

Oracle 18c Express Installation Guide



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Table of Contents

Introduction.....	3
Oracle Overview.....	3
Downloading and Installing Oracle.....	5
Step 1: Creating an OTN Account.....	5
Step 2: Downloading Oracle	7
Step 3: Installing Oracle.....	11
Installing the Oracle SQL Developer Client.....	16
Step 1: Downloading Oracle SQL Developer	16
Step 2: Launching Oracle SQL Developer.....	19
Step 3: Connecting to Your Database.....	20
Step 4: Creating Your Own User	23
Step 5: Connecting with Your New User	25
Appendix A: Troubleshooting Installation and Usage Issues.....	29
I Forgot My Password	29
Oracle SQL Developer Won't Launch in Windows 10	29
My Oracle Listeners Are Refusing Connections.....	30
Appendix B: Configuring Oracle Startup Options.....	36
Appendix C: Installing Oracle on a Mac	38
Using a Virtual Machine	38
Dual Booting.....	39
Using Virtual Machine Versus Dual Booting	39
Appendix D: Caring for Your Oracle Installation.....	41
Process 1 – Getting Started	41
Process 2 – Verifying	44
Process 3 – Stopping Your Database.....	45
Process 4 – Starting Your Database	47
Process 5 – Putting it into a Batch File	47

Introduction

These Oracle installation instructions are used by students enrolled in the Master of Science in Computer Information Systems and other Computer Science Department programs in both on-campus and online programs. The document begins with a discussion of Oracle, connecting to the Oracle web site, creating an Oracle Technology Network (OTN) account, then downloading and installing Oracle, then setting up a client to connect to your database. The examples in the main document are for the Microsoft Windows family, including Windows 7, Windows 8, and Windows 10. If you would like to install Oracle on a Mac (OS X), please first follow the instructions in Appendix C, then continue with the rest of this installation guide. If you are installing on an operating system other than the Windows family or OS X, such as Linux or Solaris, then follow the instructions in this installation guide to join OTN, and download the version of Oracle for your platform rather than the Windows version. The *Quick Installation Guide* and the full *Installation Guide* for your operating system can be found in the *Install* directory created when you unzip the file you will download as part of these instructions.

These setup instructions are for Oracle 18c Express. Although Express has limitations with regard to the amount of memory, size, and number of tables allowed, it is quite usable for most of our classes, and it introduces a much lighter load on your computer. Oracle has maintained upward compatibility for SQL between Oracle versions for many years, so if you cannot install Oracle 18c Express on your own machine, and you have ready access to installation for an older version of Oracle, you may be able to use it. Oracle is continually updating Oracle.com, so the screens that you see on Oracle.com will probably be a little different than what is shown in this document. If you can't determine how to proceed because what you see is too different, or if something goes wrong, ask your facilitator or instructor for help.

Oracle Overview

About Oracle Oracle has most of the advanced features in any relational or object-relational database management system. Because of this, many of the new ANSI/ISO SQL standards are based on Oracle, so when you learn Oracle you are mainly close to the portable standards. Oracle runs on all common platforms from huge symmetric multiprocessors to ordinary PCs. Oracle is scalable, and supports both clustering and grid computing to surpass the performance and reliability of any single platform. Oracle is broadly considered as the standard by which other database management systems are measured, and when you learn to use Oracle your skills will transition well to other database management systems.

Oracle runs on ordinary machines. Oracle runs on the largest multiprocessors, but Oracle also runs very well on ordinary PCs and recent Macintoshes. PCs are a common Oracle hardware platform, and there are Oracle versions for many PC operating

systems, including the Windows family and Linux.

The following instructions are for the default configuration, the easiest of the Oracle installations. Oracle is very flexible and can be configured to use less or more in the way of machine resources.

**Platform
Independence**

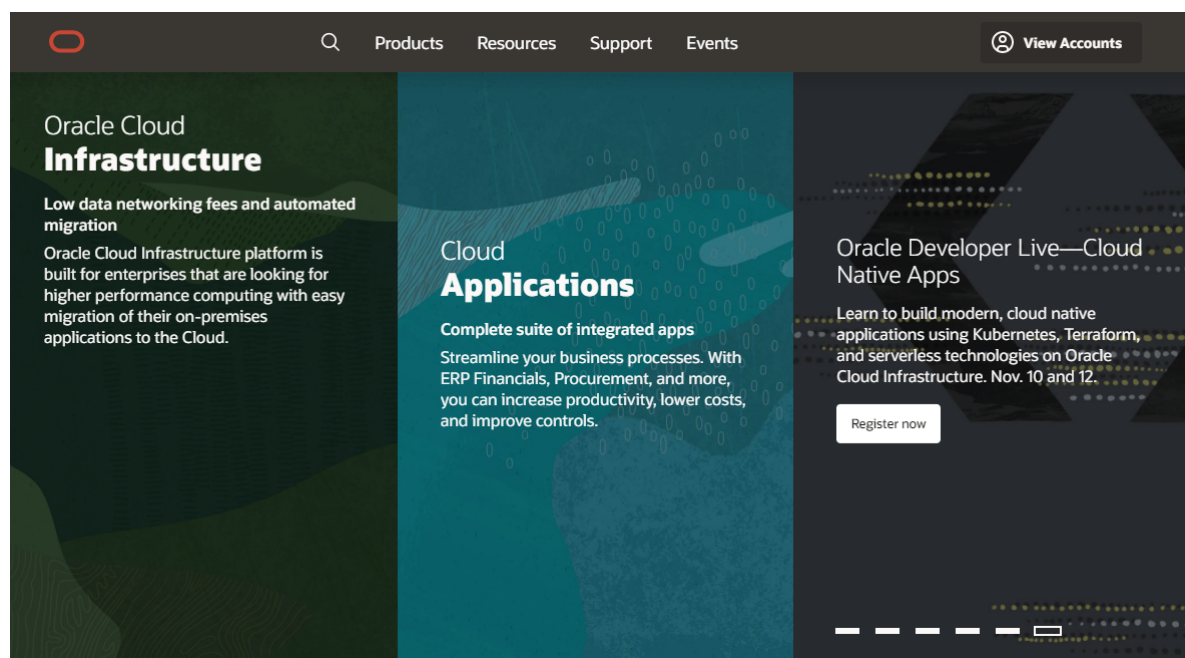
Oracle runs on most common platforms, including the Windows family, and several Linux and Unix variants. Oracle supports the features that we use in our courses on all platforms, and it doesn't matter what platform your Oracle runs on. *Oracle behaves mostly the same regardless of the platform* except for database size limitations and performance. Your exercises will behave the same way across all Oracle platforms.

Downloading and Installing Oracle

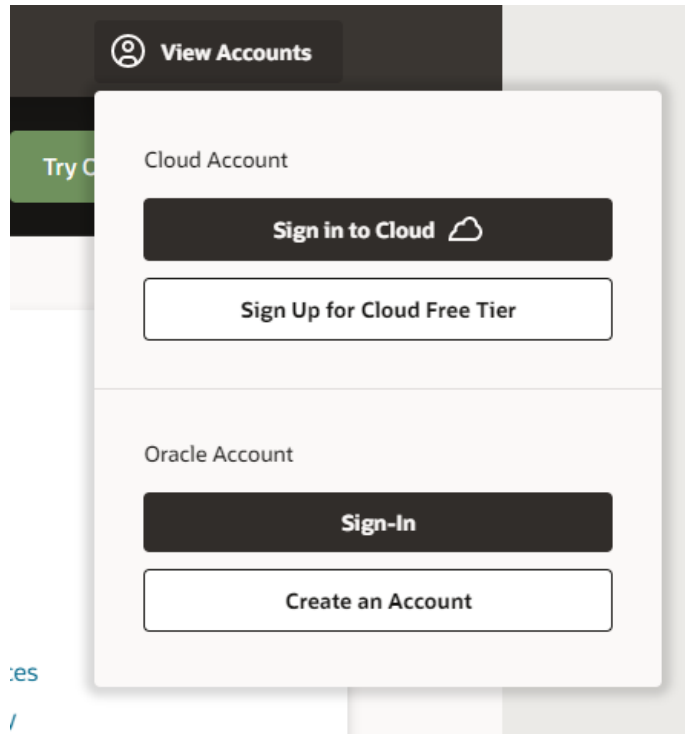
Step 1: Creating an OTN Account

Introduction This section guides you through the sub-steps to create your own Oracle Technology Network (OTN) account. Before you can download Oracle you must create and login to an Oracle Technology Network account.

Create Oracle Account Go to <http://www.oracle.com/technology> to start. Oracle regularly updates their website, so what you see may be different than the following.



Click “View Accounts” to reveal the screen below.



Click the “Create an Account” button, and a form like the following will appear.

Create Your Oracle Account

Already have an Oracle Account? [Sign In](#)

Email Address *

Your email address is your username.

Password *

Passwords must have upper and lower case letters, at least 1 number, not match or contain email, and be at least 8 characters long.

Retype password *

Country *

USA

Name *

First or Given Name

Last Name

Job Title *

Work Phone *

Company Name *

Address *

City *

State/Province *

-Select-

ZIP/Postal Code *

You may opt-out of all marketing communications: [Unsubscribe](#).

By clicking on the "Create Account" button below, you understand and agree that the use of Oracle's web site is subject to the [Oracle.com Terms of Use](#). Additional details regarding Oracle's collection and use of your personal information, including information about access, retention, rectification, deletion, security, cross-border transfers and other topics, is available in the [Oracle Privacy Policy](#).

Create Account

Fill in the fields with your information, then click the “Create Account” button to create your account.

Step 2: Downloading Oracle

Introduction



The following instructions guide you through the sub-steps to download the Oracle zip file appropriate for your operating system.

Downloading the Setup File

Go to <https://www.oracle.com/database/technologies/xe-downloads.html> to view the Oracle Express download page.

Oracle Database XE Downloads

Oracle Database Express Edition (XE) Release 18.4.0.0.0 (18c)

Download	Description
 Oracle Database 18c Express Edition for Linux x64	(2,521,766,408 bytes - February 20, 2020) [Sha256sum: 4df0318d72a0b97f5468b36919a23ec07533f5897b324843108e0376566d50c8]
 Oracle Database 18c Express Edition for Windows x64	(2,054,264,100 bytes - February 20, 2019) [Sha256sum: 7C1A85D05F6FCC5BE70E7BA4017BEEC70C8D095E685031695B8486C40C114F1A]


Click on the “Oracle Database 18c Express Edition for Windows x64” link to continue. You will then be prompted to accept the license agreement.

×

You must accept the [Oracle License Agreement](#) to download this software.

☐ I reviewed and accept the Oracle License Agreement *Required*

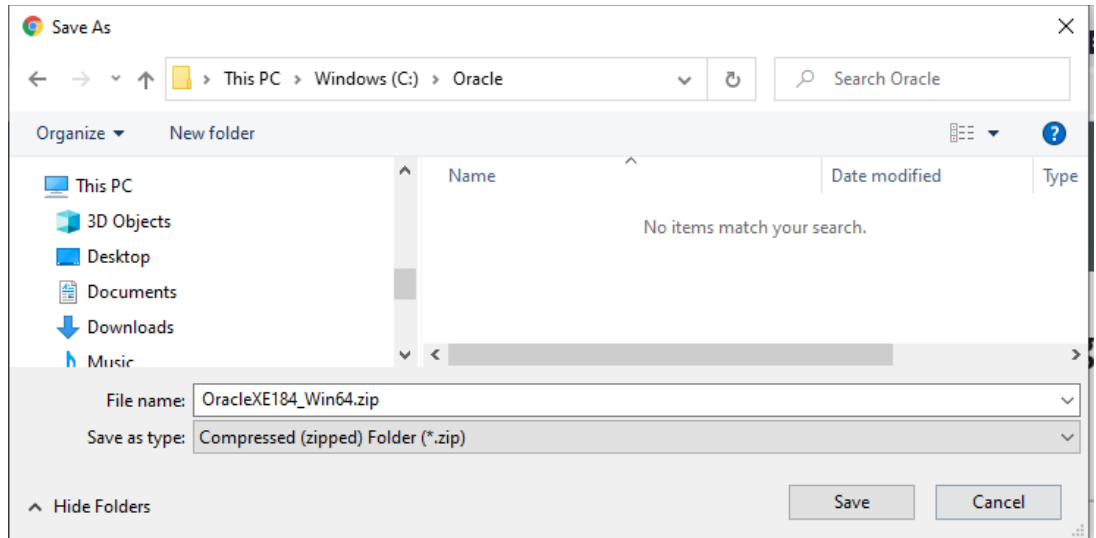
You will be redirected to the login screen in order to download the file.

Download OracleXE184_Win64.zip 

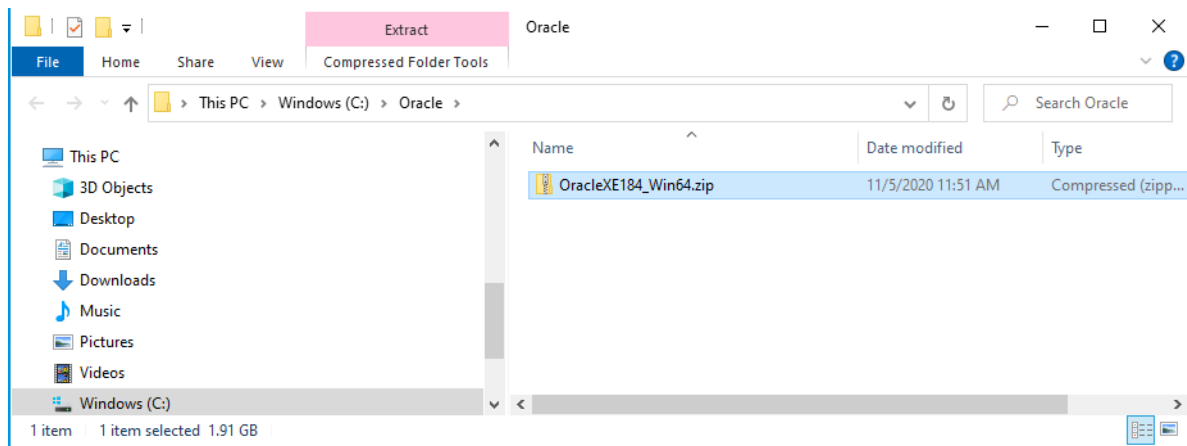
Accept the license agreement to continue.

