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Integrated Cloud Applications & Platform Services



# Oracle Database Cloud for Oracle DBAs

Activity Guide

D99336GC30 | D101206

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**Course Practice  
Environment: Security  
Credentials**

## Course Practice Environment: Security Credentials

For operating system usernames and passwords, see the following:

- If you are attending a classroom-based or live virtual class, ask your instructor or LVC producer for operating system credentials information.
- If you are using a self-study format, refer to the communication that you received from Oracle University for this course.

### Linux VM credentials:

Linux Landing Pad VM	
IP address / host name	<i>Provided by instructor / Oracle University as part of account information</i>
OS <code>root</code> user	<i>Provided by instructor / Oracle University as part of account information</i>
OS <code>oracle</code> user	<i>Provided by instructor / Oracle University as part of account information</i>

**Cloud Compute Node credentials:** This is the Oracle Cloud Compute Node VM

Compute Node: Oracle Cloud Credentials	
Account Specification	Information / Password
Cloud Account Name (domain)	<i>Per your account assignment</i>
Cloud Account Username	<i>Per your account assignment</i>
Cloud Account Password	<i>Per your account assignment</i>
Cloud Compute Node IP	<i>Gets assignment when you create DBCS instance</i>
DBCS Service Name	
PDB name	

**For product-specific credentials used in this course, see the following table:**

Product-Specific Credentials		
Product/Application	Username	Password
Data Pump Export and Import	<code>SYS</code> and <code>SYSTEM</code>	<i>Administration password you specified when creating the database deployment</i>
Oracle SQL Developer Web	<code>SYSTEM</code>	
Enterprise Manager Database Express	<code>SYS</code> and <code>SYSTEM</code>	
RMAN	<code>SYS</code> and <code>SYSTEM</code>	
SQL*Plus	<code>SYS</code> and <code>SYSTEM</code>	

**Important: Please take a note of the following points:**

1) To ensure you are working with the correct system, the following naming convention has been used through the course practices:

- The Linux system, which plays the role of a landing pad for this course environment is referred to as “**Linux VM**.”
- The Cloud Compute Node hosting your Oracle Database Cloud Service (DBCS) database deployment is referred to as “**compute node**”.

2) All instructions in this course, unless specified otherwise, assume that you are working on the **Linux VM**, logged in using a graphical user interface as the **oracle** operation system (OS) user.

Connection to the **compute node** can be initiated from the **Linux VM**, which is described in the practices.

3) Take a note of the following conventions used through these practices. These are for your convenience and to ensure there is not ambiguity or errors when you execute various statements or commands. Pay attention to these conventions.

**Following is an example of the convention used through the course:**

```
SQL> CREATE DIRECTORY dp_from_onprem AS  
'/u01/app/oracle/admin/MYORCL/dpdump/from_onprem';  
  
Directory created.  
  
SQL>
```

**Note:**

- In general, codes and commands are in “Courier New” font.
- Codes and commands that need to be executed by participants are bold and in “**Courier New**” font.
- Part of the code or command that needs to be altered according the participant’s account information are bold, red, and in “**Courier New**” font. Ensure you substitute your account details wherever you see this.

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## **Practices for Lesson 1: Getting Started**

## Practices for Lesson 1

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There are no practices for this lesson.

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## **Practices for Lesson 2: Overview of Cloud Services**

## Practices for Lesson 2: Overview

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### Overview

In these practices, you will explore the Oracle Cloud website and learn more about Oracle Database Cloud Service. You will also log in to your Oracle Cloud account and explore the Cloud services.

### Additional References

- Getting Started with Oracle Cloud  
<https://docs.oracle.com/en/cloud/get-started/subscriptions-cloud/csgsg/toc.htm>

## Practice 2-1: Exploring the Oracle Cloud Options

---

### Overview

In this practice, you explore the Oracle Cloud website, and explore the different Oracle Cloud offerings.

### Assumptions

There are no assumptions for this practice.

### Tasks

1. Log in to the Linux VM using a graphical user interface (GUI) connection utility as the **oracle** user.
2. Launch the web browser and enter <https://cloud.oracle.com/home> or the web address (URL) provided by the instructor to explore the Oracle Cloud offerings.
3. On the home page, expand **Applications**.
4. View the description and click some of the links to know more about Oracle SaaS offerings.
5. On the home page, expand **Infrastructure**.
6. View the description and click some of the links to know more about Oracle IaaS offerings.
7. On the home page, expand **Platform**.
8. Click the **Database** link under the Data Management heading.
9. Expand **Oracle Database Cloud Service** and view the description.
10. Click **Features** to view some of the features of Oracle Database Cloud Service.
11. Under the Database heading, click **Pricing** to view information about pricing of Oracle Database Cloud Service.
12. Click **Learn More** to see where you can access videos, tutorials, collateral, and documentation.
13. Explore any other areas that are of interest to you and then close the browser.

## Practice 2-2: Explore Your Oracle Cloud Account

---

### Overview

In this practice, you log in to your Oracle Cloud account and explore it, with a focus on Oracle Database Cloud Service.

### Assumptions



In the training environment, you have been assigned an Oracle Cloud account. All information related to your Oracle Cloud account is provided by the instructor.

Be sure to record the following:

- Cloud Account Name (domain)
- Cloud Account Username
- Cloud Account Password
- Tenant Name (This is the Identity Service ID on the Service Overview page)

### Tasks

1. Log in to the Linux VM using a graphical user interface (GUI) connection utility as the **oracle** user.
2. Launch the web browser and enter <https://cloud.oracle.com/home>.
3. Click **Sign In**.
4. Select **Cloud Account with Identity Cloud Service** from the drop-down.
5. Enter the assigned **Cloud Account Name**.
6. Click **MyServices**.
7. A login screen appears. Enter the assigned Cloud account username and password and click **Sign in**.
8. At this point, you should be logged in to **Oracle Cloud My Services Dashboard**, also referred to as the Cloud dashboard.
9. Explore the options available on the My Services Page:
  - Users
  - Notifications
  - Account Management
  - Identity Domain
  - Customize Dashboard
  - Create Instance
10. The identity domain and username appear at the top of the page. If you are entitled, then you can also select other accounts or identity domains from the Identity Domain list on the dashboard.

11. A bell icon  displays important notifications, if any, at the top of the page. This is known as the Message Center and indicates important messages for the selected domain or account. If you switch to another domain, then another bell icon appears pertaining to that domain.
12. Click **Customize Dashboard** to select services for display.
13. Explore the Guided Journey page, or click **Dashboard** to go directly to the My Services Dashboard.
14. Click the  navigation menu in the top-left corner of the My Services Dashboard.
15. Click **Services** to expand the menu items, and then click **Database Classic**. You will be directed to the Oracle Database Cloud Services home page.  
**Note:** If you choose Database you will navigate to OCI log in page, this is not the correct page for this practice.
16. Minimize the browser window and stay connected to your cloud account; you will use it in the coming practices.

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## **Practices for Lesson 3: Creating a Database Deployment**

## Practices for Lesson 3: Overview

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### Overview

In these practices, you will create an Oracle Database Cloud Service database deployment.

### Important:

Ensure the following while working with Oracle Cloud accounts:

- Create only those services that are necessary for the practices and follow the practice instructions as listed in the Activity Guide.
- You will be working on a shared Oracle Cloud domain, which is used for various classes running in parallel. You will be able to see each other's services when you log in to My Services Dashboard.
- Therefore, it is extremely important to add unique identifier to the services being created, so you can spot your services, instance without disturbing other's work.

### Additional References

- Accessing the Database Cloud Service Console  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/access-service-console.html>
- Creating a Database Deployment  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/create-db-deployment.html>
- Generating a Secure Shell (SSH) Private/Public Key Pair  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/generate-ssh-key-pair.html#GUID-4285B8CF-A228-4B89-9552-FE6446B5A673>

## Practice 3-1: Creating a Database Deployment

---

### Overview

In this practice, you will create your own database deployment, taking the following into consideration:

- The database deployment should be created with **Oracle Database 18c** with the **In-Memory Database** option.
- The database deployment should be named as follows:  
**<student\_initials>DBCS<no\_of\_minutes\_on\_your\_clock\_right\_now>** (Throughout the practices, the database deployment will be referred to as MYDBCS.)
- The database should be named **MYORCL** and the PDB should be named **MYpdb1**.
- Select **Oracle Database Cloud Service** as the service level.
- Select **monthly** as the metering frequency.
- You need **1 OCPU** and **7.5 GB RAM**, and **25 GB** for the databases.
- You need **Cloud** and **local backups**.
- Specify that the wizard should generate the SSH key pair.

### Assumptions


In the training environment, you have been assigned an Oracle Cloud account. All information related to your Oracle Cloud account is provided by the instructor.

Be sure to record the following:

- Cloud Account Name (domain)
- Cloud Account Username
- Cloud Account Password
- Tenant Name (This is the Identity Service ID on the Service Overview page.)

### Tasks

1. Launch the web browser and sign in to Oracle Cloud by using the web address provided by your Oracle Cloud account administrator, the instructor. Follow these instructions if you are logging in for the first time:
  - a. Log in to the Linux VM using a graphical user interface (GUI) connection utility as the **oracle** user.
  - b. Go to <https://cloud.oracle.com/home>.
  - c. Click **Sign In**.
  - d. Select **Cloud Account with Identity Cloud Service** from the drop-down.
  - e. Enter the assigned **Cloud Account Name**.
  - f. Click **MyServices >**
  - g. Enter the assigned Cloud account username and password and click **Sign in**.

- h. If this is your first login, then you may not be presented with the "**MyServices Dashboard**" page. Continue with the following steps to navigate to this page.
  - i. In the top-right corner, click the **drop down option** next to the **username**.
  - j. Click **My Home**.
  - k. On the My Home page, click **My Services**.
  - l. If you don't see the necessary Cloud services on the Dashboard, then click **Customize Dashboard** options and select **Show** for the required services.
2. Click the  navigation menu in the top-left corner, click **Services**, and then click **Database Classic**.
 

**Note:** If you choose Database you will navigate to OCI log in page, this is not the correct page for this practice.
  3. On the Instances page, click **Create Instance** to launch the wizard.
  4. Refer to the considerations listed in the Practice Overview to aid in your choices as you proceed through the wizard. Select or fill in the following values and click **Next**.
    - a. Instance Name: **<student\_initials>DBCS<no\_of\_minutes\_on\_your\_clock\_right\_now>18c** (Example: MYDBCS18c)
 

**Note:** In a given Identity Domain, service name should be unique.
    - b. Description and Notification Email: *These fields are optional and can be left blank.*
    - c. Accept default value or blank for any other field not listed here.
    - d. Software Release: **Oracle Database 18c**
    - e. Software Edition: **Enterprise Edition – Extreme Performance**
    - f. Database Type: **Single Instance**
  5. Provide details for this Oracle Database Cloud Service instance and click **Next**.
    - a. DB Name: **MYORCL**
    - b. PDB Name: **MYPDB1**
    - c. Administration password: Enter the password to manage the SYS and SYSTEM database accounts. Make a note of this password.
 

