Installing Oracle XE 11g R2 on CentOS 7
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This "how to" describes a process to download and install Oracle XE 11g R2 on a CentOS 7 virtual machine using the Oracle VirtualBox hypervisor on a Windows 10 host. This "how to" is part of a series and continues from the point where a CentOS 7 "Minimal" distribution ISO has been downloaded and used to install and configure CentOS 7.

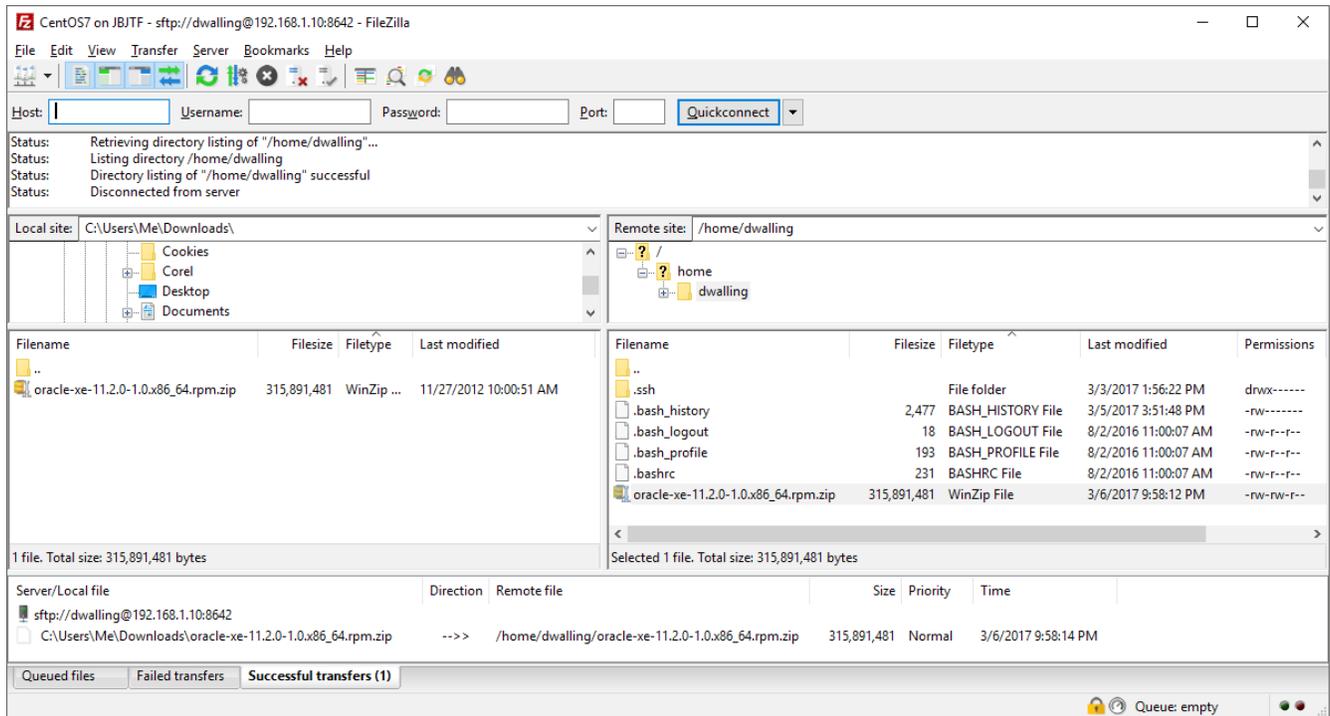Open a browser and download the Oracle XE 11g R2 for Linux x64 RPM from this site:

http://download.oracle.com/otn/linux/oracle11g/xe/oracle-xe-11.2.0-1.0.x86_64.rpm.zip

