Practice 1

Preparing the Course Practice Environment

Practice Target

This practice guides you to prepare the environment that you will use in the course practices. The practices in the course were designed using virtual machines. You will build the following two virtual machines:

- **Linux-based appliance**

  This machine will be used in most course practices. You will install Oracle database 12c R2 on it.

- **Windows-based VirtualBox appliance**

  This will be used in the course as a secondary machine. It will be basically used for storing RMAN recovery catalog and for practicing cross-platform data transportation. You will install Oracle database 12c R2 on it.

Note: this practice assumes that you have the knowledge to perform the basic tasks on Oracle VirtualBox.

Practice Overview

In high level, in this practice, you will perform the following tasks:

- Create two Oracle VirtualBox Appliances:
  - Linux-based machine named `srv1`
  - Windows-based machine named `winsrv2`
- Install Oracle database software in `srv1` and create an Oracle Database (named `ORADB`) in it
- Install Oracle database software in `winsrv2` and create an Oracle Database (named `ORAWIN`) in it
- Install Swingbench in the hosting PC and Set up Order Entry Schema in `ORADB` database
- Learn about creating and deleting snapshots in Oracle VirtualBox

Practice Environment Requirements

Following are the requirements to prepare the practice environment. All those items must be available before you start with the practice.

Item	Type	Description
PC machine	hardware	A PC with Windows 7, 8 or 10 64-bit installed on it to host the virtual machines. Following are the required specifications: Memory: 12 GB or more Storage free space: 170 GB or more This PC will be referred to in the course practices as the **hosting PC**.
Oracle VirtualBox, release 6.1.32 or newer	software	Software to create virtual machines (called virtual appliances) **Note**: You can use Oracle VirtualBox release 7.x. But there will be difference between it and the screenshots used in the course practice documents. **Note**: The video was recorded using VirtualBox 5.1.
Putty	software	A program which provides a command line prompt to connect to a Linux server from Windows Can be downloaded from this link.
Swingbench 2.5	software	Download Swingbench from one of the following sources: • Course **downloadable resources** section OR • Dominic Giles portal
Java Runtime for Windows	software	Java runtime JRE 1.8 should be installed on your hosting PC. It will be used by the Swingbench software Can be downloaded from this link.
Oracle Database 12c R2 (12.2.0.1.0) for Linux x86 64-bit	software	To be installed in the Linux-based VirtualBox Appliance. link
Oracle Database 12c R2 (12.2.0.1.0) for Windows 64-bit	software	To be installed in the Windows-based VirtualBox Appliance. link
Oracle Database 12c Client (R1 or R2) for Windows	software	To be installed on the hosting PC. link

Create the Oracle VirtualBox Appliances

A. Install the Software on the Hosting PC

1. Install the following software in **the hosting PC**:

- Oracle VirtualBox, release 6.1.32
- Putty
- Java Runtime 1.8
- Oracle Database Client (R1 or R2) for Windows.

  In the course code examples, it is assumed that Oracle Database client is installed in the directory `D:\oracle\product\12.1.0\client_1`. In the course code examples, you need to change that directory to the Oracle Database client home directory in your PC.

B. Create an Oracle Linux 64-bit VirtualBox appliance

In the following steps, you will create an Oracle VirtualBox Linux appliance.

2. Create a Linux-based VirtualBox appliance with the specifications as shown in the table below.

- You can download pre-built appliance from my website at this link (its size is 1.6 GB). This is an Oracle VirtualBox appliance which has a fresh installation of Oracle Linux 6.10 installed on it. Please read the **readme file** on my web site to obtain details about the appliance including the root password.

OR

- You can create the VirtualBox appliance from scratch. The procedure to create it from scratch is documented here, or you can watch it in my channel at YouTube here.

  Caution: The video demonstrates installing Oracle Linux 6.7. However, follow the same steps to install Oracle Linux 6.10 instead. Oracle Linux 6 of older updates cannot communicate with Oracle Yum repositories.

Item	Value
Hostname	`srv1`
Memory	4 GB
Operating system	Oracle Linux 6.10

3. If you use the pre-built VirtualBox appliance, make sure to disable the Linux Automatic Update by performing the following: login as **root** -> **System** -> **Preferences** -> **Software updates**: Check for updates: **Never**, Automatically install: **Nothing**

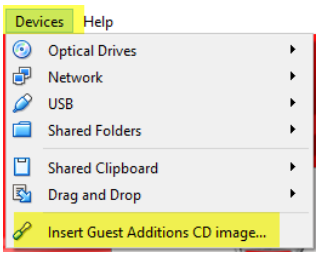
Linux Automatic Update makes the appliance so slow and may update a library that conflicts with downloaded Oracle software release.

4. If you are using a pre-built copy of the virtual machine (like the one available in my web site), make sure the Guest Additions version is upgraded to the version of the VirtualBox you are using.

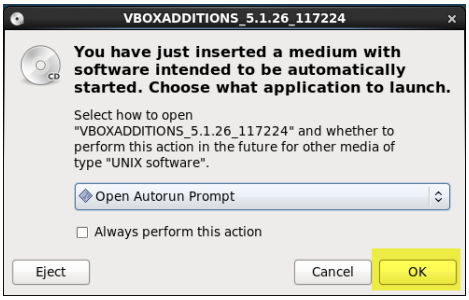
The pre-built virtual machine that is available in my site was created using version 6.1.32. If you are using a later version of Oracle VirtualBox, you should update its VirtualBox Guest Additions.

To Update the VirtualBox Guest Additions in the virtual machine, perform the following steps:

a. In the VirtualBox window, login as root and click on **Devices** menu | **Insert Guest Additions CD image**.



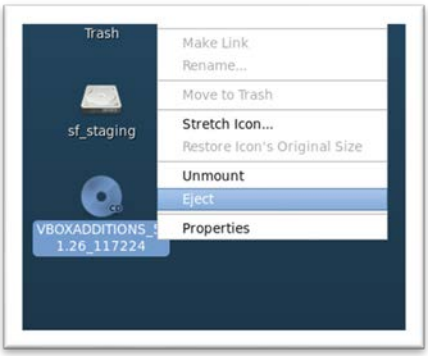
b. When the following window pops up, click on **OK** button



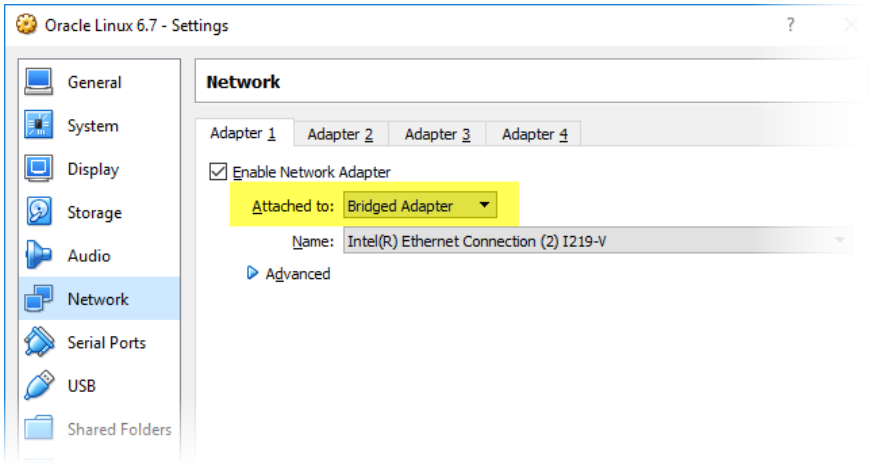
c. Wait for the installation to finish.

d. Reboot the machine and login to it as `root`.

e. Right click on the VirtualBox Additions CD icon and select **Eject** option.