**Important:** Ensure that the administration password confirms to password rules for Oracle Database 18c:

      - Must be 8 to 30 characters in length
      - Must contain at least one lowercase letter
      - Must contain at least one uppercase letter
      - Must contain at least one number
      - Must contain at least one of these symbols: \_ (underscore), # (hash sign), or \$ (dollar sign)
      - Must not contain the word "oracle"
    - d. Accept default value or blank for any other field not listed here.
    - e. Usable Database Storage: **25**

- f. Compute Shape: **OC3 – 1.0 OCPU, 7.5 GB RAM**
- g. SSH key: Click **Edit**. Select **Create a New Key**, click **Enter**, and then download the zip file containing the generated key pair by clicking **Download**. Ensure you save the file on your Linux VM in a desired location. After the download is complete, click **Done**.  
Make a note of the location where the zip file was downloaded.
- h. Backup destination: **Both Cloud Storage and Local Storage**
- i. Cloud Storage Container: This field will have a prepopulated value suffixed with your instance name, such as,  
**`https://ocuocictrng6.storage.oraclecloud.com/v1/Storage-ocuocictrng6/dbcs-MYDBCS18C`**  
If this is not the case edit the value and add your instance name at the end of the string.
- j. Username: Cloud account username
- k. Password: Cloud account password
- l. Create Cloud Storage Container: **Select**
- m. Create Instance from Existing Backup: **No**
- n. Accept the default values for all other fields in the wizard.

6. Review the Confirmation page to ensure that it is similar to the one shown here:

Instance		Database Configuration	
Instance Name:	MYDBCS	DB Name:	MYORCL
Description:		PDB Name:	MYPDB1
Bring Your Own License:	No	Usable Database Storage (GB):	25
Service Level:	Oracle Database Cloud Service	Total Data File Storage (GB):	184.5
Metering Frequency:	Hourly	Listener Port:	1521
Software Release:	Oracle Database 18c	Timezone:	(UTC) Coordinated Univers...
Software Edition:	Enterprise Edition - Extreme Performance	Character Set:	AL32UTF8 - Unicode Univer...
Compute Shape:	OC3 - 1.0 OCPU, 7.5 GB RAM	National Character Set:	AL16UTF16 - Unicode UTF-1...
SSH Public Key:	ssh-rsa AAAAB3NzaC1yc2EAA...	Include "Demos" PDB:	No
Use High Performance Storage:	No	Include GoldenGate:	No
Assign Public IP:	Yes	Database Clustering with RAC:	No
Backup and Recovery Configuration		Standby Database Configuration	
Backup Destination:	Both Cloud Storage and Local Storage	Standby Database with Data Guard:	No
Cloud Storage Container:	https://ocuoicltmg6.stor...		
Username:	ora039		

**Note:** Ensure that you see the message that confirms that **Cloud Storage Container** was created.

7. On the Confirmation page, click **Create**.
8. Click the refresh icon next to the **Create Service** button periodically until you see that your database deployment has been created.

**Note:** Generally, database deployment takes anywhere between 30 to 50 minutes to complete depending on resource availability. Allow sufficient time for this to complete.

9. A zip file named `sshkeybundle.zip` containing the public key and private key files in open SSH format was generated when you selected **Create a New Key**. To unzip the file and secure the key files, perform the following steps:
- Open a terminal window on your Linux VM and navigate to the location where the SSH key zip file was saved.
  - List the contents of the directory. You should find the `sshkeybundle.zip` file in this directory.

```
[oracle@edp1 ~]$ ls
sshkeybundle.zip
```

- c. For security reasons, move the zip file to `~/ .ssh`, and then unzip the file.

```
[oracle@edp1]$ mv sshkeybundle.zip ~/.ssh
[oracle@edp1]$ cd ~/.ssh
[oracle@edp1 .ssh]$ ls
config sshkeybundle.zip
[oracle@ed1 .ssh]$ unzip sshkeybundle.zip
Archive:  sshkeybundle.zip
  inflating: privateKey
  inflating: publicKey
[oracle@edp1 .ssh]$
[oracle@edp1 .ssh]$ ls -l
```

```
total 16
-rw-r--r-- 1 oracle oinstall 131 Mar 05 06:53 config
-rw-r--r-- 1 oracle oinstall 1679 Mar 05 06:53 privateKey
-rw-r--r-- 1 oracle oinstall 380 Mar 05 06:53 publicKey
-rw-r--r-- 1 oracle oinstall 1851 Mar 05 06:53 sshkeybundle.zip
```

- d. Change the permissions on the private key file to owner access:

```
[oracle@edp1 .ssh]$ chmod 600 privateKey
[oracle@edp1 .ssh]$ ls -l
total 16
-rw-r--r-- 1 oracle oinstall 131 Mar 05 06:53 config
-rw----- 1 oracle oinstall 1679 Mar 05 06:53 privateKey
-rw-r--r-- 1 oracle oinstall 380 Mar 05 06:53 publicKey
-rw-r--r-- 1 oracle oinstall 1851 Mar 05 06:53 sshkeybundle.zip
```

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## **Practices for Lesson 4: Administering a Database Deployment**

## Practices for Lesson 4: Overview

---

### Overview

In these practices, you will become familiar with the Cloud console. You will also configure connections for the `oracle` and `opc` users.

### Additional References

- Connecting to a Compute Node Using the `ssh` Utility on UNIX and UNIX-Like Platforms  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/connect-ssh.html#GUID-A459860F-A1FA-4262-87EB-4FD5BD581A85>
- Accessing Oracle Compute Cloud Service Using the Web Console  
<https://docs.oracle.com/en/cloud/iaas/compute-iaas-cloud/stcsg/accessing-oracle-compute-cloud-service-using-web-console.html>
- Viewing Detailed Information for a Database Deployment  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/view-detailed-info-db-deployment.html>
- Exploring the My Services Dashboard  
<https://docs.oracle.com/en/cloud/get-started/subscriptions-cloud/csgsg/toc.htm>

## Practice 4-1: Using the Consoles

---

### Overview

In this practice, you will familiarize yourself with Cloud consoles.

### Tasks

1. Log in to your Cloud account and access the My Services Dashboard.
2. Click **Customize Dashboard** to select services for display.
  - a. Set Oracle Database Cloud Service, Oracle Database Backup Service, and Oracle Compute Cloud Service to **Show**.
  - b. Set the other services to **Automatic**.
3. View details about the database deployments in the domain. Go to the Oracle Database Cloud Service.
  - a. Click Open Service Console.
  - b. Expand the menu icon of your deployment database name to see the list of consoles that you can open and actions you can perform, including deleting your deployment database.
4. View details about your own deployment database. Among the list of deployment database services, click your deployment database name. Click the "Show more" link to see more details about the database deployment.

What information do you see now that was not displayed in the previous step?

  - The full connect string to the Oracle Database instance
  - The Oracle PDB name, if the Oracle database is a CDB. If the Oracle database were a non-CDB, it would display the Oracle database name.
  - The SQL\*Net port used to access the Oracle CDB and PDB
  - The public IP address
  - The Oracle database instance name (SID)
5. Access the Compute Classic Cloud Service.
  - a. Click Dashboard to get back to the My Services Dashboard.
  - b. Then among the services displayed, select the Oracle Compute Classic Cloud Service.
6. Click **Open Service Console**.
  - a. Which actions can you perform with the console?
    - 1) Rapidly provision virtual machines on Oracle Cloud with all the necessary storage and networking resources.
    - 2) Manage and scale your virtual machine topology in the cloud.
  - b. What information do you see now that was not displayed in previous steps? The private IP address.

**Note:** You may not see the information related to all instances, network, storage, and other metadata in tabs. This depends on the site selector visible in the upper right of the compute console.

- c. What do you see when you click the **Storage** tab? The five storage volumes attached to your deployment database:
    - 1) `boot` for the boot image of the compute node
    - 2) `bits` for the files of the compute node
    - 3) `data` for the data files of the Oracle database
    - 4) `fra` for the flash recovery area of the Oracle database
    - 5) `redo` for the redo log files of the Oracle database
  - d. Which actions can you perform from the Storage tab in the Compute Cloud Service console?
    - 1) View details about each storage volume: Click a storage volume to get the size of a particular volume.
    - 2) Create a new storage volume.
    - 3) Detach a storage volume that you added.
7. Click **Dashboard** to return to the My Services Dashboard.

## Practice 4-2: Connecting to the Compute Node

### Overview

In this practice, you will configure a connection for the `opc` user and the `oracle` user.

### Tasks

1. Retrieve the IP Address of the compute node assigned to your database deployment:
  - a. Log in to the Linux VM using a graphical user interface (GUI) connection utility as the `oracle` user.
  - b. If you signed out, sign in to Oracle Cloud by using your Cloud user account. First enter the identity domain, and then the username and password.
  - c. Access the **My Services Dashboard**.
  - d. Among the list of services, click the **Oracle Database Cloud Service**.
  - e. Click the **Open Service Console**.
  - f. Click the name of your database deployment. The public IP Address is displayed on the Overview page in the Resources section. Make a note of the IP address.
2. Edit the `~/.ssh/config` file on your Linux VM to include the IP address of your compute node hosting the database deployment:
  - a. Open a terminal window.
  - b. Open the `~/.ssh/config` file with an editor:  
`vi /home/oracle/.ssh/config`
  - c. Press `I` on the keyboard, and then replace *<IP address of DB instance from OPC>* with the IP address of the compute node for your database deployment. Save your changes by clicking the keys **Esc+:+ w+q!**.

```
Host <IP address of DB instance from OPC>
ProxyCommand nc -X connect -x ges-proxy.us.oracle.com:80 %h %p
GSSAPIAuthentication no
ServerAliveInterval 60
```

3. Connect to the compute node as the `opc` user.
  - a. In a command shell, set the file permissions of the private key file so that only you have access to it. In this example, the file name is `privateKey`,

```
$ chmod 600 privateKey
```

- b. Use `ssh` to connect to the database deployment compute node. This operation opens the session to the compute node. You are now connected to the compute node as `opc`.

```
[oracle@edpl ~/.ssh]$ ssh -i your_private_key_file
opc@your_compute_node_IP_address
[opc@MYDBCS ~]$
```

- c. Did you provide a password for the `opc` user to log in to the compute node? No. The `opc` user authentication is completed with the SSH private/public keys. The SSH private key file pairs with the public key used during the database deployment creation process.