If you do not have an Oracle account, the site may prompt you to create one before you can download.
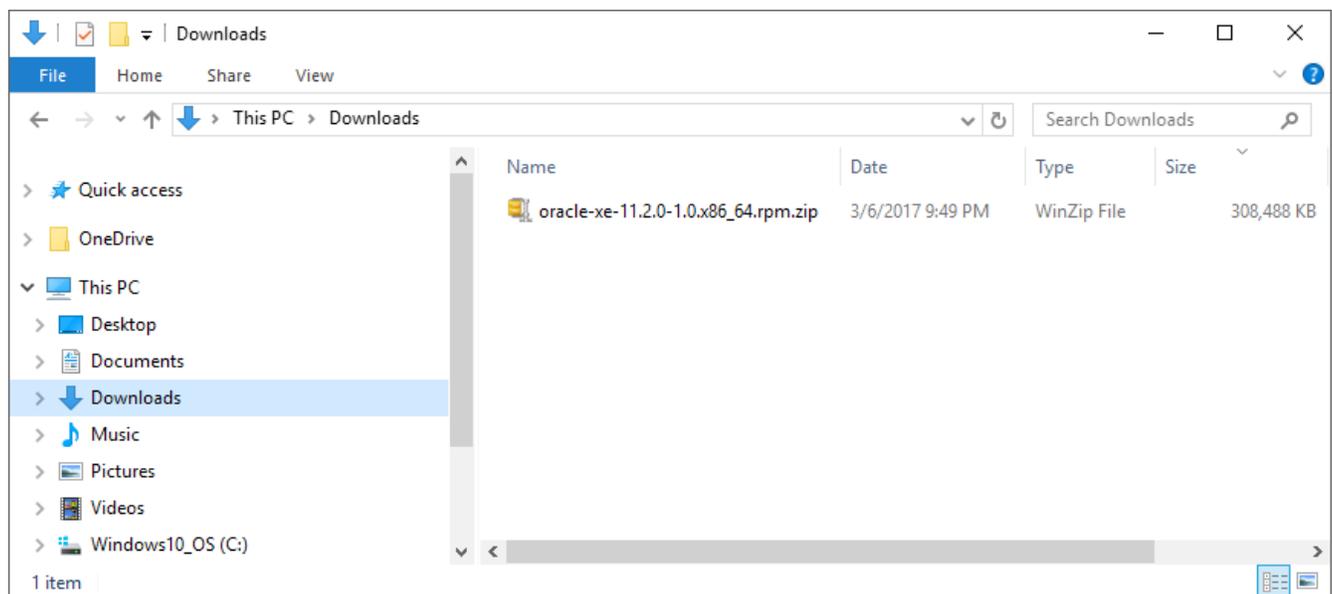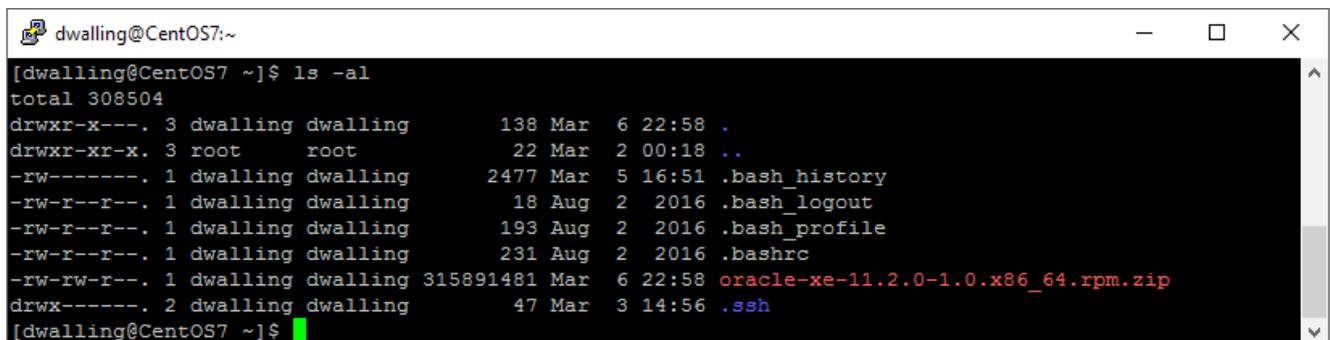

After downloading the Oracle XE archive, consider storing it in an organized download hierarchy in case you want or need to reinstall again.

Next, we'll upload the Oracle XE archive to CentOS. In a previous "how to", we established secure connectivity into our CentOS using SFTP or secure shell (SSH). Here, we're leveraging this configuration to connect to CentOS from a file transfer application, FileZilla. This tool allows the upload by dragging and dropping the archive file from our Windows 10 host to our CentOS virtual machine.

