DAT 307 AMAZON RELATIONAL DATABASE SERVICE (RDS) WORKSHOP

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Contents

Abstract:
Description: Amazon Relational Database Service (RDS) for Oracle hands-on workshop guide.

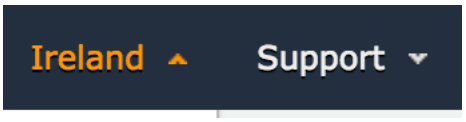
Pre-requisites:

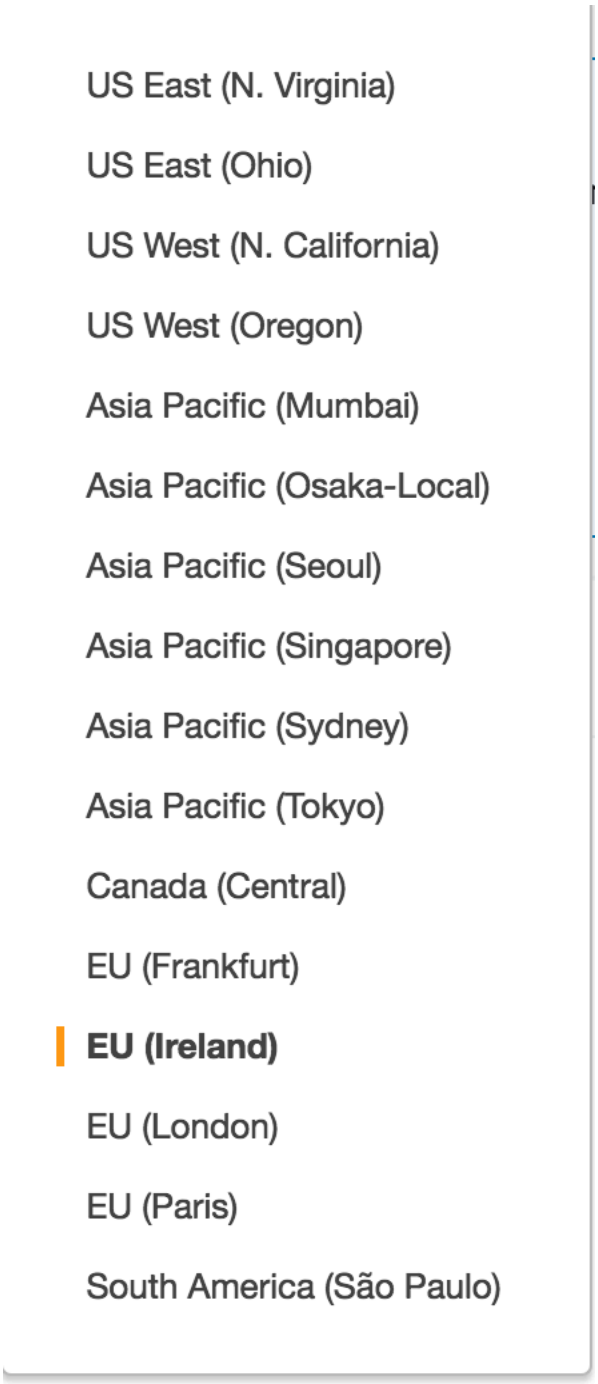
1. Active AWS account with Admin privileges. (IAM user should have administrator access).
2. Pre-installed Oracle Database client tools like SQL Developer to connect to the RDS Oracle Database
3. Screenshots and steps are created using new AWS console.

Please note that we are providing credits to all the attendees to cover the cost associated with creating all the AWS resources for the duration of this workshop only. Therefore, it is very important that all the resources created as a part of this workshop needs to be deleted at the end of the lab to avoid any additional cost associated with creating those resources.

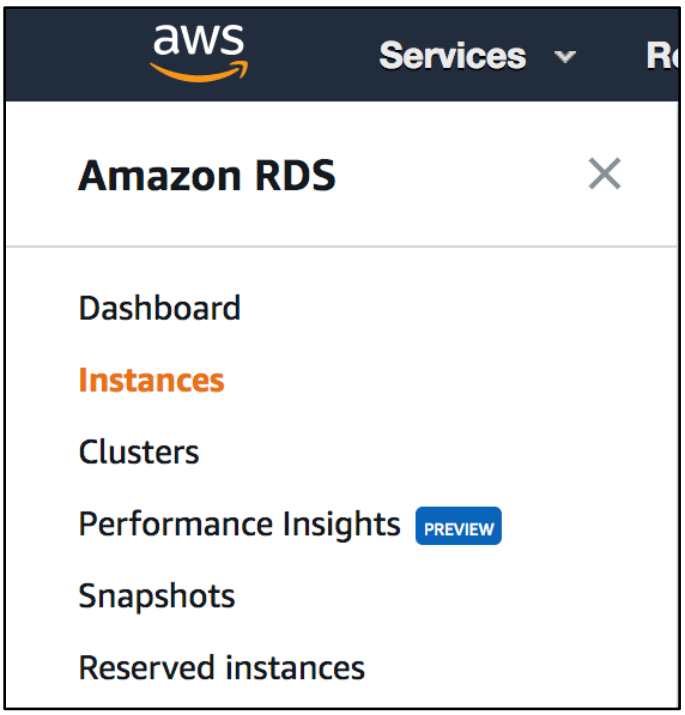
Lab1: Creating RDS Oracle Database Instance (ETC ~10 -15 minutes)