Save the Zip File

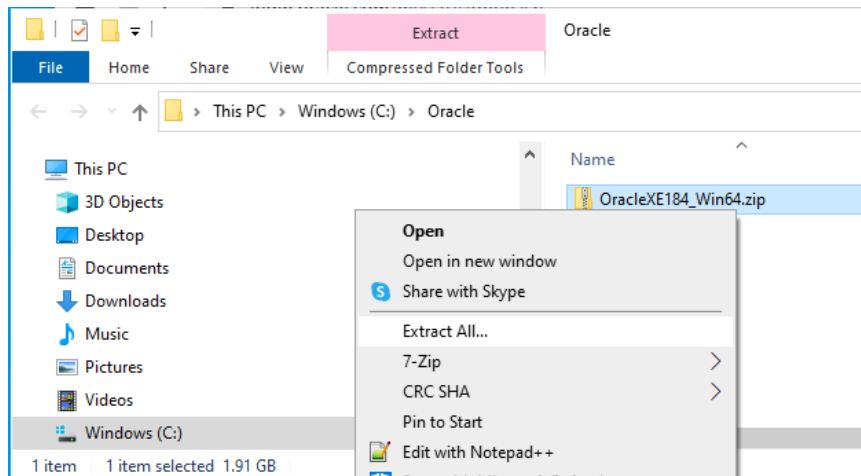
A dialog will appear asking where you’d like to save the zip file. Create a directory for the downloaded file, such as C:\Oracle, and download the file into that directory.



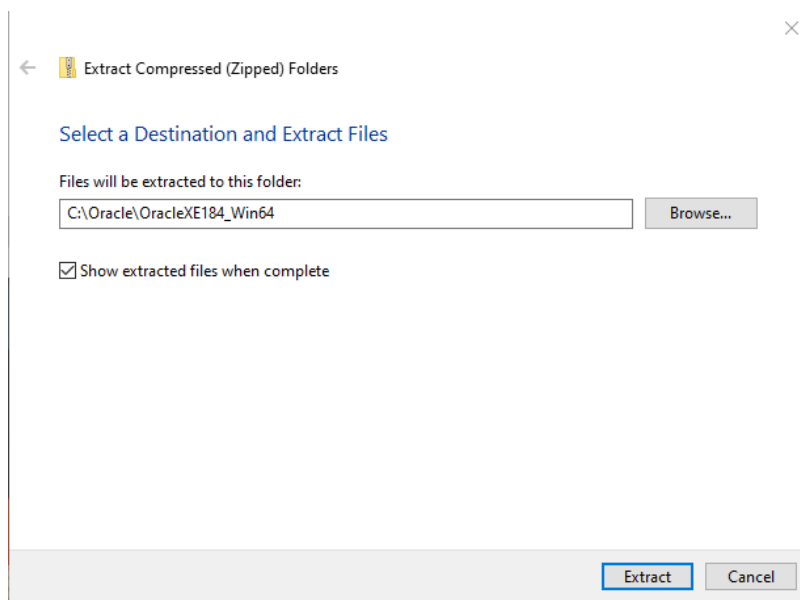
When the download is complete, use File Explorer to navigate to the directory you created. It will look as follows.



Unzip the File Right click on the file and select “Extract All...” to start the unzipping process.

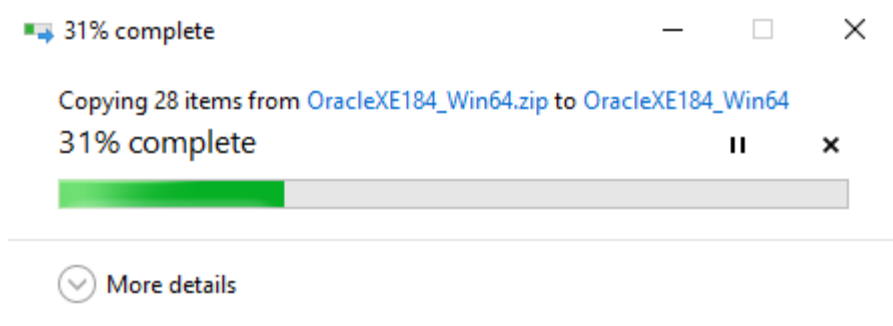


You may leave the default directory when selecting the final unzip directory (shown below).

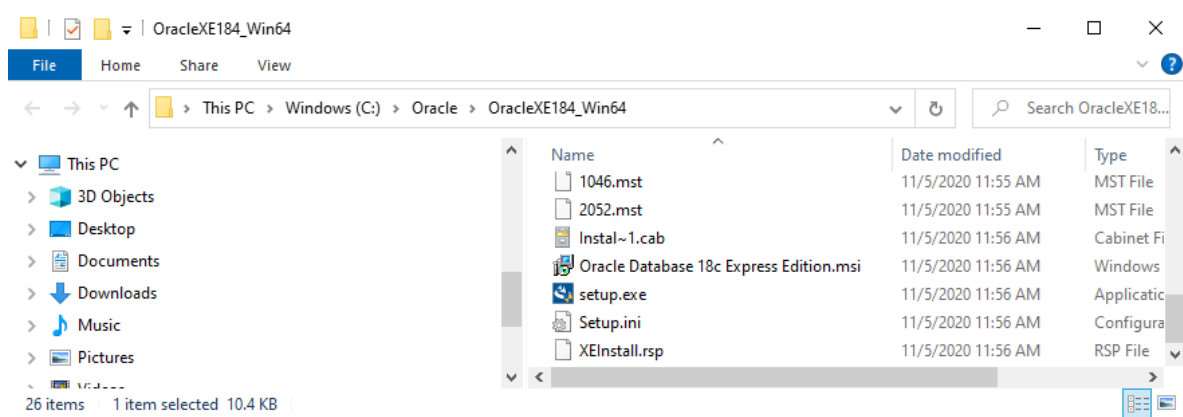


Then click the “Extract” button.

A progress dialog will indicate how much progress has been made.

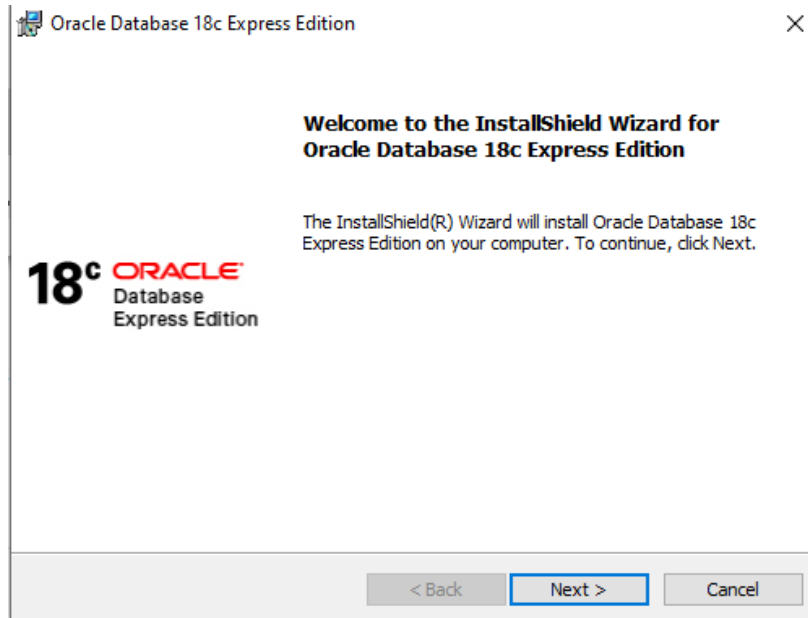


When finished, the unzipped directory will be shown, like the below.



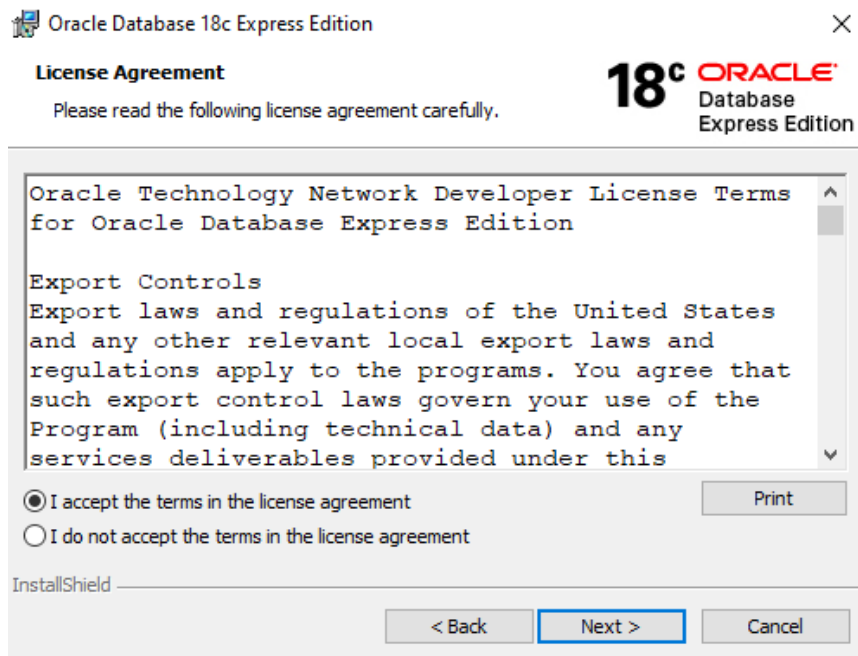
Step 3: Installing Oracle

Launch Setup Launch the Oracle Installer by double-clicking on *setup.exe*. A screen like the following will appear.

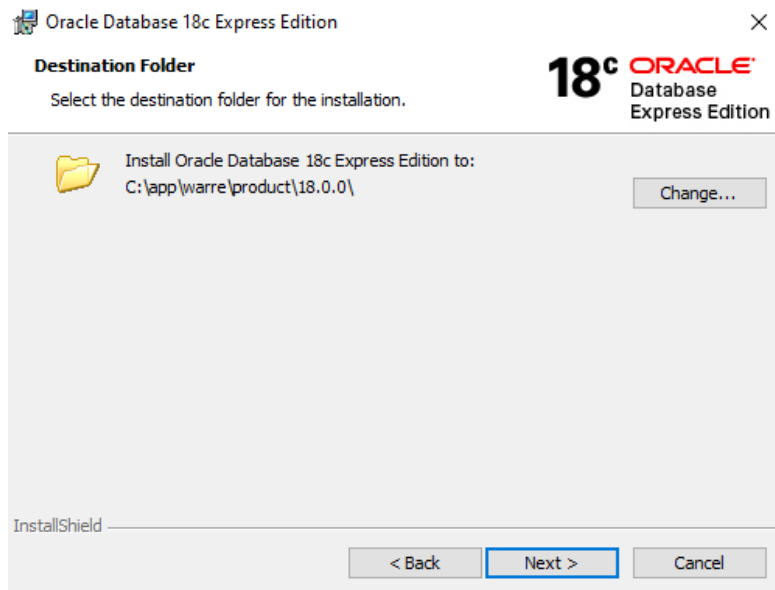


Complete the Installation

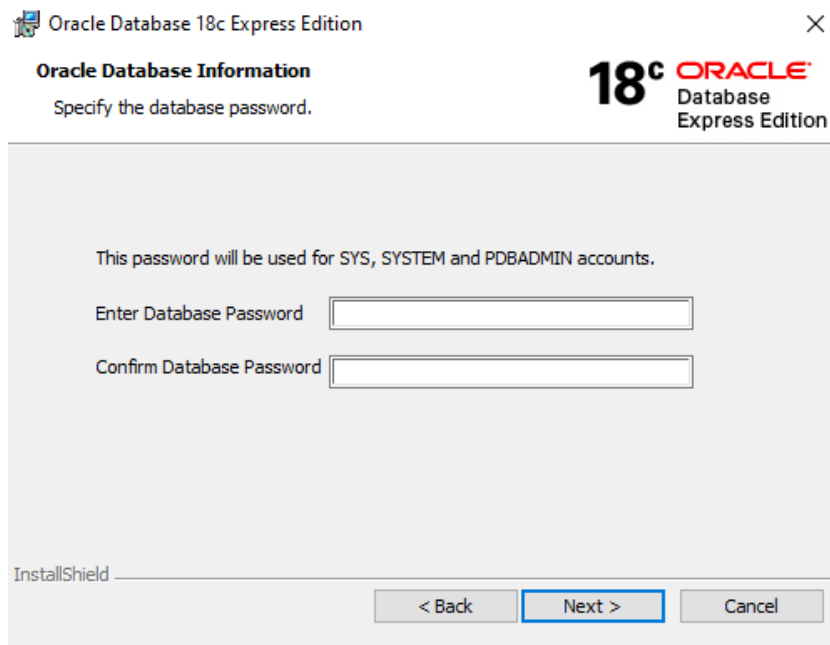
Click next, then accept the license agreement and click Next again:



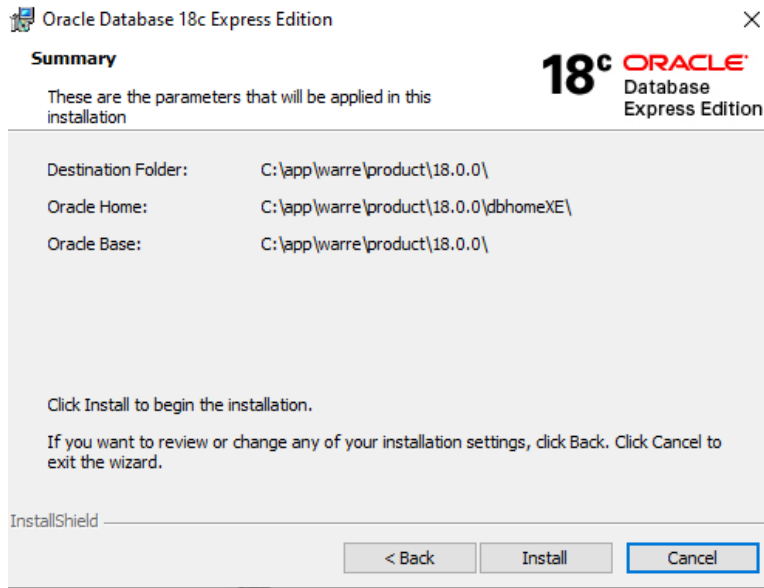
Click next again to accept the default directory.



