Oracle on Linux Installation Guide

Version 01
For Oracle 12c

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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, who are interested in installing Oracle on Linux. 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. If you would like to install Oracle on Windows or Mac (OS X), please read the installation guides for those platforms instead.

These setup instructions are for Oracle 12c. Oracle has maintained upward compatibility for SQL between Oracle versions for many years, so if you cannot install Oracle 12c 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. Good luck, and have fun!

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. 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. Oracle is very flexible and can be configured to use less or more in the way of machine resources.

Hardware Requirements

The Oracle12c database requires about 13 GB of working disk space for a successful installation on Linux. In addition, it requires 6+ GB of Linux swap space, depending on the physical memory available. The installation media downloads in 3 GB, and decompresses to about 4 GB, so you are likely to need this additional space as well.

We suggest the following allocations:

- 30 GB disk space, plus additional space if you anticipate handling large datasets.
- 2 or more CPUs (cores).
- 5 GB physical memory.

Oracle Editions

Oracle 12c can be installed in one of four editions -- Enterprise, Standard Edition, Standard Edition One, and Express Edition. All editions come with the core relational DBMS along with full SQL support. The main difference in functionality between the editions is how many advanced features are supported, including features pertaining to high availability, scalability, performance, manageability, security, data warehousing, and business intelligence.

Platform Independence

Oracle runs on most common operating systems and platforms, including the Windows family, and several Linux and Unix variants. Oracle supports the features that we use in our courses on all operating systems and 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.

Preparations and Setup

You can obtain a copy of Oracle by downloading Oracle database software directly from Oracle. If you experience downloading difficulties, please contact your facilitator, lead facilitator, or course instructor. Most people with broadband should be able to complete the download and install the program with minimal difficulty.

Setting up Oracle is not like setting up an ordinary application. Oracle and other DBMS are more deeply integrated with the operating system than ordinary applications. Oracle installs do many more things than application installs. The installer will check for the various configuration problems that can occur on a Linux system. The installer will provide commands for altering your Linux installation to support Oracle. Things can go wrong, particularly with modifying the Linux operating system environments, but in practice this is unusual. Be alert for the unexpected, and don't feel embarrassed if something unexpected happens. Unexpected events are common for database installations. Just contact your instructor of facilitator, who will help you.

Obtaining a Suitable Linux Distribution

Step 1: Evaluating your Linux Distribution

Oracle Supported Distributions

There are a large number of distributions of Linux, each with their own strengths, support, and followers. However, Oracle does not directly support all Linux distributions, but supports CentOS, "Oracle Linux," other Linux distributions based on Fedora/Red Hat. It also supports SUSE and NeoKylin. The first step is to determine if Oracle supports your particular Linux distribution. If it does not, you will want to install one that does support Oracle. There are instructions for doing so in the next step.

Step 2: Installing CentOS

CentOS Introduction

In this installation guide, Oracle is installed on CentOS 7. You may choose another suitable distribution if you'd like, though the screenshots and installation steps may vary.

Downloading CentOS

The full DVD for CentOS 7 is used, but the source code option was not used. Download as indicated in the screenshot below.

Configuration Options

Many steps are automatic, but you need to ensure you take two steps: enabling the network, and configuring the disk. You will initially see a screen as follows with these options:
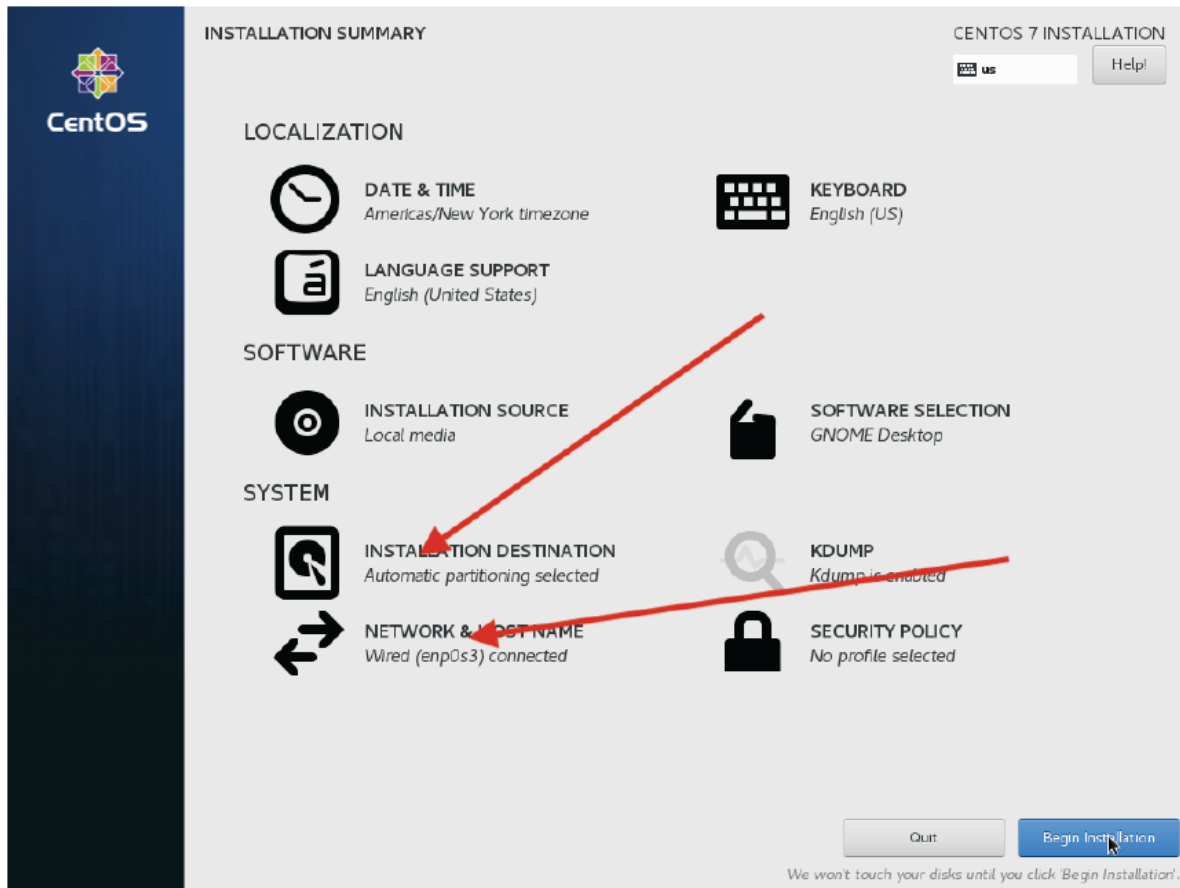
Configuring Partitioning