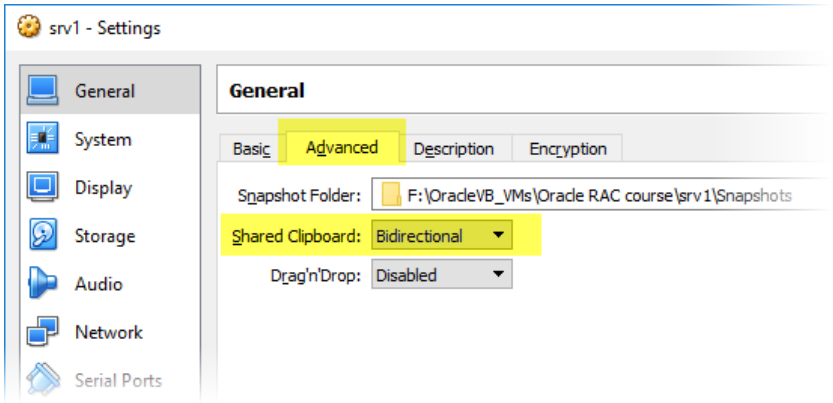


5. Shutdown `srv1` and click on **Settings** -> click on "**Network**" link from the left hand side pane -> click on "**Adapter 1**" tab -> set "Attached to" to "**Bridged Adapter**".

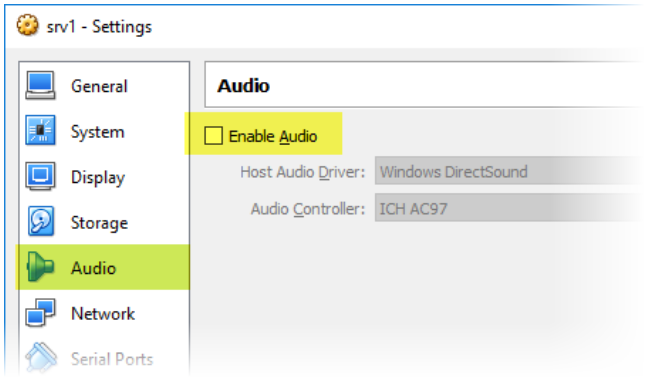


6. Proceed with making more modifications on the settings of `srv1` as follows:

   a. Click on "**General**", "**Advanced**" tab, and set the "**Shared Clipboard**" to "**Bidirectional**".



   b. Disable the audio card using "**Audio**" link (optional). Then press "**OK**" button.



7. If you have a firewall software installed into your hosting PC, configure it to allow the traffic to go to and come from Oracle VirtualBox application or disable it.

8. Start `srv1`, login to it as `root`

9. Make sure the firewall is disabled: Linux Main menu | **System** | **Administration** | **Firewall**. Click on **Disable** icon, then on **Apply** button.

10. Obtain the IP address assigned to srv1 by performing the following:

    a. In the VirtualBox appliance window, open the Network Connections window

    System | **Preferences** | **Network Connections**

    b. Click on **eth0**, **Edit** button, make sure the "Connect automatically" check box is marked, Change its “Connection Name” to **eth0**.

    c. Click on **IPv4 Settings** tab, make sure the method is set to "**Automatic (DHCP)**". This adapter will take its IP address from your network and it should get the connection to the Internet through this connection.

    d. Click on **Apply** button and click on **Close** button.

    e. Open a terminal window and obtain the IP address assigned to **eth0** and take a note of it.

    ```
    ifconfig
    ```

    f. Make sure that the VM machine is connected to the Internet, ping google.com

    ```
    ping -c 3 google.com
    ```

C. Create a Windows-based VirtualBox appliance

In the following steps, you will create an additional Windows-based VirtualBox appliance.

11. Create another Windows-based VirtualBox appliance with the specifications as shown in the table below. Select Bridged Network for the appliance.

You can obtain Windows Server Evaluation Edition installation ISO file for 180-day evaluation license from the following link:

https://www.microsoft.com/en-us/evalcenter/evaluate-windows-server-2016

Alternatively, download the windows-based vm OVA file from this link. This is a VirtualBox appliance with Windows Server 2016 Evaluation installed in it. The administrator password is: Oracle@dba

Note: This vm was created using Oracle VirtualBox version 6.1.32. It cannot be used in a VirtualBox environment older than this release.

Note: The evaluation license in this vm might be already expired. You will see a message in the Windows taskbar that reads "Windows License is Expired". Follow the instructions in this link to extend this license for 180 days.

Item	Value
Hostname	`winsrv2`
Memory	4 GB
Operating system	Any of the following: • Windows Server x64 (64-bit) 2016 (supported by 12c R2, not 12c R1) • Windows Server x64 (64-bit) 2012 • Windows Server x64 (64-bit) 2012 R2 • Windows Server x64 (64-bit) 2008 R2 • Windows x64 (64-bit) 10 **Note**: the course practices have been implemented in the course demos using Windows 2016 Standard Edition Evaluation. You are still free to use any of the operating systems listed above.

Note: I recommend assigning at least two CPU cores to the VirtualBox appliance. When I tested an Oracle VirtualBox appliance with a single CPU core, Oracle software installation and database operation was quite slow.

Note: I recommend creating two disks. C drive for Windows installation and D drive for Oracle software and database files.

12. Update the Guest Additions in the appliance.

a. In the VirtualBox window, login as **Administrator** and click on **Devices** menu | **Insert Guest Additions CD image**.

b. "confirmation to run an exe file" window pops up, click on **OK** button and install the software. Wait for the installation to finish.

c. Reboot the machine and login to it as Administrator

d. Eject the VirtualBox Additions CD. Open **file explorer** (shortcut [Windows button] + [e]) -> click on "**This PC**" icon -> right click on the CD and select **Eject**.

e. Shutdown the `winsrv2` appliance.

13. Make the following settings in `winsrv2`:

a. Click on "**General**", "**Advanced**" tab, and set the "**Shared Clipboard**" to "**Bidirectional**".

b. Disable the audio card using "**Audio**" link (optional). Then press "**OK**" button. Start the appliance after that.

14. Rename the hostname of the machine to **winsrv2**.

Open **File Explorer** (shortcut [Windows key] + [e]) -> **right-click "This PC"** icon -> select **Properties** -> click on "**Advanced system settings**" -> click on "**Computer Name**" tab -> click on "**Change**" button -> enter in the Computer Name field: **winsrv2** -> click on **OK** button -> click on **OK** button -> click on **Close** button -> click on "**Restart Now**" button

15. Turn off the firewall.

16. Make sure that **winsrv2** has the same time and date settings as in the hosting PC.

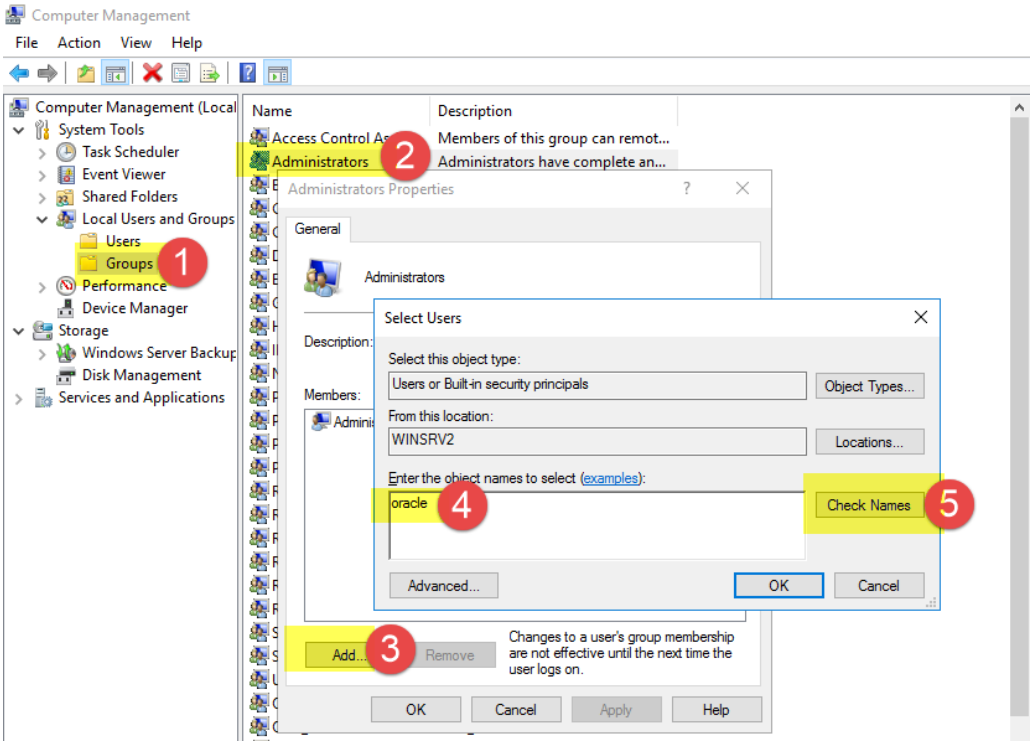
17. Obtain the IP address assigned to `winsrv2` and take a note of it. To obtain it, open a command prompt window in **winssrv2** and type the `ipconfig` command. Copy the IPv4 value.

