

Oracle® Database Express Edition Installation Guide



18c for Linux x86-64
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The Oracle logo, consisting of a solid red square with the word "ORACLE" in white, uppercase, sans-serif font centered within it.

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Preface

This guide explains how to install and configure Oracle Database Express Edition on Linux x86–64.

This guide also provides information about resources available to develop applications and how to remove the database software.

- [Audience](#)
- [Documentation Accessibility](#)
- [Command Syntax](#)
- [Related Documents](#)
- [Conventions](#)

Audience

This guide is intended primarily for application developers who are either developing applications or converting applications to run in the Oracle Database environment.

Oracle Database 18c Express Edition (Oracle Database XE) is a free version of the world's most capable relational database. Oracle Database XE is easy to install, easy to manage, and easy to develop with. With Oracle Database XE, you use an intuitive, browser-based interface to administer the database, create tables, views, and other database objects, import, export, and view table data, run queries and SQL scripts, and generate reports.

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.

Command Syntax

Refer to these command syntax conventions to understand command examples in this guide.

Convention	Description
\$	Bourne or BASH shell prompt in a command example. Do not enter the prompt as part of the command.
%	C Shell prompt in a command example. Do not enter the prompt as part of the command.
#	Superuser (root) prompt in a command example. Do not enter the prompt as part of the command.
monospace	UNIX command syntax
backslash \	A backslash is the UNIX and Linux 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: <pre>dd if=/dev/rdsk/c0t1d0s6 of=/dev/rst0 bs=10b \ count=10000</pre>
braces { }	Braces indicate required items: <pre>.DEFINE {macrol}</pre>
brackets []	Brackets indicate optional items: <pre>cvtcrt termname [outfile]</pre>
ellipses ...	Ellipses indicate an arbitrary number of similar items: <pre>CHKVAL fieldname value1 value2 ... valueN</pre>
<i>italic</i>	Italic type indicates a variable. Substitute a value for the variable: <pre>library_name</pre>
vertical line	A vertical line indicates a choice within braces or brackets: <pre>FILE filesize [K M]</pre>

Related Documents

To help you with your development efforts, consult the books in the development category of the Oracle database documentation set at [Oracle Database Development](#)

Title	Content
<i>2 Day DBA</i>	Discusses common day-to-day administrative tasks.
<i>2 Day Developer's Guide</i>	Explains how to develop applications with the Oracle Database.
<i>2 Day + PHP Developer's Guide</i>	Provides a tutorial that shows you how to download and install Apache and the Zend Core PHP drivers, and then how to use PHP to connect to Oracle Database XE, and demonstrates how to use PHP to develop a simple application that accesses and modifies data.

Title	Content
<i>2 Day + Java Developer's Guide</i>	Provides a tutorial that shows you how to use Java and JDBC to connect to Oracle Database, and demonstrates how to develop a simple Java application that accesses and modifies data.

For more information, see these documents in the Oracle Database documentation set:

- *Oracle Database SQL Language Reference*
- *Oracle Database PL/SQL Language Reference*
- *Oracle Database PL/SQL Packages and Types Reference*
- *Oracle Database JSON Developer's Guide*
- *Oracle Database SODA for PL/SQL Developer's Guide*
- *Oracle Database Development Guide*
- *Oracle Database Administrator's Guide*
- *Oracle Database SecureFiles and Large Objects Developer's Guide*
- *Oracle Database Object-Relational Developer's Guide*
- *Oracle Database Concepts*
- *Oracle Database Sample Schemas*

See Also:

- [Application Express Release 18.2](#)
- [Application Express Release 5.1](#)
- <https://www.oracle.com/database/technologies/application-development.html>

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.
<i>italic</i>	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

Installation Guide

Welcome to *Oracle Database Express Edition Installation Guide for Linux x86-64*.

This guide covers the following topics:

- [Introduction](#)
- [Requirements](#)
- [Licensing Restrictions](#)
- [Installing Oracle Database XE](#)
- [Connecting to Oracle Database XE](#)
- [Starting and Stopping Oracle Database](#)
- [Using Enterprise Manager Express](#)
- [Exporting and Importing Data between Oracle Database XE 11.2 and 18c](#)
- [Migrating Data and Applications](#)
- [Deinstalling Oracle Database XE](#)
- [Reporting Security Vulnerabilities](#)
- [Globalization Support](#)

2

Introduction

Oracle Database XE is a fully free edition of the Oracle Database.

Development Environments

Oracle Database XE supports the following development environments:

- **Java:** Develop and deploy modern database-bound Java Web applications (Servlets), modules (Microservices) or standalone Java frameworks using the Oracle JDBC Driver, the Universal Connection Pool (UCP), and the Database-embedded JVM (for in-place, server-side processing).
Visit <http://oracle.com/jdbc> for more information
- **C and C++ :** Developers can use Oracle Call Interface (OCI) and Oracle C++ Call Interface (OCCI) to create high performance programs accessing Oracle Database XE. ODBC and the ODPI-C wrapper over OCI are also usable.
Visit <https://www.oracle.com/technetwork/database/features/oci/index-090945.html> for more information
- **.NET:** Visual Studio and .NET developers can use Oracle Data Provider for .NET (ODP.NET) and Oracle Developer Tools for Visual Studio (ODT) for full development life cycle support.
Visit <https://www.oracle.com/database/technologies/appdev/dotnet.html> for more information
- **Oracle SQL Developer:** Oracle SQL Developer is a graphical version of SQL*Plus that gives database developers a convenient way to perform basic tasks. You can connect to any target Oracle Database XE schema using standard Oracle database authentication. Once connected, you can perform operations on objects in the database.
Download and install Oracle SQL Developer from:
<http://www.oracle.com/technetwork/developer-tools/sql-developer/overview/index.html>
- **Oracle Application Express:** Oracle Application Express (APEX) is a rapid web application development tool for the Oracle database.
Download and install Application Express from:
<http://www.oracle.com/technetwork/developer-tools/apex/overview/index.html>
- **Oracle REST Data Services (ORDS):** ORDS makes it easy to develop modern REST interfaces for relational data in the Oracle Database and the Oracle Database 18c JSON Document Store.
Download and install ORDS from:
<https://www.oracle.com/database/technologies/appdev/rest.html>
- **SODA** (Simple Oracle Document Access) APIs that let you develop NoSQL-style applications against collections of JSON documents. Native language SODA drivers are available for common languages.