1. All the workshop participants are required to use "Ireland" region for this workshop. Login in to your AWS console and go to RDS landing page https://eu-west-1.console.aws.amazon.com/rds/home?region=eu-west-1# (This is for **Ireland region**, you can find the RDS service in all supported regions in your console). The screenshots in this workshop guide are taken from the Different AWS region.





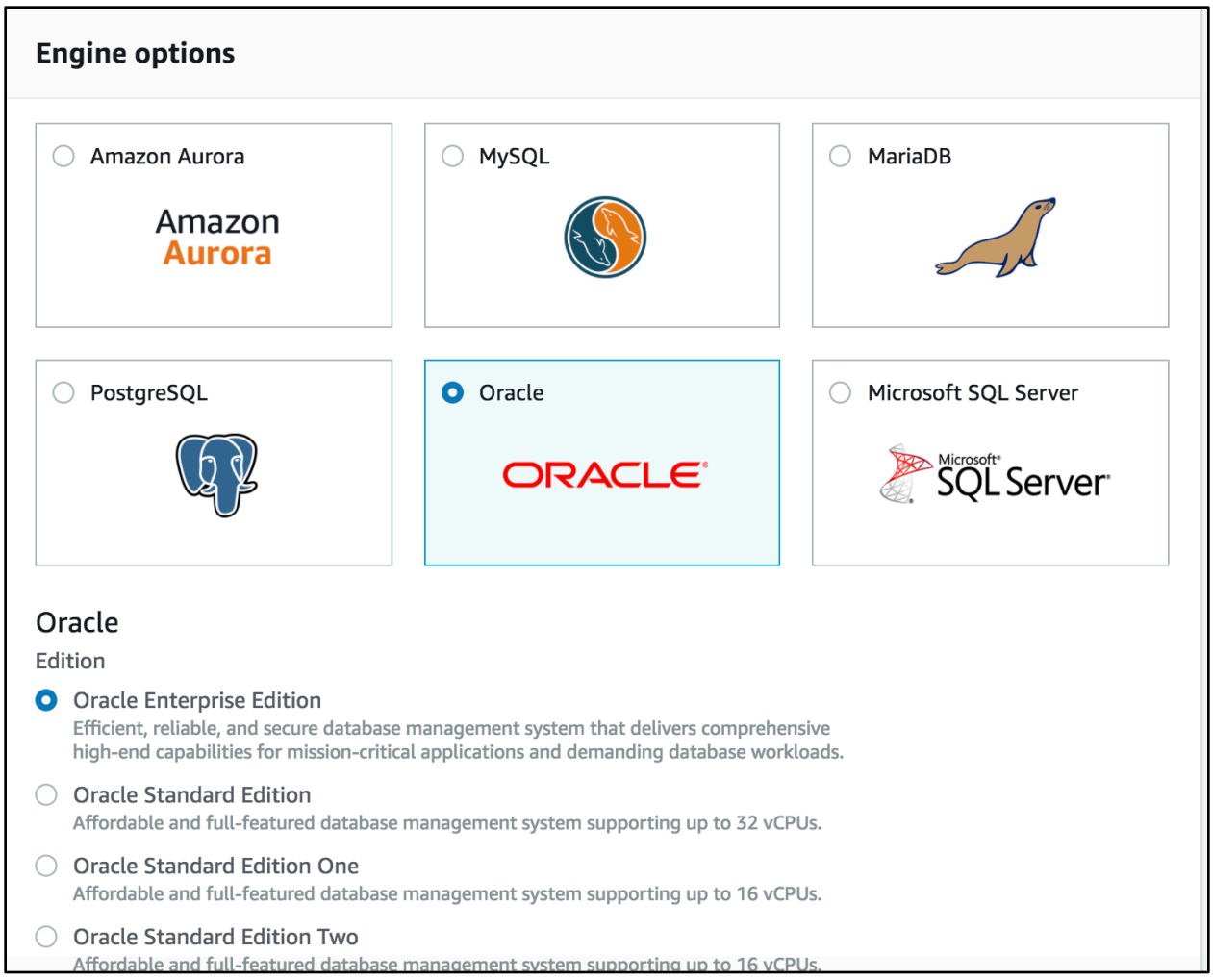
2. Choose “Instances” under the Dashboard option on the left