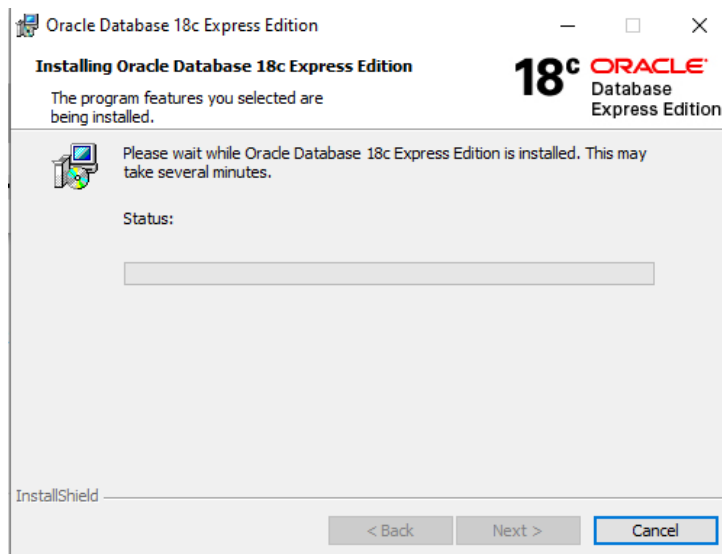
Enter a password, which will be what you use when you first login in a later step. Because this is a local database on your PC and will not be accessible to other users remotely, choose a password you can easily remember.



Click "Install" on the next screen.

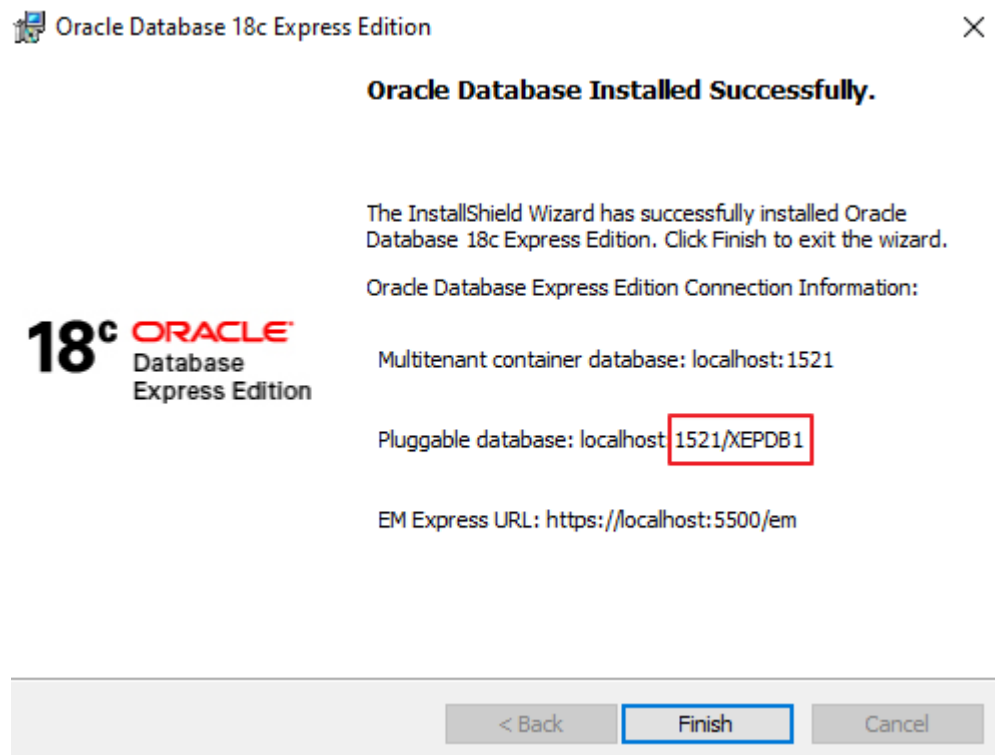


A dialog will show you the progress of the installation. This installation may take several minutes to complete, even on a fast PC.



Capturing Install Information

When installation is completed, the last screen will display. **Do not close this screen without reviewing the information indicated below.** The information will be used to connect to the database in a later step.



The first part of the highlighted information above is the port number, in this case, 1521. The second part of the highlighted information is the service name, in this case, XEPDB1. These are the defaults, what you will see if you have never installed Oracle before and do not have other conflicting programs. **If you install Oracle multiple times or have conflicting programs, these values might be different.** If they are different, record the values so you can successfully connect in a later step (this document illustrates using the default values).

Running Oracle Express

After you have installed Oracle Express, the database is up and running. Because the database is a server, you do not need to run anything specifically to start your database. It is always running in the background. You will however need a client to access your database. Follow the instructions on subsequent pages in this document for installing the Oracle SQL Developer client.

Installing the Oracle SQL Developer Client

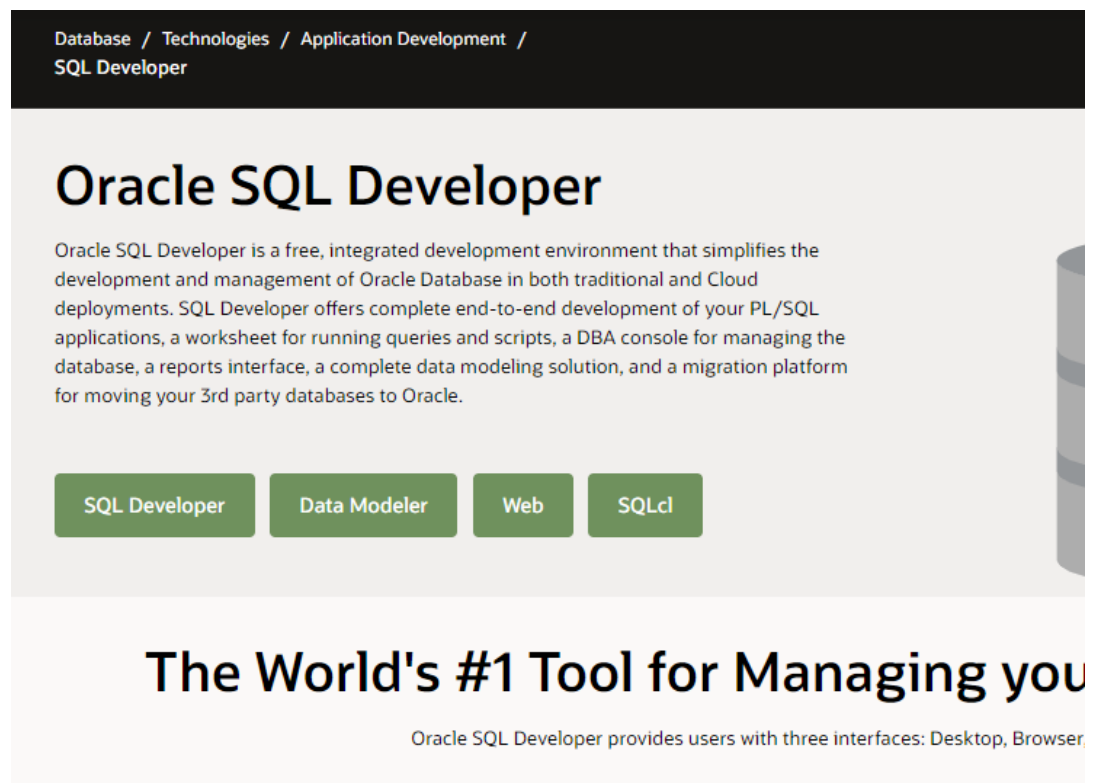
Step 1: Downloading Oracle SQL Developer

Introduction

With the database installed, you now need to download and use a client that is capable of connecting to the database. Modern clients are graphical and have many features to enhance productivity. If you already have a working copy of a SQL client you prefer, you do not need to complete this section. Simply setup a connection to your installed database and continue with the next section. Otherwise, it is recommended that you install the free Oracle SQL Developer client. This section contains step-by-step instructions for downloading and using Oracle SQL Developer.

Download Oracle SQL Developer

Go to <https://www.oracle.com/database/technologies/appdev/sqldeveloper-landing.html> to begin the process. The screen will look like the following.




Click on “SQL Developer” to arrive at the download screen.

SQL Developer 20.2 Downloads

Version 20.2.0.175.1842 - June 25, 2020

- [Release Notes](#)
- [Bugs Fixed](#)
- [Documentation](#)

Platform	Download	Notes
Windows 64-bit with JDK 8 included	 Download (494 MB)	<ul style="list-style-type: none">• MD5: c4...• SHA1: c1ea4ce...• Installa...


Click on the “Download” link highlighted above to continue. There are several download links provided, so make sure to click on the one highlighted above.

Accept the license agreement on the next screen.

×

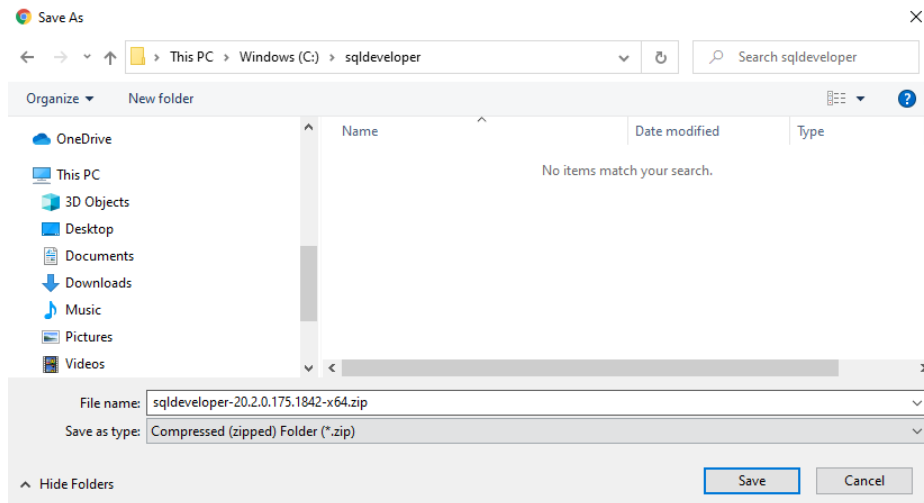
You must accept the [Oracle License Agreement](#) to download this software.

☒ I reviewed and accept the Oracle License Agreement

Download sqldeveloper-20.2.0.175.1842-x64.zip 

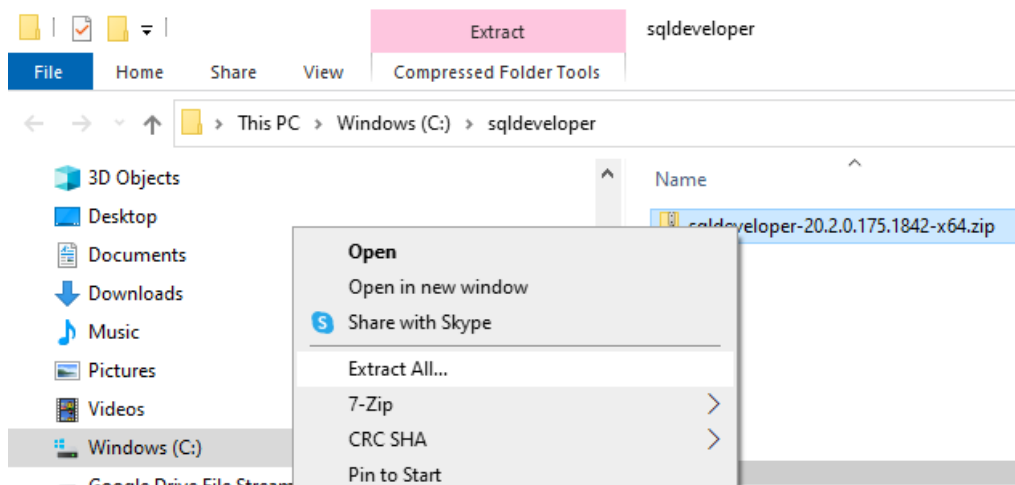
Then click the Download button. If prompted, login with the Oracle account created in prior sections.

When the save file dialog appears, create a directory you can easily remember, and save the file in that directory. In this case, we create a C:\sqldeveloper directory.

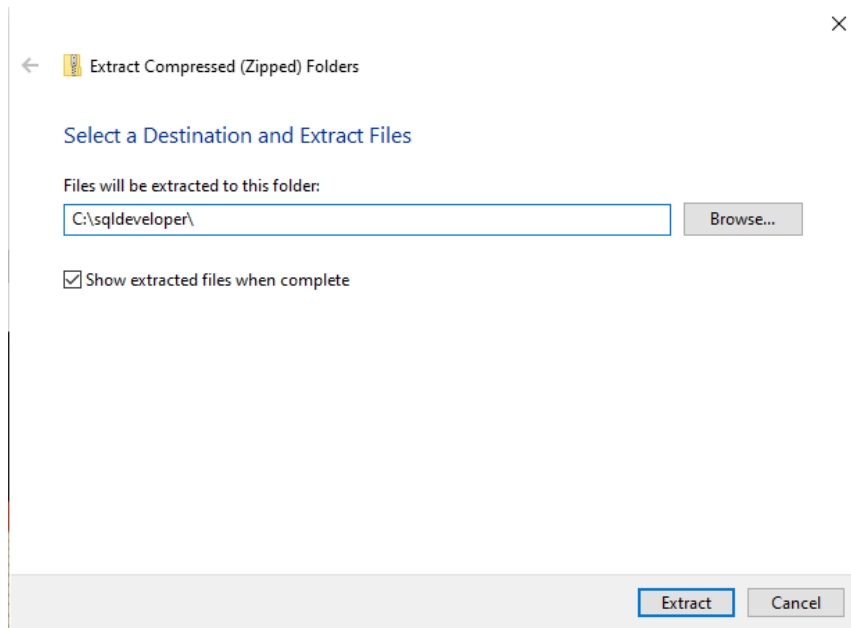


Unzip SQL Developer

Right click on the file to start this process, then select “Extract All...”.