Visit <https://docs.oracle.com/en/database/oracle/simple-oracle-document-access/> for more information

Scripting Languages

You can use **scripting languages** such as:

- **PHP:** Access Oracle Database with the PHP OCI8 extension or the PDO_OCI Driver. PHP OCI8 and PDO_OCI are part of the PHP open source project.

Visit <http://php.net/oci8> for more information on PHP OCI8 and http://php.net/pdo_oci for more information on PDO_OCI

Python: The cx_Oracle Python extension module enables access to Oracle Database.

Visit https://oracle.github.io/python-cx_Oracle/ for more information about cx_Oracle Python extension module

Node.js: The node-oracledb add-on for Node.js powers high performance Oracle Database applications.

Visit <https://oracle.github.io/node-oracledb/> for more information about node-oracledb

ROracle: ROracle is an open source R package supporting a DBI-compliant Oracle driver based on the high performance OCI library.

Visit <http://cran.r-project.org/web/packages/ROracle/index.html> for more information about ROracle

Ruby: Build Ruby and Ruby on Rails applications using the ruby-oci8 driver or JRuby with the Oracle Enhanced Adapter for ActiveRecord.

Visit:

- <http://www.rubydoc.info/gems/ruby-oci8/> for information about the ruby-oci8
- <http://jruby.org/> for information about JRuby
- <https://github.com/rsim/oracle-enhanced> for information about Oracle Enhanced Adapter

Others

Accessing Oracle Database XE from other languages including Go is possible using community drivers based on OCI or ODPI-C.

Download Open Source drivers from:

<http://www.oracle.com/technetwork/database/database-technologies/scripting-languages/index.html>.

Oracle Call Interface (OCI) Demonstration Programs

A set of OCI demonstration programs and their corresponding project files are available in the `$ORACLE_HOME/demo` subdirectory after an Oracle Database Express Edition (XE) installation.

You can run these OCI demonstration programs to familiarize yourself with the steps involved in developing OCI applications. The Oracle Database Express Edition (XE) does not support generating the client shared library. The build option in `demo_rdbms.mk` is not valid for XE. You can compile and link application and demo

programs with the provided header files. Because the object (.o's) and archive (.a's) libraries are not available in the installed location, you cannot use `genclntsh` and `genclntst`.

Examples

You can download and install Oracle Database Examples in an existing Oracle home to view the product demonstrations.

See *Examples Installation Guide* for more information about products available on the Oracle examples media

Examples are also available from <https://github.com/oracle/oracle-db-examples>

Learning More About Oracle Database XE

For more information on Oracle Database XE, see the following:

- Oracle Database XE home page on the Oracle Technology Network:

Visit <https://www.oracle.com/database/technologies/appdev/xe.html>

- Oracle Database XE Discussion Forum:

You can search that forum to see if the problem has already been discussed; and if you do not find the answer, you can create a new thread and provide the details.

Visit https://community.oracle.com/community/technology_network_community/database/developer-tools/oracle_database_express_edition_xe/overview

3

Requirements

You must have `root` user credentials to install Oracle Database XE.

The system must meet the following software requirements:

- [System Requirements](#)
- [Swap Space Requirements](#)
- [Server Component Kernel Parameter Requirements](#)

3.1 System Requirements

[Table 3-1](#) provides system requirements for Oracle Database XE.

Table 3-1 Oracle Database XE Requirements

Requirement	Value
Operating system	<i>Oracle Database Installation Guide</i> , "Operating System Checklist for Oracle Database Installation on Linux" for the list of supported Linux distributions and the set of minimum requirements for each x86-64 Linux platforms
Network protocol	The following protocols are supported: <ul style="list-style-type: none">• IPC• Named Pipes• UDP• TCP/IP• TCP/IP with SSL
RAM	1 gigabyte minimum, 2 gigabytes recommended
Disk space	10 gigabytes minimum

3.2 Swap Space Requirements

Minimum swap space recommended for Oracle Database XE is 2 GB or twice the size of RAM, whichever is lesser.

3.3 Server Component Kernel Parameter Requirements

The Oracle Database XE preinstallation RPM checks your system for the following kernel parameter settings.

If the kernel parameter values of your system are less than the values listed in [Table 3-2](#), then the preinstallation RPM sets the recommended minimum kernel parameter values for you.

The values set in the `/etc/sysctl.d/97-oracle-database-sysctl.conf` file persist on system restarts.

Table 3-2 Kernel Parameter Settings Required for Oracle Database XE

Kernel Parameter	Setting
<code>semmsl</code>	250
<code>semms</code>	32000
<code>semopm</code>	100
<code>semmni</code>	128
<code>shmmax</code>	4398046511104
<code>shmmni</code>	4096
<code>shmall</code>	1073741824
<code>file-max</code>	6815744
<code>aio-max-nr</code>	1048576
<code>ip_local_port_range</code>	9000–65500
<code>panic_on_oops</code>	1
<code>rmem_default</code>	262144
<code>rmem_max</code>	4194304
<code>wmem_default</code>	262144
<code>wmem_max</code>	1048576

 **See Also:**

Installation Guide for Linux for more information about changing kernel parameter values manually

4

Licensing Restrictions

This section covers the following topics:

- [Oracle Database XE CPU Limitations](#)
- [Oracle Database XE Installation and Execution Restrictions](#)
- [Oracle Database XE User Data Limitations](#)
- [Oracle Database XE RAM Limitation](#)

4.1 Oracle Database XE CPU Limitations

Oracle Database XE limits itself automatically to two cores for processing. For example, on a computer with 2 dual-core CPUs (four cores), if a large number of database clients try to simultaneously execute CPU-intensive queries, then Oracle Database XE will process the queries at the rate of just two cores even if more CPU capacity is available.