18. Create a user named "**oracle**"

Control Panel -> User Accounts -> User Accounts -> Manage another account -> Add a user account

19. Add oracle user to the Administrators group

Search windows for Computer Management then follow the steps as numbers in the following screenshots:



D. Perform Network Configurations on the Appliances

In the following steps, you will perform network configuration on the appliances so that each machine should connect to the other.

20. In **srv1** appliance, configure the `/etc/hosts` file as follows. **Replace** the IP addresses in the code with the IP addresses of your environment.

```
vi /etc/hosts


127.0.0.1    localhost    localhost.localdomain
192.168.1.163 srv1.localdomain srv1
192.168.1.115 winsrv2.localdomain winsrv2
```

To test the configuration:

```
ping -c 3 srv1
ping -c 3 winsrv2
```

21. In **winsrv2** appliance, configure the `hosts` file as follows. Run `Notepad.exe` **as administrator** then open the `C:\Windows\System32\drivers\etc\hosts`

```
127.0.0.1    localhost
192.168.1.163 srv1
192.168.1.115 winsrv2
```

To test the configuration:

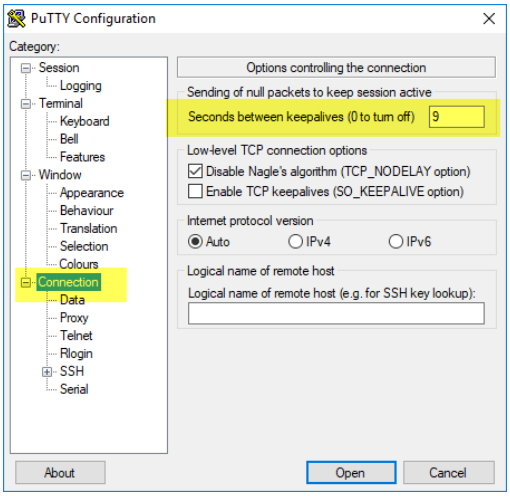
```
ping srv1

# -4 switch is used to display the output in IPv4:
ping winsrv2 -4
```

E. Configure Putty

22. Open PuTTY then configure a connection to **srv1**.

23. Set the KeepAlive setting to 9 seconds.



24. **Save** the connection configuration.

25. Open the connection and test it.

F. Create and set staging directory

In the following steps you will create staging directories in the hosting PC. Those staging directories will be used by the VirtualBox appliances.

Staging directories is useful for the appliances to save temporary files in them. This approach is better than saving the files directly in the appliances themselves because it saves the disk space in the appliances.

26. Shutdown `srv1` and `winsrv2`.

27. In your hosting machine, under the disk drive letter that has the most free disk space, create the following directory structure.

The code examples in the practice document assumes that the staging directories are created under the D drive. Replace it with the drive letter that matches your case.

```
D:\staging\Linux
D:\staging\Windows
```

28. In **VirtualBox Manager**, open the "**Settings**" of **srv1**, click on "**Shared Folders**" link in the right-hand pane. Add shared folder by pressing "**plus**" icon. Then select path to `D:\staging\Linux`, and mark the "**Auto-mount**" box. Change the "**Folder Name**" to "**extdisk**"

29. Start **srv1** and add `oracle` to `vboxsf` group. This group has privilege to access the shared folder.

a. Login as root

b. Open a terminal window and execute the following command to make sure the shared folder is seen by the appliance:

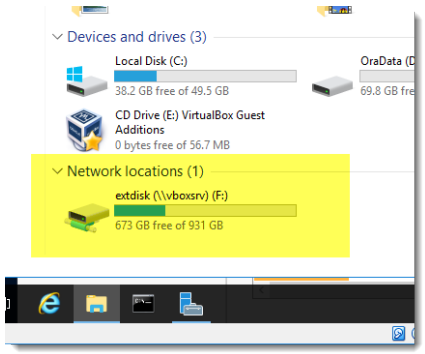
```
ls -ld /media/sf_extdisk/
```

c. Add `oracle` to `vboxsf` group.

```
usermod -a -G vboxsf oracle
```

30. In **VirtualBox Manager**, open the "**Settings**" of **winsrv2**, click on "**Shared Folders**" link in the right-hand pane. Add shared folder by pressing "**plus**" icon. Then select path to `D:\staging\Windows`, and mark the "**Auto-mount**" box. Change the "**Folder Name**" to "**extdisk**"

31. Start **winsrv2** and login to it as **Administrator**. Make sure the Shared folder is seen as F drive:



Create an Oracle Database in srv1

In the following steps, you will create an Oracle 12c R2 in srv1 machine.

G. Configure the Oracle software owner

32. Open Putty and login to `srv1` as `oracle` user

33. Set the OS environment variables in the `oracle` user profile:

```
su – oracle

mv ~/.bash_profile ~/.bash_profile_bk
vi ~/.bash_profile
```

```
# .bash_profile
if [ -f ~/.bashrc ]; then
. ~/.bashrc
fi

ORACLE_SID=ORADB; export ORACLE_SID
ORACLE_BASE=/u01/app/oracle; export ORACLE_BASE
ORACLE_HOME=$ORACLE_BASE/product/12.2.0/db_1; export ORACLE_HOME
ORACLE_TERM=xterm; export ORACLE_TERM
NLS_DATE_FORMAT="DD-MON-YYYY HH24:MI:SS"; export NLS_DATE_FORMAT
TNS_ADMIN=$ORACLE_HOME/network/admin; export TNS_ADMIN
PATH=.:${PATH}:$ORACLE_HOME/bin
PATH=${PATH}:/usr/bin:/bin:/usr/local/bin
export PATH
LD_LIBRARY_PATH=$ORACLE_HOME/lib
LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:$ORACLE_HOME/oracm/lib
LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:/lib:/usr/lib:/usr/local/lib
export LD_LIBRARY_PATH
export TEMP=/tmp
export TMPDIR=/tmp
export EDITOR=vi
umask 022
```

H. Install Oracle Database software in srv1

34. Extract the installation file into the Linux staging directory `D:\staging\Linux`

35. In the **VirtualBox** window of `srv1`, login as `oracle`, open a terminal window, change the current directory to the staging directory, and start the installer. If you are already logged on as `oracle` source the bash file before you run the installer.

```
cd
source .bash_profile
cd /media/sf_extdisk/12.2/database
./runInstaller
```

36. Respond to the Installer windows as follows:

Window	Response
Configure Security Updates	• **Unmark** "I wish to receive security updates.." checkbox. • Click on **Next** • Confirmation Window pops up • Click on **Yes**
Installation Option	• Select "Install Database Software only"
Database Installation Options	• Select "Single instance database installation"
Database Edition	• Select "Enterprise Edition"
Installation Location	• Keep it to the default Oracle base: /u01/app/oracle Oracle Home: /u01/app/oracle/product/12.2.0.1/db_1
Create Inventory	• Keep the inventory directory to its default value • Set the groups to **oinstall**
Operating System Groups	• Make sure **dba** is selected to all OS groups. It is OK to keep OSOPER blank.
Summary	• Click on **Install** button • When prompted, **run scripts as root** • When prompted, Install Oracle Trace File Analyzer
Finish	• Click on **Close** button

I. Create an Oracle Database in srv1

In the following steps you will create a database (named ORADB) in srv1.