4. Perform the same task to connect as the `oracle` user.

```
[opc@MYDBCS ~]$ exit
[oracle@edpl .ssh]$ ssh -i your_private_key_file
oracle@your_compute_node_IP_Address
[oracle@MYDBCS ~]$
```

5. After connecting as the `oracle` user, exit the session.

## Practice 4-3: Adding Compute Node Users

### Overview

When the database deployment was created, three Linux users were created on the compute node associated with database deployment:

- `oracle`: Authorized to log in to the database deployment compute node, but not authorized to run `root` commands
- `opc`: Authorized to log in to the database deployment compute node and to run `root` commands
- `root`: Not authorized to log in to the database deployment compute node

In this practice, you will create an additional compute node user in your database deployment that will be able to perform standard OS operations, such as installing and running applications. The user will be authorized to log in to the database deployment compute node, but not authorized to run `root` commands. You will see how to change the permissions of the new user to allow the user to run `root` commands. The compute node user is called `user1`.

### Tasks

1. From a terminal window on your Linux VM, connect to the compute node as `opc`.

```
[oracle@edpl .ssh]$ ssh -i your_private_key_file
opc@your_compute_node_IP_address
[opc@MYDBCS ~]$
```

2. As the `root` user, create the new Linux user, `user1`, with the home directory set to `/home/user1/.ssh`.

```
[opc@MYDBCS]$ sudo -s
[root@MYDBCS opc]# useradd user1
[root@MYDBCS opc]# mkdir /home/user1/.ssh
```

3. Copy the SSH public key value to the authorization file.
  - a. Open the local SSH public key file, `/home/oracle/.ssh/authorized_keys`, with an editor and copy the SSH public key value.

```
[root@MYDBCS opc]# vi /home/oracle/.ssh/authorized_keys
```

- b. Copy the SSH public key value to the new user's `/home/user1/.ssh/authorized_keys` file by using the `echo` command.

```
[root@MYDBCS opc]# echo "ssh-rsa AAAAB3NzaC1..." >
/home/user1/.ssh/authorized_keys
```

4. Edit the `/etc/ssh/sshd_config` file. Find the **AllowUsers** line and add the **user1** username.

```
...
# Example of overriding settings on a per-user basis
#Match User anoncvs
#       X11Forwarding no
#       AllowTcpForwarding no
#       ForceCommand cvs server
AllowUsers opc oracle user1
-- INSERT --
```

5. Set the ownership of the new user's home directory files and appropriate permission on the `.ssh` directory.

```
[root@MYDBCS opc]# chown -R user1:user1 /home/user1/.ssh
[root@MYDBCS opc]# chmod -R 700 /home/user1/.ssh
```

6. Restart the SSH daemon on your instance and exit the `root` and `opc` sessions.

```
[root@MYDBCS opc]# /sbin/service sshd restart
Stopping sshd:                                     [ OK ]
Starting sshd:                                     [ OK ]
[root@MYDBCS opc]# exit
[opc@MYDBCS ~] $ exit
[oracle@edp1 ~]$
```

7. Test if you can log in as `user1`.

- a. Use `ssh` to configure connections to the database deployment compute node. Open the session to the compute node.

```
[oracle@edp1 .ssh]$ ssh -i your_private_key_file
user1@your_compute_node_IP_address
[user1@MYDBCS ~]$
```



8. Can `user1` perform `opc` operations?

- a. Enter the `sudo -s` command.

```
[user1@MYDBCS ~]$ sudo -s
```

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 user1:
```

- b. Cancel the `sudo -s` command.

- c. Exit the `user1` session.

9. To allow the new user to run `root` commands, log in again as `opc` and edit the `/etc/sudoers` file.

- a. Edit the `/etc/sudoers` file.

```
[opc@MYDBCS ~]$ sudo vi /etc/sudoers
```

- b. Add a new line as follows:

```
%user1 ALL=(ALL) NOPASSWD: ALL
```

**Note:** Names beginning with a "%" indicate group names. The `user1` group can execute any command as any user on any host. `NOPASSWD` is a "tag" that means no password will be requested. If `user1` has a different group, removing "%" allows `user1` to use `sudo`.

- c. Press `Esc+:+w+q+!` to save your changes and exit from the file.

10. Reconnect as the new user and verify that `user1` can now run `root` commands.

```
[user1@MYDBCS ~]$ sudo -s
```

```
[root@MYDBCS user1]#
```

11. Do the changes you made to your database deployment persist?

If for any reason, the compute node is automatically reprovisioned by Oracle, then any changes made on that compute node will be lost.

12. Exit the `root` user session and your session as `user1`.

## Practice 4-4: Managing Database Users and Privileges

### Overview

In this practice, you will connect to the compute node of your MYDBCS database deployment, check whether the pre-created Oracle database instance MYORCL is running and that the pre-created Oracle database holds a PDB named MYPDB1. Connect to the Oracle database instance as the SYS user and check the pre-created users.

### Tasks

1. Using `ssh` (on Linux VM), log in to the compute node of your database deployment as the `oracle` user.

```
[oracle@edp1~]$cd .ssh
[oracle@edp1 .ssh]$ ssh -i your_private_key_file
oracle@your_compute_node_IP_address
[oracle@MYDBCS ~]$
```

2. Check whether the MYORCL Oracle database instance is running.

```
[oracle@MYDBCS ~]$ pgrep -lf smon

12120 ora_smon_MYORCL

[oracle@MYDBCS ~]$
```

3. Connect to the Oracle database instance as SYSDBA to verify that the database contains a PDB named MYPDB1.

- a. Connect as SYSDBA.

```
[oracle@MYDBCS ~]$ sqlplus / AS SYSDBA

SQL*Plus: Release 18.0.0.0.0 Production on Mon Mar 5 21:07:41
2018

Copyright (c) 1982, 2017, Oracle. All rights reserved.

Connected to:
Oracle Database 18c EE Extreme Perf Release 18.0.0.0.0 -
Production Version 18.1.0.0.0

SQL>
```

- b. Check for MYPDB1.

```
SQL> SHOW pdbs
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
2	PDB\$SEED	READ ONLY	NO
3	MYPDB1	READ WRITE	NO

- c. Exit from SQL\*Plus.

```
SQL> EXIT
```

Disconnected from Oracle Database 18c EE Extreme Perf Release  
18.0.0.0.0 - Production Version 18.1.0.0.0  
[oracle@MYDBCS ~]\$

- d. What is the Oracle Database version displayed in the banner of the database deployment?

The banner displays the Cloud Edition defined at the database deployment creation:  
Oracle Database 18c EE Extreme Perf Release 18.0.0.0.0.

4. Connect to MYPDB1 and find the users that do not exist in an on-premises database.

- a. Connect to MYPDB1 as the SYSTEM user.

```
[oracle@MYDBCS ~]$ sqlplus system@MYPDB1
```

SQL\*Plus: Release 18.0.0.0.0 Production on Mon Mar 5 21:13:54 2018

Copyright (c) 1982, 2017, Oracle. All rights reserved.

Enter password:

Last Successful login time: Fri Mar 17 2017 21:13:11 +00:00

Connected to:

Oracle Database 18c EE Extreme Perf Release 18.0.0.0.0 -  
Production Version 18.1.0.0.0

```
SQL>
```

- b. Which password did you use to connect to the PDB?

The password defined for the PDB during the database deployment creation.

- c. Query CDB\_USERS to view the users defined in the database.

```
SQL> COL username format A40
```

```
SQL> SELECT username, con_id FROM cdb_users ORDER BY 1;
```

```

USERNAME                                CON_ID
-----                                -
ANONYMOUS                                3
APEX_050100                              3
APEX_LISTENER                            3
APEX_PUBLIC_USER                         3
APEX_REST_PUBLIC_USER                   3
...
C##DBAAS_BACKUP                          3
...
SCOTT                                    3
..
46 rows selected.

SQL>

```

d. Which users do you see that do not exist in an on-premises database?

- APEX\_XXXX: A database deployment includes Oracle Application Express, which you manage using the Oracle Application Express administration console.
- C##DBAAS\_BACKUP: C##DBAAS\_BACKUP is the common user updating the status in a database table that is then used for showing Automated backup status on the user interface, and to send messages to users when Automated backups fail.

5. Will users, privileges, and roles management be different in the pre-created database than in an on-premises database?

The common users and common roles are created in the CDB root the same way as they are in an on-premises CDB root, and the local users and local roles are created in the MYPDB1 PDB the same way they are in any on-premises PDB. Privileges are granted commonly or locally in the CDB root or PDB the same way they are in an on-premises CDB root or PDB.

6. Exit from SQL\*Plus and close your terminal window.

## Practice 4-5: Scaling Up Storage

---

### Overview

In this practice, you will scale up the storage capacity of the pre-created Oracle database instance `MYORCL`. The CDB should get an additional 10 GB to store application data.

### Additional References

- Scaling Up the Storage for a Database Deployment  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/scale.html>
- Attaching a Storage Volume to an Instance  
<https://docs.oracle.com/en/cloud/iaas/compute-iaas-cloud/stcsg/attaching-storage-volume-running-instance.html>

### Tasks

1. Open the Oracle Database Cloud Service console for your database deployment.
2. Click your database instance to go to the database instance page.
3. In the Resources section, from the menu icon, select **Scale Up/Down**.
4. In the dialog box, set Additional Storage to **10**.
5. Select an option from the **Add Storage To** pull-down menu:
  - a. What storage scaleup options do you see?
    - **Create New Storage Volume:** Adds a new storage volume to the database deployment and mounts it as the next available `/u0n` mount point
    - **Extend Data Storage Volume:** Adds the storage volume to the existing Linux LVM disk group (or Oracle ASM disk group on deployments that use Oracle Real Application Clusters) for database data storage
    - **Extend Backup Storage Volume:** Adds the storage volume to the existing Linux LVM disk group (or Oracle ASM disk group on deployments that use Oracle Real Application Clusters) for backup and FRA storage

Which storage scaleup option will you choose to increase the application storage volume for the database?

**Extend Data Storage Volume** is the appropriate choice.
6. Confirm that you want to scale up the service. The scaling operation begins. The deployment is in **Service Maintenance** status, and unavailable while the scaling operation is in progress. The deployment is shut down and rebooted during this operation.
7. Click the refresh icon periodically until the database deployment is once again available. When the operation is completed, "Last scale up/down succeeded" is displayed under Overview. The Resources section displays the increased Storage size.
8. Check whether the storage was increased:
  - a. Click **Dashboard** to return to the Cloud services dashboard.
  - b. Click the **Compute Classic** link.

- c. Open the **Oracle Cloud Infrastructure - Compute Classic Cloud Service console** to view details about the storage extension of your database deployment.
- d. Click **View** from the menu icon for your database deployment. The storage volume added is 10 GB in size.

Observe that the Oracle Compute Cloud console allows you to create a storage volume with the Create Storage Volume button on the Storage page. The created volume is not attached to a specific database deployment. You must then attach the storage volume to a database deployment and then mount the storage volume on the database deployment.

## **Practices for Lesson 5: Backing Up and Recovering**

## Practices for Lesson 5: Overview

---

### Overview

In these practices, you will perform an on-demand backup, and then recover your database after the loss of a data file.