Remove the extra characters from the directory it will be extracted into, so that it will be unzipped into the same directory the zip file is located in. In our case, we will change the directory to “C:\sqldeveloper”.

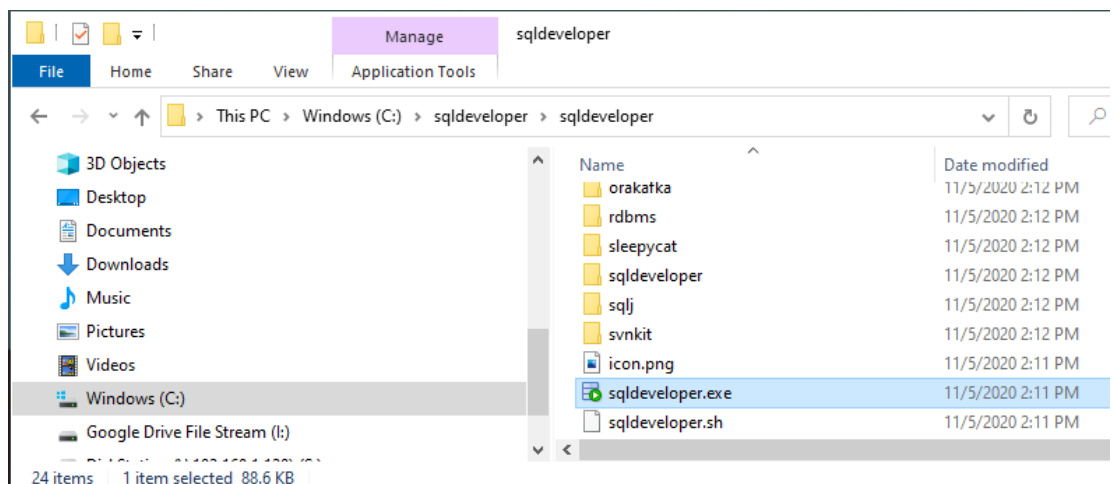


Click the “Extract” button to unzip.

Step 2: Launching Oracle SQL Developer

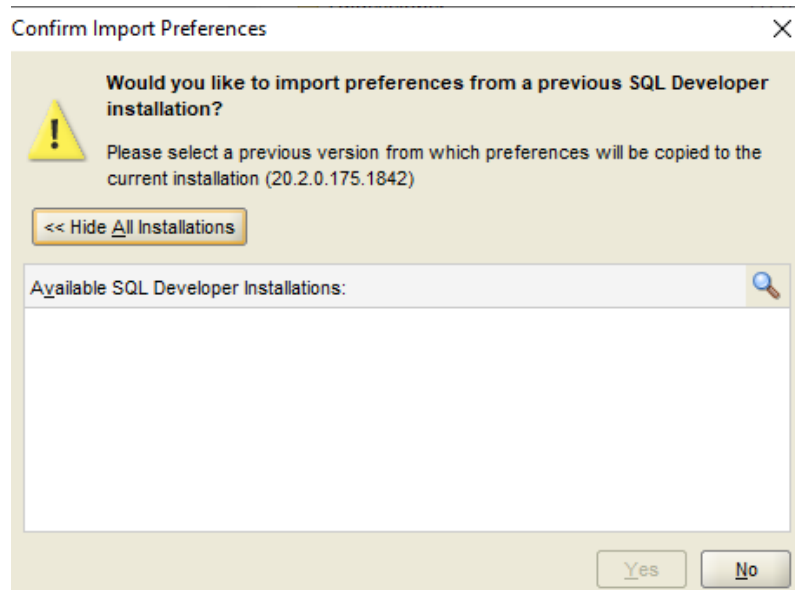
Launch Oracle SQL Developer

To launch Oracle SQL Developer, simply navigate into the newly created “sqldeveloper” directory, and execute “sqldeveloper.exe” by double clicking the file. In our case, this directory is “C:\sqldeveloper\sqldeveloper”, because the zip file adds the extra subdirectory.

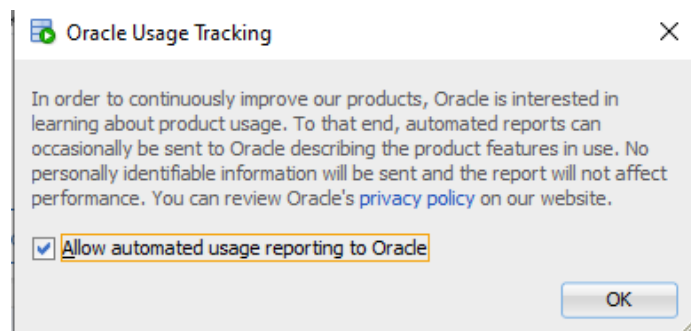


This standalone client does not require an installation before being used.

When launched, you can say “No” to importing preferences from prior versions.




When you first launch, it will ask you if Oracle can track usage. Choose whatever option you are comfortable with and dismiss the dialog.

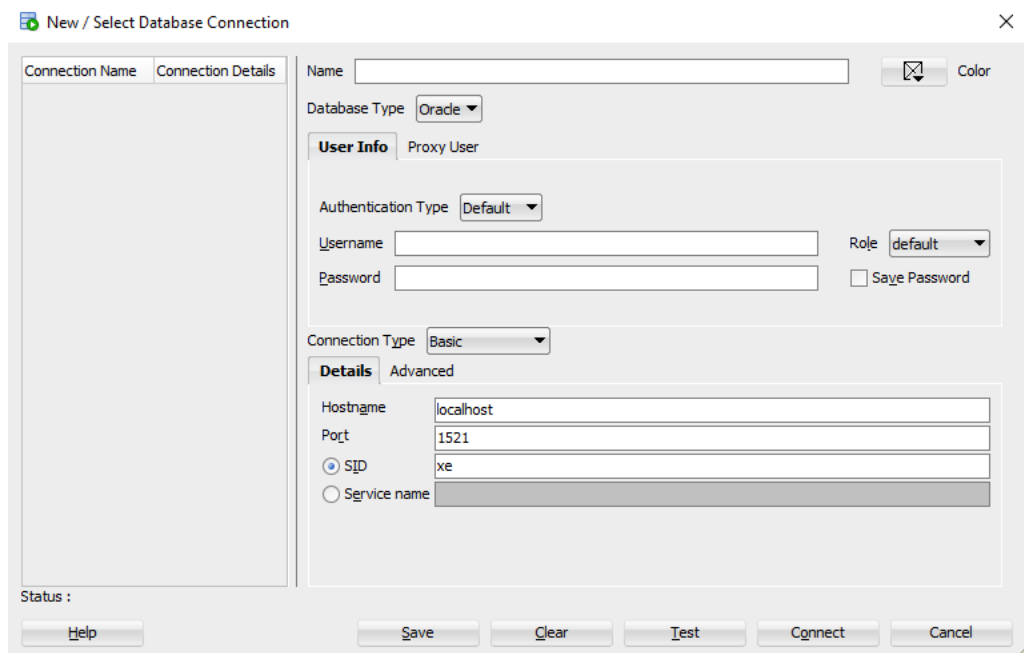


Step 3: Connecting to Your Database

Introduction In any SQL client, we must first establish a connection to the database before typing our SQL commands. A connection opens a communication pathway between the client and the database. In Oracle SQL Developer, the term “connection” is overloaded to indicate both inactive and active communication pathways, as well as all of the configuration information necessary to connect again and again to the same database.

Connecting as the System User

We first need to connect to the database as the “system” user, so that we can create our own user to complete the assignments. To start, click the  icon to start setting up a new connection. Doing so will bring up the window below.



The screenshot shows a window titled "New / Select Database Connection". It has a "Connection Name" tab and a "Connection Details" tab. The "Connection Details" tab is selected. The fields are as follows:

- Name: (empty text box)
- Database Type: Oracle (dropdown)
- User Info: Proxy User (tab)
- Authentication Type: Default (dropdown)
- Username: (empty text box)
- Password: (empty text box)
- Role: default (dropdown)
- Save Password: (checkbox, unchecked)
- Connection Type: Basic (dropdown)
- Details: Advanced (tab)
- Hostname: localhost (text box)
- Port: 1521 (text box)
- SID: (selected radio button, text box contains "xe")
- Service name: (radio button, text box is empty)

At the bottom, there is a "Status:" label and buttons for Help, Save, Clear, Test, Connect, and Cancel.

You will need to modify the following fields – Name, Username, Password, Save Password, and Service name.

Name is just an identifier that you are giving your connection, so that you may identify it in the future. You can type anything you want that is memorable. We will use the name “system” because this connection is for the system user.

Username is the username we are logging in with, in this case, “system”.

Password is the password you had chosen in a prior step when installing the database. Enter that password.

Save Password will save your password so you don’t have to retype it again and again.

Service name is XEPDB1 by default.

The screen should look like the below after the fields are modified.

New / Select Database Connection

Connection Name Connection Details

Name system

Database Type Oracle

User Info Proxy User

Authentication Type Default

Username system Role default

Password Save Password

Connection Type Basic

Details Advanced

Hostname localhost

Port 1521

SID xe

Service name XEPDB1

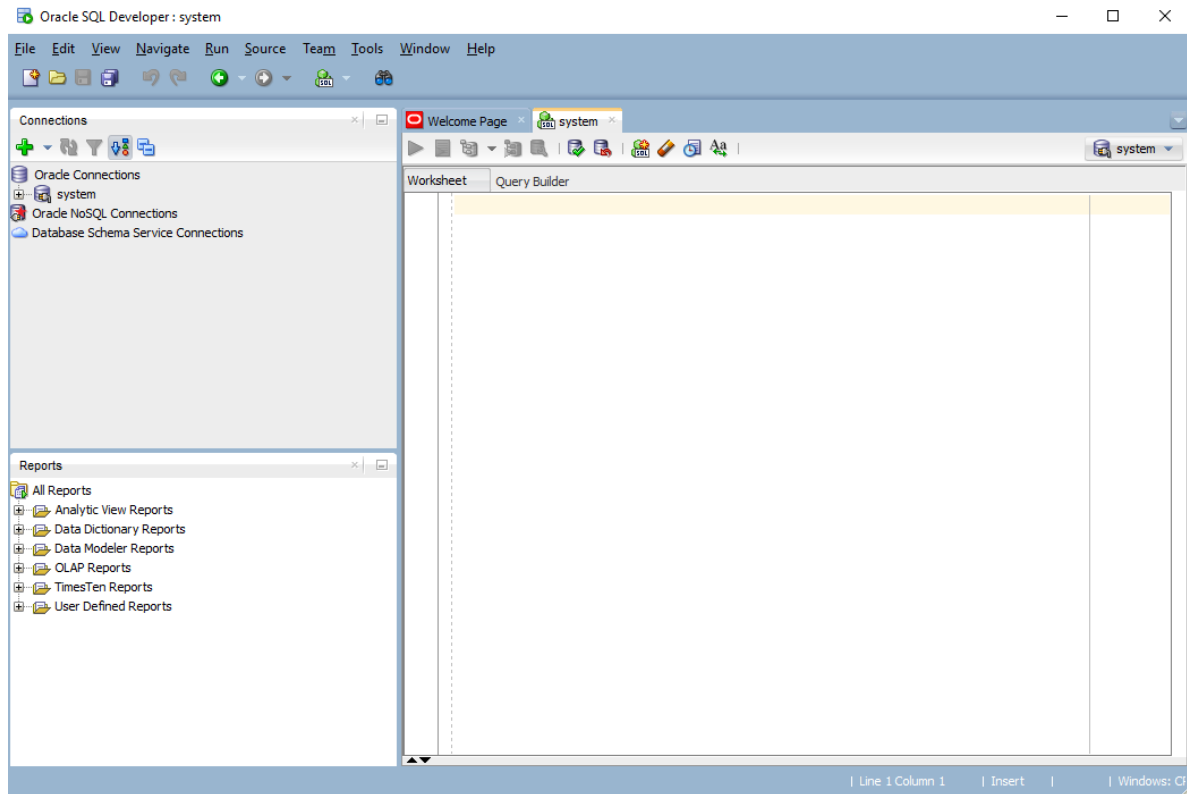
Status :

Help Save Clear Test Connect Cancel

Note that if your port or service name is not the same as the defaults above, because you have multiple Oracle versions installed, or because of other software, you will need to enter that information here instead of the defaults.

Click the **Test** button to ensure that you are able to connect. If you are able to connect, it will state "Status: Success" in the lower left-hand part of the dialog. If there is an issue, it will display the issue in the place of the success status. You will need to fix any issues before proceeding to connect.

Now simply click the **Connect** button to establish the connection. When you do so, Oracle SQL Developer will open up a blank SQL worksheet.



In this SQL worksheet, you can type commands, execute them, and see the results. However, you will first need to create a new user before completing assignments.