37. Start the Oracle Net Configuration Assistant and create a default listener

```
netca
```

Listener Configuration -> Add -> LISTENER -> Next -> Next -> No -> Next -> Finish

38. Start the dbca and respond to its windows as follows:

Window	Response
Database Operation	**Create Database**
Creation Mode	**Advanced Configuration**
Deployment Type	**General Purpose or Transaction processing**
Database Identification	**Global Database Name: ORADB.localdomain** **Sid: ORADB** **UnMark "Create as Database Container"** **Note:** you will learn about working the CDB databases later in the course.
Storage Option	**Select "**Use following for the storage attributes**"** **Database files storage type:** File System **Database files location:** {ORACLE_BASE}/oradata/{DB_UNIQUE_NAME} **Mark "**Use Oracle-Managed Files (OMF)**"**
Fast Recovery Option	**Mark** "Specify the Fast Recovery Area" Set the "Fast Recovery Area" to: {ORACLE_BASE}/**fra**/{DB_UNIQUE_NAME} Fast Recovery Area size (approx): **40960** MB Make sure "Enable Archiving" is unmarked.
Network Configuration	Make sure the **LISTENER** is selected
Data Vault Option	Make sure the check boxes are unmarked
Configuration Options	**Memory tab**: Select "Use Automatic Shared Memory Management" SGA size: 1652 PGA size: 552 **Sizing tab:** Processes: 300

	Character Sets tab: select "Use Unicode AL32UTF8" **Connection mode tab:** Make sure the "Dedicated server mode" is selected **Sample Schemas** Keep the option "Add sample schemas to the database" unmarked
Management Options	Make sure "Configure Enterprise Manager (EM) database express" is marked.
Use Credentials	Select "User the same administrative password for all accounts" Set the password (it has been set to "oracle" in my demonstrations)
Creation Option	Make sure "Create database" is selected.
Summary	click on **Finish**

39. Test the created database by connecting to it using sqlplus:

```
sqlplus system/oracle@ORADB
```

40. Exit from the Putty session.

J. Automating Database Startup and Shutdown

In the following steps you will configure `srv1` so that the database automatically starts up when you start the appliance and automatically shuts down when you shut down the appliance.

Note: this procedure is applicable in our case because the Oracle Restart has not been configured. If the Oracle Restart was configured, you would have followed different procedure.

41. Open Putty and login as `root` to `srv1`

42. Edit the `oratab` file

```
vi /etc/oratab
```

43. Change the last field for the database line to **`Y`**

```
ORADB:/u01/app/oracle/product/12.2.0/db_1:Y
```

44. Create the file `/etc/init.d/dbora` and add the following code in it:

```
#! /bin/sh
# description: Oracle auto start-stop script.
ORA_HOME=/u01/app/oracle/product/12.2.0/db_1
ORA_OWNER=oracle

case "$1" in
'start')
    # Start the Oracle databases:
    # Remove "&" if you don't want startup as a background process.
    su - $ORA_OWNER -c "$ORA_HOME/bin/dbstart $ORA_HOME" &
    touch /var/lock/subsys/dbora
    ;;

'stop')
    # Stop the Oracle databases:
    su - $ORA_OWNER -c "$ORA_HOME/bin/dbshut $ORA_HOME" &
    rm -f /var/lock/subsys/dbora
    ;;
esac
```

45. Change the group of the `dbora` file to `dba`, and set its permissions to 750

```
chgrp dba /etc/init.d/dbora
chmod 750 /etc/init.d/dbora
```

46. Create symbolic links to the `dbora` script in the appropriate run-level script directories

```
ln -s /etc/init.d/dbora /etc/rc.d/rc0.d/K01dbora
ln -s /etc/init.d/dbora /etc/rc.d/rc3.d/S99dbora
ln -s /etc/init.d/dbora /etc/rc.d/rc5.d/S99dbora
```

47. Restart `srv1` and wait for a few minutes to allow the database to automatically start up.

48. Login as `oracle` to `srv1` and verify that the database has automatically started.

```
ps -ef | grep pmon
sqlplus / as sysdba
```

K. Setting NLS_DATE_FORMAT in SPFILE

Most RMAN date-affected operations run well with setting `NLS_DATE_FORMAT` in the OS level. However, I have hit a bug when implementing DBPITR procedure that could only be resolved by setting the `NLS_DATE_FORMAT` in the SPFILE.

49. Issue the following command in SQL*Plus.

The change will not take effect until the database is restarted.

```
ALTER SYSTEM SET NLS_DATE_FORMAT='YYYY-MM-DD:HH24:MI:SS' SCOPE=SPFILE;
```

Create an Oracle Database in winsrv2

In the following steps, you will create an Oracle 12c R2 in winsrv2 machine.

L. Install Oracle Database software for Windows

50. Extract the installation file into the Windows staging directory `D:\staging\Windows`

51. Start **winsrv2**, if it is not up.

52. Login as **oracle** user

53. Go to the directory that contains the installation files: `F:\database`
Oracle in Windows does not support running the installer from a network drive. You have to copy the installation files to a local drive.

54. In **winsrv2**, copy the installation files to `D:\temp`

55. In `D:\temp\database`, double click on **setup.exe** file.

56. Respond to the Installer windows as follows:

Window	Response
Configure Security Updates	**Unmark** "I wish to receive security updates.." checkbox. Click on **Next** Confirmation Window pops up Click on **Yes**
Installation Option	Select "Install Database Software only"
Database Installation Options	Select "Single instance database installation"
Database Edition	Select "Enterprise Edition"
Oracle Home User	Select "**Create New Windows User**" Username: **oraclehome1** Password: **Mypassword123** Confirm Password: **Mypassword123**
Installation Location	Oracle base: `D:\oracle` Oracle Home: `D:\oracle\product\12.2.0\dbhome_1`
Install Product	Click on **Install** button **Note**: The installer hangs at some point between %86 and %89 for long time. That is normal behavior. Just wait till it finishes.
Finish	Click on **Close** button

M. Create an Oracle database in winsrv2

57. Open a command prompt window **as Administrator** and start the Oracle Net Configuration Assistant. Use it to create a default listener

```
netca
```

Listener Configuration -> Add -> LISTENER (enter oraclehome1 password) -> Next -> Next -> No -> Next -> Finish

58. Start the dbca and respond to its windows as follows:

Window	Response
Database Operation	**Create Database**
Creation Mode	**Advanced Configuration**
Deployment Type	**General Purpose or Transaction processing**
Database Identification	**Global Database Name: `ORAWIN.localdomain`** **SID: `ORAWIN`** **UnMark "Create as Database Container"**
Storage Option	**Select "**Use following for the storage attributes**"** **Database files storage type:** File System **Database files location:** {ORACLE_BASE}/oradata/{DB_UNIQUE_NAME} **Mark "**Use Oracle-Managed Files (OMF)**"**
Fast Recovery Option	**Mark** "Specify the Fast Recovery Area" Set the "Fast Recovery Area" to: {ORACLE_BASE}/**fra**/{DB_UNIQUE_NAME} Fast Recovery Area size (approx): 9546 MB Make sure "Enable Archiving" is unmarked
Network Configuration	Make sure the **LISTENER** is selected
Data Vault Option	Make sure the check boxes are unmarked
Configuration Options	**Memory tab**: Select "Use Automatic Shared Memory Management" SG size: 1428 PGA size: 520
Management Options	**Unmark** "Configure Enterprise Manager (EM) database express"

Use Credentials	Select "Use the same adminstrative password for all accounts" Set the password (it has been set to "oracle" in my demonstrations) Enter the Oracle Home User password
Creation Option	Make sure "Create database" is selected.
Summary	Click on **Finish** button
Finish	Click on **Close** button

59. Test the created database by connecting to it using sqlplus:

```
sqlplus system/oracle@ORAWIN
```

60. Add the following environment variables to the system

Open **File Explorer** (shortcut [Windows key] + [e]) -> **right-click "This PC"** icon -> select **Properties** -> click on "**Advanced system settings**" -> click on "**Advanced**" tab -> click on "**Environment Variables**" -> under the "User Variables for oracle" add the following variables:

Variable	Its value
ORACLE_HOME	D:\oracle\product\12.2.0\dbhome_1
ORACLE_SID	ORAWIN
TNS_ADMIN	D:\oracle\product\12.2.0\dbhome_1\network\admin

Note: Usually, this is not needed in a production database in Windows server. We do it in the course practice to simplify some commands.