On the installation destination screen, make sure to select "I will configure partitioning".
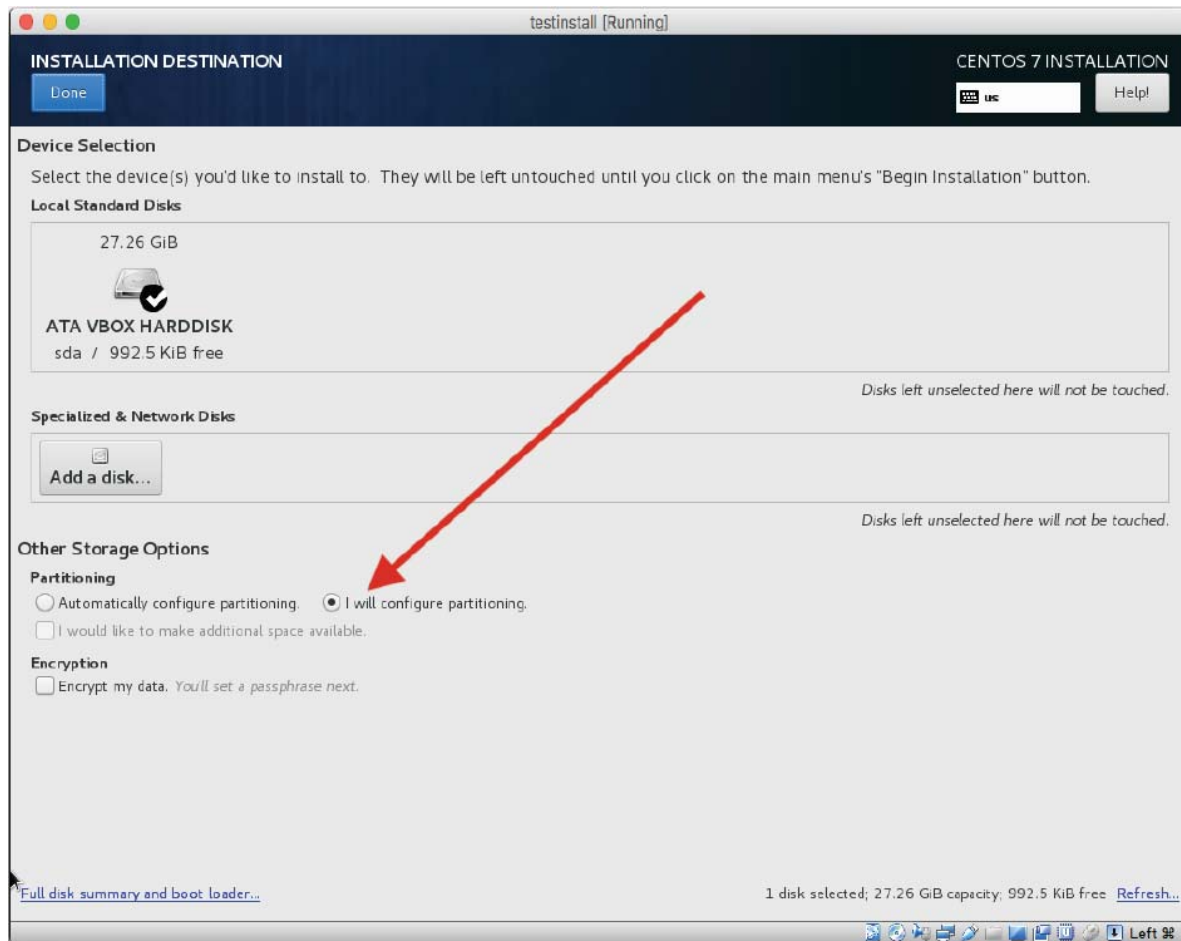
When you click "Done," it will take you to a custom partitioning page.

Click 'automatic partitioning,' then click on the main partition labeled "/" and resize it down to allow 6 GB of space on the swap partition. Then resize the swap partition to 6GB or more. At the end, it should look something like this.
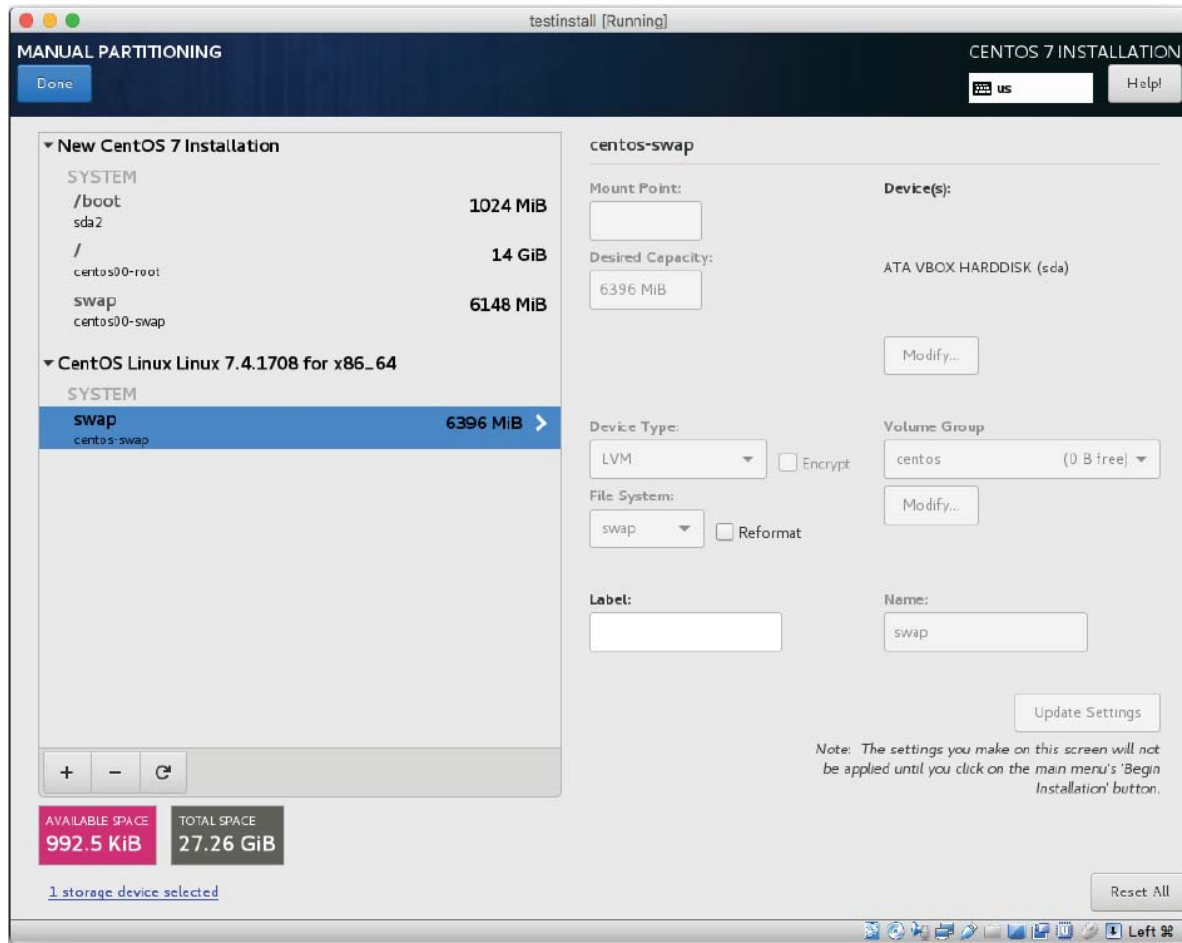
Completing Installation

Along the way, you will be asked for an administrator ("root") password and another user. We suggest naming the user "oracle" and making that user an administrator as well (there is a checkbox). Then let the installation complete.

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.

Log On to OTN   Go to http://www.oracle.com to log onto the Oracle Technology Network. Oracle is regularly updates their web site, so what you see may be different than the following.

Click on the "Oracle Technology Network" tab at the top or just enter http://www.oracle.com/technology into your browser and you will see something like this:

Click on "Sign In/Register for Account" in the top bar. You should see something like this:
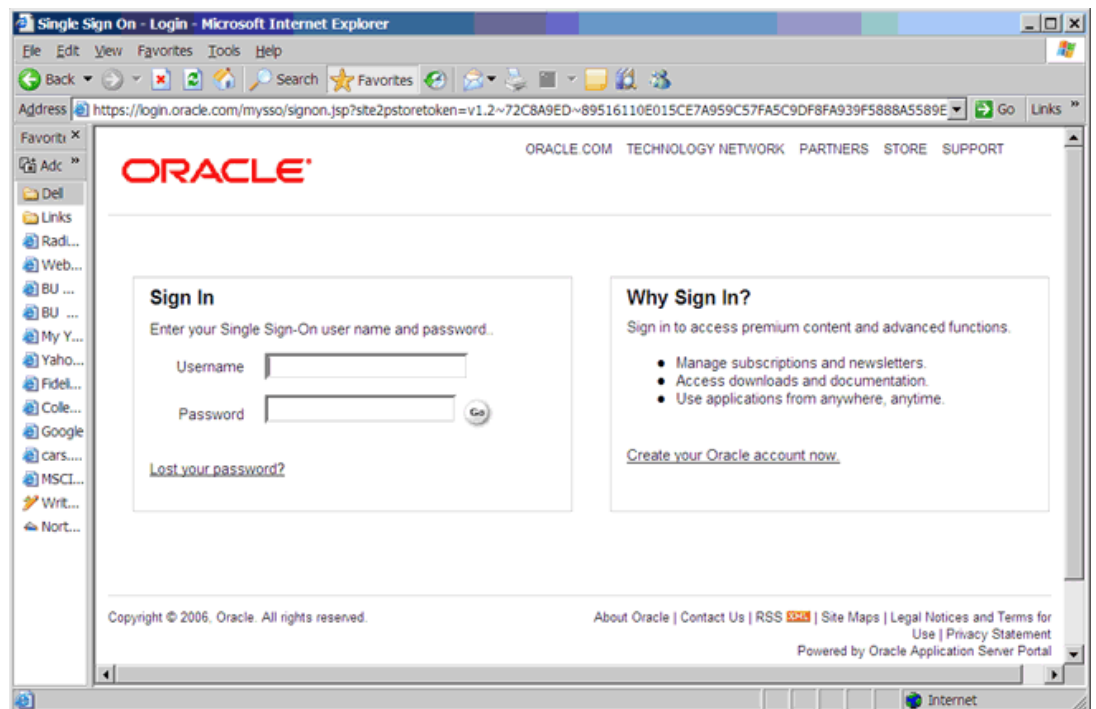
If you already have an Oracle account, enter your new username and password, and then click the "Go" button to continue.
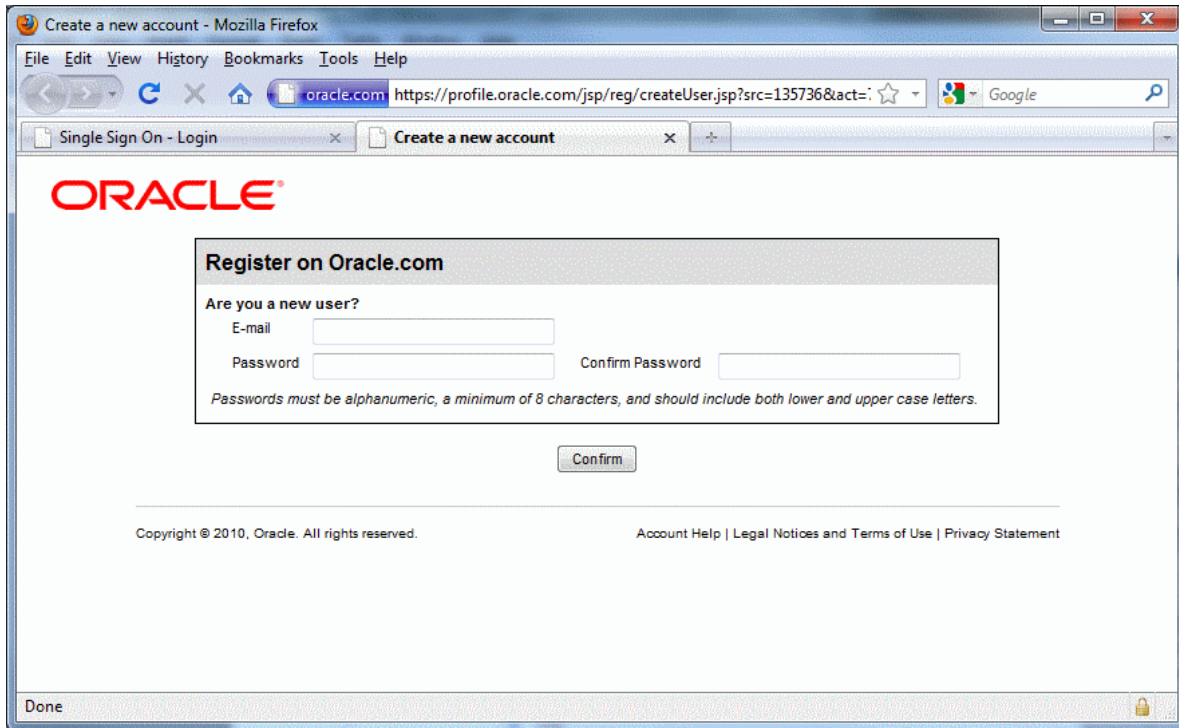
Sign Up For your Oracle OTN Account

If you don't already have an Oracle account, click on "Create your Oracle account now" at the bottom of the right box. You should see something like the following:

- Type in your email address and a password for your new OTN account.
- Click *Confirm*. Note that Oracle uses the portion of your email address to the left of the "@" sign as your OTN user name. If the site complains that the user name is already taken, you will need to use another email address, or create a new one. It is easy to create a new email account at sites like yahoo.com. I used such a Yahoo email address below.
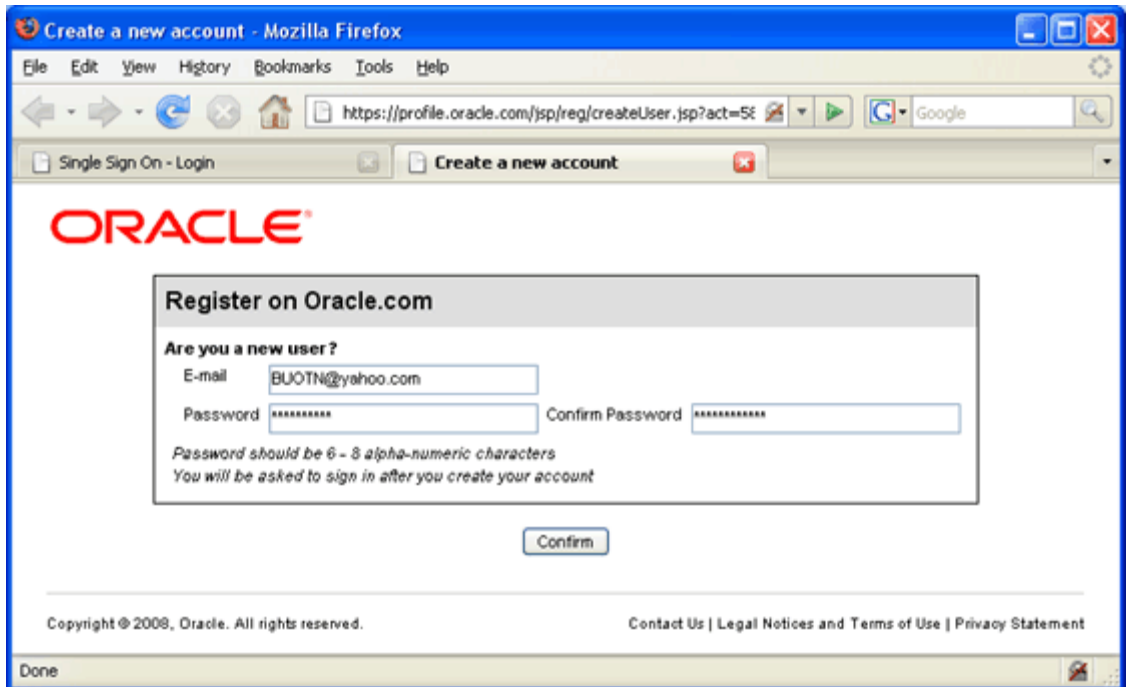
You will then be presented with a long form asking for your name, address, etc. Complete the form and click "continue." You will find yourself logged into the OTN. Click on the "Downloads" tab to get to the Oracle database downloads.

If you look in the upper left hand corner you should see your first name and "Sign Out", which indicates that you are logged onto OTN.

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 On the database downloads page for Oracle 12, there will be a radio button for accepting the OTN license agreement. Even though it may seem selected already, click it again. It should show you a 'Thank you' message as in the following figure. Click on the "Linux x86-64" link.

It will then begin downloading the file. If you are not already logged into your Oracle account, it will first ask you to login before downloading the file.

Working with the Zip File

Create a directory for the downloaded file, and download the file into that directory. Use the zipping program of choice to unzip the file.

Step 3: Installing Oracle

Create Oracle Directories

Log into Linux as the "oracle" user you created earlier. You will need to create two directories for the installation. We suggest you create these in the root directory. For this, you need to use your administrative privileges, but then you must make sure the directories are owned by the "oracle" user.

Create the following directories:

- /o12c_linux - for "Oracle base"
- /oraInventory - for "Inventory Directory"

Start the Installer

Open a terminal window and change the directory to where you unzipped your Oracle installation zip file. From that directory run the command:

`./runInstaller`

The installer will emit a few informational messages, then start up a graphical installer. Oracle went for many years without a graphical installer, but at present the GUI based installation is preferable. The installer may still be workable in character "terminal" mode, but at present it's more straightforward to use the GUI installer.