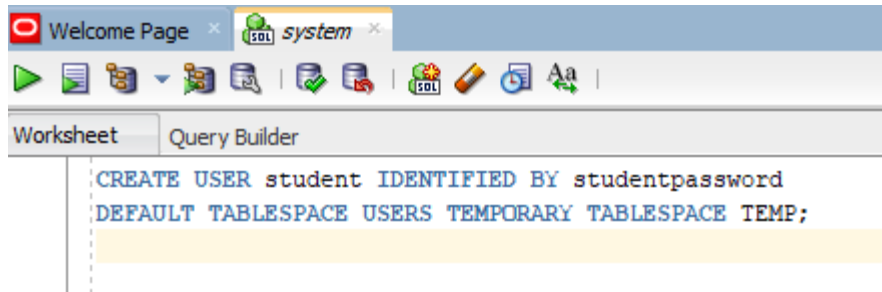
Step 4: Creating Your Own User


Create the User

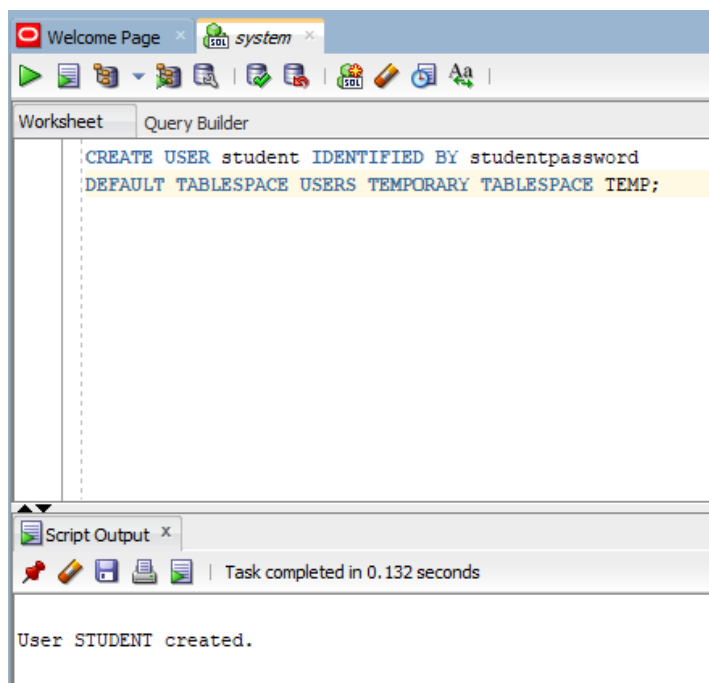
The SYSTEM account that we are now logged in under is the initial DBA account, and it has so many privileges that it is risky for routine use. We will next create an ordinary user of the sort that we will use for this class. I will call this user “student”, but you can substitute any name. Choose a password that you can remember. Just type in the following:

```
CREATE USER student IDENTIFIED BY studentpassword
DEFAULT TABLESPACE USERS TEMPORARY TABLESPACE TEMP;
```

This SQL command creates user “student” with password “studentpassword” and sets up two important defaults for student’s account. Note the semicolon at the end. Upper case is conventional for SQL keywords in the Oracle community. When you have typed this command, it will look like this:



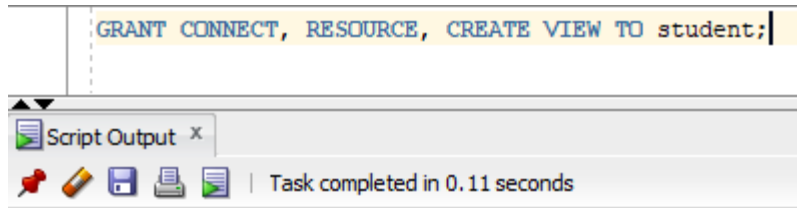
We now need to execute this command for it to take effect in the database. Click the  icon to do so. When executed, the results of the command – the fact that the user is created – should display in a pane below the command.



Give the User Basic Privileges

Next we will give user “student” the privilege to connect and use the database, with this command.

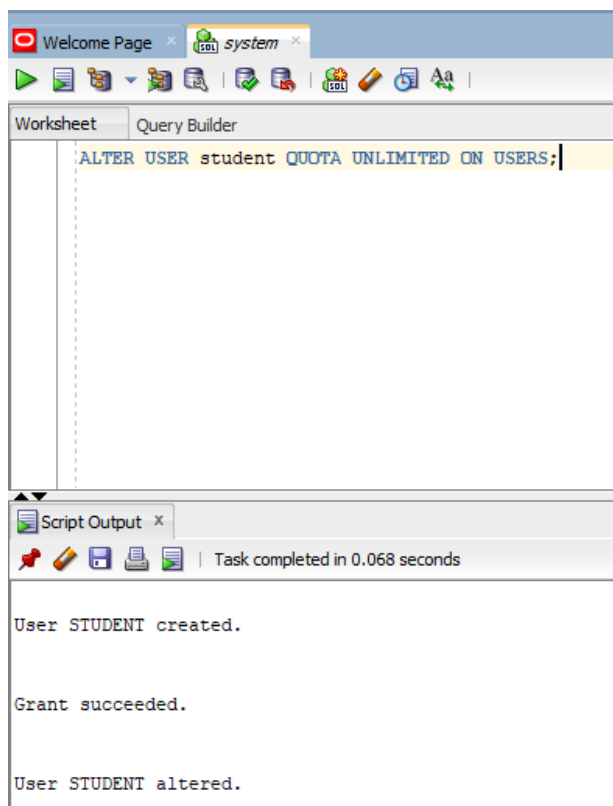
`GRANT CONNECT, RESOURCE, CREATE VIEW TO student;`



Grant succeeded.

We also need to give the user privileges to use database resources, with this command:

ALTER USER student QUOTA UNLIMITED ON USERS;

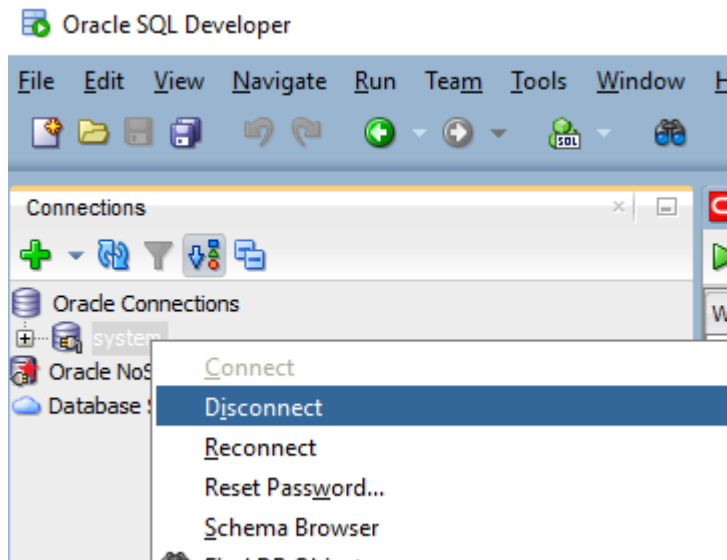


The new user is setup and can be used!

Step 5: Connecting with Your New User

Disconnect the System User

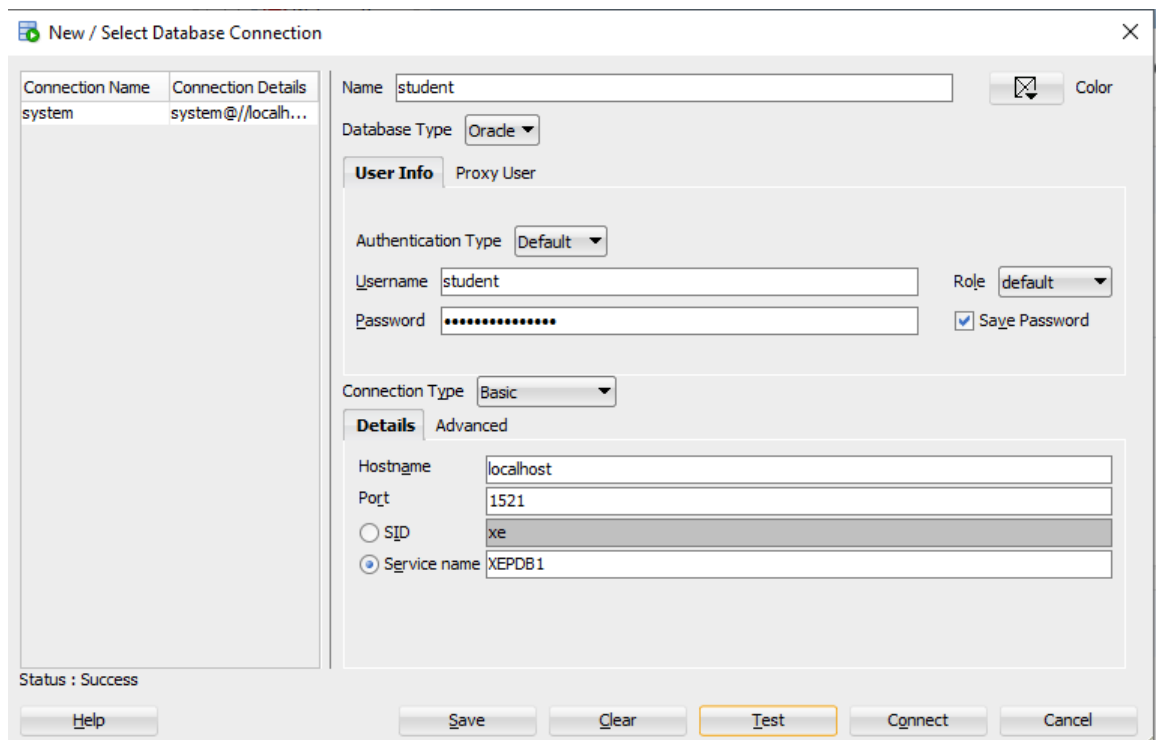
We can use this new user to complete our assignments without concerning ourselves with accidentally damaging the database. So that we are sure not to use the “system” any longer, let us close the connection to “system” by right clicking on the “system” connection, and choosing “Disconnect” from the context menu.

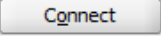


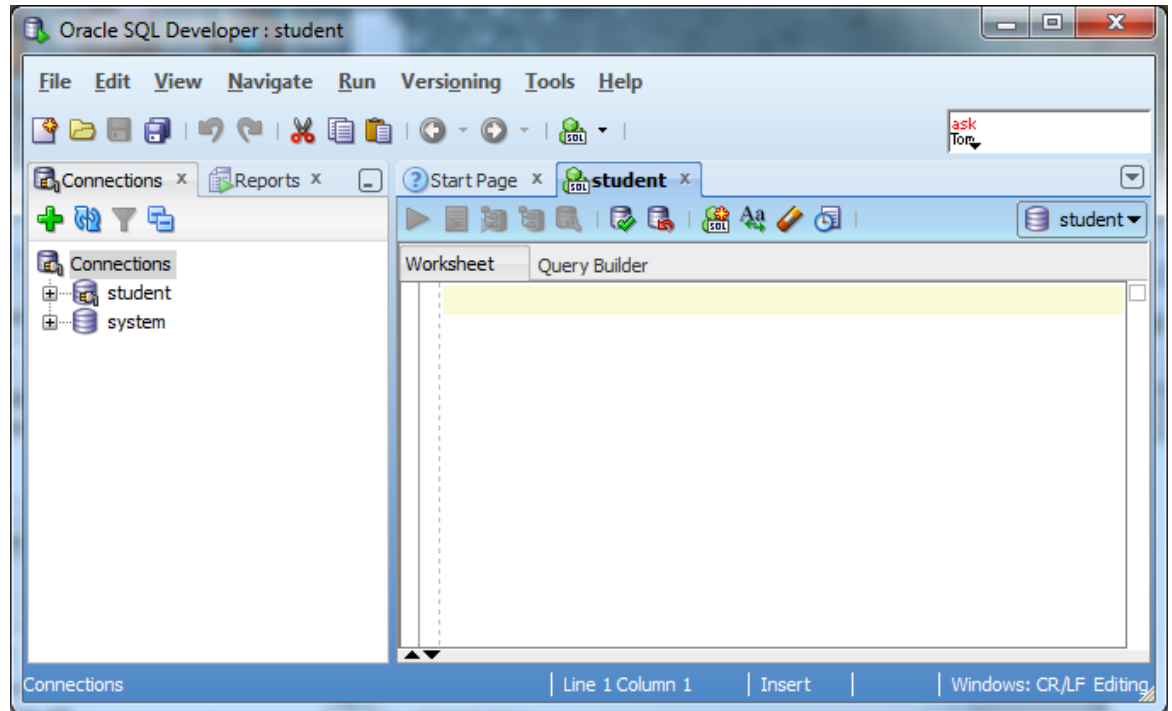
This will terminate the system connection, but will not close the SQL command window. You can close the existing SQL command window by clicking the icon.

Connect as Your New User

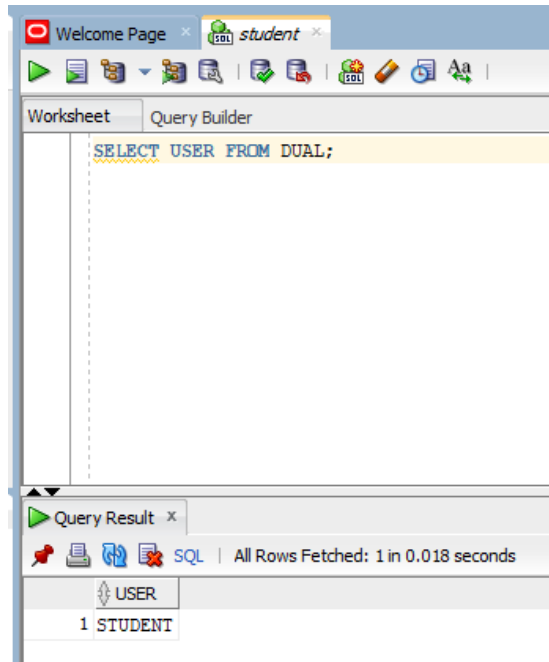
Next we will setup a new connection to your new user by following similar steps to setting up a connection to the system user. Click the icon to create another connection. Fill in the appropriate information for that connection.