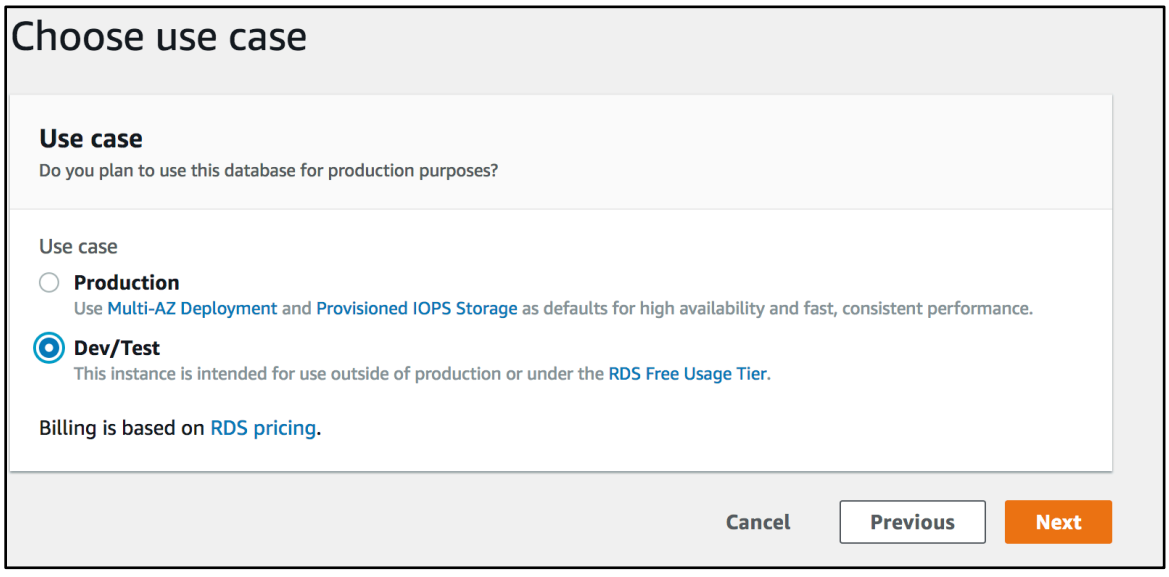
3. Choose “Create Database” on the right