CentOS7 on JBJTF - sftp://dwalling@192.168.1.10:8642 - FileZilla

File   Edit   View   Transfer   Server   Bookmarks   Help

Host: | Username: | Password: | Port: | Quickconnect ▾

Status: Retrieving directory listing of "/home/dwalling"...
Status: Listing directory /home/dwalling
Status: Directory listing of "/home/dwalling" successful
Status: Disconnected from server

Local site: C:\Users\Me\Downloads\   Remote site: /home/dwalling

- Cookies
- Corel
- Desktop
- Documents

Remote:
- /
  - home
    - dwalling

Filename	Filesize	Filetype	Last modified
..			
oracle-xe-11.2.0-1.0.x86_64.rpm.zip	315,891,481	WinZip ...	11/27/2012 10:00:51 AM

Filename	Filesize	Filetype	Last modified	Permissions
..				
.ssh		File folder	3/3/2017 1:56:22 PM	drwx------
.bash_history	2,477	BASH_HISTORY File	3/5/2017 3:51:48 PM	-rw-------
.bash_logout	18	BASH_LOGOUT File	8/2/2016 11:00:07 AM	-rw-r--r--
.bash_profile	193	BASH_PROFILE File	8/2/2016 11:00:07 AM	-rw-r--r--
.bashrc	231	BASHRC File	8/2/2016 11:00:07 AM	-rw-r--r--
oracle-xe-11.2.0-1.0.x86_64.rpm.zip	315,891,481	WinZip File	3/6/2017 9:58:12 PM	-rw-rw-r--

1 file. Total size: 315,891,481 bytes   Selected 1 file. Total size: 315,891,481 bytes

Server/Local file	Direction	Remote file	Size	Priority	Time
sftp://dwalling@192.168.1.10:8642					
C:\Users\Me\Downloads\oracle-xe-11.2.0-1.0.x86_64.rpm.zip	-->>	/home/dwalling/oracle-xe-11.2.0-1.0.x86_64.rpm.zip	315,891,481	Normal	3/6/2017 9:58:14 PM

Queued files | Failed transfers | **Successful transfers (1)**

Queue: empty

Recall that we setup one user for all SSH connections into CentOS. For better security, do not allow the "root" user or any other user with elevated privileges to remotely connect to CentOS over SSH.

We will also demonstrate the use of SSH connections using the PuTTY client program. Since we have not (yet) installed support for a GUI in our CentOS VM, the PuTTY client at least allows us to dynamically resize the client window dimensions and to open multiple concurrent sessions (windows) as needed.

dwalling@CentOS7:~

```
[dwalling@CentOS7 ~]$ ls -al
total 308504
drwxr-x---. 3 dwalling dwalling        138 Mar  6 22:58 .
drwxr-xr-x. 3 root     root             22 Mar  2 00:18 ..
-rw-------. 1 dwalling dwalling       2477 Mar  5 16:51 .bash_history
-rw-r--r--. 1 dwalling dwalling         18 Aug  2  2016 .bash_logout
-rw-r--r--. 1 dwalling dwalling        193 Aug  2  2016 .bash_profile
-rw-r--r--. 1 dwalling dwalling        231 Aug  2  2016 .bashrc
-rw-rw-r--. 1 dwalling dwalling  315891481 Mar  6 22:58 oracle-xe-11.2.0-1.0.x86_64.rpm.zip
drwx------. 2 dwalling dwalling         47 Mar  3 14:56 .ssh
[dwalling@CentOS7 ~]$
```