To take advantage of the full processing power of your computer, you can use a different Oracle Database Edition such as the Oracle Database 18c Personal Edition, Oracle Database 18c Standard Edition 2, or Oracle Database 18c Enterprise Edition.

4.2 Oracle Database XE Installation and Execution Restrictions

Oracle Database XE restricts itself to only one installation per logical environment. The logical environment can either be a virtual host such as a VM or container, or a physical host. If more than one Oracle Database XE installation is attempted to be started in such a logical environment, an "ORA-00442: Oracle Database Express Edition (XE) single instance violation error" is raised and the database will not start. This does not affect any existing installation or new installations of Oracle Database 18c Personal Edition, Oracle Database 18c Standard Edition 2, or Oracle Database 18c Enterprise Edition. To run more than one Oracle Database instance or install more than one copy of the database software, upgrade to Oracle Database 18c Personal Edition, Oracle Database 18c Standard Edition 2, or Oracle Database 18c Enterprise Edition.

Oracle GoldenGate can not be used with Oracle Database Express Edition.

4.3 Oracle Database XE User Data Limitations

The maximum amount of user data in an Oracle Database XE database cannot exceed 12 gigabytes. If the user data grows beyond this limit, then an `ORA-12592` error will appear. To use more than 12 gigabytes of user data, upgrade to Oracle Database 18c Personal Edition, Oracle Database 18c Standard Edition 2, or Oracle Database 18c Enterprise Edition.

4.4 Oracle Database XE RAM Limitation

The maximum amount of RAM that an Oracle Database XE database uses cannot exceed 2 gigabytes, even if more is available.

To use more than 2 gigabytes of RAM, upgrade to Oracle Database 18c Personal Edition, Oracle Database 18c Standard Edition 2, or Oracle Database 18c Enterprise Edition.

For more information about managing memory, refer to *Oracle Database 2 Day DBA*.

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Installing Oracle Database XE

You can install Oracle Database Express Edition using RPM packages.

An RPM-based installation performs preinstallation checks, extracts the database software, reassigns ownership of the extracted software to the preconfigured user and groups, maintains the Oracle inventory, and executes all root operations required to configure the Oracle Database software for a single-instance Oracle Database creation and configuration.

The RPM-based installation process detects when the minimum requirements for an installation are not met and prompts you to finish these minimum preinstallation requirements.

This section covers the following topics:

- [Installing Oracle Database XE Using RPM Packages](#)
- [Performing a Silent Installation](#)
- [Setting the Oracle Database XE Environment Variables](#)

5.1 Installing Oracle Database XE Using RPM Packages

Perform the following steps to install and configure Oracle Database XE using RPM packages.

Before attempting to install Oracle Database XE 18c, uninstall any existing Oracle Database XE or database with the SID `XE` from the target system.

An Oracle Database XE installation will consume around 9 gigabytes of disk space under `/opt`. If this disk partition does not have the required disk space available, you must add space or mount an alternative partition as `/opt/oracle`. This disk partition is the defined Oracle Base where the software and database will reside.

Note:

The Oracle Database XE installation does not support usage of symbolic links (symlink) for that disk.

Installing Oracle Database XE RPM

1. Execute as user `root` using `sudo`.

```
$ sudo -s
```

2. For Oracle Linux, the Database Preinstallation RPM is pulled automatically, proceed to the next step. For Red Hat compatible Linux distributions, download and install the Database Preinstallation RPM using the following:
 - a. For Red Hat Enterprise Linux 6, run these commands:

```
# curl -o oracle-database-preinstall-18c-1.0-1.el6.x86_64.rpm https://
yum.oracle.com/repo/OracleLinux/OL6/latest/x86_64/getPackage/oracle-database-
preinstall-18c-1.0-1.el6.x86_64.rpm
# yum -y localinstall oracle-database-preinstall-18c-1.0-1.el6.x86_64.rpm
```

For Red Hat Enterprise Linux 7, run these commands:

```
# curl -o oracle-database-preinstall-18c-1.0-1.el7.x86_64.rpm https://
yum.oracle.com/repo/OracleLinux/OL7/latest/x86_64/getPackage/oracle-database-
preinstall-18c-1.0-1.el7.x86_64.rpm
# yum -y localinstall oracle-database-preinstall-18c-1.0-1.el7.x86_64.rpm
```

 **Note:**

Use the `-y` option if you want `yum` to skip the package confirmation prompt.

3. Access the software download page for Oracle Database RPM-based installation from Oracle Technology Network :

<https://www.oracle.com/technetwork/database/database-technologies/express-edition/downloads/index.html>

4. Download the `oracle-database-xe-18c-1.0-1.x86_64.rpm` file required for performing an RPM-based installation to a directory of your choice.
5. Install the database software using the `yum localinstall` command.

```
# yum -y localinstall oracle-database-xe-18c-1.0-1.x86_64.rpm
```

The Database Preinstallation RPM automatically creates Oracle installation owner and groups and sets up other kernel configuration settings as required for Oracle installations. If you plan to use job-role separation, then create the extended set of database users and groups depending on your requirements. **Check the RPM log file to review the system configuration changes.**

For example, review this file for latest changes: `/var/log/oracle-database-preinstall-18c/results/orakernel.log`.

The installation of Oracle Database software is now complete.