### Additional References

- Creating an On-Demand Backup by Using the Oracle Database Cloud Service Console  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/create-demand-backup.html#GUID-2370EA04-3141-4D02-B328-5EE9A10F66F2>
- Restoring from the Most Recent Backup  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/recover-most-recent-backup.html#GUID-12C9D458-AB55-4E38-949D-F649E2D6A26C>

**Important:** Update Oracle Cloud account user's password if it gets changed for any reason.

- You might encounter problem creating On-Demand Backup in Practice 5-1 if your Oracle Cloud account user's password has changed after creating the DBCS instance for any reason. If your password has changed, you must update the user password for backing up to the Storage Cloud to resolve this problem.
- You can update Cloud user account password by using the Oracle Database Cloud Service Console. Follow the instruction in the below link and then perform Practice 5-1:  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/update-storage-container-password.html>



## Practice 5-1: Backing Up a Database Deployment

---

### Overview

In this practice, you create an on-demand backup by using the Oracle Database Cloud Service console.

### Assumptions

Your database deployment was configured for backups when it was created.

### Tasks

1. Create an on-demand backup by using the Oracle Database Cloud Service console.
  - a. Click **Database** on the Cloud Dashboard.
  - b. Click **Open Service Console**.
  - c. Click the name of your database deployment.
  - d. Click **Administration**.
  - e. Click **Backup Now**.
  - f. Select **No** to Keep Forever.
  - g. Confirm that you want to create a backup by clicking **Backup**.
  - h. Periodically refresh the page until you see that the backup has completed.
2. Verify that the backups are in the Storage Cloud container.
  - a. Access the **Storage Cloud Service console**.
  - b. Note that there are objects in the storage container that was created when you created the database deployment.
  - c. Click the storage container to view a list of the objects in the container.
3. Verify the backups by using RMAN.
  - a. Open a terminal window on your Linux VM.
  - b. Log in to the database deployment compute node as the **oracle** user.

```
[oracle@edp1 ~]$ cd ~/.ssh
[oracle@edp1 .ssh]$ ssh -i your_private_key_file
oracle@your_compute_node_IP_address
[oracle@MYDBCS ~]$
```

- c. Display the contents of the database files configuration file (`/home/oracle/bkup/<DBNAME>/dbcfg.spec`) and the system files configuration file (`/home/oracle/bkup/<DBNAME>/oscfg.spec`) to know which files are automatically backed up. For example:

```
[oracle@MYDBCS ~]$ more /home/oracle/bkup/MYORCL/dbcfg.spec
[oracle@MYDBCS ~]$ more /home/oracle/bkup/MYORCL/oscfg.spec
```

- d. Check whether the database files have been backed up by using RMAN.

```
[oracle@MYDBCS ~]$ rman target /
Recovery Manager: Release 18.0.0.0.0 - Production on Mon Mar 5
06:54:21 2018 Version 18.1.0.0.0
Copyright © 1982, 2018, Oracle and/or its affiliates. All Rights
Reserved
Connected to MYORCL (DBID=776580803)
RMAN> list backup;
RMAN> exit
[oracle@MYDBCS ~]$
```

- e. Have the files listed in `/home/oracle/bkup/MYORCL/dbcfg.spec` and `/home/oracle/bkup/MYORCL/oscfg.spec` configuration files been backed up during the on-demand backup?

No. These files are backed up during the automated scheduled backups defined in `crontab`. Because the automated backup is scheduled to run every night, files mentioned in the configuration files will be backed up during the next nightly backup. Check whether the important system files have been backed up after the nightly backup has been taken.

4. View the backups that have been taken. Your dates will be different than what is shown, so directory names and file names with date stamps will vary from the examples.

```
[oracle@MYDBCS ~]$ cd /u03/app/oracle/fast_recovery_area/MYORCL

[oracle@MYDBCS MYORCL]$ ls
3E09703FB0AF1A7EE053DE4BC40A6C1D  autobackup      datafile
onlinelog
4BB98F5FCE2E2026E053DAD5C40AC48A  backupset      flashback
oscfgfiles
archivelog                          control02.ctl  ohcfile
[oracle@MYDBCS MYORCL]$ cd oscfgfiles

[oracle@MYDBCS oscfgfiles]$ ls -l

total 12
drwxrwxrwx 2 root root 4096 Jan 16 23:29 2018_01_16

[oracle@MYDBCS oscfgfiles]$ cd 2018_01_16
```

```
[oracle@MYDBCS 2018_01_16]$ ls  
  
oscfgfiles_20180116_2328.tar.gz  
  
[oracle@MYDBCS 2018_01_16]$
```

5. View the list of files contained in the  
/u03/app/oracle/fast\_recovery\_area/MYORCL/oscfgfiles/<TimeStamp>/os  
cfgfiles\_xxx.tar.gz file by using the `tar tvzf` command.

```
[oracle@MYDBCS 2018_01_16]$ tar tvzf  
oscfgfiles_20180116_2328.tar.gz  
[oracle@MYDBCS 2018_01_16]$
```

6. Does the backup encrypt data?  
Yes. Encryption is automatic.

## Practice 5-2: Recovering a Database Deployment

### Overview

In this practice, you will recover your database deployment database after a data file loss in the MYORCL CDB. You will use the Database Cloud Service console to recover your database.

### Assumptions

You have taken a backup of your database deployment.

### Tasks

1. Log in to your database deployment compute node as the `oracle` user.

```
[oracle@edp1]cd .ssh
[oracle@edp1 .ssh]$ ssh -i your_private_key_file
oracle@your_compute_node_IP_address
[oracle@MYDBCS ~]$
```

2. Remove one of the data files of your MYPDB1 PDB, such as  
`/u02/app/oracle/oradata/MYORCL/MYPDB1/MYPDB1_users01.dbf`.

```
[oracle@MYDBCS ~]$ rm
/u02/app/oracle/oradata/MYORCL/MYPDB1/MYPDB1_users01.dbf
[oracle@MYDBCS ~]$
```

3. Log in to SQL\*Plus and create a table in the USERS tablespace. Then exit from SQL\*Plus.

```
[oracle@MYDBCS MYORCL]$ sqlplus system/<adminPassword>@MYPDB1
....
SQL> CREATE TABLE mytab (c NUMBER) TABLESPACE users;

CREATE TABLE mytab (c NUMBER) TABLESPACE users

*

ERROR at line 1:
ORA-01116: error in opening database file 12
ORA-01110: data file 12:
'/u02/app/oracle/oradata/MYORCL/MYPDB1/MYPDB1_users01.dbf'
ORA-27041: unable to open file
Linux-x86_64 Error: 2: No such file or directory
Additional information: 3

SQL> EXIT
```

4. Access the service console for your database deployment.

5. Recover your database.
  - a. Click the **Administration** link on your database instance page.
  - b. Click **Recover**.
  - c. Select **Latest** and click **Recover** to perform a complete recovery.
  - d. Refresh the page till you see that the recovery is complete. It may take a few minutes before the console shows that the recovery is completed.
6. Verify that you can now create a table in the `USERS` tablespace in your `MYPDB1` PDB by repeating step 3.

```
SQL> CREATE TABLE mytab (c NUMBER) TABLESPACE users;
```

```
Table created.
```

```
SQL> exit
```

7. Close the connection to your database deployment.

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**Practices for Lesson 6: Use  
Case: Create a Database  
Deployment by Using a  
Production Database Backup**

## Practices for Lesson 6

---

There are no practices for this lesson.

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## **Practices for Lesson 7: Overview of Oracle Cloud Security**

## Practices for Lesson 7: Overview

---

### Overview

In these practices, you will connect to the compute node as the `oracle` and `opc` users to perform various operations.

## Practice 7-1: Connecting to the Compute Node and Database

### Overview

In this practice, you will connect to the compute node of your database deployment. You will verify that to run root commands, the user must be logged in as the `opc` user and perform a `sudo -s` command. You will also check whether the environment variables such as `ORACLE_SID` and `ORACLE_HOME` are set to the values defined by default during the database deployment creation for the `oracle` and `opc` users.

### Tasks

1. Using SSH on Linux VM, log in to the compute node of your database deployment as the `oracle` user.

```
[oracle@edp1]cd .ssh
[oracle@edp1 .ssh]$ ssh -i your_private_key_file
oracle@your_compute_node_IP_address
[oracle@MYDBCS ~]$
```

2. Check whether the environment variables such as `ORACLE_SID` and `ORACLE_HOME` are set to the values defined by default during the database deployment creation.

```
[oracle@MYDBCS ~]$ env | grep ORA
ORACLE_UNQNAME=MYORCL
ORACLE_SID=MYORCL
ORACLE_BASE=/u01/app/oracle
ORACLE_HOSTNAME=MYDBCS.compute-<your_domain>
ORACLE_HOME=/u01/app/oracle/product/18.0.0/dbhome_1
[oracle@MYDBCS ~]$
```

3. Try to execute the `bkup_api` utility to check the current backup status of your database deployment.

```
[oracle@MYDBCS ~] /var/opt/oracle/bkup_api/bkup_api status
API::ERROR Api requires root rights or sudoer
```

```
[oracle@MYDBCS ~]$ sudo -s
```

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:
```

Is oracle a sudoer?

No, only opc is.

4. Close the oracle user connection to the compute node.
5. Using SSH on Linux VM, log in to the compute node of your database deployment as the **opc** user.

```
[oracle@edp1 .ssh]$ ssh -i your_private_key_file
opc@your_compute_node_IP_address
[opc@MYDBCS ~]$
```

6. Once again, try to execute the **bkup\_api** utility to check the current backup status of your database deployment.

```
[opc@MYDBCS ~]$ /var/opt/oracle/bkup_api/bkup_api status
API::ERROR Api requires root rights or sudoer

[opc@MYDBCS ~]$ sudo -s

[root@MYDBCS opc]# /var/opt/oracle/bkup_api/bkup_api bkup_status

DBaaS Backup API V1.5 @2016 Multi-Oracle home
DBaaS Backup API V1.5 @2015 Multi-Oracle home
-> Action : bkup_status
-> logfile: /var/opt/oracle/bkup_api/log/bkup_api.log
Warning: unable to get current configuration of: catalog
* Current backup settings:
* Last registered Bkup: 03-27 23:21 API::23705:: Starting dbaas
  backup process
* Bkup state: finished
...
-> API:: All requested tasks are completed
*
* RETURN CODE:0
#####
[root@MYDBCS opc]#
```

7. Exit from the `root` session and close your `opc` connection to the compute node.

