## Contents

### Preface

<table>
<thead>
<tr>
<th>Audience</th>
<th>v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation Accessibility</td>
<td>v</td>
</tr>
<tr>
<td>Related Documentation</td>
<td>v</td>
</tr>
<tr>
<td>Command Syntax</td>
<td>vi</td>
</tr>
<tr>
<td>Typographic Conventions</td>
<td>vi</td>
</tr>
</tbody>
</table>

### 1 Overview of Oracle Database Instant Client Installation

<table>
<thead>
<tr>
<th>Planning Your Installation</th>
<th>1-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Considerations</td>
<td>1-1</td>
</tr>
<tr>
<td>Oracle Database Instant Client Installation Types</td>
<td>1-2</td>
</tr>
<tr>
<td>Oracle Database Instant Client and Oracle Database Interoperability</td>
<td>1-3</td>
</tr>
<tr>
<td>Simplified Patching of Timestamp with Time Zone Data Type</td>
<td>1-3</td>
</tr>
</tbody>
</table>

### 2 Oracle Database Instant Client Preinstallation Tasks

<table>
<thead>
<tr>
<th>Checking the Hardware Requirements</th>
<th>2-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Requirements</td>
<td>2-1</td>
</tr>
<tr>
<td>System Architecture</td>
<td>2-1</td>
</tr>
<tr>
<td>Disk Space Requirements</td>
<td>2-2</td>
</tr>
<tr>
<td>Checking the Software Requirements</td>
<td>2-2</td>
</tr>
<tr>
<td>Instant Client Light Requirements</td>
<td>2-3</td>
</tr>
</tbody>
</table>

### 3 Installing and Removing Oracle Database Instant Client

<table>
<thead>
<tr>
<th>Downloading and Installing the Oracle Database Instant Client Software</th>
<th>3-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removing the Oracle Database Instant Client Software</td>
<td>3-1</td>
</tr>
</tbody>
</table>

### 4 Oracle Database Instant Client Postinstallation Tasks

<table>
<thead>
<tr>
<th>Using Oracle Database Instant Client</th>
<th>4-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Postinstallation Tasks</td>
<td>4-2</td>
</tr>
</tbody>
</table>
Connecting Instant Client or Instant Client Light to an Oracle Database 4-2
Specifying a Connection by Using the Easy Connect Naming Method 4-2
Specifying a Connection Using an Empty Connect String and TWO_TASK 4-3
Setting the NLS_LANG Environment Variable 4-3
Updating Instant Client 4-4
Required Product-Specific Postinstallation Tasks 4-4
Configuring Oracle Precompilers 4-4
Configuring Pro*C/C++ 4-5

Index
Preface

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

Audience

This guide is intended for anyone responsible for installing Oracle Database Client 18c. 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.

See Also:

- Oracle Database Installation Guide to install Oracle Database using the default settings.
- You can view more information about supported Application Programming Interfaces (API) at http://docs.oracle.com/database/122/nav/development.htm

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 18c products includes the following manuals:

- Oracle Database Installation Guide
- Oracle Grid Infrastructure Installation Guide
**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:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>backslash \</td>
<td>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:</td>
</tr>
<tr>
<td>&lt;br&gt;dd if=/dev/rdsk/c0t1d0s6 of=/dev/rst0 bs=10b &lt;br&gt;count=10000</td>
<td></td>
</tr>
<tr>
<td>braces {}</td>
<td>Braces indicate required items:</td>
</tr>
<tr>
<td>&lt;br&gt;.DEFINE {macro1}</td>
<td></td>
</tr>
<tr>
<td>brackets []</td>
<td>Brackets indicate optional items:</td>
</tr>
<tr>
<td>&lt;br&gt;cvtcrt termname [outfile]</td>
<td></td>
</tr>
<tr>
<td>ellipses ...</td>
<td>Ellipses indicate an arbitrary number of similar items:</td>
</tr>
<tr>
<td>&lt;br&gt;CHKVAL fieldname value1 value2 ... valueN</td>
<td></td>
</tr>
<tr>
<td>italics</td>
<td>Italic type indicates a variable. Substitute a value for the variable:</td>
</tr>
<tr>
<td>&lt;br&gt;library_name</td>
<td></td>
</tr>
<tr>
<td>vertical line</td>
<td>A vertical line indicates a choice within braces or brackets:</td>
</tr>
<tr>
<td>&lt;br&gt;FILE filesize [K</td>
<td>M]</td>
</tr>
</tbody>
</table>

**Typographic Conventions**

The following text conventions are used in this document:
<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>boldface</strong></td>
<td>Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.</td>
</tr>
<tr>
<td><em>italic</em></td>
<td>Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.</td>
</tr>
<tr>
<td><strong>monospace</strong></td>
<td>Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.</td>
</tr>
</tbody>
</table>
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 18c Release 1, 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 or Oracle Database JDBC Developer’s Guide for more information about Instant Client

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
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 12c Release 1 (12.1), the patching process of TIMESTAMP WITH TIMEZONE data type values is simplified.

See Also:

"Changes in This Release for Oracle Database Globalization Support Guide" and "Clients and Servers Operating with Different Versions of Time Zone Files" in Oracle Database Globalization Support Guide for information about simplified patching process and how certain clients work with server with different time zone files.
This chapter describes the tasks that you must complete before you install Oracle Instant Client. It includes the following information:

- 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 18c:

- Memory Requirements
- System Architecture
- Disk Space Requirements

Memory Requirements

The following are the memory requirements for Oracle Database Instant Client 18c:

- 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

System Architecture

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

$ uname -p
**Note:**

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 18c 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. The procedure following the table describes how to verify whether these requirements are addressed.