After successful installation, you can delete the downloaded RPM files, for example:

```
# rm oracle-database-preinstall-18c-1.0-1.el6.x86_64.rpm
# rm oracle-database-preinstall-18c-1.0-1.el7.x86_64.rpm
# rm oracle-database-xe-18c-1.0-1.x86_64.rpm
```

Creating and Configuring an Oracle Database

The configuration script creates a container database (XE) with one pluggable database (XEPDB1) and configures the listener at the default port (1521) and Enterprise Manager Express on port 5500.

You can modify the configuration parameters by editing the `/etc/sysconfig/oracle-xe-18c.conf` file.

The parameters set in this file are explained in more details in the silent mode installation procedure: [Performing a Silent Installation](#).

To create the Oracle XE database with the default settings, perform the following steps:

1. Execute as user `root` using `sudo`.

```
$ sudo -s
```

2. Run the service configuration script:

```
# /etc/init.d/oracle-xe-18c configure
```

At the prompt, specify a password for the `SYS`, `SYSTEM`, and `PDBADMIN` administrative user accounts. Oracle recommends that the password entered should be at least 8 characters in length, contain at least 1 uppercase character, 1 lower case character and 1 digit [0-9].

See Also:

The same password will be used for these accounts. The password should conform to the Oracle recommended standards. See *Oracle Database Security Guide* for more information about guidelines for securing passwords

After the configuration completes, the database and listener are started.

Configuration, Database Files and Logs Location

Table 5-1 Configuration, Database Files and Logs Location

File Name and Location	Purpose
<code>/opt/oracle</code>	Oracle Base. This is the root of the Oracle Database XE directory tree.
<code>/opt/oracle/product/18c/dbhomeXE</code>	Oracle Home. This home is where the Oracle Database XE is installed. It contains the directories of the Oracle Database XE executables and network files.
<code>/opt/oracle/oradata/XE</code>	Database files.
<code>/opt/oracle/diag</code> subdirectories	Diagnostic logs. The database alert log is <code>/opt/oracle/diag/rdbms/xexxe/trace/alert_xe.log</code>
<code>/opt/oracle/cfgtoollogs/dbca/XE</code>	Database creation logs. The <code>XE.log</code> file contains the results of the database creation script execution.
<code>/etc/sysconfig/oracle-xe-18c.conf</code>	Configuration default parameters.
<code>/etc/init.d/oracle-xe-18c</code>	Configuration and services script.

5.2 Performing a Silent Installation

You can install Oracle Express Edition using the silent mode. This mode can be used for embedded install of XE (with your application) or unattended operation.

To perform a silent installation, a password for the administrative accounts must be provided as a parameter to the script, or specified in the configuration file.

1. Create a wrapper shell script to perform the silent installation.

It should contain commands similar to the following:

```
#!/bin/bash

yum -y localinstall /downloads/oracle-database-xe-18c-1.0-1.x86_64.rpm > /
xe_logs/XEsilentinstall.log 2>&1

/etc/init.d/oracle-xe-18c configure >> /xe_logs/XEsilentinstall.log 2>&1
```

Alternatively, you can pass on the password in the script, such as:

```
(echo "password"; echo "password"); | /etc/init.d/oracle-xe-18c configure >> /
xe_logs/XEsilentinstall.log 2>&1
```

Replace *password* with a password that is secure. The password entered should be at least 8 characters in length, contain at least 1 uppercase character, 1 lower case character and 1 digit [0-9].

2. Make the wrapper script executable.

```
chmod +x myscript.sh
```

3. Run as root using `sudo`.

```
sudo ./myscript.sh
```

XE Oracle Home is `/opt/oracle/product/18c/dbhomeXE`.

For details of the installation, review the `/xe_logs/XEsilentinstall.log` file.

The XE database is configured with default settings. It is not necessary to modify these parameters unless you have specific requirements. Make a copy of the configuration file `/etc/sysconfig/oracle-xe-18c.conf` before modifying it. Make your modifications after the RPM install and before configuring the database.

The provided configuration file `/etc/sysconfig/oracle-xe-18c.conf` sets the following:

- `LISTENER_PORT`: A valid listener numeric port value for the database listener. Do not specify for automatic port assignment.
- `EM_EXPRESS_PORT`: A valid port numeric value for Oracle Enterprise Manager (EM) Express listener. This is set to port 5500.
- `CHARSET`: Character set of the database. This is set to `AL32UTF8`.
- `DBFILE_DEST` Database file directory. By default, the database files are stored in the Oracle Base `/opt/oradata` subdirectory.
- `SKIP_VALIDATIONS`: Skip validation for memory and disk space. Default: `false`.
- `ORACLE_PASSWORD`: The password for the administrative accounts.

▲ Caution:

When you modify and save a file containing plain text password, ownership of the file should be given to the Oracle software installation owner only, and permissions on the file should be changed to 600. Oracle strongly recommends that database administrators or other administrators delete or secure such files containing plain text passwords when they are not in use.

 **Note:**

The password should conform to the Oracle recommended standards. See *Oracle Database Security Guide* for more information about guidelines for securing passwords

You can find the database creation logs under the Oracle Base `/opt/oracle/cfgtoollogs/dbca/` subdirectory.

 **See Also:**

[Configuration, Database Files and Logs Location](#) for a summary of important files and their locations

5.3 Setting the Oracle Database XE Environment Variables

After you have installed and configured Oracle Database XE, you must set the environment before using Oracle Database XE.

The `oraenv` and `coraenv` scripts can be used to set your environment variables.