Database Options

Follow along with the installation wizard, and when asked, select the Enterprise edition, and choose to create a database. Pay special attention to the screen below when it appears:
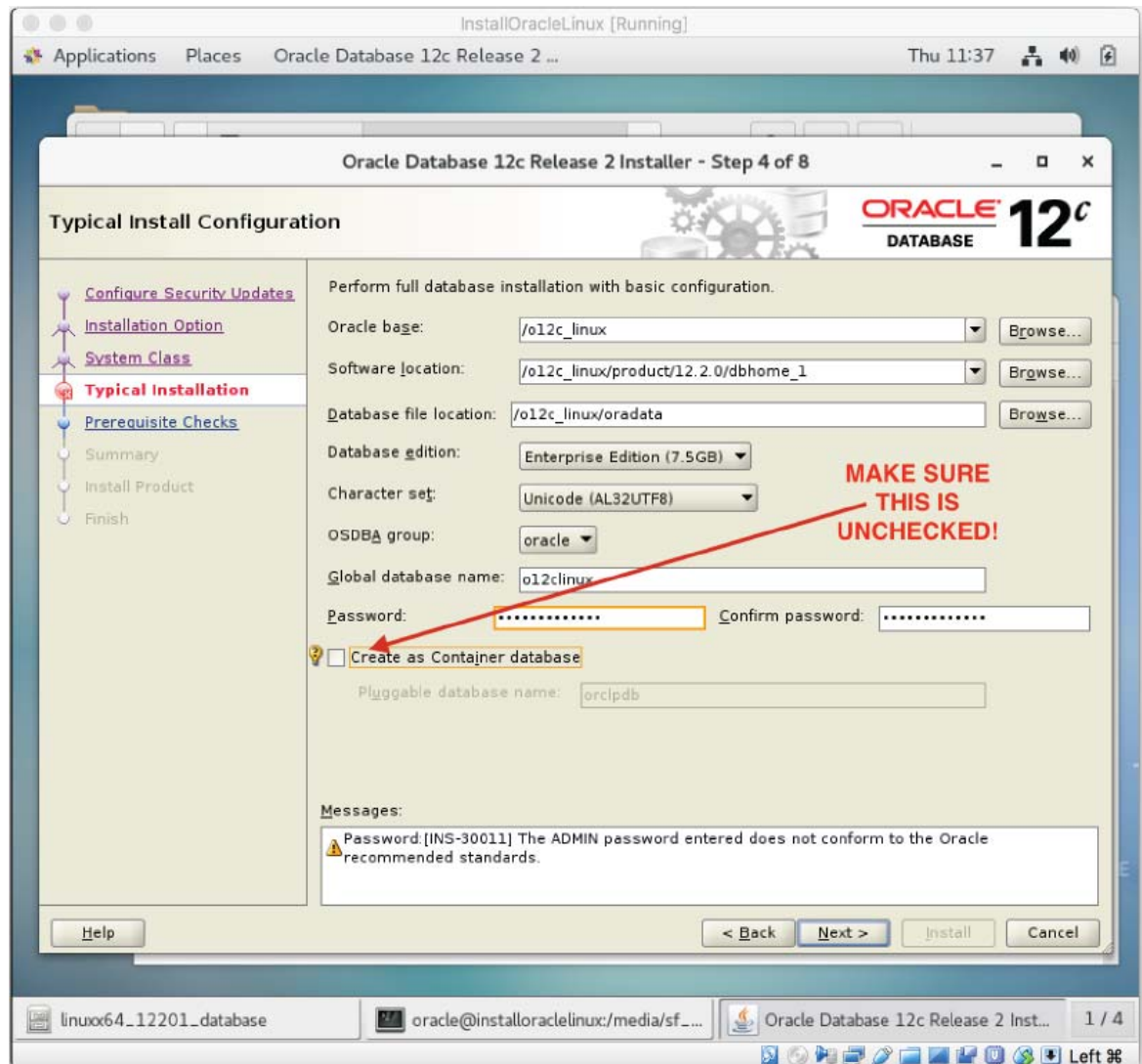
Fill out the fields as listed in the screenshot above. *Make double sure to uncheck the "Create as Container database" option as otherwise creating users will be problematic for you when you start using the database.* You can enter a different identifier for the global database name if you would like, but make sure to remember what you enter.

Completing Installation

The installer will go through various actions that it performs, and some "fixup steps" for you to perform. It will almost always tell you to run at least one fixup step to alter the Linux operating system configuration, generally to increase allocations of operating systems resources to support Oracle. Run the fixup exactly as the installer instructs you, then return to the installer and it will re-check. If there are different problems, run the fixup step again.

Along the way, you will be asked to provide a password for the Oracle privileged account as well. *Make sure to remember what you enter for this, so you can use your copy of Oracle after it's installed.*

If a "fixup" problem report repeats, the system needs to be rebooted to activate the changed settings so that the installer can see they have been corrected. Exit the installer (it won't hurt anything). Then restart the system by clicking the icon in the way up right corner, and select restart.

When the restart is complete, log in as Oracle again and return to the installer and run it again. If the installer doesn't run to completion, you will need to consult your facilitator, or Oracle's installation docs which are available on the web site.

Post Installation Setup

After your Oracle is installed, you will want to add the following lines to your .bashrc file in your home directory.

```
export ORACLE_BASE=/o12c_linux
export ORACLE_HOME=$ORACLE_BASE/product/12.2.0/dbhome_1
export ORACLE_SID=your_database_name
. $ORACLE_HOME/bin/oraenv
```

This sets up your environment - especially the PATH and LIBPATH variables - to run sqlplus and other Oracle binaries as needed. Make sure you put in your database name as you entered it in the installation. If your top-level "based" directory is different from our recommended "/o12c_linux" then change that in the same way.

If you do not have a text editor of choice, gedit is an easy-to-use graphical text editor similar to Notepad on Windows, which you can use to edit your .bashrc file. To access it to edit the .bashrc file, simply type the following command:

```
gedit .bashrc &
```

Verifying your Installation

You've made it this far. Great! Now you need to verify your installation. Open a terminal, and change directory to your "base" directory and navigate to subdirectories "product" then "12.2.0" then "dbhome_1" and "bin", then run the following command:

```
./sqlplus / as sysdba
```

You should be connected successfully to the database. You may try a query to verify this.

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.

Downloading Oracle SQL Developer
On Oracle.com, click on the Downloads/SQL Developer link:
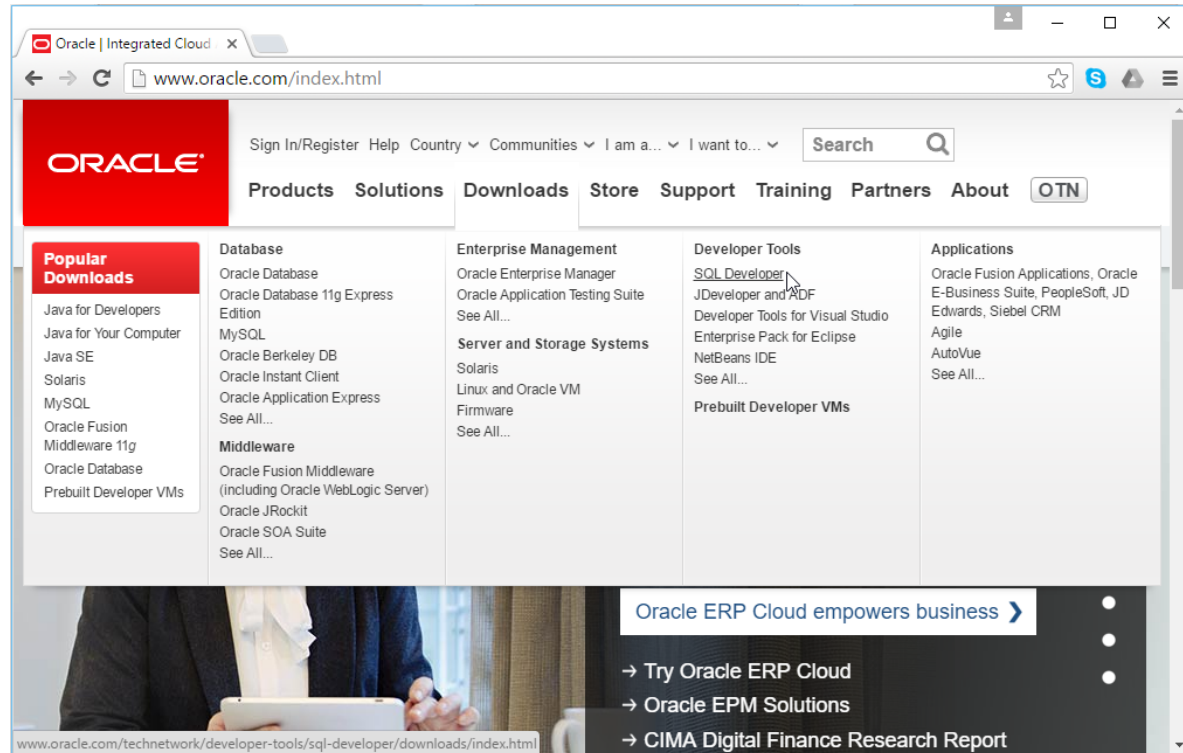
This will take you to a page of Oracle SQL Developer downloads for different platforms and different Java configurations. Before downloading, you must first accept the license agreement. Then click on "Download" link for the "Linux RPM" option.