61. Open a new command-prompt window and verify that the variables were successfully added.

```
echo %ORACLE_HOME%
echo %ORACLE_SID%
echo %TNS_ADMIN%
```

N. Set the tns Naming configuration

62. In **both** appliances, enable the tnsnaming and easy connect methods in the `sqlnet.ora` file.

```
# in  srv1:
vi $ORACLE_HOME/network/admin/sqlnet.ora

# in winsrv2:
notepad %ORACLE_HOME%/network/admin/sqlnet.ora

# add the following to the file:
NAMES.DIRECTORY_PATH= (TNSNAMES, EZCONNECT)
```

63. Edit the `tnsnames.ora` file in each system so that they can connect to each database.

Do not copy paste from the PDF file. Copy the code the downloadable `tnsnames.ora` file.

```
# in srv1:
vi $TNS_ADMIN/tnsnames.ora

# in winsrv2:
notepad %ORACLE_HOME%/network/admin/tnsnames.ora

# add the following:
ORADB =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = srv1)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = ORADB.localdomain)
    )
  )

ORAWIN =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = winsrv2)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = ORAWIN.localdomain)
    )
  )
```

64. Test the configuration

```
sqlplus system/oracle@ORADB
sqlplus system/oracle@ORAWIN
```

O. Enabling ARCHIVELOG mode in ORAWIN database

65. Perform the steps below to enable the ARCHIVELOG mode in ORAWIN database.

```
# in sqlplus login to ORAWIN as sysdba
sqlplus / as sysdba

# mount the database
SHUTDOWN IMMEDIATE
STARTUP MOUNT

# define the destination of the archive log files
#  this is actually not required in our case because, if the log archive
#  destination is not defined, it will go by default to FRA.
ALTER SYSTEM SET LOG_ARCHIVE_DEST_1='LOCATION=USE_DB_RECOVERY_FILE_DEST'
SCOPE=SPFILE;

# enable the archivelog mode
ALTER DATABASE ARCHIVELOG;

# restart the database
SHUTDOWN IMMEDIATE
STARTUP OPEN

# switch the log file
ALTER SYSTEM SWITCH LOGFILE;

# checkout the generated archive log file
SELECT NAME FROM V$ARCHIVED_LOG;
```

Install Swingbench and Set up Order Entry Schema

In this section of the practice, you will install Swingbench 2.5 and then set up Order Entry schema in ORADB database. This schema will be used as our sample application data in this course.

Note: At the time of this writing, the latest version of Swingbench is 2.6. Personally, I faced issues with it and therefore prefer to use the stable version 2.5 in the course practices.

P. Set the tns Naming configuration in the Hosting PC

66. Edit the `tnsnames.ora` file in the hosting PC and add the following entries in it. Observe that the hosts are defined using the IP addresses, not hostnames because the hostnames are not defined in the hosting PC `hosts` file.

Do not copy paste from the PDB file. Copy the code from the downloadable `tnsnames.ora` file.

```
# in the hosting PC:
notepad D:\oracle\product\12.1.0\client_1\network\admin\tnsnames.ora

# add the following:
ORADB =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.1.163)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = ORADB.localdomain)
    )
  )

ORAWIN =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.1.115)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = ORAWIN.localdomain)
    )
  )
```

67. Test the configuration

```
sqlplus system/oracle@ORADB
sqlplus system/oracle@ORAWIN
```

Q. Install Swingbench in the Hosting PC and Set up an Order Entry Schema

In the following steps you will install Swingbench in your hosting PC then you will create an Order Entry schema in ORADB.

68. In your **hosting PC**, copy the software zip file to the disk drive where you want to install the software. In my case, I copied it to the D: drive.

69. Extract the zip file. The files will be automatically extracted to the following path. This folder will be referred to as $SWINGHOME folder.

```
<disk drive letter>:\swingbench
```

70. In the **hosting PC**, open a command prompt window and change the directory to $SWINGHOME\winbin

```
cd D:\swingbench\winbin
```

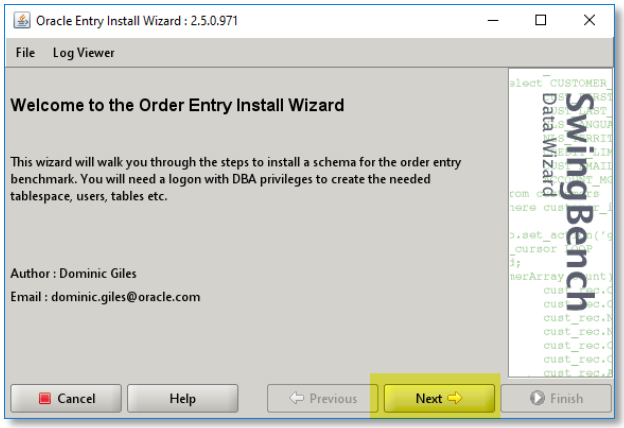
71. Start the Order Entry Wizard by issuing the command oewizard.

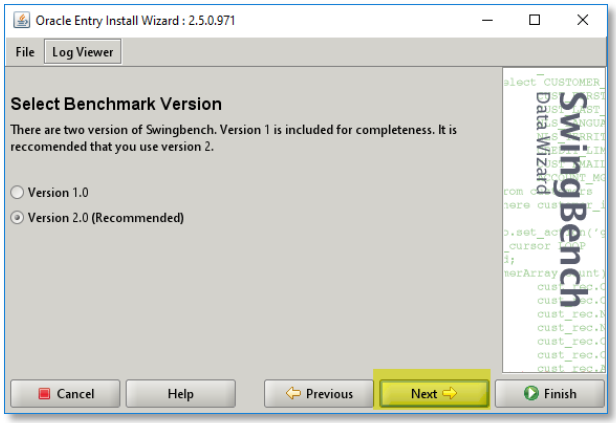
This wizard creates a simple Order Entry schema. It is similar to the OE schema installed by Oracle Examples schemas. The wizard creates a tablespace for the new schema, grants the required privileges to it, creates the schema objects, and populate them with data.

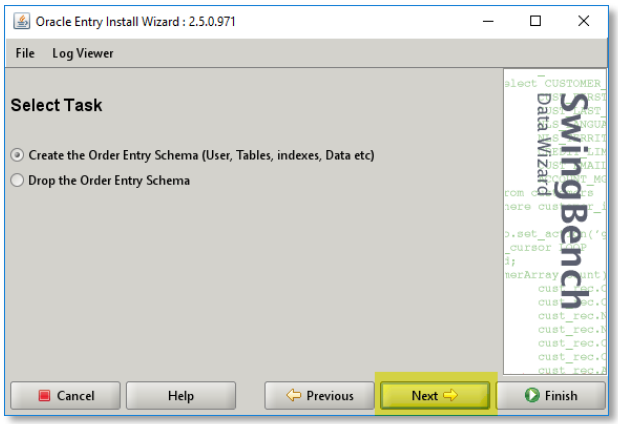
Just go to the next step and follow the instructional screenshots.

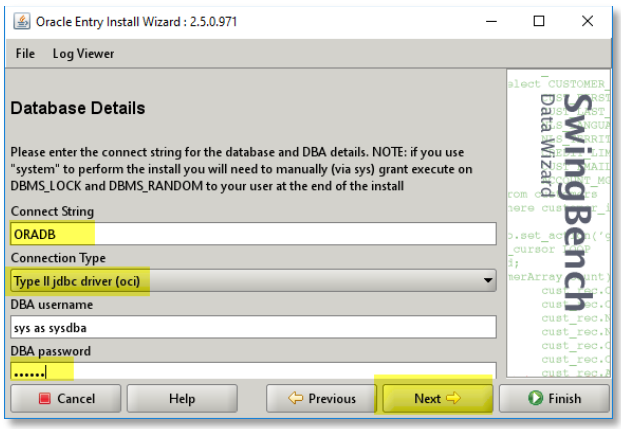
```
set PATH=D:\oracle\product\12.1.0\client_1\jdk\jre\bin;%PATH%
oewizard
```