For example, to set your environment variables in Bourne, Bash, or Korn shell without being prompted by the script:

```
$ export ORACLE_SID=XE
$ export ORAENV_ASK=NO
$ . /opt/oracle/product/18c/dbhomeXE/bin/oraenv
```

```
ORACLE_HOME = [] ? /opt/oracle/product/18c/dbhomeXE
The Oracle base has been set to /opt/oracle
```

For C shell:

```
$ setenv ORACLE_SID XE
$ setenv ORACLEENV_ASK NO
$ source /opt/oracle/product/18c/dbhomeXE/bin/coraenv
```

See *Oracle Database Administrator's Reference for Linux and UNIX-Based Operating Systems* for more information about setting a common environment

6

Connecting to Oracle Database XE

Connecting using SQL*Net

The database listener for your XE database is started with a configuration that can be viewed using the command :

```
lsnrctl status

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=dbhost.example.com)
(PORT=1521)))
STATUS of the LISTENER
-----
Alias                LISTENER
Version              TNSLSNR for Linux: Version 18.0.0.0.0 - Production
Trace Level          off
Security              ON: Local OS Authentication
SNMP                  OFF
Default Service      XE
Listener Parameter File  /opt/oracle/product/18c/dbhomeXE/network/admin/listener.ora
Listener Log File      /opt/oracle/diag/tnslsnr/dbhost/listener/alert/log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=dbhost.example.com)(PORT=1521)))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(KEY=EXTPROC1521)))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcps)(HOST=dbhost.example.com)(PORT=5500))
(Security=(my_wallet_directory=/opt/oracle/admin/XE/xdw_wallet))(Presentation=HTTP)
(Session=RAW))
Services Summary...
Service "77f81bd10c818208e053410cc40aef5a" has 1 instance(s).
  Instance "XE", status READY, has 1 handler(s) for this service...
Service "XE" has 1 instance(s).
  Instance "XE", status READY, has 1 handler(s) for this service...
Service "XEXDB" has 1 instance(s).
  Instance "XE", status READY, has 1 handler(s) for this service...
Service "xepdb1" has 1 instance(s).
  Instance "XE", status READY, has 1 handler(s) for this service...
The command completed successfully
```

For example, you can connect to the database from a client computer with SQL*plus using the connect identifier:

```
sqlplus system@"dbhost.example/XE"
```

The XE services are defined in the configuration in `/opt/oracle/product/18c/dbhomeXE/network/admin/tnsnames.ora` file.

Connecting to Oracle Using Easy Connect Naming Method

You can connect to the database using the following Easy Connect strings:

- Multitenant container database: `host[:port]`
- Pluggable database: `host[:port]/service_name`

XEPDB1 is the service name defined for the first PDB created by default. If your PDB has another name, you must provide the service name for that PDB.

Specifying the port is optional when the listener is setup with the default port 1521. You must specify the port if other port number is used.

 **See Also:**

- *2 Day DBA* for more information about the listener and network configuration

Oracle Database Development Guide for more information about connection strategies for database applications

7

Starting and Stopping Oracle Database

You can start and stop the database manually, set it to automatically after the system shuts down and starts, or using Enterprise Manager.

Shutting Down and Starting Up Using the Configuration Services Script

Execute these commands as `root` using `sudo`.

```
$ sudo -s
```

Oracle Linux 6:

You can start and stop the database using the `/etc/init.d/oracle-xe-18c` script.

Run the following command to start the listener and database:

```
# /etc/init.d/oracle-xe-18c start
```

Run the following command to stop the database and the listener:

```
# /etc/init.d/oracle-xe-18c stop
```

Run the following command to stop and start the listener and database:

```
# /etc/init.d/oracle-xe-18c restart
```

Oracle Linux 7:

Run the following command to start the listener and database:

```
# systemctl start oracle-xe-18c
```

Run the following command to stop the database and the listener:

```
# systemctl stop oracle-xe-18c
```

Run the following command to stop and start the listener and database:

```
# systemctl restart oracle-xe-18c
```

Shutting Down and Starting Up Using SQL*Plus

You can shut down and start the database using SQL*Plus.

To shutdown the database, login to the oracle user with its environment variables set for access to the XE database, and issue the following SQL*Plus command:

```
$ sqlplus / as sysdba
SQL> SHUTDOWN IMMEDIATE
```

To start the database, issue the commands:

```
SQL> STARTUP
SQL> ALTER PLUGGABLE DATABASE ALL OPEN;
```


 **See Also:**

- *Oracle Database 2 Day DBA* for general information about managing a database
- *Oracle Multitenant Administration Guide* for more information about shutting down and starting a PDB

Automating Shutdown and Startup

Oracle recommends that you configure the system to automatically start Oracle Database when the system starts, and to automatically shut it down when the system shuts down. Automating database shutdown guards against incorrect database shutdown.

To automate the startup and shutdown of the listener and database, execute the following commands as `root`:

```
$ sudo -s
```

For Oracle Linux 6, run these commands:

```
# /sbin/chkconfig oracle-xe-18c on
# /sbin/service oracle-xe-18c start
```

For Oracle Linux 7, run these commands:

```
# systemctl daemon-reload
# systemctl enable oracle-xe-18c
```

8

Using Enterprise Manager Express

You can leverage all the functionality and ease of use of Enterprise Manager (EM) to manage your XE database.

To connect to EM Express, go to `https://localhost:5500/em` from the browser on the system.

Port 5500 is the default `EM_EXPRESS_PORT` assigned during database creation.

8.1 Making Oracle Database EM Express Available to Remote Clients

After you install Oracle Database XE, EM Express is only available from the local server, it cannot be accessed remotely.

To make EM Express available to remote clients, start SQL*Plus and log in as `SYSTEM` and execute this procedure:

```
$ sqlplus system
Enter password: SYSTEM_password
SQL> EXEC DBMS_XDB.SETLISTENERLOCALACCESS(FALSE);
```

9

Exporting and Importing Data between Oracle Database XE 11.2 and 18c

This section explains how to export and import data between Oracle Database XE 11g Release 2 (11.2) and XE 18c. Depending if Oracle Application Express (APEX) was used or not in your 11.2 database, follow one of these procedures:

- [Exporting and Importing Data for non-APEX Users](#)
- [Exporting and Importing Data for Oracle Application Express \(APEX\) Users](#)

9.1 Exporting and Importing Data for non-APEX Users

This topic describes how to export and import data between your Oracle Database XE 11.2 and XE 18c databases when Oracle Application Express (APEX) was not used in your 11.2 XE database.