```
[root@MYDBCS opc]# exit
Exit

[opc@MYDBCS ~]$ exit
logout
Connection to ... closed.
[oracle@edp1 .ssh]$
```

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## **Practices for Lesson 8: Configuring Network Access to a Database Deployment**

## Practices for Lesson 8: Overview

---

### Overview

In these practices, you will use various methods to enable access to your database through Enterprise Manager Database Express.

### References

- About Security Applications  
<https://docs.oracle.com/en/cloud/iaas/compute-iaas-cloud/stcsg/managing-security-applications.html#GUID-B038A419-EB69-4508-A5C5-8F1F270E5DAE>
- Creating an SSH Tunnel Using the ssh Utility on Linux  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/create-ssh-tunnel.html#GUID-DDDD4848-386C-43E6-A408-CA475B7DC5A7>
- Creating an SSH Tunnel Using the PuTTY Program on Windows  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/create-ssh-tunnel.html#GUID-BE797E70-CB3E-4A80-9620-A7DF1AA91B9E>




## Practice 8-1: Opening Ports to a Compute Node

---

### Overview

In this practice, you will enable the security rule that allows you and others to connect to your database deployment using Oracle Enterprise Manager Database Express.

### Tasks

- Find the security application that is used in security rules to control traffic between instances via Enterprise Manager Database Express.
  - Access the Oracle Compute Cloud Service console.
  - Click **Network** to view the security applications and security rules.
  - Under the **Shared Network** grouping, click the **Security Applications** heading to find the `MYDBCS/db_1/ora_dbexpress` security application for port 5500 for your database deployment.
- Enable the `ora_p2_dbexpress` access rule that provides access via Enterprise Manager Database Express to your database deployment CDB.
  - Log in to your Cloud account, select Database, and open the service console.
  - Expand the  menu for your database deployment.
  - Select Access Rules.
  - Expand the **Actions** menu for the `ora_p2_dbexpress` security rule and click **Enable**.
  - Confirm that you want to enable the rule by clicking **Enable** again.
- Verify that you can launch Enterprise Manager Database Express and access your database by entering the following URL:  
`https://<your_compute_node_IP_address>:5500/em`
- Ask your neighbor to access your database deployment using the same URL:  
`https://<your_compute_node_IP_address>:5500/em`  
The attempt is successful.
- Try to access Enterprise Manager Database Express on your neighbor's compute node:  
`https://<neighbor_compute_node_IP_address>:5500/em`  
The attempt is successful if your neighbor performed the same steps on his or her database deployment.
- What is the source of the `ora_p2_dbexpress` access rule?  
The hosts from which traffic is allowed are public-internet.
- What is the destination of the `ora_p2_dbexpress` access rule?  
The destination is the security list to which traffic is allowed. This is the `MYDBCS/db_1/ora_db` security list for your deployment. Therefore, any host can access this destination, provided that the user knows the database deployment password.
- Reset the `ora_p2_dbexpress` security rule to the default `DISABLED` status.

## Practice 8-2: Creating an SSH Tunnel for Port Forwarding

---

### Overview

In this practice, you enable access to Enterprise Manager Database Express by creating an SSH tunnel for port forwarding.

### Tasks

1. In a Terminal window on your Linux VM, create an SSH tunnel to use the EM Express port (5500) on the compute node of your database deployment.

```
$ ssh -i your_private_key_file -L  
5500:your_compute_node_IP_address:5500  
oracle@your_compute_node_IP_address  
[oracle@MYDBCS ~]$
```

2. Use Firefox on your Linux VM to launch Enterprise Manager Database Express by entering the following URL: **https://localhost:5500/em**
3. If you receive the Firefox "Your connection is not secure" message, click **Advanced**. Click **Add Exception**. Click **Confirm Security Exception**.
4. Enterprise Manager Database Express is started. Log in as either the `SYSTEM` or the `SYS` user, just as you would with an on-premises database.
5. Ask your neighbor to try to access your database deployment by using the URL for Enterprise Manager Database Express:  
**https://*your\_ComputeNode\_IP\_Address*:5500/em**  
Is your neighbor able to access your database?
6. Log out of Enterprise Manager Database Express.
7. Close the SSH tunnel by quitting your Linux desktop session where the SSH tunnel was opened.

## **Practices for Lesson 9: Using Oracle SQL Developer Web**

## Practices for Lesson 9: Overview

---

### Overview

In these practices, you will use Oracle SQL Developer Web to manage and monitor your database.

### References

- Enabling Access to a Compute Node Port  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/enable-access-port.html#GUID-AD275C82-1D35-41E8-B958-B872F97E4D90>
- Using Oracle SQL Developer Web in Database Cloud Service  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/use-sql-dev-web-this-service.html#GUID-373CAEDE-4A82-4A1E-BE79-5278B8266D65>

## Practice 9-1: Enabling a Schema for Oracle SQL Developer Web

---

### Overview

In this practice, you will enable a schema for Oracle SQL Developer Web.

### Assumptions

Your database deployment created using Oracle Database Cloud Service

### Tasks

1. Log in to the Linux VM using a graphical user interface (GUI) connection utility as the **oracle** user.
2. Log in to the database deployment compute node as the **opc** user and perform a **sudo -s** command.

```
[oracle@edp1 ~]$ cd ~/.ssh
[oracle@edp1 .ssh]$ ssh -i your_private_key_file
opc@your_compute_node_IP_address
[opc@MYDBCS ~]$
[opc@MYDBCS ~]$ sudo -s
[root@MYDBCS opc]#
```

3. Create a text file containing the password of the user whose schema you want to enable, in this case, **SYSTEM**.

```
[root@MYDBCS opc]# touch /home/oracle/password.txt
[root@MYDBCS opc]#
```

4. Restrict permissions 600 on the **password.txt** file.

```
[root@MYDBCS opc]# chmod 600 /home/oracle/password.txt
[root@MYDBCS opc]#
```

**Note:** Use a text editor (such as vi) to enter the password in the file. The file should consist of a single line containing the password without any whitespace characters.

5. Change directory containing the **ords** assistant.

```
[root@MYDBCS opc]# cd /var/opt/oracle/ocde/assistants/ords
[root@MYDBCS ords]#
```

6. Run the `ords` assistant to enable the schema.

**Important:**

- Ensure you substitute your PDB name in the below command, also make sure there are no spelling mistakes or extra space while constructing this command.
- After executing this command look for the output highlighted in bold, confirming the successful execution before moving to the next practice.

```
[root@MYDBCS ords]# ./ords -ords_action="enable_schema_for_sdw" \  
> -ords_sdw_schema="SYSTEM" \  
> -ords_sdw_schema_password="/home/oracle/password.txt" \  
> -ords_sdw_schema_container="MYPDB1" \  
> -ords_sdw_schema_enable_dba="TRUE"  
WARNING: Couldn't obtain the "dbname" value from the assistant  
parameters nor the "$OCDE_DBNAME" environment variable  
Starting ORDS  
Logfile is /var/opt/oracle/log/ords/ords_2018-12-18_14:40:26.log  
Config file is /var/opt/oracle/ocde/assistants/ords/ords.cfg  
INFO: Starting environment summary checks...  
INFO: Datacenter : usdc2  
INFO: Database version : 18000  
INFO: Database CDB : yes  
INFO: Original DBaaS Tools RPM installed : dbaastools-1.0-  
1+18.4.3.0.0_181011.1252.x86_64  
INFO: Actual DBaaS Tools RPM installed : dbaastools-1.0-  
1+18.4.3.1.0_181212.1500.x86_64  
INFO: DBTools JDK RPM installed : dbtools_jdk-1.8.0-  
2.74.el6.x86_64  
INFO: DBTools JDK RPM "/var/opt/oracle/rpms/dbtools/dbtools_jdk-  
1.8.0-2.74.el6.x86_64.rpm" MD5 :  
48f13bb401677bfc7cf0748eb1a6990d  
INFO: DBTools ORDS Standalone RPM installed :  
dbtools_ords_standalone-18.2.0-1.r1831332.el7.x86_64  
INFO: DBTools ORDS Standalone RPM  
"/var/opt/oracle/rpms/dbtools/dbtools_ords_standalone-18.2.0-  
1.r1831332.el7.x86_64.rpm" MD5 :  
4451696691d301f44bdb463e5ff99aab  
INFO: DBTools DBaaS Landing Page RPM installed :  
dbtools_dbaas_landing_page-3.0.0-1.el7.x86_64  
INFO: DBTools DBaaS Landing Page RPM  
"/var/opt/oracle/rpms/dbtools/dbtools_dbaas_landing_page-3.0.0-  
1.el7.x86_64.rpm" MD5 : 8bf6a2f83a304a3b04add88060b9f1bd  
INFO: Environment summary completed...  
INFO: Action mode is "full"  
INFO: Database Role is "PRIMARY"
```

```
WARNING: ORDS is installed in a certain PDB but not in the
CDB$ROOT
INFO: Enabling "SYSTEM" schema in "MYPDB1" container for SQL
Developer Web...

SQL*Plus: Release 18.0.0.0.0 - Production on Tue Dec 18 14:40:51
2018
Version 18.3.0.0.0
Copyright (c) 1982, 2018, Oracle. All rights reserved.

Connected to:
Oracle Database 18c EE Extreme Perf Release 18.0.0.0.0 -
Production
Version 18.3.0.0.0

SQL> SQL> SQL> SQL> SQL> SQL> SQL Developer Web user enable
starting...
Enabling "SYSTEM" user on "MYPDB1" for SQL Developer Web...

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

Call completed.

Commit complete.

PL/SQL procedure successfully completed.

Session altered.

PL/SQL procedure successfully completed.

PL/SQL procedure successfully completed.

"SYSTEM" user on "MYPDB1" enabled successfully. The schema to
access SQL
Developer Web is "MYPDB1/system"...
```

```
PL/SQL procedure successfully completed.

SQL Developer Web user enable finished...
Disconnected from Oracle Database 18c EE Extreme Perf Release
18.0.0.0.0 - Production
Version 18.3.0.0.0
INFO: To access SQL Developer Web through DBaaS Landing Page,
the schema "MYPDB1/system" needs to be provided...
INFO: "SYSTEM" schema in the "MYPDB1" container for SQL
Developer Web was enabled successfully...
[root@MYDBCS ords]#
```

**Note:** For more information on using Oracle SQL Developer Web in Database Cloud Service refer this link:

<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/use-sql-dev-web-this-service.html>

7. Exit from terminal.