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system</td>
<td>The following or later versions of the operating system are supported for Oracle Database 18c:</td>
</tr>
<tr>
<td></td>
<td>• Apple Mac OS X 10.13.5 (High Sierra)</td>
</tr>
<tr>
<td></td>
<td>• Apple Mac OS X 10.14 (Mojave)</td>
</tr>
<tr>
<td>Tools</td>
<td>• Xcode 9.4</td>
</tr>
<tr>
<td></td>
<td>• GNU C compiler (gcc) version 4.2.1 or later</td>
</tr>
<tr>
<td></td>
<td>This version of gcc is included in Xcode 9.4 or later.</td>
</tr>
<tr>
<td></td>
<td>• Apple LLVM version 9.1.0</td>
</tr>
<tr>
<td></td>
<td>• JDK 1.8.0_172.jdk</td>
</tr>
<tr>
<td>Pro*C/C++, Oracle Call Interface, Oracle C++ Call Interface</td>
<td>The version of the GNU C and C++ compiler listed previously is supported for use with these products.</td>
</tr>
<tr>
<td>Oracle JDBC/OCI Drivers</td>
<td>You must use JDBC-OCI 1.8.0 or later versions with the JNDI extension.</td>
</tr>
<tr>
<td>Oracle ODBC Driver</td>
<td>Download and install unixODBC-2.3.4 or later at <a href="http://www.unixodbc.org">http://www.unixodbc.org</a></td>
</tr>
</tbody>
</table>

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

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 command 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

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
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.
Installing and Removing Oracle Database Instant Client

The Oracle Database Instant Client software is available on Oracle Technology Network website. This chapter describes the following sections:

- Downloading and Installing the Oracle Database Instant Client Software
- Removing the Oracle Database Instant Client Software

Downloading and Installing the Oracle Database Instant Client Software

Download and install Oracle Database Instant Client 18c by completing the following steps:


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_18_1 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].

Refer to "Instant Client Light Requirements" for information about setting the NLS_LANG environment variable to the required character set.

This completes the installation of Oracle Database Instant Client.

Removing the Oracle Database Instant Client Software

To remove the Oracle Database Instant Client software, delete the instantclient_18_1 directory.
This chapter describes how to complete postinstallation tasks after you have installed the Oracle Database Instant Client software. It includes information about the following topics:

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

Oracle recommends that you perform the tasks listed in "Recommended Postinstallation Tasks" after all installations.

If you install and intend to use any of the products listed in "Required Product-Specific Postinstallation Tasks", then you must perform the tasks listed in the product-specific subsections.

### 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_18_1/sdk/demo.mk file, then perform the following steps:

1. Edit the instantclient_18_1/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_18_1/ path, then you must add the following line in the ott script:

   JAVA_PATH=-Djava.library.path=/home/oracle/OTN/instantclient_18_1/
   and run the following command:

   exec java $JAVA_PATH $JREOPTIONS oracle.ott.c.CMain nlslang=$ {NLS_LANG} $args

The compilation options are as follows:
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:
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 for more information about using Oracle Call Interface Instant Client

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.
Updating Instant Client

To update Instant Client:


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.

Required Product-Specific Postinstallation Tasks

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

Configuring Oracle Precompilers

This section describes postinstallation tasks for 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 for more information about setting environment variables
Index

C
character sets, 2-3
checking system requirements, 2-2
cHECKING THE GCC VERSION, 2-3
cHECKING VERSION OF THE OPERATING SYSTEM, 2-2
cHECKING THE GCC VERSION, 2-3
cHECKING VERSION OF THE OPERATING SYSTEM, 2-2

D
disk space requirements, 2-2

E
environment variables
NLS_LANG, 4-3

H
hardware requirement, 2-1
memory requirements, 2-1
system architecture, 2-1
hardware requirements
disk space requirements, 2-2

I
installation
available products, 1-2
installation considerations, 1-1
certifications, 1-1
installation types
Instant Client, 1-2
installing Oracle Database Instant Client
downloading Oracle Database Instant Client, 3-1
Instant Client
installation type, 1-2
Instant Client Light requirements, 2-3
character sets, 2-3

M
memory requirements, 2-1

O
operating system, 2-2
cHECKING VERSION OF THE OPERATING SYSTEM, 2-2
Oracle Database Instant Client
connecting to an Oracle Database, 4-2
Oracle Database Instant Client Light
connecting to an Oracle Database, 4-2
Oracle JDBC/OCI drivers, 2-2
Oracle precompilers, 4-4
Pro C/C++, 4-4

P
postinstallation tasks, 4-1
NLS_LANG, 4-3
Oracle precompilers, 4-4
preinstallation requirements
hardware requirement, 2-1
preinstallation tasks, 2-1
software requirements, 2-2
preinstallation tasks
preinstallation requirements, 2-1
Pro*C/C++ requirement, 2-2

R
removing Oracle Database Instant Client, 3-1

S
software requirements, 2-2
cHECKING SYSTEM REQUIREMENTS, 2-2
Instant Client Light requirements, 2-3
operating system, 2-2
Oracle JDBC/OCI drivers, 2-2
Pro*C/C++ requirement, 2-2
tools requirement, 2-2
system architecture, 2-1
TIMESTAMP WITH TIMEZONE patching, 1-3

tools requirement, 2-2