Oracle® Instant Client

Installation Guide

23ai for Apple macOS (ARM64)

F97088-01

June 2024

ORACLE®

Oracle Instant Client Installation Guide, 23ai for Apple macOS (ARM64)

F97088-01

Primary Author: Sunil Surabhi

Contributors: Prakash Jashnani

Contributors: Soumyadip Saha, Arun Singh, Dilip Nutakki, Shubham Johri, Mani Mannampalli, Vijaya Sarode, Rajendra Sahoo, Deepak Suryavanshi, Bala Appulingam, Pappan Manavazhi, Joseph Therrattil Koonen, Ranjit Noronha, Abhinab Roy, Trishala Saxena, Shubha Nagaraja Rao, Christopher Jones

Contents

Preface

This guide provides instructions about installing and configuring Oracle Instant Client for Apple macOS (ARM64).

Audience

This guide is intended for anyone responsible for installing Oracle Instant Client for Apple macOS (ARM64). 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.

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 Instant Client Installation

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

Installation Considerations

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.

About Oracle Instant Client

Learn how Oracle Instant Client enables applications to connect to a local or remote Oracle Database for development and production deployment.

The Oracle Instant Client libraries provide the necessary network connectivity, as well as Oracle Database client-side files to create and run Oracle Call Interface (OCI), Oracle C++ Call Interface (OCCI), ODBC, and JDBC OCI applications to make full use of Oracle Database.

Oracle Instant Client is commonly used by the Oracle APIs of popular languages and environments including Python, Node.js, Go, Ruby, and PHP. Tools included in Oracle Instant Client, such as SQL*Plus, SQL*Loader, and Oracle Data Pump provide quick and convenient data access. Oracle Instant Client simplifies the deployment of applications by eliminating the need for an Oracle home on the client machines.

Oracle's standard client-server network interoperability allows connections between different versions of Oracle Instant Client and Oracle Database. For certified configurations, refer to My Oracle Support note 207303.1. Tools such as Data Pump may have other restrictions.

Benefits of Oracle Instant Client

- Easy installation using DMG files.

- Easy for independent software vendors to package applications.

Oracle Instant Client Packages

Various Oracle Instant Client packages are available that help you run applications.

Table 1-1   Oracle Instant Client Packages

Package Name	Description
Basic	All files required to run Oracle Call Interface (OCI), OCCI, and JDBC-OCI applications for Oracle Database
Basic Light	Smaller version of the Basic package, with only English error messages and Unicode, ASCII, and Western European character set support.
SDK	Additional header files and an example makefile for developing OCI and OCCI applications.
SQL*Plus	Additional package providing the SQL*Plus command-line tool for executing SQL and PL/SQL statements and scripts.
Tools	Additional tools including Data Pump, SQL*Loader and Workload Replay Client.
ODBC	Additional libraries providing ODBC.
Precompilers	Additional tools and libraries providing the Pro*C precompiler.
JDBC-OCI Supplement	Additional libraries to support Internationalization.

Oracle Instant Client Utilities

Oracle Instant Client Basic and Oracle Instant Client Basic Light contain the following utilities:

- **genezi**: You can retrieve information about your Oracle Instant Client installation using the `genezi` utility. This utility displays information such as the time zone files that are part of the Oracle Instant Client data shared library. The timezone information shows either the embedded timezone files, or those specified by the ORA_TZFILE environment variable, if it is set.

  Run the `genezi -v` command to determine the client library information.

- **adrci**: Automatic Diagnostic Repository Command Interpreter (`adrci`) is a command-line tool that you can use to manage Oracle Database diagnostic data. `adrci` enables you to investigate problems, view health check reports, and package first-failure diagnostic data, all within a command-line environment.

- **uidrvci**: Do not use the `uidrvci` file as it is used to access diagnostic data.

Oracle Instant Client and Oracle Database Interoperability

For information about interoperability between Oracle 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

Unsupported Features and Components

The following features or components are not supported on Apple macOS (ARM64):

- Pro*FORTRAN
- Pro*COBOL
- Oracle Database 23ai Vector Operations

2
Oracle Instant Client Preinstallation Tasks

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

Check the System Architecture

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

```
$ arch
```

This command displays the processor type. The command output must be `arm64`. 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 Instant Client 23ai is 100 MB.