```
[root@MYDBCS ords]# exit
[opc@MYDBCS ~]#
```



## Practice 9-2: Accessing Oracle SQL Developer Web

---


### Overview

In this practice, you will launch Oracle SQL Developer Web. You will verify that Oracle SQL Developer Web is accessible via the HTTPS port (443).

### Assumptions

Oracle SQL Developer Web is available as part of Oracle Database Cloud Service.

### Tasks

1. Log in to the Linux VM using a graphical user interface (GUI) connection utility as the **oracle** user.
2. Open the Oracle Database Cloud Service console.
3. Navigate to your DBCS instance page.
4. From the  menu for the database deployment, select **Access Rules**.  
Do you get the entire list of security or access rules of all database deployments in the domain, as was the case in the Compute Cloud Service console?  
No. The Database Cloud Service console displays only the security rules created for your database deployment.  
Are the names of the security rules the same as in the Compute Cloud Service console?  
No. For example, `ora_p2_dbexpress` corresponds to `MYDBCS/db_1/ora_dbexpress` and `ora_p2_httpssl` corresponds to `MYDBCS/db_1/ora_httpssl`.
5. Locate the `ora_p2_httpssl` access rule, which controls access to port 443. This port is used for HTTPS connections, including Oracle SQL Developer Web.
6. From the menu for the `ora_p2_httpssl` rule, check whether it is **Enabled**. If it is not enabled, enable the security rule. The given port on the compute node is opened to the public Internet.
7. To launch the Oracle SQL Developer Web, enter  
`https://node-ip-address/ords/schema-path/_sdw` in a new browser tab.

**Sample URL:** `https://111.111.11.111/ords/MYPDB1/system/_sdw/`

**NOTE:-** The schema path is the schema name with all letters lowercase and special characters changed to underscores. "SDW" schema in the "MYPDB1" container for SQL Developer Web was enabled successfully as per Practice #9-1. Hence, to access SQL Developer Web, the schema path "system" needs to be provided in the URL.

8. If you receive a "Your connection is not secure message," click **Advanced** and then **Add Exception**. Click **Confirm Security Exception**.

9. In the Oracle SQL Developer Web credentials box, enter **SYSTEM** as the username and the password you specified when the database deployment was created. Click **Login**.

## Practice 9-3: Monitoring the Database Deployment

### Overview

In this practice, you will monitor your database deployment by using Oracle SQL Developer Web.

### Assumptions

Oracle SQL Developer Web is available as part of Oracle Database Cloud Service. You have logged in to Oracle SQL Developer Web in the previous practice.

### Tasks

1. Explore the Oracle SQL Developer Web **Dashboard** page.
2. Real Time SQL Monitoring
  - a. From **QuickLinks** on the **Dashboard** page, click **SQL Monitor**.
  - b. Click **PLAN HASH** in one of the Query.
  - c. Explore the **Overview** page.
  - d. Click the **Plan Statistics** tab.
  - e. Click the **Parallel** tab.
  - f. Click the **cross** for closing.
3. Except for the default PDB that gets created when you create the database deployment, you can close and reopen user created PDBs using SQL Developer Web.
4. Find the Connection Details for MYPDB1.
  - a. Expand the menu for MYPDB1 and click **Connection Details**.
  - b. Click OK to return to the Manage page.
5. Click the **DBA** menu and explore **Storage**.
6. Explore the list of segments in the USERS tablespace.
  - a. Open a terminal window and connect to your database deployment as the **oracle** user.

```
[oracle@edp1 .ssh]$ ssh -i your_private_key_file  
oracle@your_compute_node_IP_address
```

- b. Log in to SQL\*Plus as the SYSTEM user.

```
[oracle@MYDBCS ~]$ sqlplus system@MYPDB1  
  
SQL*Plus: Release 18.0.0.0.0 Production on Thu Mar 6 13:37:27  
2018 Version 18.1.0.0.0  
  
Copyright (c) 1982, 2017, Oracle. All rights reserved.  
  
Enter password:  
Last Successful login time: Mon March 03 2018 19:01:55 +00:00
```

```
Connected to:
Oracle Database 18c EE Extreme Perf Release 18.0.0.0.0 -
Production Version 18.1.0.0.0
SQL>
```

- c. Create a table in the `USERS` tablespace in `MYPDB1`.

```
SQL> CREATE TABLE newtab (c NUMBER) TABLESPACE users;
Table created.

SQL>
```

- d. Exit SQL\*Plus.
- e. Using Oracle SQL Developer Web, find the list of segments stored in the `USERS` tablespace in `MYPDB1`.
- 1) Expand the **DBA** menu, and click **Storage**.
  - 2) Select **MYPDB1**.
  - 3) Click **USERS** to see the segments in the `USERS` tablespace.
7. Return to the **DBA** menu and explore the **Listener** option.
8. Examine the percent of **OS Memory** used by various processes.
- a. Expand the **OS** menu and select **Memory**.
  - b. Return to the **Home** page.
9. Check the percentage of disks used in your deployment. Are they any close to being full?
- a. Expand the **OS** menu and select **Storage**.
  - b. Return to the **Dashboard**.
10. Explore any other areas of interest to you and then **Sign Out** of Oracle SQL Developer Web.

## **Practices for Lesson 10: Implementing Database Deployment Security**

## Practices for Lesson 10: Overview

---

### Overview

In these practices, you will verify that tablespace encryption is enabled by default in your database. You will also verify the settings for network encryption. Finally, you will change the frequency with which audit files are purged.

### References

- Creating and Activating a Master Encryption Key for a PDB  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/use-multitenant-this-service.html#GUID-4C4276E6-BCD4-47BE-93DF-0EAD71EA315F>

## Practice 10-1: Protecting Data at Rest by Using Encryption

### Overview

In this practice, you will use Oracle SQL Developer Web to create a new PDB named `TESTPDB` in the `MYORCL` CDB. You will then create a tablespace named `TEST` in the PDB and verify that the `TEST` tablespace uses encryption by default.

### Tasks

1. Log in to the Linux VM using a graphical user interface (GUI) connection utility as the `oracle` user.
2. Log in to Oracle SQL Developer Web.
3. Create a new PDB named `TESTPDB`.
  - a. From the **Dashboard** menu, select **SQL Developer**.
  - b. Select **DBA** menu, and click **Manage**.
  - c. Click **Create PDB**.
  - d. Enter the PDB name and a password for the PDB admin user.
  - e. Select **Create TDE Key** and provide the keystore password (the administrative password you provided when you created the DBCS database deployment).  
The PDB creation requires the CDB keystore password to create the PDB's own master encryption key, which is stored in a single keystore used by all containers.
  - f. View the generated SQL commands using the **Show SQL** button.
  - g. Click **OK** to create the PDB.
  - h. After the PDB is created, click **OK** to close the window.
4. **Sign Out** of Oracle SQL Developer Web.
5. In a terminal window on your Linux VM, log in to the compute node as the `oracle` user.
6. Use SQL\*Plus to connect to the `TESTPDB` PDB as the `SYSTEM` user.

If you do not know which connect string to use, return to Oracle SQL Developer Web and select Connection Details from the menu for your new PDB. Ensure that you enter the details of the “TESTPDB” service in the `tnsnames.ora` file.

```
[oracle@MYDBCS ~]$ sqlplus SYSTEM@TESTPDB
SQL *Plus: Release 18.0.0.0.0 Production on Tue Mar 06 06:52:41
2018 Version 18.1.0.0.0
Copyright © 1982, 2017, Oracle. All rights reserved.
Enter password:
Last Successful login time: Tue Mar 06 2018 06:37:33 +00:00
```

7. Create the `TEST` tablespace.

```
SQL> CREATE TABLESPACE TEST;
Tablespace created.
```

8. Verify that the `TEST` tablespace uses encryption.

```
SQL> SELECT tablespace_name, encrypted FROM dba_tablespaces;

TABLESPACE_NAME          ENC
-----
SYSTEM                   NO
SYSAUX                   NO
UNDOTBS1                 NO
TEMP                     NO
TEST                     YES
SQL>
```

Do all tablespaces use encryption?

No. Only user-defined tablespaces are encrypted by default.

9. Verify the value of the parameter that controls tablespace encryption by default. Log out of SQL\*Plus.

```
SQL> SHOW PARAMETER encrypt_new_tablespaces

NAME                                TYPE        VALUE
-----
encrypt_new_tablespaces            string      CLOUD_ONLY

SQL> exit
Disconnected from Oracle Database 18c EE Extreme Perf Release
18.0.0.0.0 - Production Version 18.1.0.0.0
[oracle@MYDBCS ~]$
```

10. Find the TDE wallet of the database deployment.

```
[oracle@MYDBCS ~]$ grep ENCRYPTION_WALLET
$ORACLE_HOME/network/admin/sqlnet.ora

ENCRYPTION_WALLET_LOCATION =
(SOURCE=(METHOD=FILE) (METHOD_DATA=(DIRECTORY=/u01/app/oracle/admin/MYORCL/tde_wallet)))

[oracle@MYDBCS ~]$ cd /u01/app/oracle/admin/MYORCL/

[oracle@MYDBCS MYORCL]$ ls

adump  db_wallet  opc_wallet  tde_wallet  xdb_wallet

[oracle@MYDBCS MYORCL]$ cd tde_wallet

[oracle@MYDBCS tde_wallet]$ ls -l
total 28
```



```
-rw----- 1 oracle oinstall 2555 Jun 30 02:16  
ewallet_2018063002164369.p12  
-rw----- 1 oracle oinstall 5467 Jul 5 14:12  
ewallet_2018070514124324.p12  
-rw----- 1 oracle oinstall 6955 Jul 5 14:12 ewallet.p12  
-rw----- 1 oracle oinstall 7000 Jul 5 14:12 cwallet.sso  
[oracle@MYDBCS tde_wallet]$
```

## Practice 10-2: Checking Data Protection in Transit

### Overview

In this practice, you will check whether the data in transit over the network is protected. Encryption of network data prevents unauthorized parties to view data as it passes over the network.

You will also check that integrity algorithms protect against data modification and illegitimate replay.

### References

- Using Network Encryption and Integrity  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/use-network-encryption-and-integrity.html>

### Tasks

1. Log in to the compute node as the **oracle** user.
2. Verify the parameter settings in the `sqlnet.ora` file as shown in the code box:

```
[oracle@MYDBCS ~]$ cat $ORACLE_HOME/network/admin/sqlnet.ora

SQLNET.ENCRYPTION_SERVER = required

SQLNET.CRYPTO_CHECKSUM_SERVER = required

SQLNET.CRYPTO_CHECKSUM_TYPES_SERVER = (SHA1)

ENCRYPTION_WALLET_LOCATION =
(SOURCE=(METHOD=FILE) (METHOD_DATA=(DIRECTORY=/u01/app/oracle/admin/MYORCL/tde_wallet)))

SQLNET.ENCRYPTION_TYPES_SERVER = (AES256, AES192, AES128)

NAMES.DIRECTORY_PATH = (TNSNAMES, EZCONNECT)

SQLNET.WALLET_OVERRIDE = FALSE

SQLNET.EXPIRE_TIME = 10

WALLET_LOCATION = (SOURCE = (METHOD = FILE) (METHOD_DATA =
(DIRECTORY = /u01/app/oracle/admin/cprops/cprops_wallet)))

SSL_VERSION = 1.2
```

```
[oracle@MYDBCS ~]$
```

3. You can also perform the verification by connecting to your Oracle database and examining the network service banner entries associated with each connection.
  - a. Use SQL\*Plus to connect to the MYORCL CDB as the **SYSTEM** user.