You will then be able to save the RPM file to a location of your choosing.

Installing SQL Developer

After the RPM is downloaded, click the "Installation Notes" illustrated in the screenshot above and follow the instructions for installing the RPM. That screen looks like the below as of the time of writing, but the instructions may change over time.

Step 2: Launching Oracle SQL Developer

Launch Oracle SQL Developer

To launch Oracle SQL Developer, simply open a terminal, navigate into the newly created "sqldeveloper" directory, and execute "./sqldeveloper". You may need to choose the directory to your Java path, and then SQL Developer will launch.
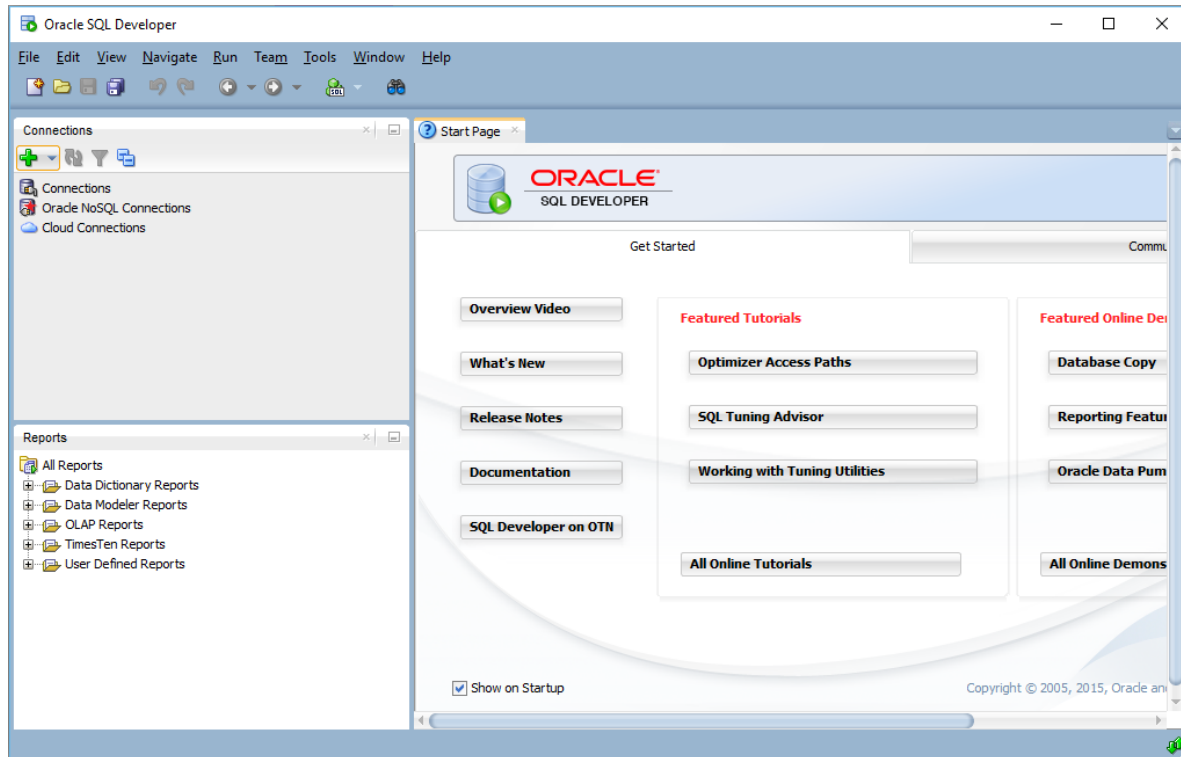
Step 3: Connecting to Your Database