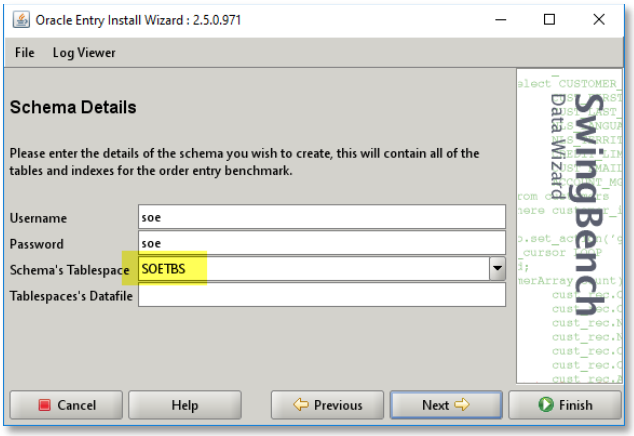
72. Respond to the wizard windows as shown in the following screenshots:

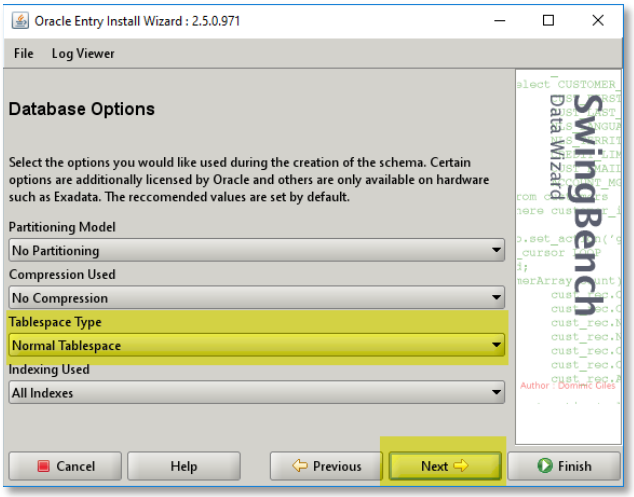


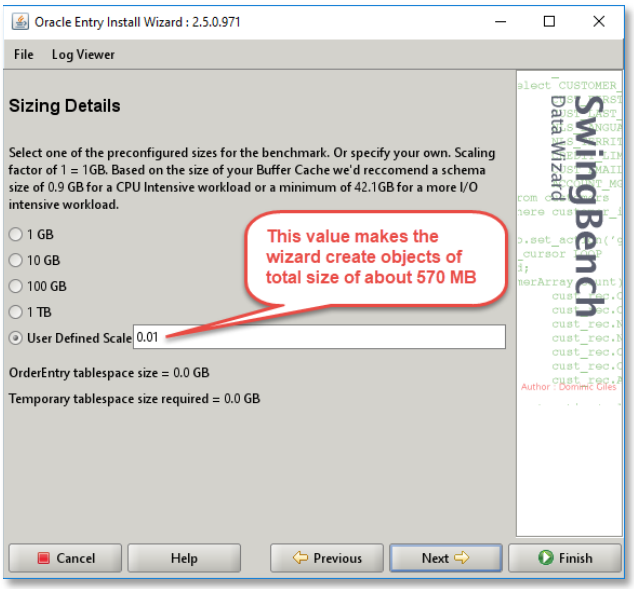

Oracle Entry Install Wizard : 2.5.0.971
File
Log Viewer
Select Benchmark Version
There are two version of Swingbench. Version 1 is included for completeness. It is reccomended that you use version 2.
Version 1.0
Version 2.0 (Recommended)
SwingBench
Data Wizard
Cancel
Help
Previous
Next
Finish

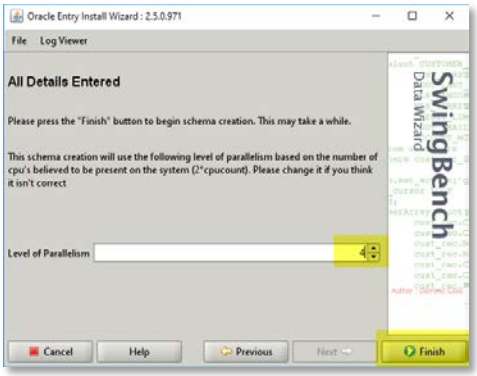

Oracle Entry Install Wizard : 2.5.0.971
File
Log Viewer
Select Task
Create the Order Entry Schema (User, Tables, indexes, Data etc)
Drop the Order Entry Schema
SwingBench
Data Wizard
Cancel
Help
Previous
Next
Finish

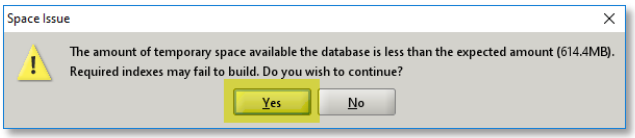

Oracle Entry Install Wizard : 2.5.0.971
File
Log Viewer
Database Details
Please enter the connect string for the database and DBA details. NOTE: if you use "system" to perform the install you will need to manually (via sys) grant execute on DBMS_LOCK and DBMS_RANDOM to your user at the end of the install
Connect String
ORADB
Connection Type
Type II jdbc driver (oci)
DBA username
sys as sysdba
DBA password
SwingBench
Data Wizard
Cancel
Help
Previous
Next
Finish

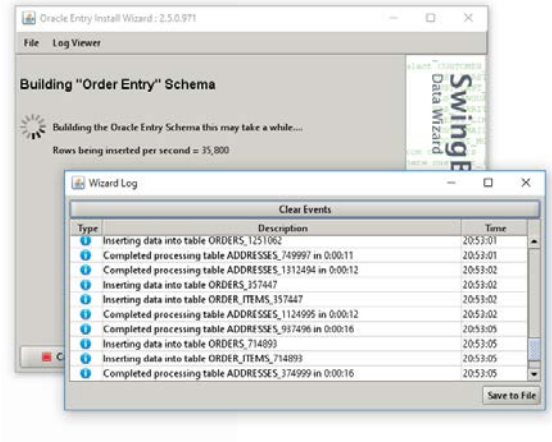

Oracle Entry Install Wizard : 2.5.0.971
File Log Viewer
Schema Details
Please enter the details of the schema you wish to create, this will contain all of the tables and indexes for the order entry benchmark.
Username soe
Password soe
Schema's Tablespace SOETBS
Tablespaces's Datafile
Cancel Help Previous Next Finish
SwingBench Data Wizard

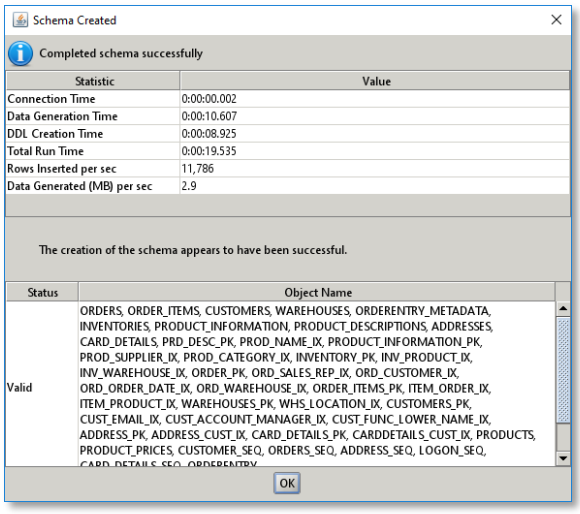

Oracle Entry Install Wizard : 2.5.0.971
File Log Viewer
Database Options
Select the options you would like used during the creation of the schema. Certain options are additionally licensed by Oracle and others are only available on hardware such as Exadata. The reccomended values are set by default.
Partitioning Model
No Partitioning
Compression Used
No Compression
Tablespace Type
Normal Tablespace
Indexing Used
All Indexes
Cancel Help Previous Next Finish
SwingBench Data Wizard


Oracle Entry Install Wizard : 2.5.0.971
File Log Viewer
Sizing Details
Select one of the preconfigured sizes for the benchmark. Or specify your own. Scaling factor of 1 = 1GB. Based on the size of your Buffer Cache we'd reccomend a schema size of 0.9 GB for a CPU Intensive workload or a minimum of 42.1GB for a more I/O intensive workload.
1 GB
10 GB
100 GB
1 TB
User Defined Scale 0.01
This value makes the wizard create objects of total size of about 570 MB
OrderEntry tablespace size = 0.0 GB
Temporary tablespace size required = 0.0 GB
Cancel Help Previous Next Finish
SwingBench Data Wizard