```
[oracle@MYDBCS ~]$ sqlplus SYSTEM@MYORCL
```

- b. Query **V\$SESSION\_CONNECT\_INFO** as shown in the code box:

```
SQL> SELECT network_service_banner
  2 FROM v$session_connect_info
  3 WHERE sid in (select distinct sid from v$mystat);
NETWORK_SERVICE_BANNER

-----
TCP/IP NT Protocol Adapter for Linux: Version 18.0.0.0.0 -
Production

Encryption service for Linux: Version 18.0.0.0.0 - Production

AES256 Encryption service adapter for Linux: Version 18.0.0.0.0
- Production

Crypto-checksumming service for Linux: Version 18.0.0.0.0 -
Production

SHA1 Crypto-checksumming service adapter for Linux: Version
18.0.0.0.0 - Production

SQL>
```

4. Log out of SQL\*Plus.

## Practice 10-3: Cleaning Up Audit Files

### Overview

In this practice, you will check whether audit files are automatically purged every day. You will change the retention period for the audit files to 2 days and you will clean up those files manually without waiting for the next automatic execution of the cleanup script.

### Tasks

1. Log in to the compute node as the `oracle` user.
2. View the contents of the `/var/opt/oracle/cleandb/cleandblogs.pl` script:

```
[oracle@MYDBCS ~]$ cat /var/opt/oracle/cleandb/cleandblogs.pl
|grep -i aud

"AuditRetentionDB" => 1,
"select 'adumpDest:'||value from v\parameter where name =
'audit_file_dest'";
$log->logprt("Processing audit logs...\n");
PurgeLogFiles("$results{'adumpDest'}/*.aud", $CleanLogs-
>{AuditRetentionDB});
PurgeLogFiles("$ORACLE_HOME/rdbms/audit/*.aud", $CleanLogs-
>{AuditRetentionDB});
```

3. Verify that audit files exist in the following directories:
  - a. The `AUDIT_FILE_DEST` directory: `/u01/app/oracle/admin/MYORCL/adump`

```
[oracle@MYDBCS ~]$ ls /u01/app/oracle/admin/MYORCL/adump

MYORCL_ora_8475_20180305220013041307466295.aud
MYORCL_ora_8475_20180305220014069825774760.aud
...
[oracle@MYDBCS ~]$
```

- b. The `$ORACLE_HOME/rdbms/audit` directory

```
[oracle@MYDBCS ~]$ ls $ORACLE_HOME/rdbms/audit/*.aud

/u01/app/oracle/product/18.0.0/dbhome_1/rdbms/audit/MYORCL_ora_1
0494_20180305220013041307466295.aud
/u01/app/oracle/product/18.0.0/dbhome_1/rdbms/audit/MYORCL_ora_1
0539_20180305220014069825774760.aud
...
[oracle@MYDBCS ~]$
```

4. Edit the `/var/opt/oracle/cleandb/cleandblogs.cfg` configuration file.
- a. Change the retention period for the audit files.

```
[oracle@MYDBCS ~]$ vi /var/opt/oracle/cleandb/cleandblogs.cfg
```

Press **I** and change the value of `AuditRetentionDB` to 2. Press **Esc+:+w+q+!** to save your changes and exit from the file.

- b. Your file should have the following values after editing:

```
[oracle@MYDBCS ~]$ more /var/opt/oracle/cleandb/cleandblogs.cfg
#
# cleandblogs.cfg
#
# all values are in days
# ##
AlertRetention=14
ListenerRetention=14
AuditRetentionDB=2
CoreRetention=7
TraceRetention=7
shorttpRetention=7
longpRetention=30
LogDirRetention=14
gfLogRetention=14
LogRetention=30
obkupLogRetention=30
bkupLogRetention=30
ScratchRetention=7
ossLogRetention=30
[oracle@MYDBCS ~]$
```

5. Execute the script to purge all audit files. Be aware that the script also removes all other log and diagnostics files based on the values in the `/var/opt/oracle/cleandb/cleandblogs.cfg` configuration file.

```
[oracle@MYDBCS ~]$ cd /var/opt/oracle/cleandb
[oracle@MYDBCS cleandb]$ ./cleandblogs.pl

Log file is /var/opt/oracle/log/cleandblogs/cleandblogs_2018-03-
07_20:02:55.log
Parameter configuration file is
/var/opt/oracle/cleandb//cleandblogs.cfg
Initializing program configuration
ADR purge started
Diagnostic destination is diag/rdbms/myorcl/MYORCL.
Setting control policy for SHORTP to 168 hours.
Setting control policy for LONGP to 720 hours.
```

```
Purging alert older than 30 days.
Purging incident older than 30 days.
Purging stage older than 30 days.
...
Processing core logs and files...
Removing files like
/u01/app/oracle/diag/rdbms/myorcl/MYORCL/cdump/*.cdmp* older
than 7 days.
Removing files like
/u01/app/oracle/diag/rdbms/myorcl/MYORCL/trace/*.cdmp* older
than 7 days.
Processing audit logs...
Removing files like /u01/app/oracle/admin/MYORCL/adump/*.aud
older than 2 days.
Removing files like
/u01/app/oracle/product/18.0.0/dbhome_1/rdbms/audit/*.aud older
than 2 days.
Completed maintenance activities on instance MYORCL.
Processing GlassFish server log.
Removing files like
/u01/app/oracle/product/glassfish3/glassfish/domains/domain1/log
s/server_*.log older than 14 days.
Completed GlassFish log maintenance.
Processing obkup logs.
Removing files like /home/oracle/bkup/MYORCL/log/obkup*.log
older than 30 days.
Completed obkup log maintenance.
Removing files like /var/opt/oracle/log/cleandblogs/* older than
14 days.
Job Completed. RC=(0) 4 Elapsed Seconds, 4 Seconds
[oracle@MYDBCS cleandb]$
```

6. Close your connection to the compute node.

## **Practices for Lesson 11: Use Case: Configuring Network Isolation**

## Practices for Lesson 11

---

There are no practices for this lesson.



**Practices for Lesson 12:  
Overview of Migrating to  
Oracle Database Cloud  
Service**

## Practices for Lesson 12

---

There are no practices for this lesson.

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## **Practices for Lesson 13: Using SQL Developer to Migrate**

## Practices for Lesson 13: Overview

---

### Overview

In these practices, you will use SQL `INSERT` statements generated by SQL Developer to create objects, and then load the data into your cloud database.

## Practice 13-1: Using SQL Developer and INSERT Statements to Migrate Selected Objects

---

### Overview

In this practice, SQL Developer is used to create a cart containing selected objects to be loaded into an Oracle Database 18c database on Oracle Database Cloud Service. You will use SQL `INSERT` statements generated by SQL Developer to create the objects and then load the data into your cloud database.

**Note:** This is not the Oracle SQL Developer Web that was used in the earlier practice. In this practice, you will use the pre-installed Oracle SQL Developer tool available on your Linux VM.

### Assumptions

The scripts `create_fsdata.sql`, `create_fsindex.sql`, `create_fsowner.sql`, and `export_customers.sql` that are used in this exercise to load pre-created objects into a DBCS 18c deployment are available in the location explained in the instructions.

### Tasks

You will now use the pre-created file to create a table and load data into your Database Cloud Service database.

1. Open a terminal window on your Linux VM and create an SSH tunnel to port 1521 on your DBCS deployment. **Leave this session open as long as you are connecting to your DBCS database with SQL Developer.**

```
[oracle@edpl ~]$ ssh -i your_private_key_file
-L 6501:your_compute_node_IP_address:1521
oracle@your_compute_node_IP_address
[oracle@MYDBCS ~]$
```

2. In SQL Developer, create a new connection to MYPDB1.
  - a. Launch SQL Developer from the desktop icon.
  - b. Right-click **Connections** and select **New Connection**.
  - c. Fill in the fields as follows:
    - 1) Connection Name: Enter **MYPDB1**
    - 2) Username: Enter **SYSTEM**.
    - 3) Password: Enter the password you supplied when you created the database deployment.
    - 4) Hostname: **localhost**
    - 5) Port: **6501**
    - 6) Service Name: PDB service name (`MYPDB1.identity_domain`)  
You can find the PDB service name by viewing the connect string on the Service Overview page. For example, `MYPDB1.588436052.oraclecloud.internal`
  - d. Click **Connect** to establish the connection.

3. Use SQL scripts to create the `FSDATA` and `FSINDEX` tablespaces.
  - a. From the Oracle SQL Developer menu, select **File**, and then click **Open**.
  - b. Navigate to the `/home/oracle/labs/migrate/sqldev` folder.
  - c. Select the `create_fsdata.sql` file and click **Open**.
  - d. The script appears in the Worksheet. Click the **Run Script** icon at the top of the worksheet.
  - e. In the Select Connection box, select **MYPDB1** and click **OK**.
  - f. In the Script Output window, you can see the creation of the tablespace.
  - g. Repeat steps c - f, selecting the `create_fsindex.sql` file.
4. Use a SQL script to create the `FSOWNER` user.
  - a. Select the `create_fsowner.sql` file and click **Open**.
  - b. The script appears in the Worksheet. Click the **Run Script** icon at the top of the worksheet.
  - c. In the Select Connection box, select **MYPDB1** and click **OK**.
  - d. In the Script Output window, you can see the creation of the user.
5. Use a SQL Developer script to create the `FSOWNER.CUSTOMERS` table and load data into it.
  - a. Select the `export_customers.sql` file and click **Open**.
  - b. The script appears in the Worksheet. Click the **Run Script** icon at the top of the worksheet.
  - c. In the Select Connection box, select **MYPDB1** and click **OK**.
  - d. In the Script Output window, you can see the creation of the table and insertion of rows.
6. You can now use SQL\*Plus to verify the creation of the table and insertion of rows.
  - a. Invoke SQL\*Plus and log in to `MYPDB1` as the `SYSTEM` user.

```
$ sqlplus system/password@MYPDB1
```

- b. Execute a query against the `FSOWNER.CUSTOMERS` table.

```
SQL> SELECT count(*) FROM fsowner.customers;
```

- c. Exit from SQL\*Plus.

```
SQL> exit
```

## **Practices for Lesson 14: Use Case: Automated Patching of Database Cloud Service**

## Practices for Lesson 14

---

There are no practices for this lesson.

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**Practices for Lesson 15:**  
**Overview of DBCS**  
**Performance Management**

## Practices for Lesson 15: Overview

---

There are no practices for this lesson.

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## **Practices for Lesson 16: Tuning Performance Issues**

## Practices for Lesson 16: Overview

---

There are no practices for this lesson.

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## **Practices for Lesson 17: Performance Management**

## Practices for Lesson 17: Overview

---

### Overview

In these practices, you will use the Database Cloud Service console to initiate a scale up operation.

### References

- Scaling the Compute Shape for a Database Deployment  
<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/scale.html>

## Practice 17-1: Scaling Up the Database Deployment

### Overview

In this practice, you will scale up your database deployment, based on the following requirements: two CPUs and 15 GB RAM.

### Tasks

1. Open a terminal window on your Linux VM and connect to your database deployment compute node as the **oracle** user.

```
[oracle@edpl .ssh]$ ssh -i your_private_key_file
oracle@your_compute_node_IP_address
[oracle@MYDBCS ~]$
```

2. Invoke SQL\*Plus and connect to the **MYPDB1** PDB as the **SYSTEM** user.

