support.apple.com/en-in/guide/activity-monitor/actmntr1004/mac

System Architecture

To determine whether the system architecture can run the software, enter the following command:

```
$ uname -p
```

This command displays the processor type. The command output must be `i386`. If you do not see the expected output, then you cannot install the software on this system.

Disk Space Requirements

The minimum disk space requirement for software files for Oracle Database Instant Client 19c is 220 MB.

To determine the amount of free disk space available, enter the following command:

```
$ df -h
```

Checking the Software Requirements

Depending on the products that you intend to install, verify that the following software is installed on the system.

Item	Requirement
Operating system	The following or later versions of the operating system are supported for Oracle Database 19c: • Apple Mac OS X 10.13.5 (High Sierra) • Apple Mac OS X 10.14 (Mojave) • Apple Mac OS X 10.15 (Catalina)
Tools	• Xcode 9.4 • GNU C compiler (gcc) version 4.2.1 or later This version of gcc is included in Xcode 9.4 or later. • Apple LLVM version 9.1.0 • JDK 1.8.0_172.jdk
Pro*C/C++, Oracle Call Interface, Oracle C++ Call Interface	The version of the GNU C and C++ compiler listed previously is supported for use with these products.
Oracle JDBC/OCI Drivers	You must use JDBC-OCI 1.8.0 or later versions with the JNDI extension.
Oracle ODBC Driver	Download and install unixODBC-2.3.4 or later at http://www.unixodbc.org

To ensure that the system meets these requirements:

1. To determine the operating system version, enter the following command:

   ```
   $ sw_vers
   ```

   The output of this command must be similar to the following:

   ```
   ProductName:    Mac OS X
   ProductVersion: 10.13.5
   BuildVersion:   17F77
   ```

> **Note:**
>
> Only the versions listed in the previous table are supported. Do not install the software on other versions of Apple Mac OS X.

2. To determine if the required version of gcc is installed, enter the following command:

```
$ gcc -v
```

This command returns output similar to the following:

```
Configured with: --prefix=/Applications/Xcode.app/Contents/
Developer/usr --with-gxx-include-dir=/usr/include/c++/4.2.1
Apple LLVM version 9.1.0 (clang-902.0.39.2)
Target: x86_64-apple-darwin17.6.0
Thread model: posix
InstalledDir: /Applications/Xcode.app/Contents/Developer/Toolchains/
XcodeDefault.xctoolchain/usr/bin
```

If the required version (including the date and build number) or a later version is not installed, then download and install Xcode 9.4 or later. You can download this software from the Apple Developer Connection website at

https://developer.apple.com/

3. To determine if the correct version of Xcode is installed, enter the following command:

```
$ /usr/bin/xcodebuild -version
```

This commands returns output similar to the following:

```
Xcode 9.4
Build version 9F1027a
```

If the required version (including the date and build number) or a later version is not installed, then download and install Xcode 5.0.2 or later. You can download this software from the Apple Developer Connection website at

https://developer.apple.com/

- Instant Client Light Requirements

Instant Client Light Requirements

In addition to the requirements described in the preceding section, if you plan to use Instant Client Light, then the applications must use the following languages and character sets:

- **Language:** Any language that is supported by Oracle
- **Territory:** Any territory that is supported by Oracle
- **Character sets:**
  - Single byte

    - US7ASCII
    - WE8DEC
    - WE8MSWIN1252
    - WE8ISO8859P1
  - Unicode
    - UTF8
    - AL16UTF16
    - AL32UTF8

    Instant Client Light can connect to databases having one of the following database character sets:

    - US7ASCII
    - WE8DEC
    - WE8MSWIN1252
    - WE8ISO8859P1
    - WE8EBCDIC37C
    - WE8EBCDIC1047
    - UTF8
    - AL32UTF8

Instant Client Light can also operate with the OCI Environment handles created in the OCI_UTF16 mode.

The language, territory, and character sets are determined by the `NLS_LANG` environment variable.

> **Note:**
>
> Ensure that you set the `NLS_LANG` environment variable to the required character set before you run Oracle Database Instant Client.

3

Installing and Removing Oracle Database Instant Client

The Oracle Database Instant Client software is available on the Oracle Instant Client downloads page.