4. Under “Engine Options” provide following input

   Engine: - Oracle
   Edition: - Oracle Enterprise Edition

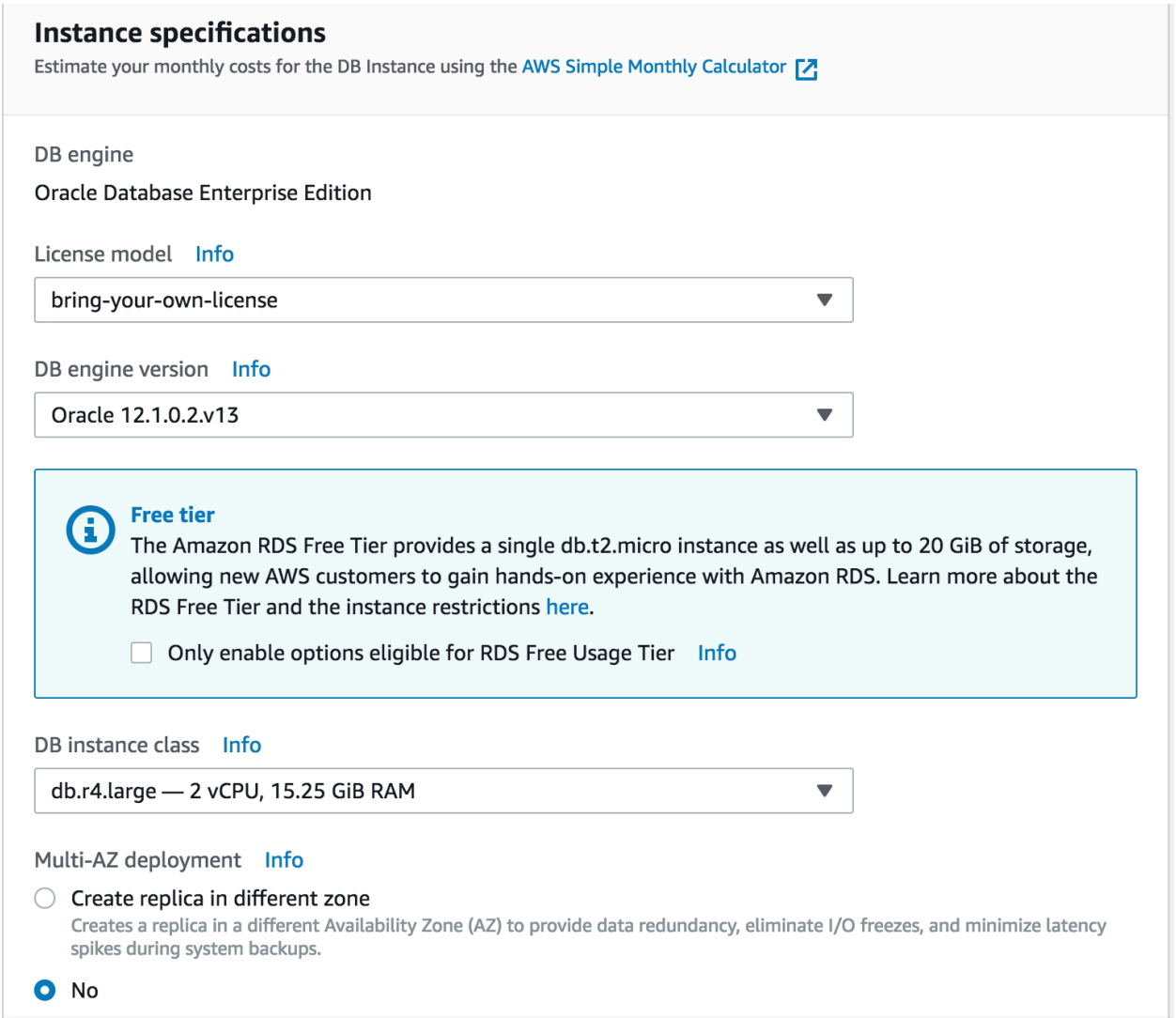


5. Under “Use cases” choose “ Dev/Test”



6. Under **Specify DB details**, provide the following

License Model Info: - bring-your-own-license
DB Engine Version: - Oracle 12.1.0.2.v13
DB Instance Class: - db.r4.large
Multi-AZ deployment: - No
Storage Type: - General Purpose (SSD)
Allocated storage: - 20 GB
DB Instance Identifier: - <user defined name> e.g. reinventdb
Master Username: - <user defined name> e.g. admin
Master password: - <user defined secure password>



Storage type Info

General Purpose (SSD)

Allocated storage

20 GiB

(Minimum: 20 GiB, Maximum: 32768 GiB) Higher allocated storage may improve IOPS performance.

Provisioning less than 100 GiB of General Purpose (SSD) storage for high throughput workloads could result in higher latencies upon exhaustion of the initial General Purpose (SSD) IO credit balance. Click here for more details.