To determine the amount of free disk space available, enter the following command in a terminal window:

```
$ df -h
```

Checking the Software Requirements for Apple macOS (ARM64)

Depending on the products that you intend to install, verify that the following software is installed on your Apple macOS (ARM64) system.

Item	Requirement
Operating system	The following or later versions of the operating system are supported: • Apple macOS 13.6 or later
Tools	• LLVM Clang version 17.0.6. You can install LLVM Clang 17.0.6 from MacPorts. • Java version: 11
Pro*C/C++, Oracle Call Interface, Oracle C++ Call Interface	The version of the Clang compiler listed previously is supported for use with these products.
Oracle JDBC/OCI Drivers	You must use JDBC-OCI 11 or later versions with the JNDI extension.
Oracle ODBC Driver	Download and install unixODBC-2.3.11 or later at http://www.unixodbc.org

Use this procedure to gather information about your system.

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

    ```
    $ sw_vers
    ```

The output of this command is similar to the following:

```
ProductName:    macOS
ProductVersion: 13.6.6
BuildVersion:   22G436
```

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

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

```
$ gcc -v
```

This command returns output similar to the following:

```
Clang version 17.0.6
Target: arm64-apple-darwin22.6.0
Thread model: posix
InstalledDir: /opt/local/libexec/llvm-17/bin
```

https://developer.apple.com/

Oracle Instant Client Basic Light Character Sets

All Oracle Instant Client installations require a Basic or Basic Light package. If you plan to use Oracle Instant Client Basic 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

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

    * US7ASCII

    * WE8DEC

* WE8MSWIN1252

* WE8ISO8859P1

* WE8EBCDIC37C

* WE8EBCDIC1047

* UTF8

* AL32UTF8

Oracle Instant Client Basic 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 your applications that use Oracle Instant Client Libraries.

3

Installing and Removing Oracle Instant Client

Perform the following steps for installing or uninstalling Oracle Instant Client for Apple macOS (ARM64). All installations require a Basic or Basic Light package. All other packages are optional.

Installing Notarized Oracle Instant Client Software DMG Files

1. Download the desired Oracle Instant Client disk image (DMG) files for Apple macOS (ARM64) from the Oracle Instant Client Downloads page:

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

   > **Note:**
   >
   > You can use the `stapler` utility to check if the DMG files are notarized. For example:
   >
   > ```
   > $ /usr/bin/xcrun stapler validate instantclient-basic-
   > macos.arm64-23.3.0.23.09.dmg
   > Processing: instantclient-basic-macos.arm64-23.3.0.23.09.dmg
   > The validate action worked!
   > ```

2. Mount all the desired DMG packages.

   For example:

   ```
   /usr/bin/hdiutil mount instantclient-basic-macos.arm64-23.3.0.23.09.dmg
   ```

3. Run the following commands to copy the volume contents to the install location, for example, `/Users/user-name/Downloads/instantclient_23_3`.

   For example:

   ```
   cd /Volumes/instantclient-basic-macos.arm64-23.3.0.23.09
   sh ./install_ic.sh
   ```

   > **Note:**
   >
   > Run `install_ic.sh` only once, from any `instantclient-*-macos.arm64-23.3.0.23.09` directory.

4. Eject the mounted Oracle Instant Client packages in **Mac Finder**.

ORACLE

Alternatively, use the `hdiutil unmount` command in the terminal to eject the mounted
Oracle Instant Client packages. For example:

```
/usr/bin/hdiutil unmount /Volumes/instantclient-basic-
macos.arm64-23.3.0.23.09
```

Removing the Oracle Instant Client Software

To remove the Oracle Instant Client software, delete the instant client directory. For example, `/Users/user-name/Downloads/instantclient_23_3`.