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, right click on the Connections category, then select "New Connection…" from the context menu.
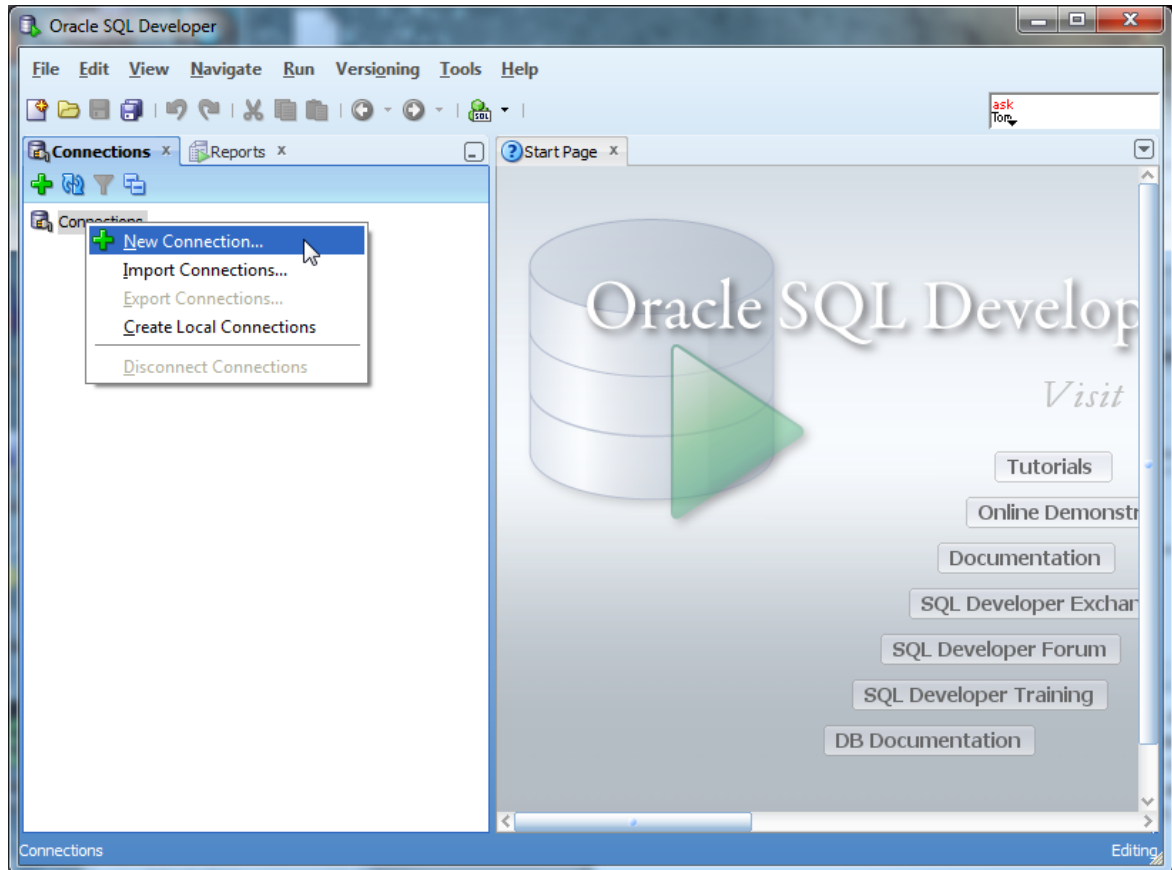
Oracle SQL Developer will launch the New Connection dialog, which requests configuration information about this new connection.
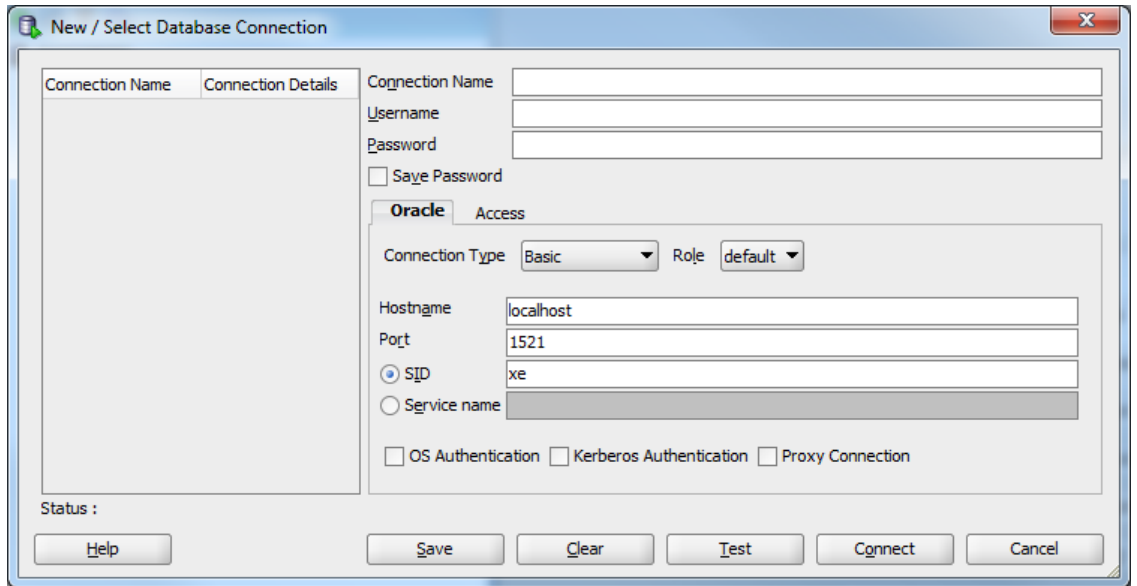
You will need to modify the following fields – Connection Name, Username, and Password, and SID. The Connection Name is just an identifier that you are giving your connection, so that you may identify it in the future. You can type anything you want that is memorable. We will use the name "system" because this connection is for the system user. The username is "system". The password is whatever you chose your password to be during the Oracle installation process. The SID will be whatever SID you chose during installation. If you followed the defaults in this installation guide, you would have selected "o12clinux" as your SID. The screen will look similar to the following:
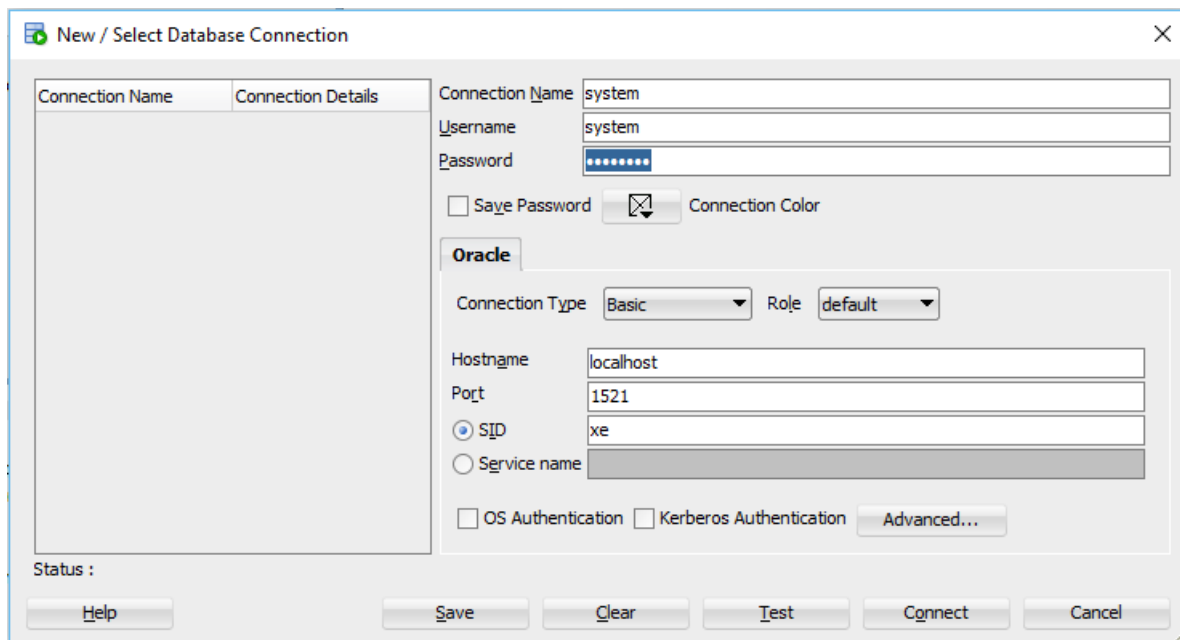
Click the [Test] button to ensure that you are able to connect. If you are able to connect, it will state "Status: Success" in the lower left-hand part of the dialog. If there is an issue, it will display the issue in the place of the success status. You will need to fix any issues issue before proceeding 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.
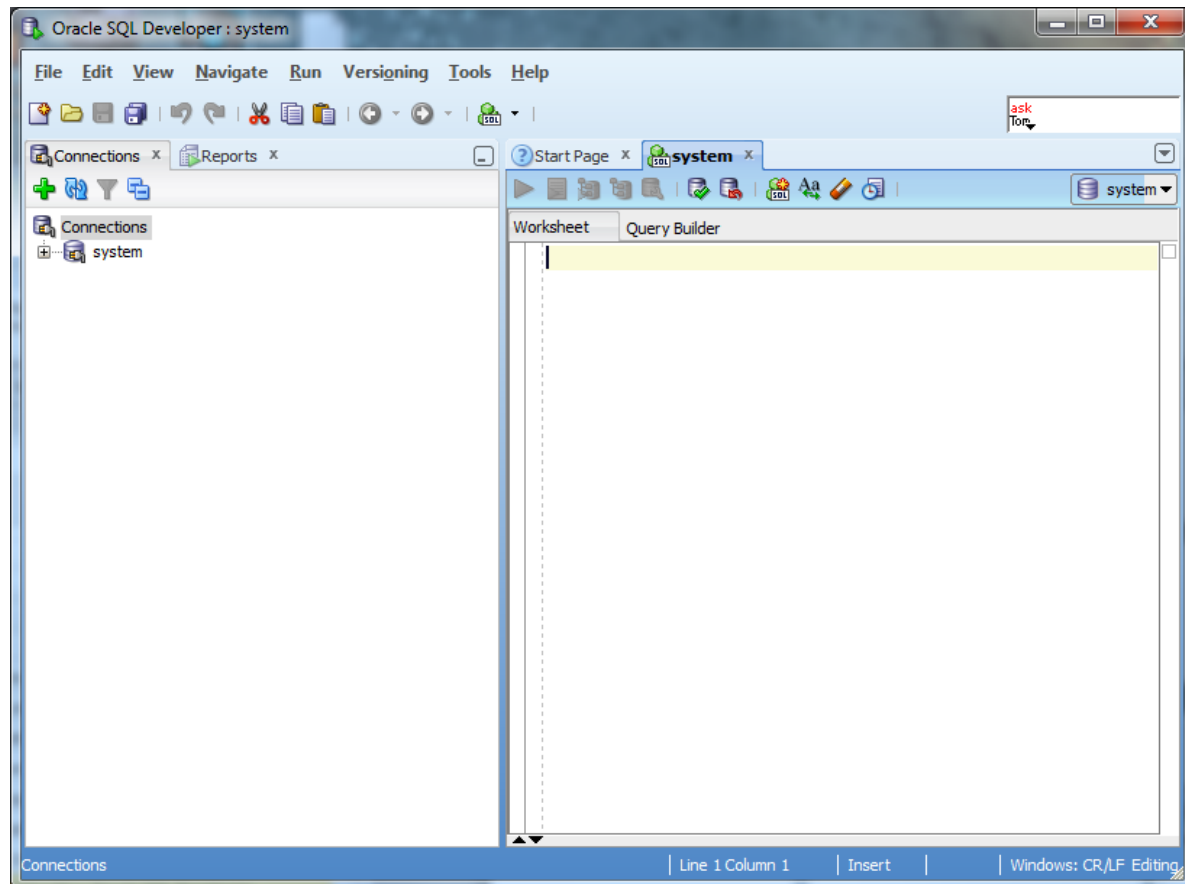
In this SQL worksheet, you can type commands, execute them, and see the results.

Congratulations! You have now successfully launched Oracle SQL Developer and established a connection to your database.