After inputting the information, click the  to connect. A SQL worksheet for the new user will open up.



You are now connected to Oracle as an ordinary user. You can test out a simple command by typing and executing "SELECT USER FROM DUAL".



This shows you that you are connected as the student user. With this user, you can complete your classwork.

Congratulations! You are ready to work in Oracle! Have fun!

Appendix A: Troubleshooting Installation and Usage Issues

I Forgot My Password

If you forget your password, do not panic, because you can log in a different way and change your password. Your access to the computer onto which you installed Oracle means that you are able to login to Oracle as the SYS user without a password. Your privileges are akin to a master DBA in a production environment. Because you typically install and use your own database locally in this course, security is not usually an issue for your student database. For class databases it is recommended to use an easily memorized password.

This method uses the operating system authentication, which must be enabled for this to work. We will login to Oracle using the SYSDBA account for which operating system authentication is turned on by default for operating system users in the “dba” user group. Users with the administrator privilege on MSWindows are usually in the dba user group. This solution depends upon having SQLPlus or another comparable Oracle client installed on the machine.

If you are running on a Microsoft Windows platform and you are logged onto the machine as a user in the "dba" operating system user group, which Oracle creates, you don't need to specify a password to connect as sysdba. Open the DOS (Command line) prompt and run "sqlplus / as sysdba". SQLPlus should be launched in the command line interface, connected to Oracle as SYSDBA. You can then change the SYSTEM password with the command:

```
ALTER USER SYSTEM IDENTIFIED BY <new password>;
```

Where <new password> is replaced by the new password that you wish to give to the SYSTEM user. For a class installation choose something memorable, and write it down or store it on your computer. Clearly, in a production environment, the password would be carefully chosen to be resistant to attacks, and the password would be carefully protected.

After you have changed the SYSTEM password to something that you know, you can connect as SYSTEM, and do anything that you wish, including changing any passwords. There are similar ways of connecting to Oracle if you know the root password on UNIX family platforms.

Oracle SQL Developer Won't Launch in Windows 10

If you have followed the installation instructions for SQL Developer but receive the following error, "Unable to launch the Java Virtual Machine. Located at path: ...", there is a quick fix as outlined below.

1. After unzipping the SQL Developer zip file, go to your sqldeveloper folder in File Explorer.
2. Within that folder, go to the subdirectory “jdk\jre\bin”.
3. Copy the file "msvcr100.dll" within that subdirectory.
4. Go back up to the sqldeveloper folder.

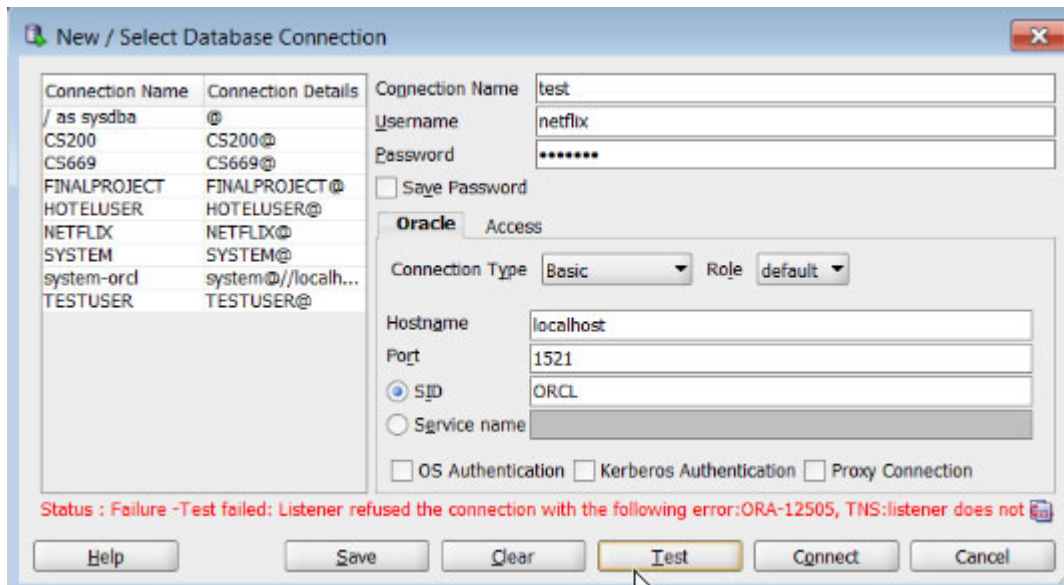
5. Within that folder, go to the subdirectory "sqldeveloper\bin" (yes, the initial subdirectory has the same name as the parent folder).
6. Paste the "msvcr100.dll" file you had copied in step #3.

You should now be able to launch SQL Developer. If the link is still active, visit <https://community.oracle.com/thread/2323010?start=0&tstart=0> for additional details.

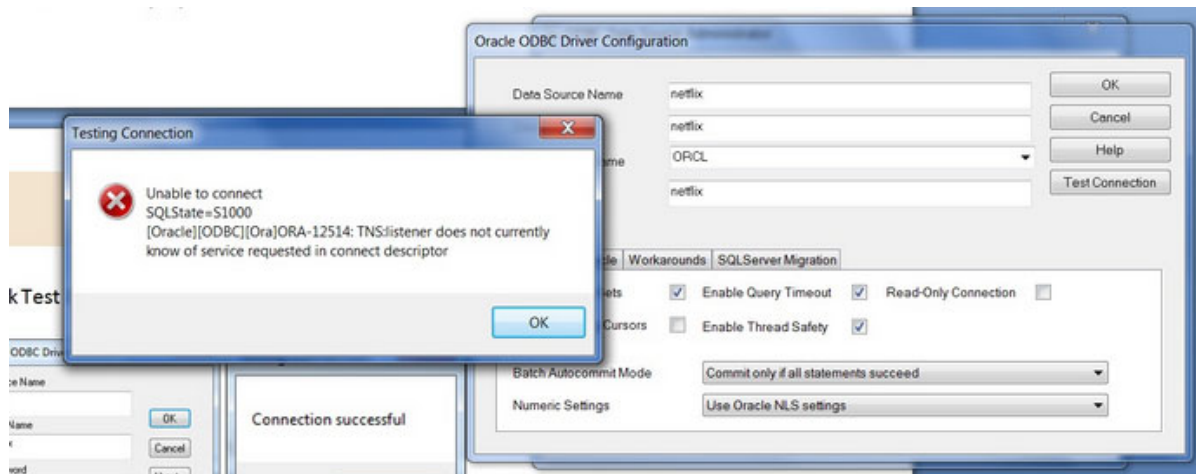
My Oracle Listeners Are Refusing Connections

If you attempt to establish a connection to your database, and the database client reports the following error, "Listener refused the connection with the following error: ORA-12505", this section may help you resolve the issue.

The error looks similar to the following in Oracle SQL Developer:



You may also see this issue while attempting an ODBC connection, as follows:



There are two common causes for this error. The first cause is that one or more required Oracle services are not running. This cause is relatively simple to resolve, and should be resolved before attempting to resolve the second cause. The second cause is that the listener may be incorrectly configured. Correcting the second cause is a little more involved and requires updating configuration files.

Cause 1: Oracle Services not started

You will first want to verify that all required Oracle services are running.

1. Go to Start->Control Panel->Administrative Tools-> Services
2. Scroll down to the services that begin with the word "Oracle". Your screen should look something like this:

Online files	The Online ...	Started	Automatic	Local Syst...
Oracle ORCL VSS Writer Service			Manual	Local Syst...
OracleDBConsoleorcl			Manual	Local Syst...
OracleJobSchedulerORCL			Disabled	Local Syst...
OracleMTSRecoveryService			Manual	Local Syst...
OracleOraDb11g_home1TNSListener		Starte	Manual	Local Syst...
OracleServiceORCL		Started	Manual	Local Syst...

Make sure that the following services have a status of "Started":

OracleOraDB18c_home1TNSListener

OracleServiceXXXX, where XXXX is the Oracle SID you chose during the Oracle installation (the default is XE).

If either or both of these services are not running, right click on them and select "Start" from the context menu. Starting the services may be all that you need to do in order to resolve the error.

Cause 2: Incorrect Listener Configuration

If you have verified that your required Oracle services are started, and you continue to see the “ORA-12505” error, your listener may be incorrectly configured. The following steps may help you resolve the issue.

1. Update the tnsnames.org configuration file.

- a. Using Windows Explorer, go to the directory where you installed Oracle, then navigate into this subdirectory:

NETWORK\ADMIN

Note that your directory may vary slightly, depending upon the version of Oracle you are installing, and upon the installation configuration.

- b. Open the tnsnames.ora file with a text editor, such as notepad or notepad++. When you first open the file, it will look similar to the following:

```
# tnsnames.ora Network Configuration File: C:\Oracle\product\11.2.0\dbhome_1\network\admin\tnsnames.ora
# Generated by Oracle configuration tools.

LISTENER_ORCL =
  (ADDRESS = (PROTOCOL = TCP) (HOST = localhost) (PORT = 1521))

ORACLR_CONNECTION_DATA =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = IPC) (KEY = EXTPROC1521))
    )
    (CONNECT_DATA =
      (SID = CLRExtProc)
      (PRESENTATION = RO)
    )
  )

ORCL =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = localhost) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl)
    )
  )
```

First, completely delete the two lines associated with the LISTENER_XXXX construct.

Next, change the word “SERVICE_NAME” to “SID”, and type in your SID after the equal sign.

After the changes are applied, your file should look similar to the following:


```

tnsnames.ora Network Configuration File: C:\Oracle\product\11.2.0\dbhome_1\network\admin\tnsnames.ora
# Generated by Oracle configuration tools.

ORACL_CONNECTION_DATA =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = IPC) (KEY = EXTPROC1521))
    )
    (CONNECT_DATA =
      (SID = CLRExtProc)
      (PRESENTATION = RO)
    )
  )
)

ORCL =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = localhost) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SID = ORCL)
    )
  )
)

```

- c. Now save the file with the changes. If Windows security will not let you save it as is, then save a copy to the desktop with the same name, then drag the file to the folder to replace the original. Windows will confirm this action with security dialog, which you should approve.
2. Update the listener.ora configuration file.

- a. Using Windows Explorer, go to the directory where you installed Oracle, then navigate into this subdirectory:
Note that your directory may vary slightly, depending upon the version of Oracle you are installing, and upon the installation configuration.
- b. Open the listener.ora file with a text editor, such as notepad or notepad++. When you open the file, it will look similar to the following:

```

listener.ora Network Configuration File: C:\Oracle\product\11.2.0\dbhome_1\network\admin\listener.ora
# Generated by Oracle configuration tools.

LISTENER =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = IPC) (KEY = EXTPROC1521))
      (ADDRESS = (PROTOCOL = TCP) (HOST = localhost) (PORT = 1521))
    )
  )

ADR_BASE_LISTENER = C:\Oracle

```

- c. If the machine name is not "localhost" and you are connecting locally to your machine, changing it to "localhost" may help resolve your connection issue. For example, if you see another name such as "HOST = My-PC", then you can change it to "Host = localhost" to help resolve your connection issue.
- d. The file has a missing line that you will add to the end of the file. At the end of the file, add the following line:

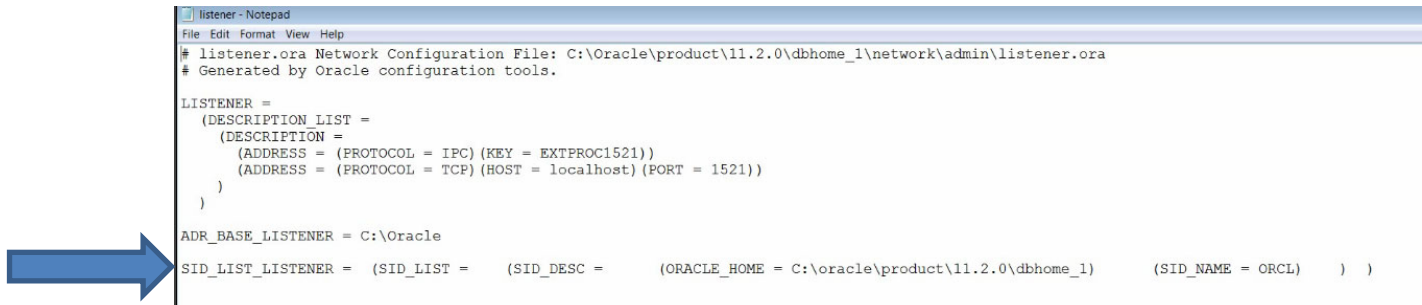
```

SID_LIST_LISTENER = (SID_LIST = (SID_DESC = (ORACLE_HOME =
C:\oracle\product\11.2.0\db\dbhome_1) (SID_NAME = LUMP)))

```

Note that if your Oracle installation path differs from the above ORACLE_HOME path, you will need to enter the correct path for your installation.