Exporting Data

1. To export data from your 11.2 XE database, perform the following steps:
 - a. Create a directory `/dump_folder` on the local file system for the `DUMP_DIR` directory object.
 - b. Connect to the 11.2 XE database as user `SYS` using the `SYSDBA` privilege.
 - c. Create directory object `DUMP_DIR` and grant `READ` and `WRITE` privileges on the `DUMP_DIR` directory to the `SYSTEM` user.

```
sqlplus / AS SYSDBA
SQL> CREATE DIRECTORY DUMP_DIR AS '/dump_folder';
SQL> GRANT READ, WRITE ON DIRECTORY DUMP_DIR TO SYSTEM;
```

- d. Export data from your 11.2 XE database to the dump folder.

```
expdp system/system_password full=Y EXCLUDE=SCHEMA:\"LIKE \'APEX_%
\'\",SCHEMA:\"LIKE \'FLOWS_%'\\" directory=DUMP_DIR dumpfile=DB11G.dmp
logfile=expdpDB11G.log
```
2. Deinstall Oracle Database XE 11.2 if installation of 18c XE is planned on the same system. See [Deinstalling Oracle Database XE](#) for more information
 3. Install Oracle Database XE 18c.

Importing Data

1. To import data in your 18c XE database, perform the following steps:
 - a. Connect to the 18c XE database as user `SYS` using the `SYSDBA` privilege.
 - b. Create directory object `DUMP_DIR` and grant `READ` and `WRITE` privileges on the directory to the `SYSTEM` user.

```
sqlplus / AS SYSDBA
SQL> ALTER SESSION SET CONTAINER=XEPDB1;
```

```
SQL> CREATE DIRECTORY DUMP_DIR AS '/dump_folder';
SQL> GRANT READ, WRITE ON DIRECTORY DUMP_DIR TO SYSTEM;
```

- c. Import data to the 18c XE database from the dump folder.

```
impdp system/system_password@localhost/xepdb1 full=Y EXCLUDE=SCHEMA:\ "LIKE
\ 'APEX_%' \ ", SCHEMA:\ "LIKE \ 'FLOWS_%' \ " directory=DUMP_DIR
dumpfile=DB11G.dmp logfile=impdpDB11G.log
```

You can ignore the following errors:

- ORA-39083: Object type TABLESPACE:"SYSAUX" failed to create with error
- ORA-31685: Object type USER:"SYS" failed due to insufficient privileges
- ORA-39083: Object type PROCACT_SYSTEM failed to create with error
- ORA-01917: user or role 'APEX_040000' does not exist
- ORA-31684 "already exists" errors

9.2 Exporting and Importing Data for Oracle Application Express (APEX) Users

This topic describes how to export and import data between Oracle Database XE 11.2 and XE 18c for Oracle Application Express (APEX) users.

Exporting Data

1. Upgrade Oracle Application Express in your 11.2 XE database to at least APEX 5.1.4 which is the minimum supported version in database 18c if you have not already done so. You can download APEX distributions at <http://www.oracle.com/technetwork/developer-tools/apex/downloads/index.html>.

See Also:

Application Express Installation Guide for more information about Upgrading Oracle Application Express (APEX) within Oracle Database Express Edition

2. To export the data from your 11.2 XE database, perform the following steps:
 - a. Create a directory on the local file system for the `DUMP_DIR` directory object.
 - b. Connect to the 11.2 XE database as user `SYS` using the `SYSDBA` privilege.
 - c. Create directory object `DUMP_DIR` and grant `READ` and `WRITE` privileges on the directory to the `SYSTEM` user.

```
sqlplus "/ AS SYSDBA"
SQL> CREATE DIRECTORY DUMP_DIR AS '/dump_folder';
SQL> GRANT READ, WRITE ON DIRECTORY DUMP_DIR TO SYSTEM;
```

- d. Export data from the 11.2 XE database in the `DUMP_DIR` directory.

```
expdp system/system_password full=Y directory=DUMP_DIR dumpfile=DB11G.dmp
logfile=expdpDB11G.log
```

3. Deinstall Oracle Database XE 11.2 if installation of Oracle Database XE 18c is planned on the same system. See [Deinstalling Oracle Database XE](#) for more information
4. Install Oracle Database XE 18c.

Importing Data

1. To import data to the 18c XE database, perform the following steps:
 - a. Connect to 18c XE database as user `SYS` using the `SYSDBA` privilege.
 - b. Create directory object `DUMP_DIR` and grant `READ` and `WRITE` privileges on the directory to the `SYSTEM` user.

```
sqlplus / AS SYSDBA
SQL> ALTER SESSION SET CONTAINER=XEPDB1;
SQL> CREATE DIRECTORY DUMP_DIR AS '/dump_folder';
SQL> GRANT READ, WRITE ON DIRECTORY DUMP_DIR TO SYSTEM;
```

- c. Import data to your 18c XE database from the dump folder.

```
impdp system/system_password@localhost/xepdb1 full=Y
REMAP_DIRECTORY='/u01/app/oracle/oradata/XE/':'/opt/oracle/oradata/XE/
XEPDB1' directory=DUMP_DIR dumpfile=DB11G.dmp logfile=impdpDB11G.log
```

Remapping the directory is necessary when you use different directory file naming conventions. The first argument of the `REMAP_DIRECTORY` parameter is the location of your 11.2 XE data files (the source) and the second argument is the location of the 18c XE data files (target).