The next set of commands is issued as the "root" user, which we access using the "su" (superuser) command. Create the "oinstall" and "dba" groups and define the "oracle" user. Provide the oracle user a secure password, please.
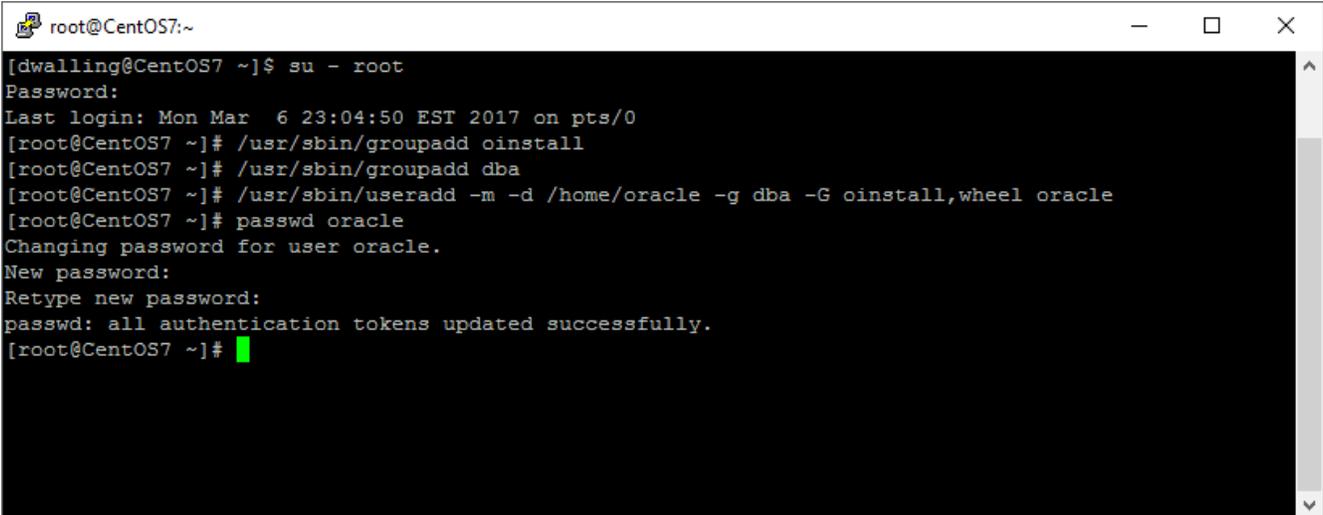
```
root@CentOS7:~                                                    —    □    ×

[dwalling@CentOS7 ~]$ su - root
Password:
Last login: Mon Mar  6 23:04:50 EST 2017 on pts/0
[root@CentOS7 ~]# /usr/sbin/groupadd oinstall
[root@CentOS7 ~]# /usr/sbin/groupadd dba
[root@CentOS7 ~]# /usr/sbin/useradd -m -d /home/oracle -g dba -G oinstall,wheel oracle
[root@CentOS7 ~]# passwd oracle
Changing password for user oracle.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[root@CentOS7 ~]#
```

```
root@CentOS7:~                                                          —   □   X

[root@CentOS7 ~]# yum install unzip bc
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
 * base: mirror.cloud-bricks.net
 * extras: centos.host-engine.com
 * updates: mirror.compevo.com
Resolving Dependencies
--> Running transaction check
---> Package bc.x86_64 0:1.06.95-13.el7 will be installed
---> Package unzip.x86_64 0:6.0-16.el7 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================
 Package          Arch             Version              Repository         Size
================================================================================
Installing:
 bc               x86_64           1.06.95-13.el7       base              115 k
 unzip            x86_64           6.0-16.el7           base              169 k

Transaction Summary
================================================================================
Install  2 Packages

Total download size: 284 k
Installed size: 580 k
Is this ok [y/d/N]: y
Downloading packages:
(1/2): unzip-6.0-16.el7.x86_64.rpm                        | 169 kB  00:00:01
(2/2): bc-1.06.95-13.el7.x86_64.rpm                       | 115 kB  00:00:01
--------------------------------------------------------------------------------
Total                                          189 kB/s | 284 kB  00:00:01
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : unzip-6.0-16.el7.x86_64                                     1/2
  Installing : bc-1.06.95-13.el7.x86_64                                    2/2
  Verifying  : bc-1.06.95-13.el7.x86_64                                    1/2
  Verifying  : unzip-6.0-16.el7.x86_64                                     2/2

Installed:
  bc.x86_64 0:1.06.95-13.el7               unzip.x86_64 0:6.0-16.el7

Complete!
[root@CentOS7 ~]# 
```