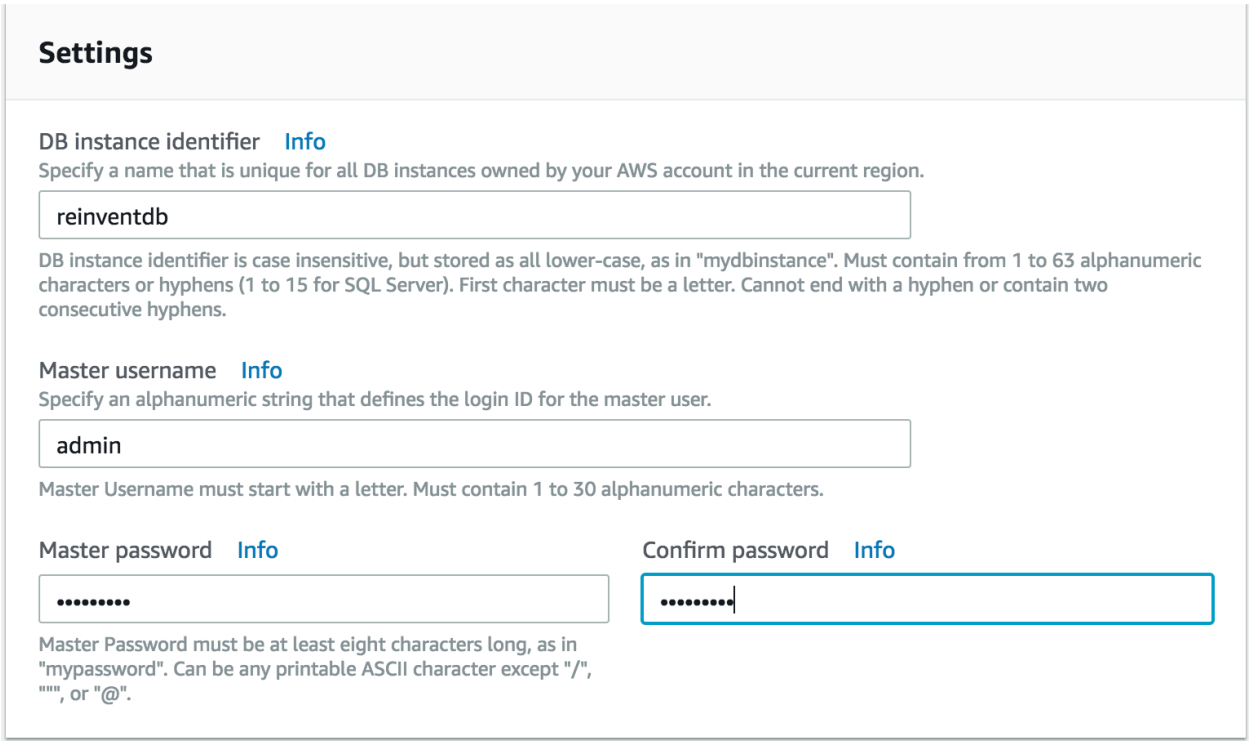
▶ Additional configuration

Estimated monthly costs

DB Instance	175.20 USD
Storage	2.30 USD
Total	**177.50 USD**

Billing estimate is based on on-demand usage as described in Amazon RDS Pricing. Estimate does not include costs for backup storage, IOs (if applicable), or data transfer.

Estimate your monthly costs for the DB Instance using the AWS Simple Monthly Calculator



Click Next

7. Under **Configure advanced settings**

   For the **Network and Security** section, choose the default values
   For the **Database Options**, provide the following inputs
   Database name: - <user defined DB name> e.g. MYDB
   Leave other fields with the default values

   For the **Encryption option**
   Choose the default "Disable encryption"

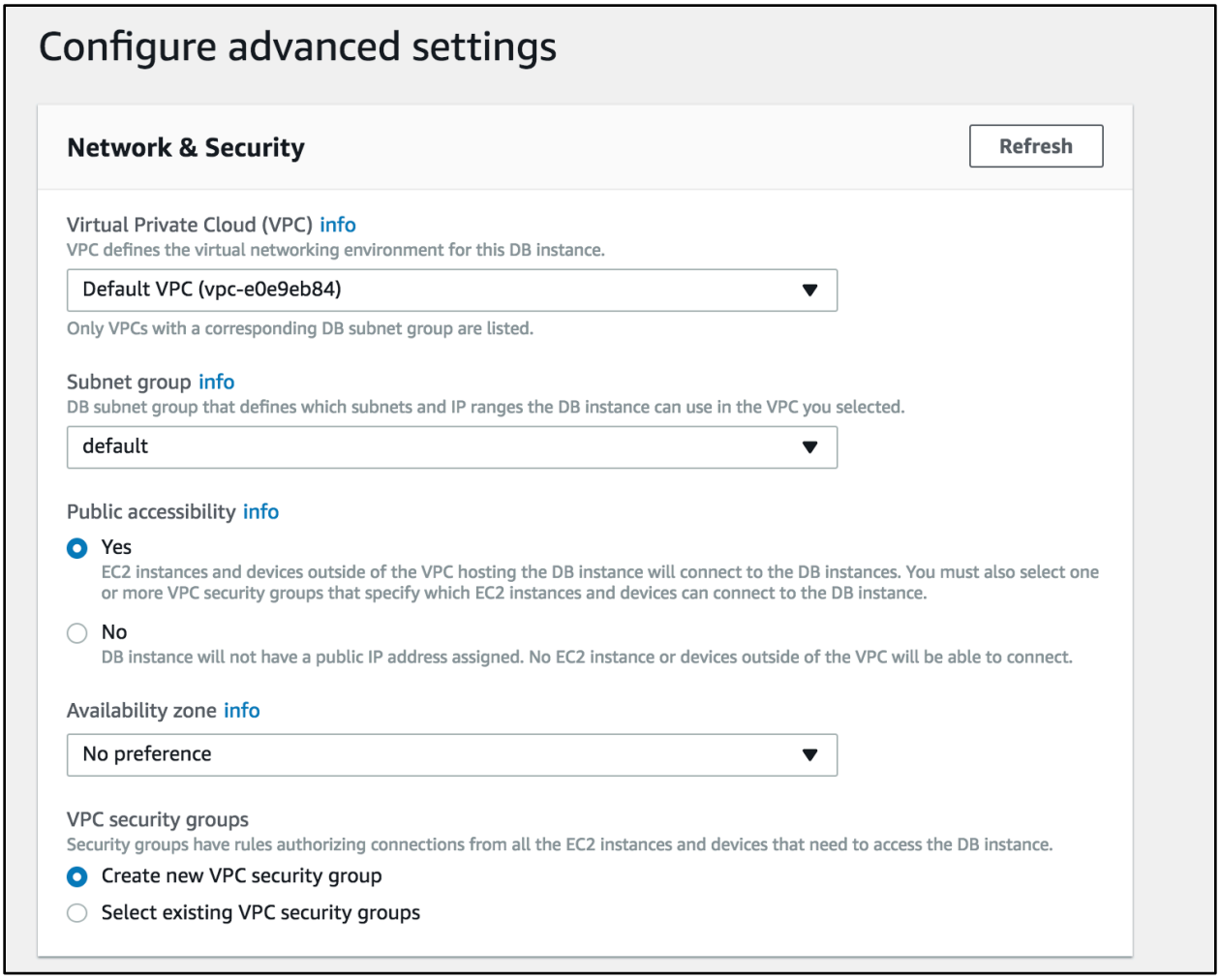
   For the **Backup option**
   Choose "0" for Backup retention days