See *Oracle Database Utilities* for more information about `impdp` `REMAP_DIRECTORY` parameter syntax

You can ignore the following errors:

- ORA-39083: Object type TABLESPACE:"SYSAUX" failed to create with error
- ORA-31685: Object type USER:"SYS" failed due to insufficient privileges
- ORA-39083: Object type PROCACT_SYSTEM failed to create with error
- ORA-01917: user or role 'APEX_040000' does not exist
- ORA-31684 "already exists" errors

2. Run post database import scripts to configure Oracle Application Express (APEX).
 - a. Download <https://www.oracle.com/technetwork/developer-tools/apex/application-express/apxfix-5137274.zip> and extract the `apxfix.sql` script on your server.
 - b. Copy the file **apxfix.sql** into the top level directory of the APEX source you used to upgrade APEX in your 11.2 XE database. Change your working directory to that source.
 - c. Run `apxfix.sql` passing the schema name that owns the APEX software. For example, if you upgraded 11.2 XE to APEX 5.1.4 prior to exporting the data, provide the schema name `APEX_050100` as the argument:

```
sqlplus / AS SYSDBA
SQL> ALTER SESSION SET CONTAINER=XEPDB1;
SQL> @apxfix.sql APEX_050100
SQL> EXIT
```

- d. Configure the embedded PL/SQL gateway. Run the `apex_epg_config.sql` script passing the file system path to the Oracle Application Express (APEX) software. For example, if you unzipped the APEX software in `/tmp`:

```
sqlplus / AS SYSDBA
SQL> ALTER SESSION SET CONTAINER=XEPDB1;
SQL> @apex_epg_config.sql /tmp
```

- e. Set the HTTP port for the embedded PL/SQL gateway. For example, to set the HTTP port to 8080:

```
SQL> ALTER SESSION SET CONTAINER=XEPDB1;
SQL> EXEC XDB.DBMS_XDB.SETHTTPPORT(8080);
SQL> COMMIT;
```

- f. Connect to `CDB$ROOT` and unlock the `ANONYMOUS` user:

```
SQL> ALTER SESSION SET CONTAINER=CDB$ROOT;
SQL> ALTER USER ANONYMOUS ACCOUNT UNLOCK;
SQL> EXIT
```

10

Migrating Data and Applications

You can migrate data and applications in and out of your XE database using various methods.

You can export tables and data from one XE installation and import them into another. Oracle recommends you use 11g Release 2 and higher to export your data.

Migrating from Oracle Database XE 18c to Oracle Database Enterprise Edition 18c is supported via the unplug, plug scenario only. You can unplug a PDB from XE 18c database and plug it into another Enterprise Edition 18c database of the same release. Migrating from Oracle Database XE 18c to any of the other Oracle Database 18c offerings is not supported.

Upgrade from Oracle Database XE 11.2 to Oracle Database XE 18c is not supported.

Procedure to Unplug a PDB from 18c XE and Plug into 18c EE

A Pluggable Database (PDB) created in Oracle Database XE 18c can be migrated to another Multitenant Container Database (CDB) Enterprise Edition (EE) 18c.

The standard plug compatibility requirements apply. See *Oracle Multitenant Administrator's Guide* for more information about general prerequisites for PDB creation.

For example, you want to unplug your xepdb1 out of the XE 18c XE CDB and plug it in another 18c EE CDB.

- Unplug xepdb1 from XE database and create the `/tmp/xepdb1.xml` metadata file using this command :

```
ALTER PLUGGABLE DATABASE xepdb1 UNPLUG INTO '/tmp/xepdb1.xml';
```

- Login to your EE environment. The xepdb1 metadata file should be available from that system.
- Run the `DBMS_PDB.CHECK_PLUG_COMPATIBILITY` function to determine whether the unplugged PDB is compatible with the CDB.

```
SET SERVEROUTPUT ON
DECLARE
  compatible CONSTANT VARCHAR2(3) :=
    CASE DBMS_PDB.CHECK_PLUG_COMPATIBILITY(
      pdb_descr_file => '/tmp/xepdb1.xml',
      pdb_name       => 'XEPDB1')
    WHEN TRUE THEN 'YES'
    ELSE 'NO'
END;
BEGIN
  DBMS_OUTPUT.PUT_LINE(compatible);
END;
/
```

- If the PDB is compatible with the CDB, you can plug xepdb1 into the 18c EE database using this command.

```
CREATE PLUGGABLE DATABASE NEWXEPDB USING '/tmp/xepdb1.xml'
NOCOPY
TEMPFILE REUSE;
```

This example assumes :

- The XML file accurately describes the current locations of the files. Therefore, the SOURCE_FILE_NAME_CONVERT clause or SOURCE_FILE_DIRECTORY clause is not required.
- The files are in the correct location. Therefore, NOCOPY is included.
- Storage limits are not required for the PDB. Therefore, the STORAGE clause is not required.
- A file with the same name as the temp file specified in the XML file exists in the target location. Therefore, the TEMPFILE REUSE clause is required.