4

Oracle Instant Client Postinstallation Tasks

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

Using Oracle Instant Client

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

1. Edit the `sdk/demo/demo.mk` file and set:

   a. `CC` variable to your `g++` location

   b. `cc` variable to your `gcc` location

   c. `ICLIBHOME` variable to the path to the installed Instant Client libraries. For example, if the libraries are located in `/home/oracle/OTN/instantclient_23_3/`, then set:

   ```
   ICLIBHOME=/home/oracle/OTN/instantclient_23_3/
   ```

   d. `ICINCHOME` variable to `$(ICLIBHOME)/sdk/` directory

   e. `CCINCLUDES` variable to the location(s) of your application's header files. For example, if your application's header files reside in `/home/app_headers` directory, then set:

   ```
   CCINCLUDES=-I$(ICINCHOME)include -I/home/app_headers/
   ```

   f. `CCFLAGS` variable to your application's other compile options.The recommended compilation options are as follows:

   ```
   -DMAC_AARCH64 -D_GNU_SOURCE -D_REENTRANT -g -arch arm64 -mcpu=apple-m1 -
   I$(ICINCHOME)include
   ```

   Run `make -f demo.mk buildoci EXE=cdemo81 OBJS=cdemo81.o` for a working demonstration of the recommended options.

   g. `CCLIB` variable to the libraries your application depends on and their location. For example, if your application depends on `/home/app_libs/libA.so`, then add `-L/home/app_libs -lA` to `CCLIB`.

   h. `LDFLAGS` variable to your application's other link options. The recommended link options are as follows:

   ```
   -arch arm64 -L$(ICLIBHOME) -locci -lclntsh -lpthread
   ```

   Run `make -f demo.mk buildoci EXE=cdemo81 OBJS=cdemo81.o` for a working demonstration of the recommended options.

2. Compile your C/C++ application by running `make -f demo.mk buildocci EXE=`*`exename`* `OBJS=`*`list_of_dependent_objects`*.

3. Set `JAVA_PATH` in the `ott` script to the location of `libocijdbc23.dylib`, if you notice the following issue while building your C++ application:

```
Exception in thread "main" java.lang.UnsatisfiedLinkError: no ocijdbc23 in
    java.library.path
   JAVA_PATH=-Djava.library.path=location_of_libocijdbc23
```

4. If your application has not been compiled with rpaths, update the `DYLD_LIBRARY_PATH` environment variable with the list of directories containing the libraries your application depends on. For example:

```
export DYLD_LIBRARY_PATH=${DYLD_LIBRARY_PATH}:/home/oracle/OTN/
instantclient_23_3/:/home/app_headers/
```

5. If you intend to colocate the optional Oracle configuration files such as `tnsnames.ora` with the Oracle Instant Client, then move these files to the `network/admin` subdirectory. This is the default Oracle configuration directory for applications linked with this Oracle Instant Client. Alternatively, you can move the Oracle configuration files to another, accessible directory. Then set the environment variable `TNS_ADMIN` to that directory name.

6. To use binaries such as `sqlplus` from the `SQL*Plus` package or any other Oracle Instant Client package, update your `PATH` environment variable. For example:

```
PATH=$PATH:/home/oracle/OTN/instantclient_23_3/
```

Related Topics

• Advanced Queuing Operations Error

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`.

> **Note:**
>
> To suppress ISO C99 Errors/Warnings, use the option `-Wno-error=` or `--std=gnu89` while compiling C programs. Always include `stdio.h` before `stdlib.h` in pc programs.

Related Topics

• *Pro*C/C++ Programmer's Guide*

Connecting Oracle Instant Client to Oracle Database

Use one of the following connection strings to specify the database connection information for the Oracle Instant Client application:

• An Oracle Easy Connect string

For more information, see Configuring the Easy Connect Naming Method.

- An Oracle Net Connect Descriptor string

  For more information, see Overview of Local Naming Parameters.

- A Net Service Name mapping to a connect descriptor

  For more information, see About Connect Descriptors

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 Oracle Instant Client

To update Oracle Instant Client:

1. Download Oracle 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 settings such as `PATH`, `CLASSPATH, and DYLD_LIBRARY_PATH`. Review the ICLIBHOME value in `demo.mk` and the `JAVA_PATH` value in the `ott` script.

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