- Installing Non-Notarized Oracle Instant Client Software Using Zip Files
- Installing Notarized Oracle Instant Client Software Using DMG Files
- Removing the Oracle Database Instant Client Software

Installing Non-Notarized Oracle Instant Client Software Using Zip Files

Download and install non-notarized Oracle Database Instant Client 19c zip files by completing the following steps:

1. Download the Oracle Instant Client for Mac OS X (Intel) (64-bit) package from the Oracle Instant Client Downloads page:

   `https://www.oracle.com/database/technologies/instant-client/downloads.html`

2. Create a directory on your computer, for example, `instantclient`. Choose a directory to install the Oracle Instant Client and unzip the downloaded zip file in that directory. The unzipped file creates the `instantclient_19_8` directory.
3. Set the `NLS_LANG` environment variable to the required character set. For example, an `NLS_LANG` of `american_america.utf8` is a valid setting. It is in the following format: `[NLS_LANGUAGE]_[NLS_TERRITORY].[NLS_CHARACTERSET]`.

   This completes the installation of Oracle Database Instant Client.

> **Note:**
>
> Non-notarized zip files will be discontinued in future releases.

Related Topics

- Instant Client Light Requirements

Installing Notarized Oracle Instant Client Software Using DMG Files

1. Download the Oracle Instant Client for Mac OS X (Intel) (64-bit) disk image (DMG) files from the Oracle Instant Client Downloads page:

https://www.oracle.com/database/technologies/instant-client/downloads.html

2. Mount all the DMG packages.
   - `/usr/bin/hdiutil mount` *`dmg_file_name`*
3. Run the following steps to copy the volume contents to `/Users/`*`user-name`*`/Downloads/instantclient_19_8`.
   a. `cd /Volumes/instantclient-*-macos.x64-19.8.0.0.0dbru`
   b. `sh ./install_ic.sh`
   c. In **Mac Finder**, eject the mounted Oracle Instant Client packages.

Removing the Oracle Database Instant Client Software

To remove the Oracle Database Instant Client software, delete the `instantclient_19_8` directory.

4

Oracle Database Instant Client Postinstallation Tasks

Complete these postinstallation tasks after you have installed the Oracle Database Instant Client software.

- Using Oracle Database Instant Client
- Required Product-Specific Postinstallation Tasks
- Recommended Postinstallation Tasks

Using Oracle Database Instant Client

You can build a C/C++ application that uses Oracle Database Instant Client and connect to an Oracle Database server. If you want to build a 64-bit application and use `instantclient_19_8/sdk/demo.mk` file, then perform the following steps:

1. Edit the `instantclient_19_8/sdk/demo.mk` file and set the `CC` and `cc` to your `gcc` location.
2. Compile the C/C++ application using the flags specified in the `demo.mk` file, namely, `-idirafter . -DMAC_OSX -D_GNU_SOURCE -D_REENTRANT -g -m64 -mmacosx-version-min=10.13 <c_file_name> -I../include`.
3. Start `make -f demo.mk buildoci EXE=cdemo81 OBJS=cdemo81.o` for a working demonstration of the options.
4. Add the Java Library Path in the `ott` script, if you notice the following issue:

   ```
   Exception in thread "main" java.lang.UnsatisfiedLinkError: no
   ocijdbc18 in java.library.path
   -Djava.library.path=location_of_libocijdbc18
   ```

   For example, if `libocijdbc18.dylib` is in the `/home/oracle/OTN/instantclient_19_8/` path, then you must add the following line in the `ott` script:

   ```
   JAVA_PATH=-Djava.library.path=/home/oracle/OTN/instantclient_19_8/
   ```

   and run the following command:

   ```
   exec java $JAVA_PATH $JREOPTIONS oracle.ott.c.CMain nlslang=$
   {NLS_LANG} $args
   ```
5. Modify `ICLIBHOME` in `demo.mk` to include the path to the libraries.

   For example, if the libraries are located in `/home/oracle/OTN/instantclient_19_8/`, then place it in the `demo.mk` file:
   `ICLIBHOME=/home/oracle/OTN/instantclient_19_8/`

The compilation options are as follows:

```
-idirafter . -DMAC_OSX -D_GNU_SOURCE -D_REENTRANT -g -m64 -mmacosx-
version-min=10.13 <c_file_name> -I../include
```

The link options are as follows:

```
-g -m64 -mmacosx-version-min=10.13 -rpath
full_path_to_instantclient_19_8_libs application_name -L../../ -locci -
lclntsh -lpthread
```

Required Product-Specific Postinstallation Tasks

The following sections describe postinstallation tasks that you must perform if you install and intend to use Oracle Precompliers:

> **Note:**
>
> You must perform postinstallation tasks only for products that you intend to use.

- Configuring Oracle Precompilers

Configuring Oracle Precompilers

This section describes postinstallation tasks for Pro*C/C++.