See *Oracle Multitenant Administrator's Guide* for more information about plugging in an unplugged PDB

- Run catalog, catproc and utlpl on the plugged in NEWXEPDB.

```
sqlplus / as sysdba
```

```
SQL> SHOW PDBS;
CON_ID CON_NAME          OPEN MODE  RESTRICTED
-----
2      PDB$SEED              READ ONLY NO
3      ORCLPDB               READ WRITE NO
4      NEWXEPDB              READ WRITE YES
```

```
SQL> ALTER SESSION SET CONTAINER=newxepdb;
SQL> SPOOL catalog.log
SQL> @$ORACLE_HOME/rdbms/admin/catalog
SQL> SPOOL OFF;
```

```
SQL> SPOOL catproc.log
SQL> @$ORACLE_HOME/rdbms/admin/catproc
SQL> SPOOL OFF;
```

```
SQL> SPOOL utlpl.log
SQL> @$ORACLE_HOME/rdbms/admin/utlpl
SQL> SPOOL OFF;
```

```
SELECT COMP_NAME, STATUS, VERSION FROM DBA_REGISTRY;
```

COMP_NAME	STATUS	VERSION
Oracle Database Catalog Views	VALID	18.0.0.0.0
Oracle Database Packages and Types	VALID	18.0.0.0.0
Oracle Real Application Clusters	OPTION OFF	18.0.0.0.0
JServer JAVA Virtual Machine	VALID	18.0.0.0.0
Oracle XDK	VALID	18.0.0.0.0
Oracle Database Java Packages	VALID	18.0.0.0.0
OLAP Analytic Workspace	VALID	18.0.0.0.0
Oracle XML Database	VALID	18.0.0.0.0
Oracle Workspace Manager	VALID	18.0.0.0.0
Oracle Text	VALID	18.0.0.0.0
Oracle Multimedia	VALID	18.0.0.0.0
Spatial	VALID	18.0.0.0.0
Oracle OLAP API	VALID	18.0.0.0.0

Oracle Label Security	VALID	18.0.0.0.0
Oracle Database Vault	VALID	18.0.0.0.0

```
SQL> SELECT OWNER, OBJECT_NAME FROM DBA_INVALID_OBJECTS WHERE STATUS = 'INVALID';
```

```
no rows selected
```

11

Deinstalling Oracle Database XE

When you deinstall Oracle Database XE, all components, including data files, the database, and the software, are removed.

If you want to save your data files but remove the Oracle Database XE software and database, then first export the data before you deinstall.

Because the deinstallation process removes all files from the directory in which Oracle Database XE is installed, back up any files from the directory (if needed) before you deinstall. The database will no longer be operational after deinstallation.

Execute this procedure as `root` or with **root** privileges.

```
$ sudo -s
```

Run the following commands to deinstall Oracle Database XE:

- This deletes all the Oracle Database XE data files, the listener and configuration files. After this operation, only logs and the Oracle Home software will be present.

```
# /etc/init.d/oracle-xe-18c delete
```

- This removes the software. After this operation, some content under Oracle Base `/opt/oracle` will remain and can be deleted manually.

```
# yum remove oracle-database-xe-18c
```

- Optional: If you only installed Oracle Database XE on the system and have no further Oracle Database software installed, you can also remove the Oracle Database Preinstall RPM:

```
# yum remove oracle-database-18c-preinstall
```

12

Reporting Security Vulnerabilities

If you find any security vulnerabilities with Oracle Database XE, then send a description of the problem to Oracle at the following e-mail address:

secalert_us@oracle.com

Include the following information in your e-mail:

- A complete description of the problem you encountered
- The version of Oracle Database XE you were using
- The platform on which you were running Oracle Database XE
- Any scripts or examples that may be helpful in tracking down the security problem

13

Globalization Support

Oracle Database XE is configured by default to be able to process character data in all supported languages simultaneously:

- The database is created with the Unicode `AL32UTF8` character set. `AL32UTF8` is the recommended database character set suitable for storing data in practically any language. Multiple languages can be mixed even in a single character value. While not a recommended option, you can modify the `CHARSET` parameter in the `oracle-xe-18c.conf` configuration file to any other valid database character set if you need to meet specific database character set requirements.
- The Oracle Database Express Edition (XE) supports the same globalization features that Oracle Database Enterprise Edition (EE) provides.

13.1 Setting Language and Locale Preferences for Client Connections

Configure client applications connecting to an Oracle Database according to your locale preferences and your I/O device character set.

You must configure client applications connecting to an Oracle Database according to your locale preferences and your I/O device character set. If your applications do not have their own specific methods to configure locale preferences, then the method you use to configure an Oracle database client connection depends on the access API you use to connect to the database. Check your application documentation, before you configure locale preferences for your applications.

For applications that connect to Oracle Databases using Oracle Call Interface (OCI) use `NLS_LANG` and other client settings with names that start with `NLS_` to set the locale conventions and client character set for Oracle Database sessions. It is important that you set the character set part of the `NLS_LANG` value properly. The character set you set must correspond to the character set used by your I/O devices, which in case of Microsoft Windows is either the ANSI Code Page (for GUI applications), such as `WE8MSWIN1252`, or the OEM Code Page (for Console mode applications), such as `US8PC437`. By doing this, the OCI API is notified about the character set of data that it receives from the application. OCI can then convert this data correctly to and from the database character set.

`NLS_LANG` and the other NLS settings can be specified either as environment variables or as Windows Registry settings. Environment variable values take precedence over Registry values.

Oracle Universal Installer sets a default value for the `NLS_LANG` setting in Registry when it creates a new Oracle home. The `NLS_LANG` value is based on the language of the Windows user interface, which is the language of Windows menu items and dialog box labels.

 **Caution:**

Failure to set the client character set correctly can cause data loss.

Java applications that connect to Oracle Databases by using Oracle JDBC do not use NLS_LANG. Instead, Oracle JDBC maps the default locale of the Java VM in which the application runs to the Oracle Database language and territory settings. Oracle JDBC then configures the connected database session using these settings. Because Java works internally in Unicode, the client character set is always set to Unicode. Unless an application explicitly changes it, the default locale of the Java VM is set based on the locale of the user operating system on which the Java VM runs. Check your Java VM documentation for information about configuring the Java VM default locale.

 **Note:**

In 3-tier architecture deployments, application servers that are database clients can have settings in their configuration files that specify the NLS_LANG value or the Java VM locale. Check the documentation accompanying these servers.

Related Topics

- *Oracle Database Administrator's Reference for Microsoft Windows*

 **See Also:**

Oracle Database Globalization Support Guide for more information about configuring user locale preferences

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