Now that we've created an "oracle" user, we'll install Oracle XE. Before we do that, there are a couple of packages we'll need. The "unzip" package is used to decompress the RPM archive file. The "bc" package is used by the rpm tool when installing the oracle-xe package.

```
oracle@CentOS7:~/Disk1                                              —    □    ✕

[root@CentOS7 ~]# ls /home/dwalling
oracle-xe-11.2.0-1.0.x86_64.rpm.zip
[root@CentOS7 ~]# mv /home/dwalling/oracle-xe-11.2.0-1.0.x86_64.rpm.zip /home/oracle
[root@CentOS7 ~]# chown oracle /home/oracle/oracle-xe-11.2.0-1.0.x86_64.rpm.zip
[root@CentOS7 ~]# chgrp dba /home/oracle/oracle-xe-11.2.0-1.0.x86_64.rpm.zip
[root@CentOS7 ~]# su - oracle
[oracle@CentOS7 ~]$ ls -al
total 308500
drwx------. 2 oracle dba          105 Mar  7 14:35 .
drwxr-xr-x. 4 root   root          36 Mar  7 14:29 ..
-rw-r--r--. 1 oracle dba           18 Dec  6 18:19 .bash_logout
-rw-r--r--. 1 oracle dba          193 Dec  6 18:19 .bash_profile
-rw-r--r--. 1 oracle dba          231 Dec  6 18:19 .bashrc
-rw-rw-r--. 1 oracle dba    315891481 Mar  7 14:26 oracle-xe-11.2.0-1.0.x86_64.rpm.zip
[oracle@CentOS7 ~]$ unzip oracle-xe-11.2.0-1.0.x86_64.rpm.zip
Archive:  oracle-xe-11.2.0-1.0.x86_64.rpm.zip
   creating: Disk1/
   creating: Disk1/upgrade/
  inflating: Disk1/upgrade/gen_inst.sql
   creating: Disk1/response/
  inflating: Disk1/response/xe.rsp
  inflating: Disk1/oracle-xe-11.2.0-1.0.x86_64.rpm
[oracle@CentOS7 ~]$ cd Disk1
[oracle@CentOS7 Disk1]$ sudo rpm -ivh oracle-xe-11.2.0-1.0.x86_64.rpm

We trust you have received the usual lecture from the local System
Administrator. It usually boils down to these three things:

    #1) Respect the privacy of others.
    #2) Think before you type.
    #3) With great power comes great responsibility.

[sudo] password for oracle: █
```

To install Oracle XE, first we move the compressed RPM archive to the oracle user's home directory and change the owner and group attributes of the file to "oracle" and "dba", respectively. Next, as the oracle user, we use unzip to decompress and expand the RPM archive. This operation creates a "Disk1" folder.

We next change the current directory to the "Disk1" folder and, as super user (su), use the "rpm" utility to install the package. You may be prompted as shown to enter the "oracle" user password to authenticate before CentOS grants permission to run the "rpm" program.

```
Preparing...                           ################################ [100%]
/var/tmp/rpm-tmp.ZyFm4y: line 257: [: 18446744073692774399: integer expression expected
/var/tmp/rpm-tmp.ZyFm4y: line 271: [: 18446744073692774399: integer expression expected
Updating / installing...
   1:oracle-xe-11.2.0-1.0               ################################ [100%]
Executing post-install steps...

You must run '/etc/init.d/oracle-xe configure' as the root user to configure the database.

[oracle@CentOS7 Disk1]$ exit
logout
[root@CentOS7 ~]# /etc/init.d/oracle-xe configure

Oracle Database 11g Express Edition Configuration
-------------------------------------------------
This will configure on-boot properties of Oracle Database 11g Express
Edition.  The following questions will determine whether the database should
be starting upon system boot, the ports it will use, and the passwords that
will be used for database accounts.  Press <Enter> to accept the defaults.
Ctrl-C will abort.

Specify the HTTP port that will be used for Oracle Application Express [8080]:8521

Specify a port that will be used for the database listener [1521]:1521

Specify a password to be used for database accounts.  Note that the same
password will be used for SYS and SYSTEM.  Oracle recommends the use of
different passwords for each database account.  This can be done after
initial configuration:
Confirm the password:

Do you want Oracle Database 11g Express Edition to be started on boot (y/n) [y]:y

Starting Oracle Net Listener...Done
Configuring database...Done
Starting Oracle Database 11g Express Edition instance...Done
Installation completed successfully.
[root@CentOS7 ~]#
```

The rpm utility installs the oracle-xe-11.2.0-1.0 package and then informs the user that the package must be "configured" while logged in as the "root" user.

We return to the root user with "exit" and invoke the oracle-xe service with the "configure" parameter. The configuration process prompts us to define two IP ports. The first port is an http port. The oracle-xe service will listen on this port for browser connections. This service supports the "Apex" database management UI that we will see below. The second port is the oracle listener port. Oracle listens on this port for connections from database client applications. The protocol used on these connections is TNS. We'll see this protocol in use below when we use a database client to connect to the database.