```
[oracle@MYDBCS ~]$ sqlplus system@MYPDB1
SQL*Plus: Release 18.0.0.0.0 Production on Mon Mar 7 19:01:46
2018

Copyright (c) 1982, 2017, Oracle. All rights reserved.

Enter password:
Last Successful login time: Mon Mar 03 2017 19:42:36 +00:00

Connected to:
Oracle Database 18c EE Extreme Perf Release 18.0.0.0.0 -
Production Version 18.1.0.0.0

SQL>
```

3. Execute the **SELECT** statement shown in the code box.

```
SQL> SELECT username, con_id FROM cdb_users ORDER BY 1;
USERNAME                                CON_ID
-----
ANONYMOUS                               3
APEX_050000                             3
APEX_LISTENER                           3
...
XDB                                      3
XS$NULL                                 3

49 rows selected.

SQL>
```

4. Access the Database Cloud Service console to scale up your database deployment. Select the correct compute shape corresponding to the required number of CPUs and RAM.
  - a. Expand the menu next to your database deployment name and select **Scale Up/Down**.
  - b. Select the correct compute shape from the New Compute Shape menu and click **Yes, Scale Up/Down Service**.
  - c. In the Database Cloud Service console, you will see a message that the scale up request has been accepted. Also note that the database deployment is in Maintenance mode.
5. Return to your SQL\*Plus session where you will see a message indicating that the database instance and compute node have been shut down as part of the scale up operation.

```
SQL> Broadcast message from root@MYDBCS (unknown) at 4:40...
The system is going down for power off NOW!
Write failed: Broken pipe
[oracle@edpl .ssh]$
```

6. The Activity section of the Database Cloud Service console indicates when the scale up operation is complete. Periodically, refresh the Service Overview page until you see that the scale up operation is complete. This may take up to 10 minutes.



**Practices for Lesson 18:  
Using REST APIs to Manage  
Oracle Database Cloud  
Service**

## Practices for Lesson 18: Overview

---

### Overview

In these practices, you will use a REST API to retrieve information about your database deployment.

### Additional References

URL Structure in *REST API for Oracle Database Cloud Service*

<https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdb/toc.htm>

## Practice 18-1: Using REST APIs

### Overview

In this practice, you will retrieve the characteristics of your database deployment by using the appropriate REST API.

### Tasks

1. Log in to the compute node of the database deployment as the `opc` user and verify that the Oracle REST Data Services (ORDS) is started.
  - a. From a terminal window on your Linux VM, connect to the compute node as the `opc` user, and then start a root-user shell.

```
[oracle@edp1 .ssh]$ ssh -i your_private_key_file
opc@your_compute_node_IP_address
[opc@MYDBCS ~]$ sudo -s
[root@MYDBCS opc]#
```

- b. Verify that ORDS is started on Oracle Cloud Compute Node and exit the terminal.

```
[root@MYDBCS opc]# /u01/app/oracle/product/ords/ords status

INFO: Obtaining Oracle REST Data Services status...

INFO: Oracle REST Data Services is already running with PID 6149
[root@MYDBCS opc]#
[root@MYDBCS opc]# exit
```

2. Obtain the REST Endpoint for your deployment from the My Services dashboard.
  - a. Navigate to the My Services **Dashboard** page.
  - b. Expand the menu for **Database Classic** and select **View Details**.
  - c. The REST endpoint is listed in the **REST Endpoint** field. Copy it so that you can use it in the cURL command in the next task.

**Note:** If the Database REST Endpoint is unavailable in the My Services dashboard, ask your instructor for further guidance.

3. Use `curl` as shown in the code box from your Linux VM. Provide the following values in the command:
  - a. `your_username`: Your cloud account username
  - b. `your_password`: Your cloud account password
  - c. `your_domain`: Your identity domain name. This is the **Identity Service ID** displayed in the **Service: Oracle Database Service** page, in the Overview tab.
  - d. `REST_Endpoint`: The REST endpoint you obtained in the previous task
  - e. `your_database_deployment`: Your database deployment name. For example, `MYDBCS18c`

```
[oracle@edpl]$ curl -v -X GET -u your_username:your_password \
-H "X-ID-TENANT-NAME:your_domain" \
https://REST_Endpoint/paas/service/dbcs/api/v1.1/instances/your_
domain/your_database_deployment
[oracle@edpl]$ curl -v -X GET -u username:password -H "X-ID-
TENANT-NAME:idcs-cc3c7c939e564609be11d257ec55aa44"
https://dbaas.oraclecloud.com/paas/service/dbcs/api/v1.1/instanc
es/idcs-cc3c7c939e564609be11d257ec55aa44/MYDBCS
* About to connect() to proxy ges-proxy.us.oracle.com port 80
(#0)
*   Trying 141.146.28.70... connected
* Connected to ges-proxy.us.oracle.com (141.146.28.70) port 80
(#0)
* Establish HTTP proxy tunnel to dbaas.oraclecloud.com:443
* Server auth using Basic with user 'ora039'
> CONNECT dbaas.oraclecloud.com:443 HTTP/1.1
> Host: dbaas.oraclecloud.com:443
> User-Agent: curl/7.19.7 (x86_64-redhat-linux-gnu)
libcurl/7.19.7 NSS/3.27.1 zlib/1.2.3 libidn/1.18 libssh2/1.4.2
> Proxy-Connection: Keep-Alive
> X-ID-TENANT-NAME:idcs-cc3c7c939e564609be11d257ec55aa44
>
< HTTP/1.0 200 Connection established
<
* Proxy replied OK to CONNECT request
* Initializing NSS with certpath: sql:/etc/pki/nssdb
* CAfile: /etc/pki/tls/certs/ca-bundle.crt
  Capath: none
* SSL connection using TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
* Server certificate:
*   subject: CN=cloud01.oraclecloud.com,O=Oracle
Corporation,L=Redwood Shores,ST=California,C=US
*   start date: Jun 26 00:00:00 2017 GMT
*   expire date: Sep 25 23:59:59 2018 GMT
*   common name: cloud01.oraclecloud.com
*   issuer: CN=Symantec Class 3 Secure Server CA -
G4,OU=Symantec Trust Network,O=Symantec Corporation,C=US
* Server auth using Basic with user 'ora039'
> GET /paas/service/dbcs/api/v1.1/instances/idcs-
cc3c7c939e564609be11d257ec55aa44/MYDBCS HTTP/1.1
> Authorization: Basic b3JhMDM5Olc0NGFRMTkydg==
> User-Agent: curl/7.19.7 (x86_64-redhat-linux-gnu)
libcurl/7.19.7 NSS/3.27.1 zlib/1.2.3 libidn/1.18 libssh2/1.4.2
> Host: dbaas.oraclecloud.com
> Accept: */*
```

```
> X-ID-TENANT-NAME:idcs-cc3c7c939e564609be11d257ec55aa44
>
< HTTP/1.1 200 OK
< Server: Oracle-Application-Server-11g
< Strict-Transport-Security: max-age=31536000;includeSubDomains
< X-ORACLE-DMS-ECID: 005S3tPFkIn6uHFpR05Eid00034R00031D
< X-ORACLE-DMS-ECID: 005S3tPFkIn6uHFpR05Eid00034R00031D
< X-Frame-Options: DENY
< Service-URI:
https://dbaas.oraclecloud.com:443/paas/service/dbcs/api/v1.1/instances/idcs-cc3c7c939e564609be11d257ec55aa44/MYDBCS
< Content-Language: en
< Content-Type: application/json
< Vary: user-agent
< Date: Thu, 05 Jul 2018 10:52:51 GMT
< Content-Length: 1773
< Connection: keep-alive
<
{"service_name":"MYDBCS","service_uuid":"3F90E952B4EB4F62BF8A72C13BE18C34","version":"18.0.0.0","status":"Running","description":"MYDBCS","identity_domain":"idcs-cc3c7c939e564609be11d257ec55aa44","creation_time":"2018-06-30T01:58:04.611+0000","last_modified_time":"2018-06-30T02:42:19.454+0000","created_by":"ora039","sm_plugin_version":"18.2.6-551","tags":{"\items\":[],\totalResults\":0,\hasMore\":false},"tools_version":"18.2.6-551","backup_supported_version":"16.2.3","service_uri":"https://dbaas.oraclecloud.com:443/paas/service/dbcs/api/v1.1/instances/idcs-cc3c7c939e564609be11d257ec55aa44/MYDBCS","num_nodes":1,"level":"PAAS","edition":"EE_EP","shape":"oc3","use_high_performance_storage":false,"subscriptionType":"HOURLY","creation_job_id":"30674137","num_ip_reservations":1,"backup_destination":"BOTH","cloud_storage_container":"https://ocucictrng6.storage.oraclecloud.com/v1/Storage-ocucictrng6/dbcs-MYDBCS","failover_database":false,"rac_database":false,"byol":false,"serviceEntitlementId":"5* Connection #0 to host gateway.proxy.us.oracle.com left intact
* Closing connection #0
88436053","serviceSubscriptionId":"1699992","current_version":"18.0.0.0.0","sid":"MYORCL","pdbName":"MYPDB1","demoPdb":"","listenerPort":1521,"timezone":"UTC","dbUsableStorage":25,"em_url":"https://129.158.71.11:5500/em","connect_descriptor":"MYDBCS:1521/MYPDB1.588436052.oraclecloud.internal","connect_descriptor_with_public_ip":"129.158.71.11:1521/MYPDB1.588436052.oraclecloud.internal","apex_url":"https://129.158.71.11/apex/mypdb1/","ords_url":"https://129.158.71.11/ords","glassfish_url":"","db
```

```
aasmonitor_url":"https://129.158.71.11/dbaas_monitor","charset":"AL32UTF8","ncharset":"AL16UTF16","is_clone":false,"clone_supported_version":"16.3.1","service_associations":[],"region":"uscom-east-1","jaas_instances_using_service":""}

[oracle@edp1]$
```

#### 4. Exit Terminal.

## **Practices for Lesson 19: Deleting a Database Deployment**

## Practices for Lesson 19: Overview

---

### Overview

In this practice, you will delete the database deployment that you have been using during this course.



## Practice 19-1: Deleting a Database Deployment

---

### Overview

In this practice, you will delete your database deployment.

### Assumptions

You have completed all of the course practices and are finished with your database deployment.

### Tasks

1. In the Oracle Database Cloud Service console, select the **Delete** option from the menu next to your database deployment.
2. In the Delete Service confirmation window, do not select Delete Backups due to time considerations. Click **Delete**.
3. Click **Terminating service** in the Status field to observe the database deployment deletion progress.
4. Access the Oracle Compute Cloud Service console. You can see that the storage volumes are detached from the deleted database deployment.
5. Return to the Oracle Database Cloud Service console, where you can see that the database deployment no longer appears and the delete history thumbnail displays the name of the database deployment, which was deleted.

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**Practices for Lesson 20: Use  
Case: Creating a Cloned  
Database Deployment from a  
Snapshot**

## Practices for Lesson 20

---

There are no practices for this lesson.

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