- e. After updating the listener.ora file, it will look similar to the following:



```
listener - Notepad
File Edit Format View Help
# listener.ora Network Configuration File: C:\Oracle\product\11.2.0\dbhome_1\network\admin\listener.ora
# Generated by Oracle configuration tools.

LISTENER =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = IPC) (KEY = EXTPROC1521))
      (ADDRESS = (PROTOCOL = TCP) (HOST = localhost) (PORT = 1521))
    )
  )

ADR_BASE_LISTENER = C:\Oracle
SID_LIST_LISTENER = (SID_LIST = (SID_DESC = (ORACLE_HOME = C:\oracle\product\11.2.0\dbhome_1) (SID_NAME = ORCL) ) )
```

- f. Now save the file with the changes. If Windows security will not let you save it as is, then save a copy to the desktop with the same name, then drag the file to the folder to replace the original. Windows will confirm this action with security dialog, which you should approve.
3. Restart the listener service.
- a. Go to Start->Control Panel->Administrative Tools->Services
 - b. Scroll down to Oracle services.
 - c. Right click on **OracleOraDB11g_home1TNSListener** and select “Restart” from the context menu.
4. Ensure that the listener is listening properly by running the **lsnrctl** command on the command line.
- a. Go to Start->All Programs->Accessories->Command Prompt
- Note to Windows 7 users. Make sure to run Command Prompt “As Administrator”. To do so, right click on the Command Prompt icon and choose “Run as Administrator”.
- b. On the command line, type the command **lsnrctl status LISTENER**. If your listener is listening correctly, you should see a screen similar to the following:

```
Administrator: C:\Windows\System32\cmd.exe

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=IPC)(KEY=EXTPROC1521)))
STATUS of the LISTENER
-----
Alias                LISTENER
Version              TNSLSNR for 32-bit Windows: Version 11.2.0.1.0 - Production
Start Date           02-FEB-2013 13:40:32
Uptime               0 days 0 hr. 0 min. 41 sec
Trace Level          off
Security             ON: Local OS Authentication
SNMP                 OFF
Listener Parameter File C:\Oracle\product\11.2.0\dbhome_1\network\admin\listener.ora
Listener Log File    c:\oracle\diag\tnslsnr\Beth-laptop\listener\alert\log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(PIPENAME=\\.\pipe\EXTPROC1521ipc)))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=127.0.0.1)(PORT=1521)))
Services Summary...
Service "ORCL" has 1 instance(s).
  Instance "ORCL", status UNKNOWN, has 1 handler(s) for this service...
The command completed successfully

C:\Windows\system32>
```

- Note the line that states that there is 1 instance running.
- c. If you see the line that there is 1 instance running, then you should now be able to successfully connect to Oracle using your database client.

Appendix B: Configuring Oracle Startup Options

Your computer may become sluggish after installing Oracle. This can be normal when Oracle is running on a machine with limited resources. When Oracle first starts up it loads the database and performs other initialization. If you have adequate memory to support Oracle and the other programs that you are running on your computer the sluggishness will go away when Oracle has finished these startup operations. The sluggishness also goes away when Oracle is stopped. You will need to have the Oracle instance running only a fraction of the time, so you can stop Oracle when you aren't using it.

You can easily start and stop Oracle by starting and stopping the corresponding service. For an instance named *SID*, this service is called *OracleServiceSID*. Just right click on the service such as *OracleServiceSID* in the Services control panel and select *Stop* or *Start*. When the service is stopped it also stops the corresponding *oracle.exe* process, and when the service is started it also starts the process.

To get to the Services control panel in Windows, first open the Control Panel. If you are on Windows XP, it's easier if you click the *Switch to Classic View* look. Then on XP you can launch the services control panel by going to *Start* then *Settings* then *Control Panel* then *Administrative Tools* then *Services*. In some cases, you may see a *Services* control right there in the control panel. If so, click on it and the services will come up. If you don't see *Services*, then you need to click on the *Administrative Tools* icon first. Then you will see *Services* and can click on that.

Once the services control opens, you will see a list of services. Highlight the one that says *OracleServiceSID*, where *SID* is the name that you gave your Oracle service when you installed Oracle. The service name will be something like "OracleServiceORCL". Then click *Action/Stop*. After a while the Oracle service shuts down the Oracle instance. Of course, once you stop it, Oracle is no longer running, so you'll have to repeat these steps and click "start" to start it again. Or, just rebooting your computer should make the service start again.

Your computer will boot more slowly when Oracle is running, because the Oracle services are starting at boot time, and starting an Oracle instance can take a while, particularly on a notebook computer.

You can configure Oracle so that it doesn't start up when you boot your machine. Just open up the *OracleServiceSID...* service, as described above. But, instead of just clicking *stop*, you need to change the startup mode. Windows services have one of three startup modes -- *automatic*, *manual*, and *disabled*. By default, the Oracle service is in *automatic* mode. This means whenever you boot your computer, the service will start up automatically. You need to change it to *manual* to keep it from starting at boot time.

To do so, right click on the *OracleServiceSID...* service then click the *Properties* option. From there, you should see the *startup mode*, and be able to switch it from *automatic* to *manual*. Do the same to the *Oracle...TNSListener* service. Then next time you boot, those services won't start. Of course, if you set these services to *manual* startup mode, then when you need to use Oracle, you'll need to go into the services again and start them manually.

On recent Windows releases you can also reduce the time to boot while leaving Oracle running by hibernating your computer rather than shutting it down and rebooting it. Restarting after hibernation will take a little longer with Oracle running, but not nearly as long as rebooting with Oracle in *automatic* startup mode.

Appendix C: Installing Oracle on a Mac

Oracle can be installed and used on a Mac, but this requires some setup work. There are many devoted Mac users today, yet the Mac platform is not supported by the major, modern DBMS vendors, including Oracle and SQL Server. If you find yourself in the situation where your home computer is a Mac, and you do not have a readily available Windows machine available for DBMS installation, you may need to install virtual machine software so that you can run Windows on your Mac.

Using a Virtual Machine

A virtual machine mostly behaves as any other application with some differences. The virtual machine has an application window that can be minimized and closed, the same as any other application. What makes a virtual machine different from an ordinary application is that an entire operating system is installed and executes inside of the virtual machine. The operating system running inside of the virtual machine, termed a “guest” operating system, runs as if it were to be on its own physical machine. This means we can install and use applications native to the guest operating system. Thus, once we are running a virtual machine, we are effectively running two operating systems at the same time – our machine’s operating system (termed the “host” operating system), and the guest operating system – and are using applications native to both operating systems at the same time.

In our case, we are interested in running Windows as a guest operating system on our Mac. There are many virtual machines available for Macs; however, perhaps the two most popular are VirtualBox and Parallels. VirtualBox, available at <http://virtualbox.org>, is free to download and use. Parallels, available at <http://parallels.com>, costs money, but offers more features. Students have successfully used both to run both Windows and Oracle on a Mac in our BU program.

Follow the steps below to install and use Oracle on your Mac:

1. Download and install your virtual machine of choice.
2. If you do not have a licensed copy of Windows, you will need to download one from the MSDNAA site. BU students are entitled to free, licensed copies of the latest versions of Windows through the MSDNAA site, and details on how to access this site are available in your course’s syllabus.
3. Install Windows inside of the virtual machine.
4. Proceed with the Oracle install instructions, starting from the beginning of this install guide, installing Oracle into the guest operating system.

Note that Oracle offers a preconfigured VirtualBox image that comes with Oracle installed on Linux. The following URLs may be helpful to you to access this image:

<http://www.oracle.com/technetwork/community/developer-vm/index.html>

<http://www.oracle.com/technetwork/database/enterprise-edition/databaseappdev-vm-161299.html>

Dual Booting

Dual booting is another solution available to you if you have a modern Mac that runs on an Intel-based processor. All new Macs run on Intel-based processors, but older ones do not. Dual booting is a fairly simple concept. Normally when you power on your computer, your operating system starts booting immediately, and this happens seamlessly so that it appears your operating system is just a natural part of the computer. In actuality, when your computer is first powered on, it first loads a boot loader program, and that boot loader tells the operating system to start. If there is only one operating system, you may not even notice the work of the boot loader, because it always starts the same operating system. However, there is no reason why one cannot install two operating systems on their computer. In such a case, each time your computer is powered on, the boot loader asks you which operating system you would like to start, and also usually defaults to the first one if you do not select an option, after a timeout period.

All new Macs come with what Apple terms “Boot Camp”, which is a built-in utility that supports dual booting Mac OS X and Windows. To install Oracle in Windows on your Mac, you will need to:

1. Review the prerequisites needed to run Boot Camp and to install Windows as a second operating system on your Mac computer. The prerequisites are listed at <http://support.apple.com/kb/HT1461>. Ensure that your computer meets the requirements before continuing.
2. Obtain a licensed copy of Windows. If you do not have a licensed copy of Windows, you will need to download one from the MSDNAA site. BU students are entitled to free, licensed copies of the latest versions of Windows through the MSDNAA site, and details on how to access this site are available in your course’s syllabus.
3. Burn the copy of Windows onto a CD, or copy the ISO image onto a USB stick. Boot Camp supports installing Windows from either a CD or a USB stick.
4. Follow the steps recommended by Apple to install Windows using Boot Camp. Instructions are included with the utility, and you can also start here as well: <http://support.apple.com/kb/HT1461>
5. After Windows is installed, reboot your computer then boot into Windows. Proceed with the Oracle install instructions, starting from the beginning of this install guide. When you need to run Oracle, boot into Windows. When you need to use your Mac applications, boot into OS X.

Using Virtual Machine Versus Dual Booting

An obvious question is, which of these two options should you use? The answer depends upon your computer hardware, and your personal preferences. The following table summarizes the advantages and disadvantages of both options:

	Advantages	Disadvantages
Virtual Machine	<p>The guest operating system and its applications run at the same time as the host operating system and its applications.</p> <p>There is clipboard sharing between applications in both operating systems. Text can be copied from an application in one operating system, and pasted into an application in the second operating system.</p>	<p>Because the guest operating system is running under the control of virtual machine software, the guest operating system and its applications will execute noticeably slower than if they were running natively on the computer.</p> <p>Because both operating systems run concurrently, the performance of the host operating system may degrade.</p>
Dual Booting	<p>Because both operating systems run natively on the computer's hardware, there is no performance overhead.</p> <p>Because both operating systems directly access the computer's hardware, there are not hardware compatibility issues.</p> <p>The setup is conceptually simpler. Simply boot the operating system you need upon startup.</p>	<p>You can only run one operating system and its applications at a time.</p> <p>To start the second operating system, you must reboot.</p> <p>There is no clipboard sharing between applications in both operating systems. If text is to be shared across applications, it must be saved in a file then loaded by applications in the other operating system.</p>

If your hardware is powerful enough to support running two operating systems simultaneously, and still perform reasonably well, you may want to use a virtual machine, so that you can run both your Mac applications and your Windows applications at the same time. If you are concerned about obtaining the best performance for both operating systems, you may want to dual boot.

A third advanced option, supported by the Parallels virtual machine, is to run the *same* Windows installation under a dual boot configuration *and* a virtual machine configuration. This is an advanced setup, and will require two Windows license registrations, as running the same installation both ways is the equivalent of running Windows on two different physical machines.

Appendix D: Caring for Your Oracle Installation

This appendix explains how to care for your Oracle installation to help prevent corruption in your Oracle database, and to avoid the need for a complete reinstallation. You now have your Oracle software installed, and your database is up and running. Great! That is the first hurdle you will leap in your course. One of the problems many students have had is that they are unaware of how to gracefully stop and start their databases. If they simply turn off their machines, the server is literally taken out from under the database. Oracle **does not** like this, and can become corrupted very easily. This appendix shows you how to verify that you have a database up and running so you can do your coursework, and how to gracefully stop and start your database. Before learning those steps, however, there are some basics for you to learn.

Process 1 – Getting Started

Oracle has a number of background processes it uses to keep the database up and running and healthy. Some of these are DBWR (Database writer, which writes changes to disk), LGWR (Log Writer, which writes changes to what are called redo logs), and PMON and SMON (Process Monitor and System Monitor, which are the head honchos of all the processes). If you run a Unix System (like Linux or Sun Solaris) you will see these running individually. If you run a Windows system, like most students in the program, you won't see these individually, but you can see a single service under the Windows Services screen. The way to see if your background processes are running in Windows is as follows:

(All key strokes are in **bold**, all commands are in **red bold**)

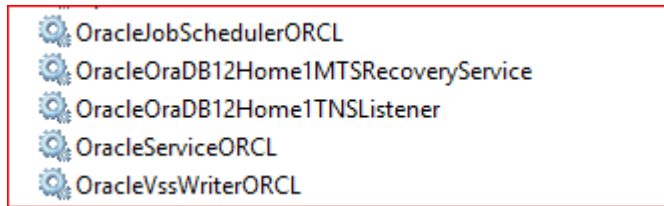


Above you will see the picture of the **Windows Logo Key** (what I call **WLK**). To get to your Windows services:

Press the WLK and the letter 'r' on your keyboard. This will bring up the run box.

Type in `services.msc` and hit enter. This will bring up the background services that are running on your Windows machine.

Scroll down to the O's (for Oracle).



You only need two of these running when you do your Labs.

OracleOraDB12Home1TNSListener

OracleServiceORCL

The “ORCL” in the second service above is a typical SID for an Oracle database database – yours could be different.

For **ALL THE OTHER** services listed above, set these to **Manual and Stopped**. You do this as follows:

Right Click on the service itself (for example OracleVssWriterORCL)

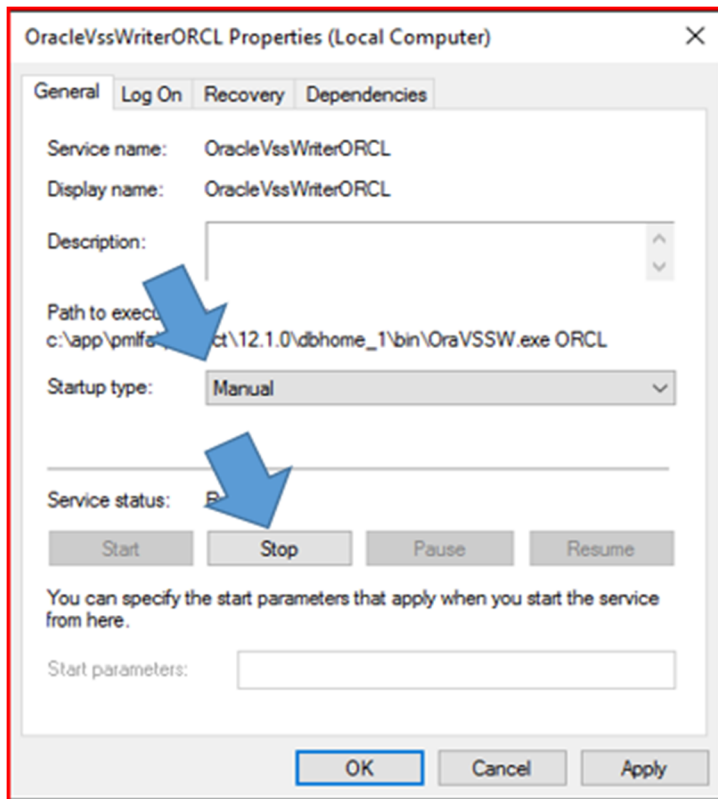
Click on Properties

Click on the down arrow next to Startup Type

Select Manual

Under Service Status Click “Stop”

Click on Apply



For the two services mentioned above, **OracleOraDB12Home1TNSListener** and **OracleServiceORCL**, set their properties to **Manual** by following the same procedure as above:

Press the **W** and the letter **'r'** on your keyboard. This will bring up the run box.