We are also prompted here to indicate whether we want Oracle XE started automatically when the system boots.

```
root@CentOS7:~                                                       —  ☐  ✕

[root@CentOS7 ~]# su - oracle
Last login: Tue Mar  7 00:32:53 EST 2017
[oracle@CentOS7 ~]$ cd /u01/app/oracle/product/11.2.0/xe/bin
[oracle@CentOS7 bin]$ . ./oracle_env.sh
[oracle@CentOS7 bin]$ echo $ORACLE_HOME
/u01/app/oracle/product/11.2.0/xe
[oracle@CentOS7 bin]$ echo $ORACLE_SID
XE
[oracle@CentOS7 bin]$ echo $PATH
/u01/app/oracle/product/11.2.0/xe/bin:/usr/local/bin:/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/home/o
racle/.local/bin:/home/oracle/bin
[oracle@CentOS7 bin]$ sqlplus /nolog

SQL*Plus: Release 11.2.0.2.0 Production on Tue Mar 7 00:43:01 2017

Copyright (c) 1982, 2011, Oracle.  All rights reserved.

SQL> connect sys/█████████ as sysdba
Connected.
SQL> EXEC DBMS_XDB.SETLISTENERLOCALACCESS(FALSE);

PL/SQL procedure successfully completed.

SQL> quit
Disconnected from Oracle Database 11g Express Edition Release 11.2.0.2.0 - 64bit Production
[oracle@CentOS7 bin]$ exit
logout
[root@CentOS7 ~]# semanage port -a -t http_port_t -p tcp 8521
[root@CentOS7 ~]# semanage port -a -t oracle_port_t -p tcp 1521
ValueError: Port tcp/1521 already defined
[root@CentOS7 ~]# firewall-cmd --permanent --add-port=8521/tcp
success
[root@CentOS7 ~]# firewall-cmd --permanent --add-port=1521/tcp
success
[root@CentOS7 ~]# firewall-cmd --reload
success
[root@CentOS7 ~]# █
```

Now we return to the "oracle" user and run the "oracle_env.sh" shell script to setup the ORACLE_HOME and ORACLE_SID environment variables and include Oracle folders in our path.

Next, as the "oracle" user, we can use the "sqlplus" utility to connect to our Oracle XE instance and run SQL queries or execute PL/SQL procedures. In the above example, we've connected to the database using the "sys" login as the "sysdba" role. As sysdba, we execute a procedure on the DBMS_XDB schema to set the value of a system setting to FALSE. This allows listener access from remote systems.

After exiting the sqlplus program, we now have to configure SELinux and our firewall to allow connections into our CentOS virtual machine on both the Apex web port and the Oracle TNS port. We use the "semanage" command to define the ports to SELinux. We use the "firewall-cmd" program to open the ports on the firewall. Note that SELinux already had port 1521 defined to it.

Remember to run "firewall-cmd --reload" to make firewall changes active.

To test our access to the Oracle XE web configuration tool, open a browser on the host system and navigate to the web port defined during the Oracle XE installation. Using the "http" protocol, after entering the CentOS IP address, include the port number and the resource "/apex/f?p=4950:1".

Now, to enter Application Express (Apex), click on the "Application Express" button.

To log in to Application Express, enter the "sys" or "system" user id and the password you defined during the Oracle XE installation.

Now, in Application Express, we can create a "workspace", which is analogous to a schema. Select "Create New" as the Data user radio button choice and enter a name for the database user, the application express user and a password.

In future "how to"'s in this series, we'll be using this virtual machine to install a Business Process Management (BPM) tool from Pegasystems, Inc. So, in the example above, I've defined a database user as "pega" and an Application Express user name as "pega". They are not equivalent. Using the same name is merely for simplicity.