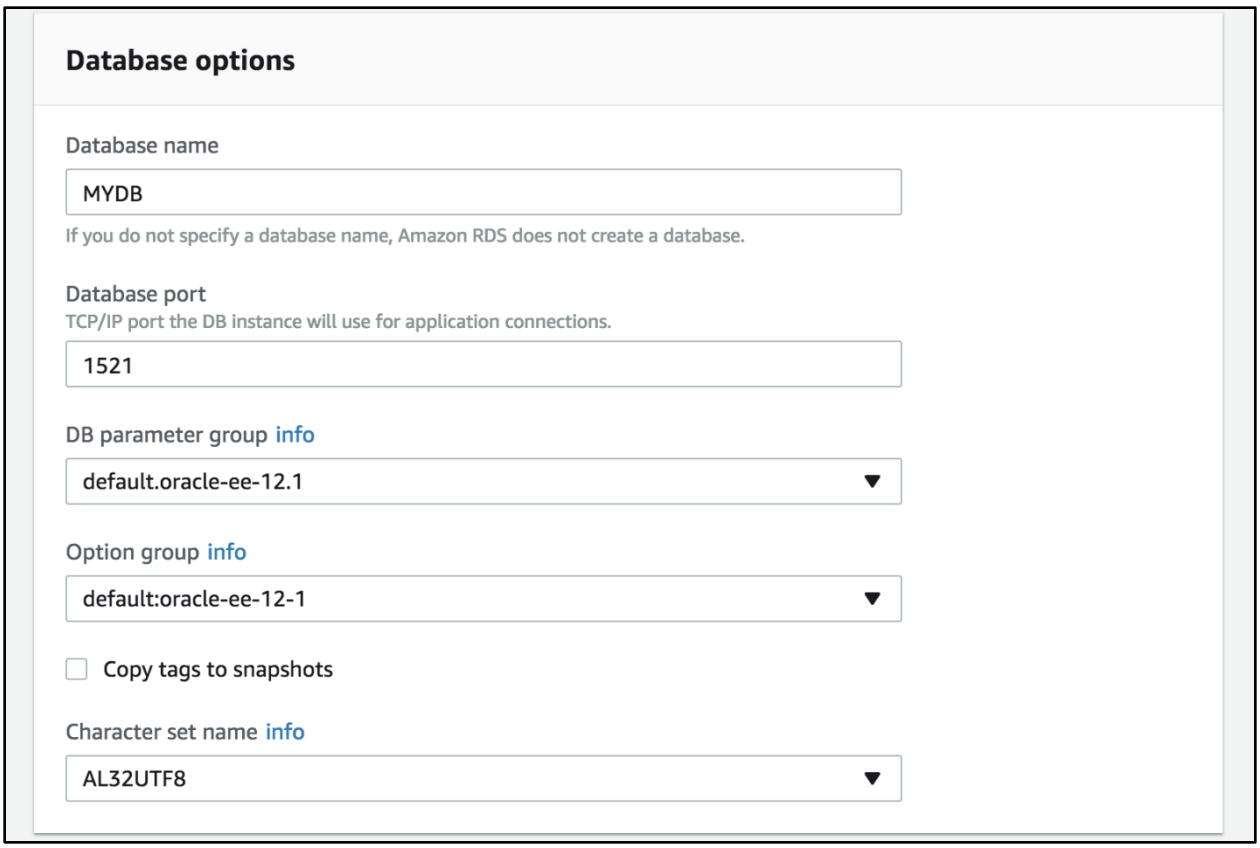
   For the **Monitoring Option**
   Choose "Disable enhanced monitoring"