# Creating a Database User to Complete Your Assignments

Step 1: Creating Your Own User
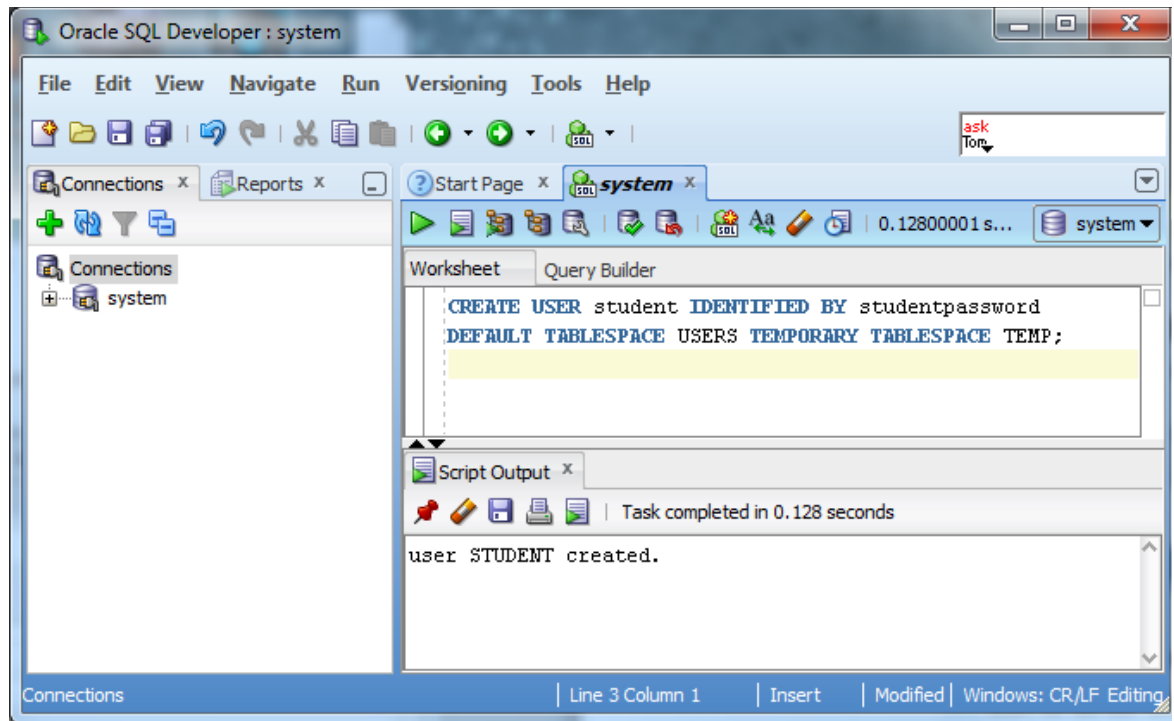
Create the User

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:
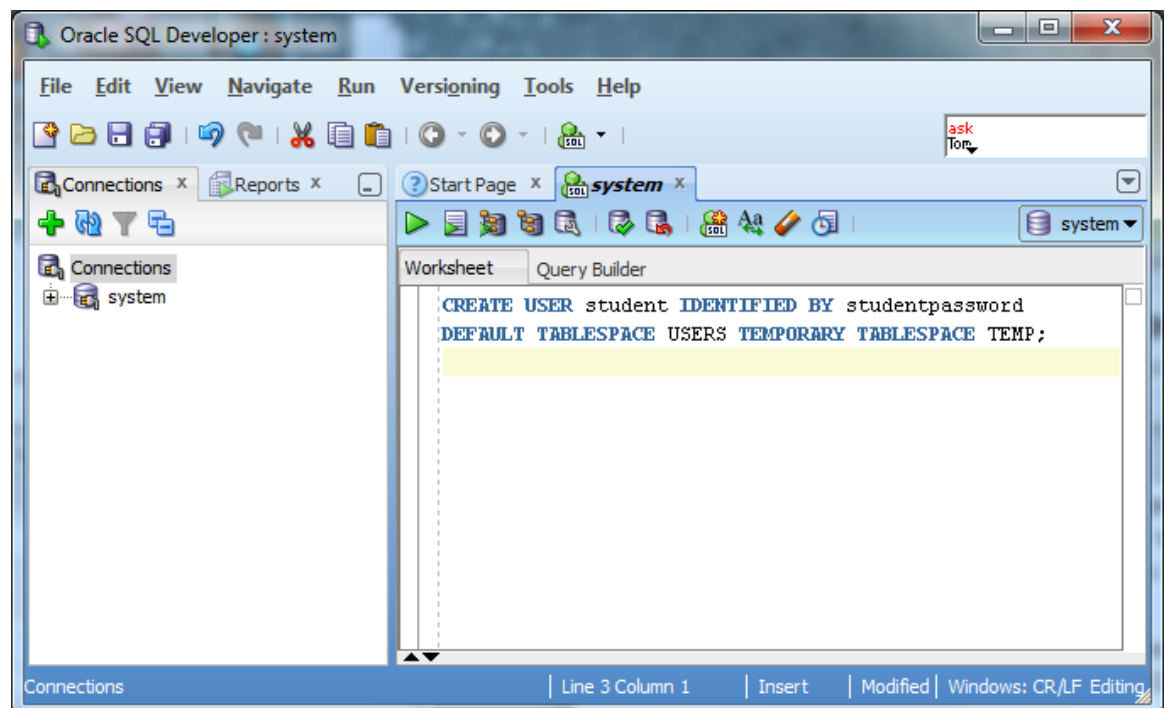
We now need to execute this command for it to take effect in the database. Click the

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.
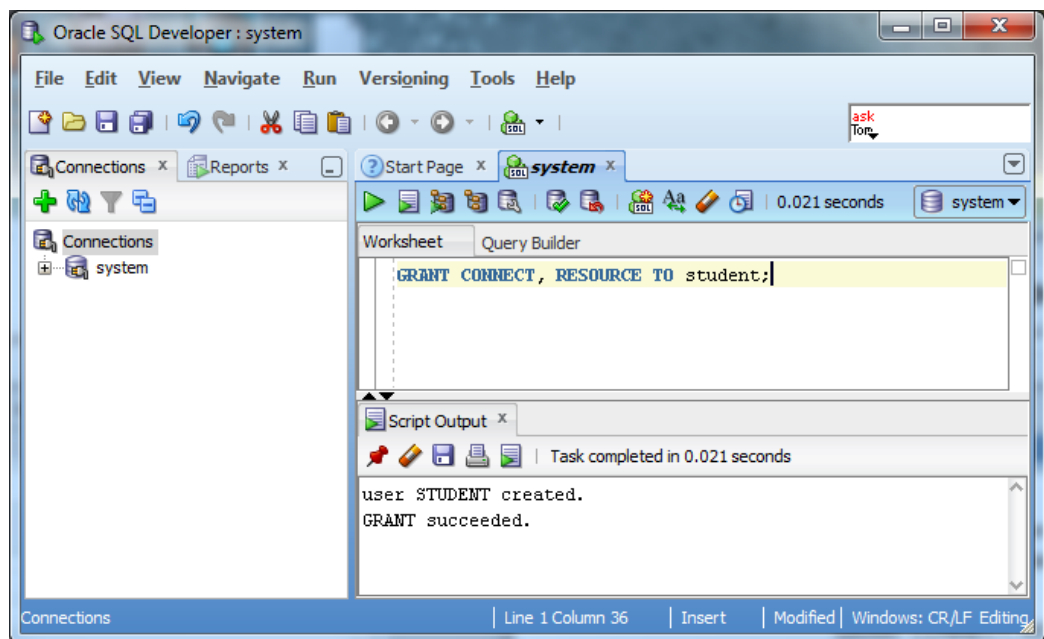
Give the User Basic Privileges

Next we will give user "student" the privilege to connect to the database and the privilege to create database resources. Type and execute

GRANT CONNECT, RESOURCE TO student;
ALTER USER student QUOTA UNLIMITED ON USERS;

Again, notice the semicolon at the end. Your screen should now look about like this:

The new user is now created!