- Configuring Pro*C/C++

Configuring Pro*C/C++

Verify that the `PATH` environment variable setting includes the directory that contains the C compiler executable. The default directory for the `gcc` compiler executable is `/usr/bin`.

> **See Also:**
>
> *Pro*C/C++ Programmer's Guide*

Recommended Postinstallation Tasks

Oracle recommends that you perform the tasks described in the following sections after completing an installation:

- Connecting Instant Client or Instant Client Light to an Oracle Database
- Setting the NLS_LANG Environment Variable
- Updating Instant Client

Connecting Instant Client or Instant Client Light to an Oracle Database

Use one of the following methods to specify the database connection information for the instant client application:

- For OCI and OCCI programs, use the following connection string format:

```
host[:port][/service_name][:server][/instance_name]
```

- Set the `TNS_ADMIN` environment variable to specify the location of the `tnsnames.ora` file and specify a service name from that file.
- Set the `TNS_ADMIN` and the `TWO_TASK` environment variables to specify a service name from the `tnsnames.ora` file.

> **Note:**
>
> You do not need to specify the `ORACLE_HOME` variable.

After checking the environment variable, you can use any of the following methods to specify Oracle Database connection information for client applications:

- Specifying a Connection by Using the Easy Connect Naming Method
- Specifying a Connection Using an Empty Connect String and TWO_TASK

Specifying a Connection by Using the Easy Connect Naming Method

You can specify a connection address to an Oracle Database directly from a client application, without having to configure a `tnsnames` setting for the Instant Client. This method is convenient as you do not have to create and manage a `tnsnames.ora` file. However, the application users must specify the host name and port number when they want to log in to the application.

For example, if you run SQL*Plus on the client computer and want to connect to the `sales_us` database, which is located on a server whose host name is `shobeen` and port number is `1521`, then you can log in as follows:

```
sqlplus system/admin@shobeen:1521/sales_us
```

Similarly, in the application code, you can use Oracle Call Interface net naming methods to create the Instant Client-to-Oracle Database connection. For example, the following formats in the `OCIServerAttach()` call specify the connection information:

- Specify a SQL connect URL string using one of the following format:

  ```
  [ ( username, [ "/", password ] | "/" ), [ "@", db_address ] ],
  [ admin_role ], [ initial_edition ]
  ```

  or

  ```
  username/password@inst1
  ```

- Alternatively, you can specify the SQL connect information as an Oracle Net keyword-value pair. For example:

  ```
  "(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp) (HOST=shobeen) (PORT=1521))
  (CONNECT_DATA=(SERVICE_NAME=sales_us)))"
  ```

> **See Also:**
>
> *Oracle Call Interface Programmer's Guide*

Specifying a Connection Using an Empty Connect String and TWO_TASK

You can set the connect string to an empty connect string (""), and then set the `TWO_TASK` environment variable to one of the following values:

- A direct address, as described under "Specifying a Connection by Using the Easy Connect Naming Method"
- Oracle Net keyword-value pair
- A `tnsnames.ora` entry and `TNS_ADMIN` is set to the location of `tnsnames.ora`

This method allows the applications to specify internally a connection string if the application code itself uses an empty connection string. The benefit of an empty connect string is that the application itself does not have to specify the `tnsnames.ora` entry. Instead, when a user starts the application, the location of the database is determined by a script or the environment, depending on where you have set the `TWO_TASK` environment variable. The disadvantage of using empty strings is that you must configure this additional information in order for the application to connect to the database.

Setting the NLS_LANG Environment Variable

`NLS_LANG` is an environment variable that specifies the locale behavior for Oracle software. This variable sets the language and territory used by the client application and the database user session. It also declares the character set of the client, which is the character set of data entered or displayed by an Oracle client program, such as SQL*Plus.

> **Note:**
>
> The character set of the data displayed is determined by the environment of the operating system, such as keyboard driver and fonts in use. The `NLS_LANG` character set should match the operating system.

Refer to the "Setting Up a Globalization Support Environment" section in *Oracle Database Globalization Support Guide* for information about Globalization Support.

Updating Instant Client

To update Instant Client:

1. Download Instant Client from Oracle Technology Network at `https://www.oracle.com/database/technologies/instant-client/downloads.html`
2. If you want to place the files in the existing directory, then ensure that the directory is empty. If you want to place the files into a different directory (and remove the previous files), ensure that you update the environment variable setting to reflect the new location.

> **Note:**
>
> A restriction on Instant Client or Instant Client Light is that you cannot perform patch upgrades using the `opatch` utility because the Instant Client installation does not create an inventory, which the patch upgrade process must access for patch upgrades.