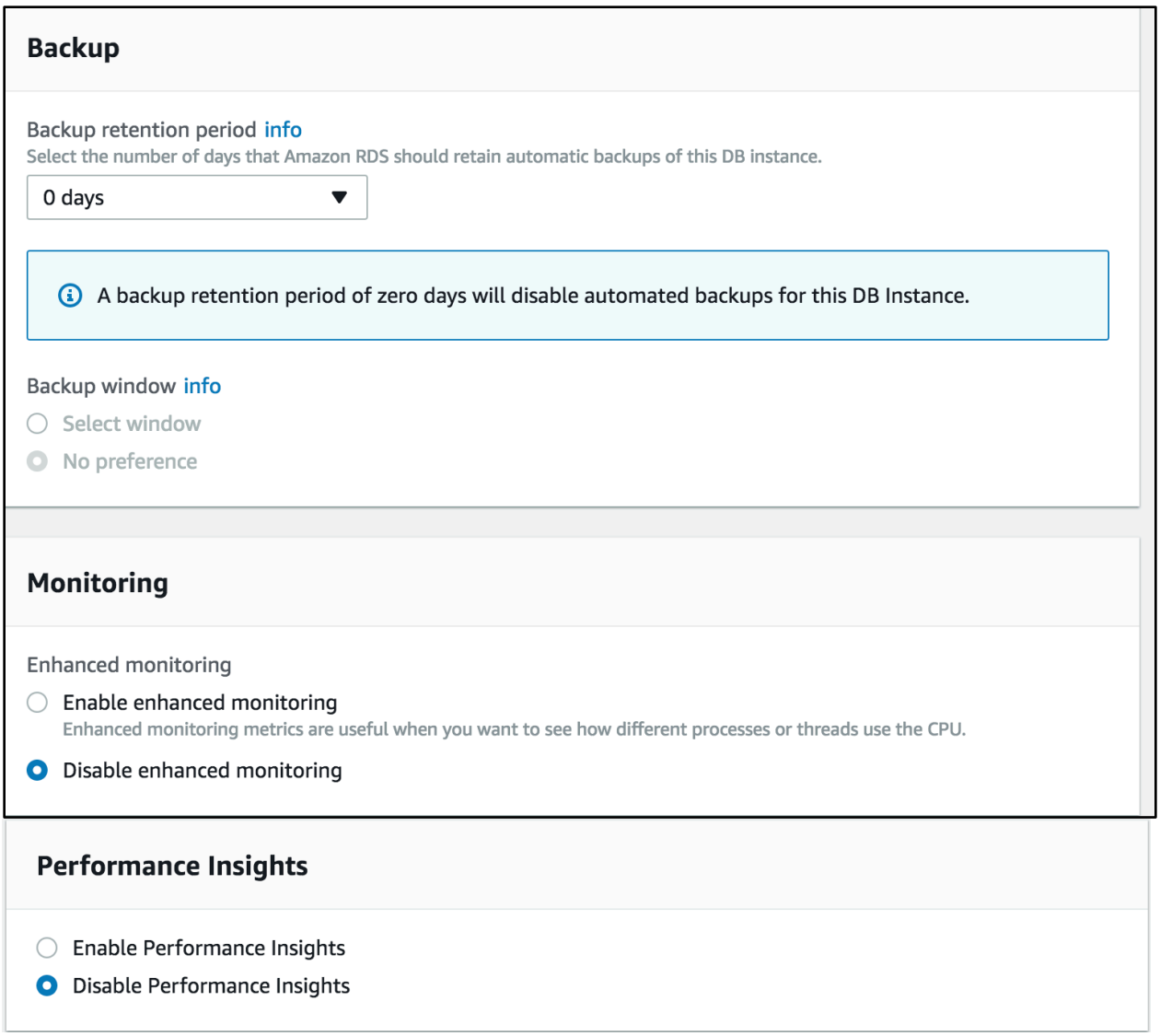
   For the **Performance Insights"**
   Choose the default "Disable Performance Insights"