Type in **services.msc** and hit enter.

Scroll down to the **O's**.

Right click on the service

Select properties

Click on the down arrow next to Startup Type

Select Manual

Click Apply

OracleOraDB12Home1TNSListener	Running	Manual
OracleServiceORCL	Running	Manual

When these are set to Manual, you will have to start them each time you start your computer. Follow Process 4 to start them.

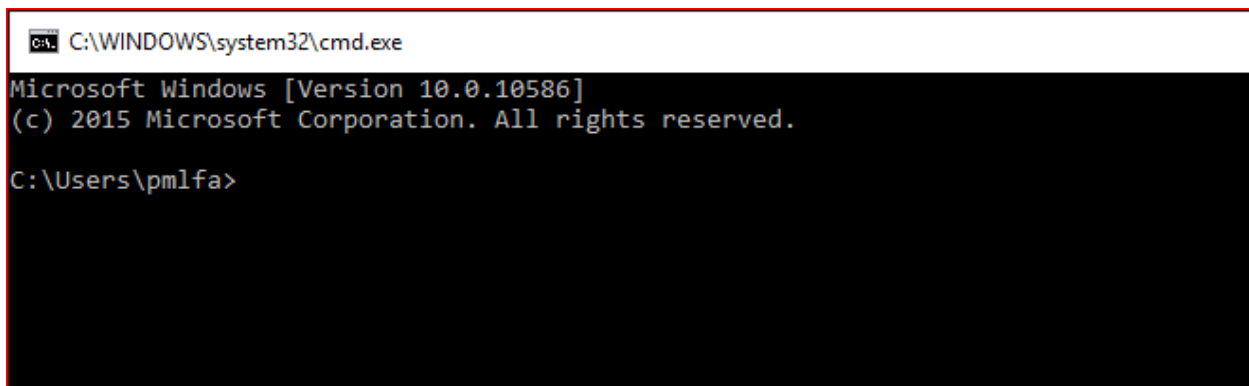
Process 2 – Verifying

There are multiple layers to the Oracle database and Oracle database software. You have just worked with one layer, that of services. There is a layer below that which are the Oracle binaries. There is one other we will discuss, the SQL Engine. The SQL Engine can be accessed through the command prompt on your Windows machine, and requires specific commands (which you will learn in your course) to give you back information you requested from your database.

Press the WLK and the letter 'r' on your keyboard. This will bring up the run box.

Type in **cmd.exe** and hit enter.

This will bring up your Windows command prompt as shown below.

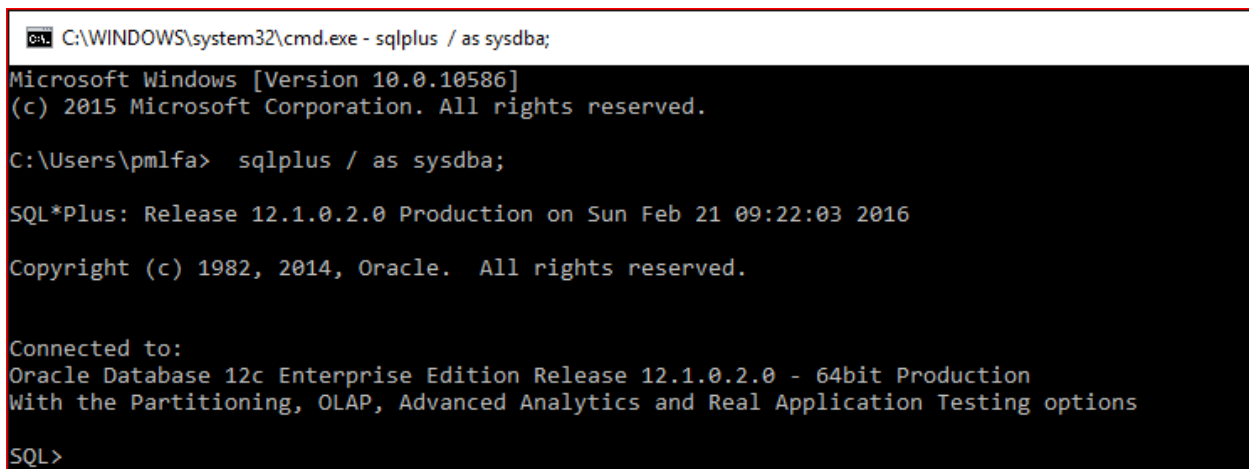
A screenshot of a Windows Command Prompt window. The title bar shows the path C:\WINDOWS\system32\cmd.exe. The window content displays the Microsoft Windows version 10.0.10586 and copyright information for 2015. The current directory is C:\Users\pmlfa, and the prompt is at the command line.

```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\pmlfa>
```

Type in the following:

sqlplus / as sysdba;

A screenshot of a Windows Command Prompt window showing the execution of the sqlplus command. The title bar shows C:\WINDOWS\system32\cmd.exe - sqlplus / as sysdba;. The output shows the SQL*Plus version 12.1.0.2.0, release date, and connection details to the Oracle Database 12c Enterprise Edition.

```
C:\WINDOWS\system32\cmd.exe - sqlplus / as sysdba;
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\pmlfa> sqlplus / as sysdba;

SQL*Plus: Release 12.1.0.2.0 Production on Sun Feb 21 09:22:03 2016

Copyright (c) 1982, 2014, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL>
```

You are in your database! This shows your SQL prompt, which is the doorway to the SQL Engine for Oracle.

Now, at the SQL Prompt “SQL >” type in the following, making sure to hit enter after each command.

SQL > set pages 9999

SQL > select instance_name, status, logins from v\$instance;

You should see something like the following.

(Again, if your global database name is different than ORCL, such as XE for the Express Edition, you should see that name in the INSTANCE_NAME field).

```
SQL> set pages 9999
SQL> select instance_name, status, logins from v$instance;

INSTANCE_NAME      STATUS      LOGINS
-----
orcl                OPEN        ALLOWED

SQL>
```

If you get the following error, chances are your services are not started. See Process 4.

```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\pmlfa>sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Mon Feb 29 18:19:39 2016

Copyright (c) 1982, 2014, Oracle. All rights reserved.

ERROR:
ORA-12560: TNS:protocol adapter error
```

You have now determined your database is up and running and accessible. Now we’ll learn how to stop and start it.

Process 3 – Stopping Your Database

BEFORE YOU SHUT DOWN YOUR COMPUTER EVERY DAY, STOP THE DATABASE FIRST !!!

If you shut your database server (your laptop or desktop) down prior to stopping your database, you can easily corrupt it. What you are doing is literally pulling the storage out from underneath your database and software.

```
C:\Users\pmlfa>sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Mon Feb 29 18:22:33 2016

Copyright (c) 1982, 2014, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> shutdown immediate;
```

At the SQL Command prompt (as shown above):

sqlplus / as sysdba;

shutdown immediate;

```
C:\Users\pmlfa>sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Mon Feb 29 18:22:33 2016

Copyright (c) 1982, 2014, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> shutdown immediate;
Database closed.
Database dismounted.
ORACLE instance shut down.
```

Then you can go into services and stop the OracleServiceORCL and OracleOraDB12Home1TNSListener.

Press the WLK and the letter 'r' on your keyboard. This will bring up the run box.

Type in `services.msc` and hit enter.

Scroll down to the O's.

Right click on the Service

Select Stop

Click Apply

This will gracefully shut everything down. To start things up again, go to Process 4. 😊

Process 4 – Starting Your Database

In order to start your database after you have started your server (laptop or desktop) up, all you have to do is start the services OracleOraDB12Home1TNSListener and OracleServiceORCL. This will automatically start your database and listener.

Press the WLK and the letter ‘r’ on your keyboard. This will bring up the run box.

Type in `services.msc` and hit enter.

Scroll down to the O’s.

Right Click on the service itself

Under Service Status Click “Start”

Click on Apply

Process 5 – Putting it into a Batch File

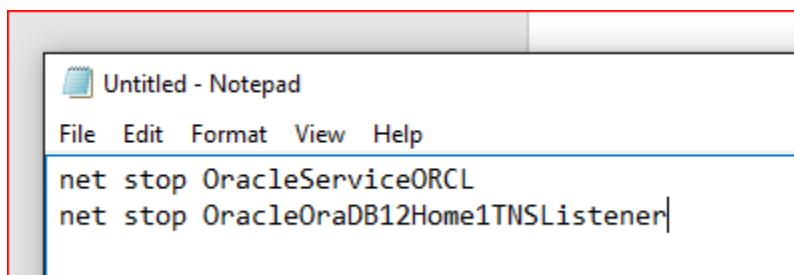
You can do most of the above (stopping and starting your databases) through a batch file so you don’t have to go into multiple screens. This can make you more efficient.

To set up a stop database command file:

Open up a Notepad (a new .txt file) on your Desktop

Type in the following command (this particular .bat will stop your database)

```
net stop OracleServiceORCL
net stop OracleOraDB12Home1TNSListener
```



Then save this file as stop_database.bat on your Desktop.

Note the “.bat” in the file name, then Save as type “All Files”.



BEFORE YOU RUN THE STOP DATABASE bat file, BE SURE TO DO THE SHUTDOWN IMMEDIATE as shown in Process 3.

To then run this command file, open up a command prompt, change directories to your Desktop, and simply type in the filename – stop_database.bat.

```
C:\WINDOWS\system32\cmd.exe

C:\Users\pmlfa\Desktop>sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Tue Apr 5 13:00:55 2016

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

SQL> shutdown immediate;
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options

C:\Users\pmlfa\Desktop>stop_database.bat

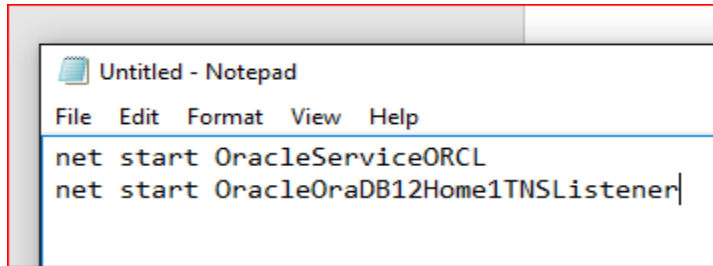
C:\Users\pmlfa\Desktop>net stop OracleServiceORCL
The OracleServiceORCL service is stopping.
The OracleServiceORCL service was stopped successfully.

C:\Users\pmlfa\Desktop>net stop OracleOraDB12Home1TNSListener
The OracleOraDB12Home1TNSListener service is stopping.
The OracleOraDB12Home1TNSListener service was stopped successfully.
```

To set up a start database command file:

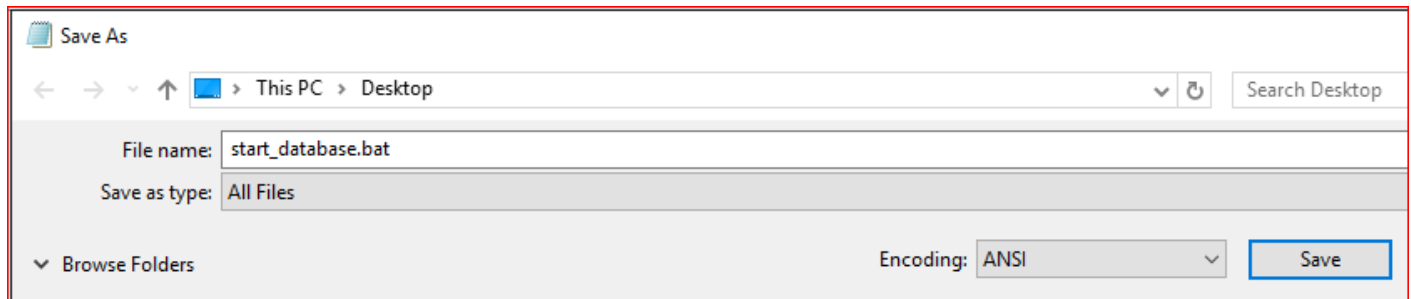
Open up a Notepad (a new .txt file) on your Desktop
Type in the following command

```
net start OracleServiceORCL  
net start OracleOraDB12Home1TNSListener
```



Then save this file as start_database.bat on your Desktop.

Note I put the ".bat" in the file name, then Save as type "All Files".



To run this command file, open up a command prompt, change directories to your Desktop, and simply type in the filename – start_database.bat.

```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\pmlfa>cd Desktop

C:\Users\pmlfa\Desktop>dir *.bat
Volume in drive C is OS
Volume Serial Number is 3461-8508

Directory of C:\Users\pmlfa\Desktop

04/05/2016  12:47 PM                68 start_database.bat
04/05/2016  12:44 PM                66 stop_database.bat
               2 File(s)              134 bytes
               0 Dir(s)  877,477,900,288 bytes free

C:\Users\pmlfa\Desktop>start_database.bat

C:\Users\pmlfa\Desktop>net start OracleServiceORCL
The OracleServiceORCL service is starting.....
The OracleServiceORCL service was started successfully.

C:\Users\pmlfa\Desktop>net start OracleOraDB12Home1TNSListener
The OracleOraDB12Home1TNSListener service is starting.
The OracleOraDB12Home1TNSListener service was started successfully.
```

If you care for your database as indicated in this appendix, you can help keep your Oracle installation alive and healthy for the duration of your course.