Oracle Entry Install Wizard : 2.5.0.971
File Log Viewer
All Details Entered
Please press the "Finish" button to begin schema creation. This may take a while.
This schema creation will use the following level of parallelism based on the number of cpu's believed to be present on the system (2*cpucount). Please change it if you think it isn't correct
Level of Parallelism
4
Cancel
Help
Previous
Next
Finish
SwingBench
Data Wizard


Space Issue
The amount of temporary space available the database is less than the expected amount (614.4MB).
Required indexes may fail to build. Do you wish to continue?
Yes
No


Oracle Entry Install Wizard : 2.5.0.971
File Log Viewer
Building "Order Entry" Schema
Building the Oracle Entry Schema this may take a while....
Rows being inserted per second = 35,800
Wizard Log
Clear Events
Type
Description
Time
Inserting data into table ORDERS_1251062
Completed processing table ADDRESSES_749997 in 0:00:11
Completed processing table ADDRESSES_1312494 in 0:00:12
Inserting data into table ORDERS_357447
Inserting data into table ORDER_ITEMS_357447
Completed processing table ADDRESSES_1124995 in 0:00:12
Completed processing table ADDRESSES_937496 in 0:00:16
Inserting data into table ORDERS_714893
Inserting data into table ORDER_ITEMS_714893
Completed processing table ADDRESSES_374999 in 0:00:16
Save to File


Schema Created
Completed schema successfully
Statistic
Value
Connection Time
0:00:00.002
Data Generation Time
0:00:10.607
DDL Creation Time
0:00:08.925
Total Run Time
0:00:19.535
Rows Inserted per sec
11,786
Data Generated (MB) per sec
2.9
The creation of the schema appears to have been successful.
Status
Object Name
Valid
ORDERS, ORDER_ITEMS, CUSTOMERS, WAREHOUSES, ORDERENTRY_METADATA, INVENTORIES, PRODUCT_INFORMATION, PRODUCT_DESCRIPTIONS, ADDRESSES, CARD_DETAILS, PRD_DESC_PK, PROD_NAME_IX, PRODUCT_INFORMATION_PK, PROD_SUPPLIER_IX, PROD_CATEGORY_IX, INVENTORY_PK, INV_PRODUCT_IX, INV_WAREHOUSE_IX, ORDER_PK, ORD_SALES_REP_IX, ORD_CUSTOMER_IX, ORD_ORDER_DATE_IX, ORD_WAREHOUSE_IX, ORDER_ITEMS_PK, ITEM_ORDER_IX, ITEM_PRODUCT_IX, WAREHOUSES_PK, WHS_LOCATION_IX, CUSTOMERS_PK, CUST_EMAIL_IX, CUST_ACCOUNT_MANAGER_IX, CUST_FUNC_LOWER_NAME_IX, ADDRESS_PK, ADDRESS_CUST_IX, CARD_DETAILS_PK, CARDDETAILS_CUST_IX, PRODUCTS, PRODUCT_PRICES, CUSTOMER_SEQ, ORDERS_SEQ, ADDRESS_SEQ, LOGON_SEQ,
OK

73. Verify the soe schema creation. In the command prompt in the hosting machine, issue the following commands.

```
sqlplus soe/soe@oradb

-- 13 tables should be returned
SELECT TNAME FROM TAB;

-- gather schema statistics of soe
EXECUTE DBMS_STATS.GATHER_SCHEMA_STATS(ownname => 'SOE');

-- get the total size of schema objects:
SELECT ROUND(SUM(BYTES)/1024/1024,3) MB FROM USER_SEGMENTS;

-- verify the SOETBS datafile is located in OMF location:
conn sys/oracle@oradb as sysdba
SELECT NAME FROM V$DATAFILE ORDER BY FILE#;
```

R. Get Started with Swingbench (optional)

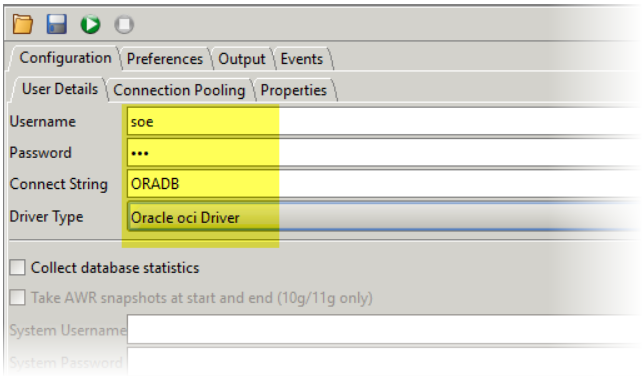
In this section of the practice, you will get familiar with using Swingbench to apply load on the ORADB database. This is just to provide you an idea about what Swingbench is all about. This procedure is actually not needed for the course.

74. In your hosting machine, in the command prompt window, make sure that the current folder is `$SWINGHOME\winbin`

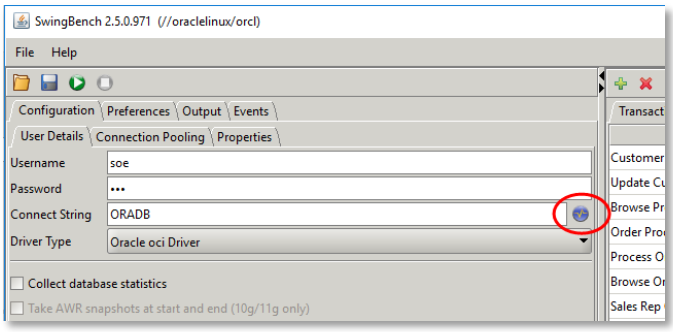
75. Start Swingbench by issuing the following command:

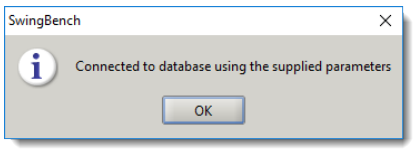
```
swingbench.bat
```

76. Under the **User Details** tab, you define the connection details to the database. Set its fields to the values as in the following screenshot:

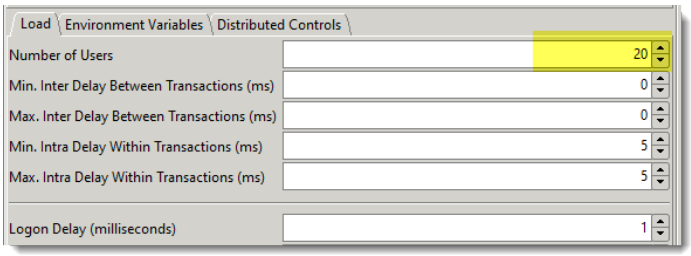


77. Click on "**Test Connection**" button to test the database connection settings. You should see a message indicating that the connection is successful.



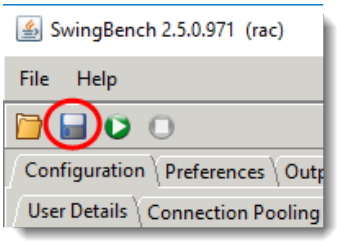


78. Under the **Load** tab, change the **Number of Users** to 20. This value sets the number of sessions that the utility will create when you start the benchmark run.



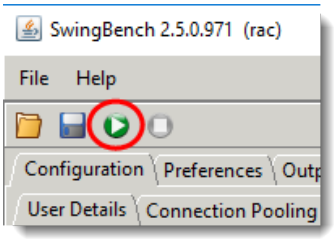
79. Click on **Save** button

When you click on Save button, the settings that you have set in Swingbench interface will be saved in `swingconfig.xml`. The next time you start Swingbench, it reads its settings from the file.