Step 2: 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.
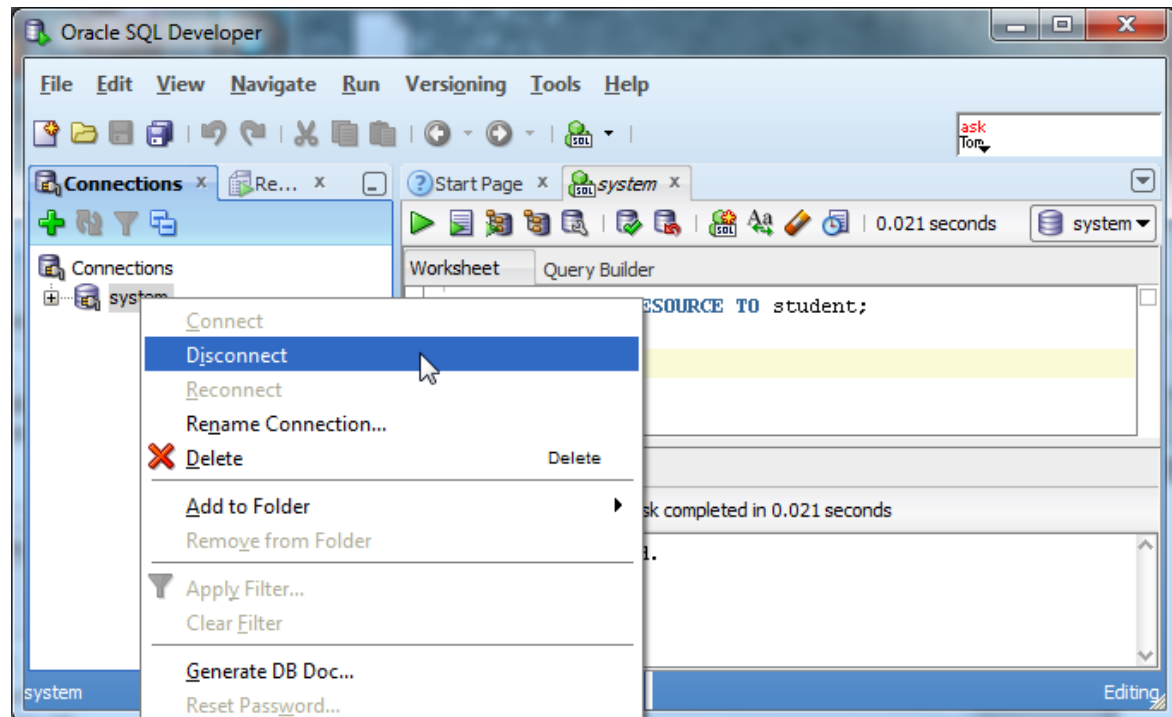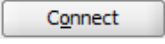
This will terminate the system connection, but will not close the SQL command window. You can close the existing SQL command window by clicking the ✕ icon.

**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. Right click the "Connections" category, choose "New Connection…" from the context menu, and fill in the appropriate information for that connection.
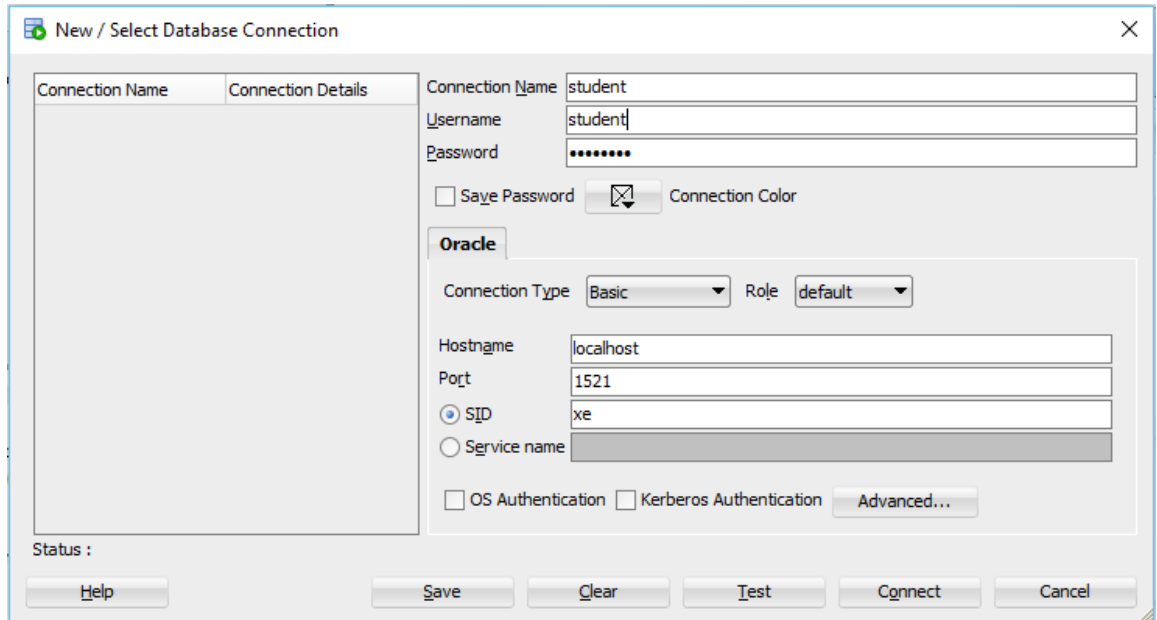
Remember to put in the new username and password instead of the system username and pasword. After inputting the information, click the Connect to connect. A SQL worksheet for the new user will open up.
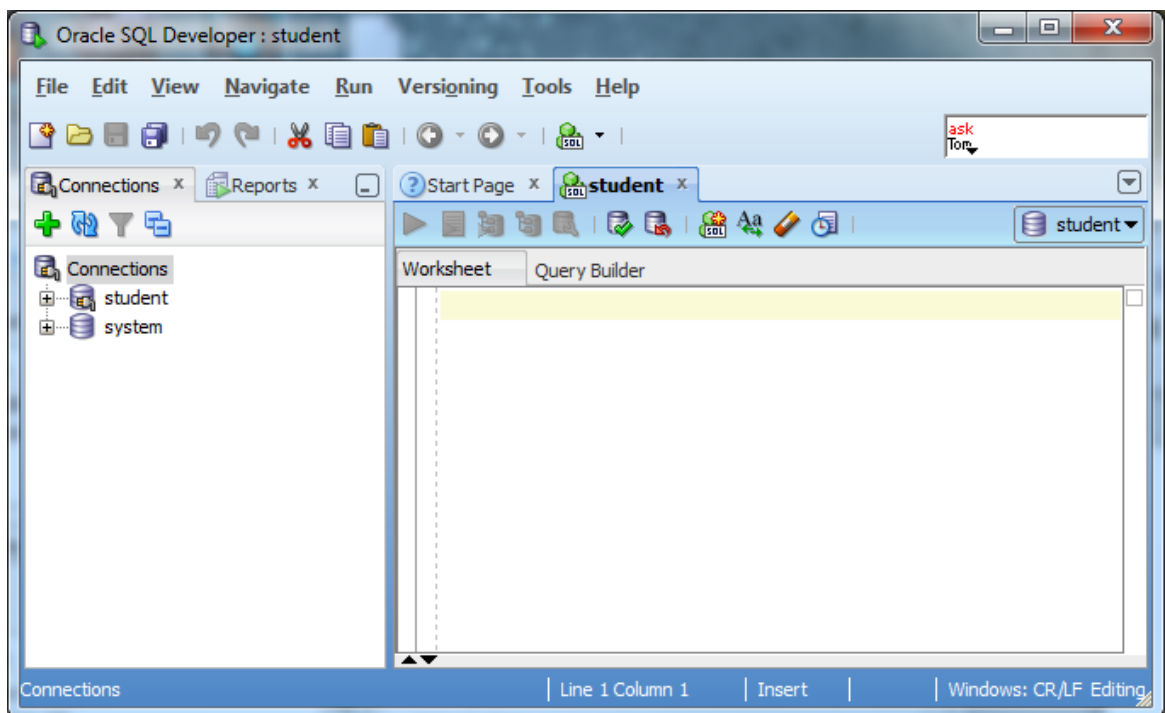
You are now connected to Oracle as an ordinary user, and you can complete your classwork, or even just experiment. If you want to create another user, just connect as "system", and do what we did to create user "student". Have fun!

Congratulations! You are ready to work in Oracle!

Appendix A: 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.

Open a command line window, then run this command (you will need to change to the bin directory of your Oracle install if this is not already in your path):

```
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";
```

Replace "new password" with a password that you wish to give to the SYSTEM user. Put the password in double-quotes as shown. Double-quotes are needed for putting mixed-case, spaces or special characters into passwords (or into names of users, tables, and other database objects). Oracle passwords are case-sensitive.

Clearly, in a production environment, the password would be carefully chosen to be resistant to attacks, and the password would be carefully protected. However, for a class installation choose something memorable, and write it down or store it on your computer. 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 passwords of ordinary Oracle users.

The "sqlplus / as sysdba" command works like this when the current user is the Linux owner of the Oracle binaries and data files, which is how you setup the "oracle" user. Oracle treats the operating system owner as "sys". In production systems, the "oracle" user would ordinarily be a no-login user. However, for a class database, security is not a concern, and leaving things as they are makes Oracle access and recovery easier.