After entering the user names and password, click the "Create Workspace" button.
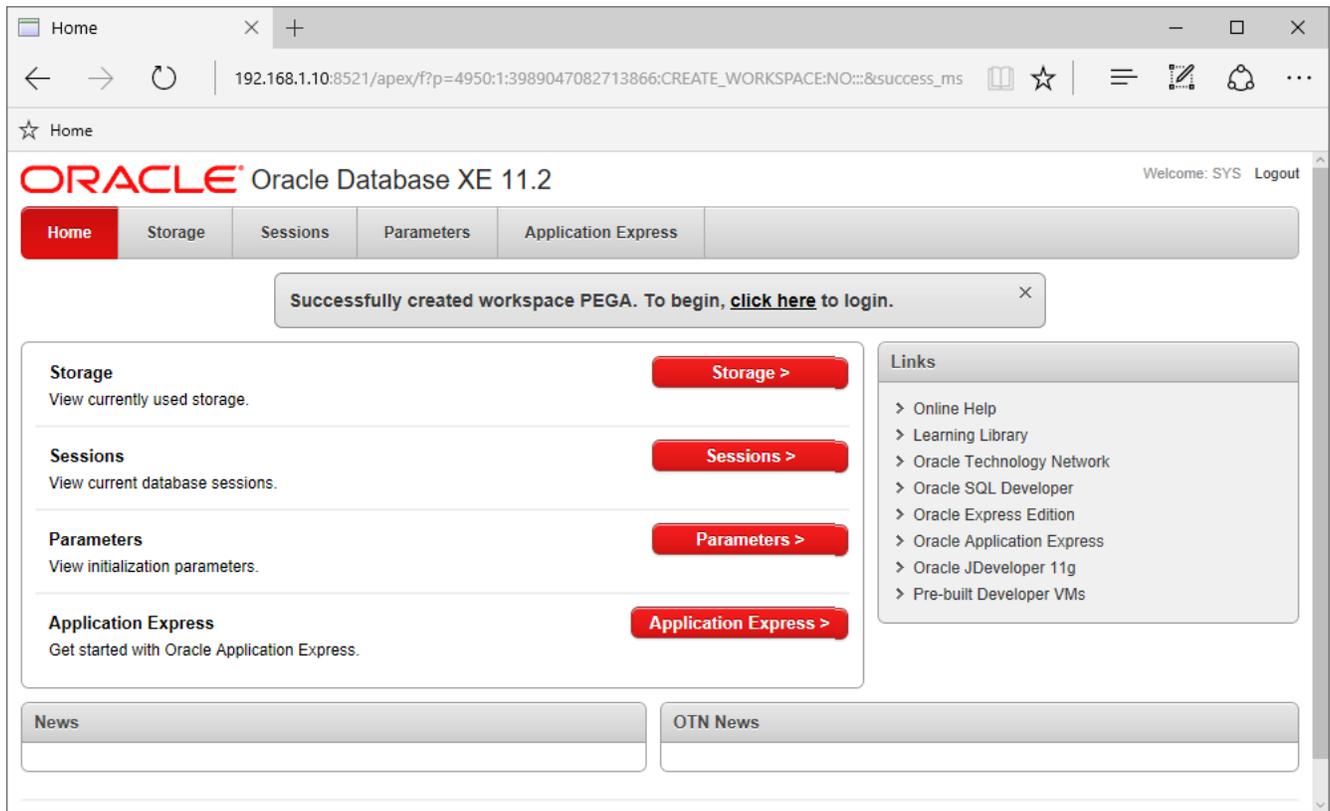
Once the workspace is created, you will be prompted with a link in case you want to enter Apex to manage the newly-created workspace.

Click on the "click here" link at this point.

If you note carefully in the URL address bar, clicking on the "click here" link from the Oracle web manager takes us to a different application, Apex. Here, we enter the workspace and user name defined above and our password. Note also that we have some administrative functions available to us at this site.