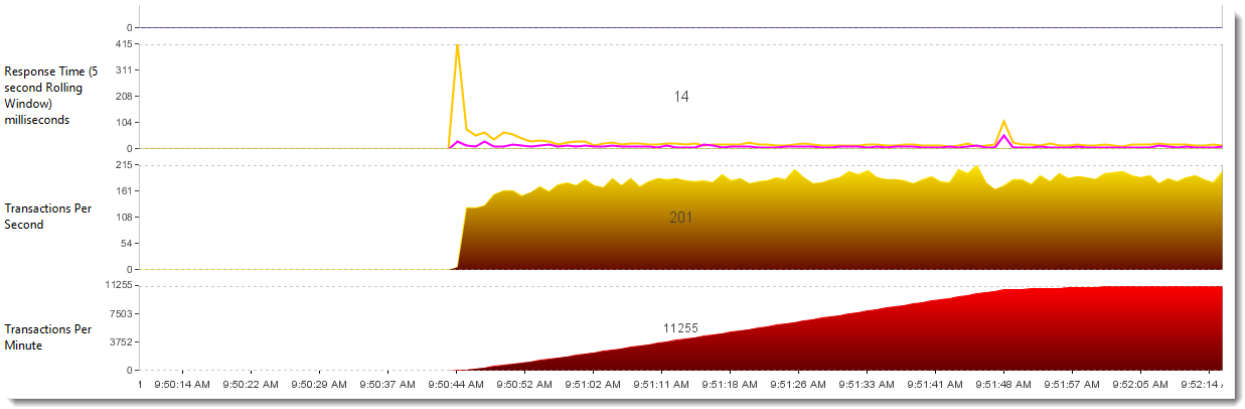


80. Click on the "**Start Benchmark run**" button.

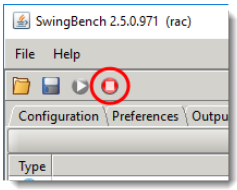
Gradually, Swingbench kicks off connection sessions to the database and executes the selected operations.



81. Observe that the "**Transactions Per Minute**" chart is increasing by time and it eventually gets saturated.



82. Stop the Benchmark Run by clicking on its button.



83. Exit Swingbench: **File** menu | **Exit**

Creating and Deleting Snapshots in VirtualBox

In Oracle VirtualBox, you can create a snapshot of the appliances. You use snapshots to roll back the state of the appliance to its state at the time at which the snapshot was created.

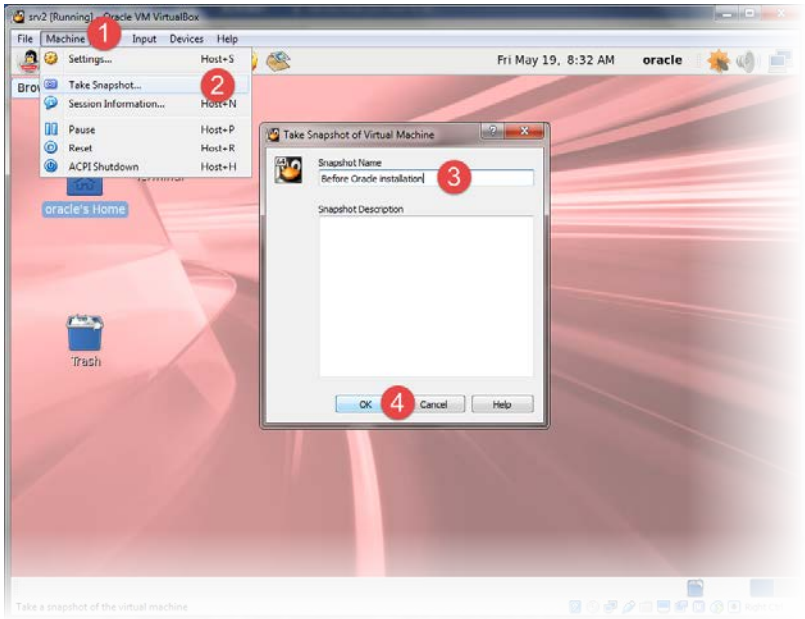
For all the course practices, start with creating snapshot of the appliance. If everything goes well with implementing the practice, delete the snapshot by the end of the practice.

84. To create the snapshot, perform the following:

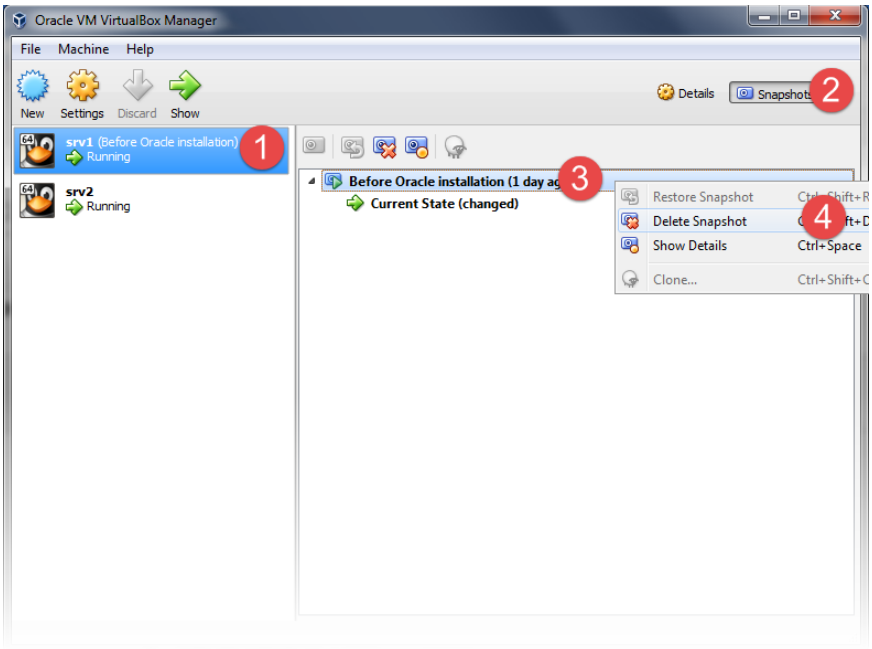
a. **Machine** -> **Take Snapshot**. “Take Snapshot of Virtual Machine” window pops up.

b. In the **Snapshot Name** field, type "Before Oracle installation"

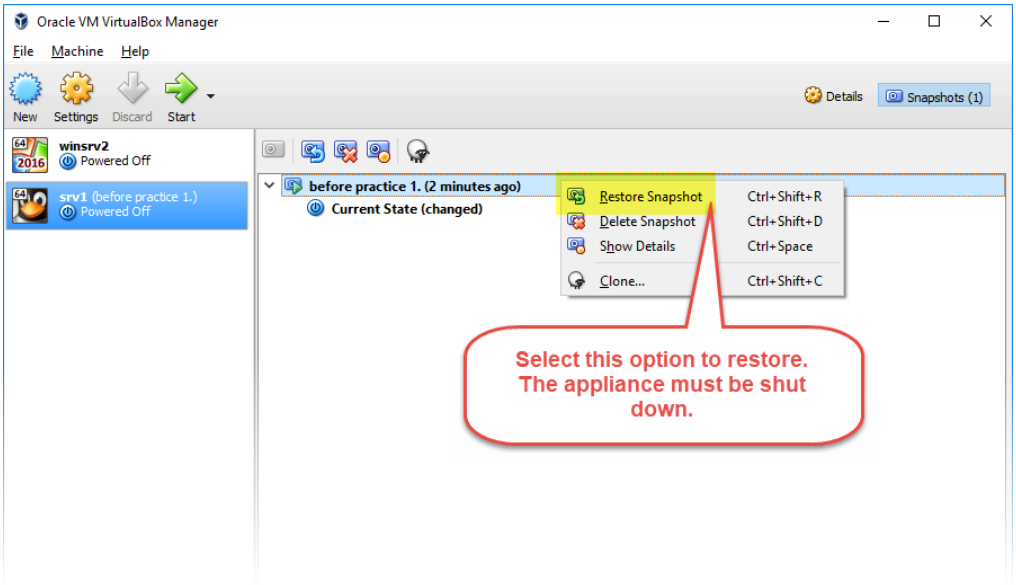
c. Click on **OK**



85. If implementing the practice was successful, you can delete the snapshot. Perform the steps illustrated in the following screenshot:



86. If you face an issue that cannot be remedied, you can restore the appliance to the snapshot state. Perform the steps illustrated in the following screenshot:



Summary

By the end of this practice, you should have two VirtualBox appliances:

Hostname……:	srv1
OS……:	Linux 6.7 (64-bit)
Database Software Release:	12.2.0.1
DB Name ……:	ORADB
Application Schema……:	soe
Hostname ……:	winsrv2
OS ……:	Windows (64-bit)
Database Software Release:	12.2.0.1
DB Name ……:	ORAWIN
Application Schema ……:	N/A