When we are logged into Application Express, we have several tools available to us. We'll explore some of these in a later "how to" when we install an application that requires us to run a database installation script.
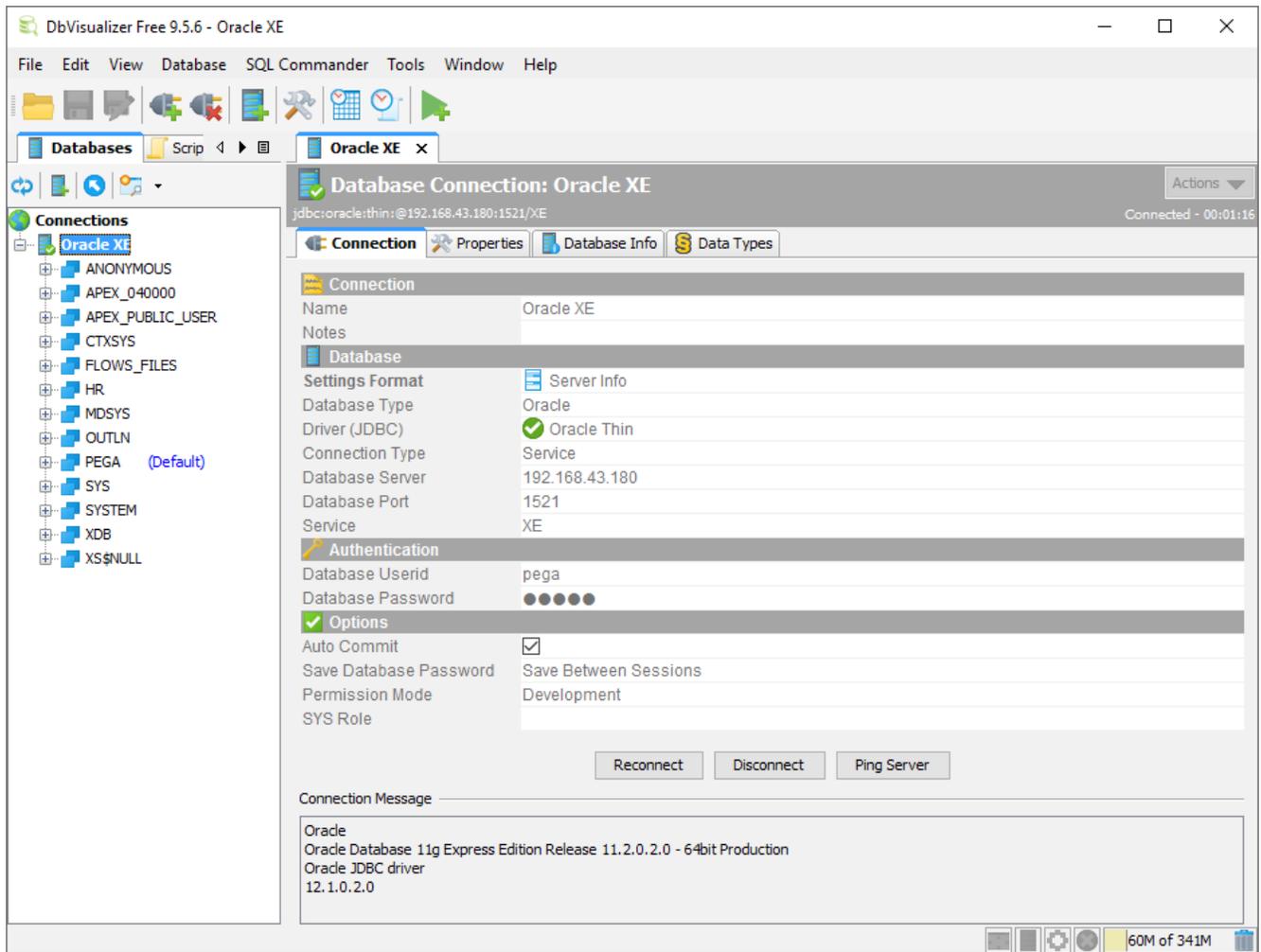
Next, we can demonstrate a client connection to our database from a DBMS client tool, DBVisualizer. In this tool, we have defined a database connection named "Oracle XE". If we open the defined connection properties page, we can see that we are able to connect to our Oracle XE instance using the standard "Oracle Thin" type of connector. We see the ORACLE_SID value, "XE", displayed as our "Service" name. We can connect using the database user "pega" that we created using the Oracle XE web manager above. Alternately, if wanted to define as a sysoper or sysdba, we could have entered "sys" or "system" as our "Database Userid" and entered "sysdba" or "sysoper" as the "SYS Role".
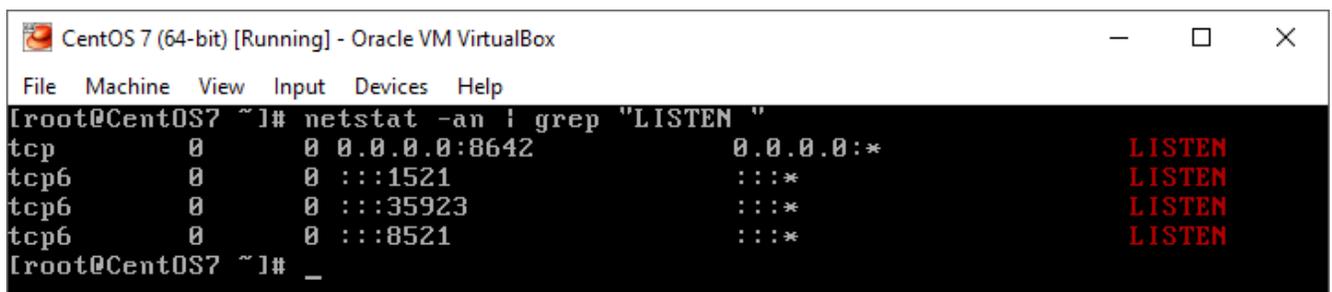
Finally, reboot the CentOS virtual machine and recheck our listening IP ports and connectivity to ensure that the Oracle XE service is restarting automatically after a reboot.