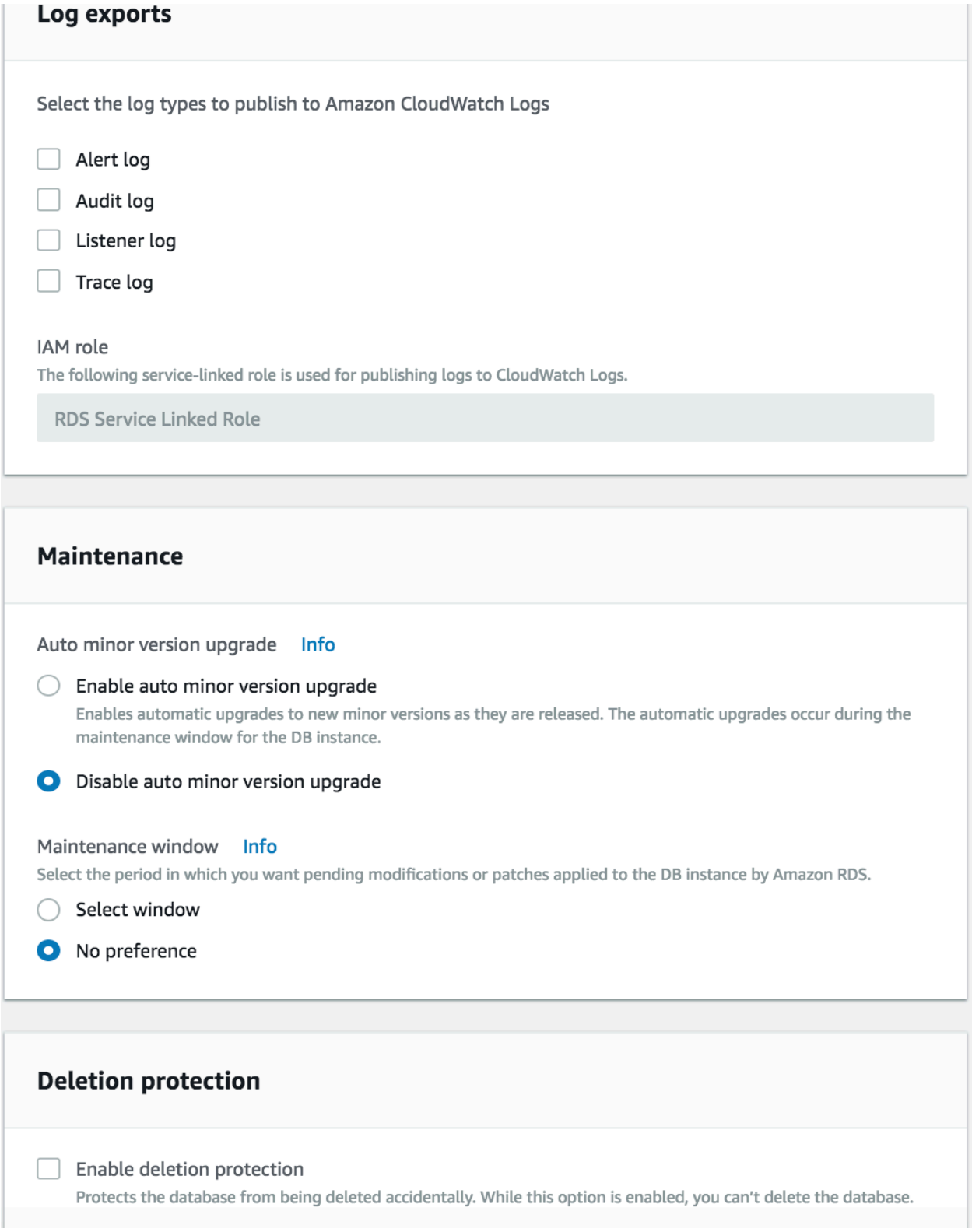
For the **Log Exports Option**
Choose the default and leave all boxes uncheck

For the **Maintenance Option**
Choose “Disable auto minor version upgrade”




Database options
Database name
MYDB
If you do not specify a database name, Amazon RDS does not create a database.
Database port
TCP/IP port the DB instance will use for application connections.
1521
DB parameter group info
default.oracle-ee-12.1
Option group info
default:oracle-ee-12-1
Copy tags to snapshots
Character set name info
AL32UTF8


Backup
Backup retention period info
Select the number of days that Amazon RDS should retain automatic backups of this DB instance.
0 days
A backup retention period of zero days will disable automated backups for this DB Instance.
Backup window info
Select window
No preference
Monitoring
Enhanced monitoring
Enable enhanced monitoring
Enhanced monitoring metrics are useful when you want to see how different processes or threads use the CPU.
Disable enhanced monitoring
Performance Insights
Enable Performance Insights
Disable Performance Insights



8. Click on Create Database to start the Instance creation

Optional: - Using AWSCLI to launch RDS Oracle Database Instance

AWS CLI

https://docs.aws.amazon.com/cli/latest/userguide/installing.html

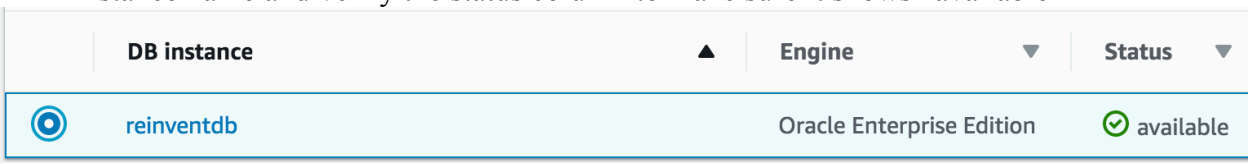
Example Command:

```
aws rds create-db-instance \
  --db-instance-identifier reinventdb \
  --db-name MYDB \
  --allocated-storage 20 \
  --storage-type gp2 \
  --db-instance-class db.r4.large \
  --engine oracle-ee  \
  --port 1521 \
  --backup-retention-period 0 \
  --license-model byol \
  --master-user-password fjie87bna09bfe3 \
  --master-username admin \
  --engine-version 12.1.0.2.v13
```

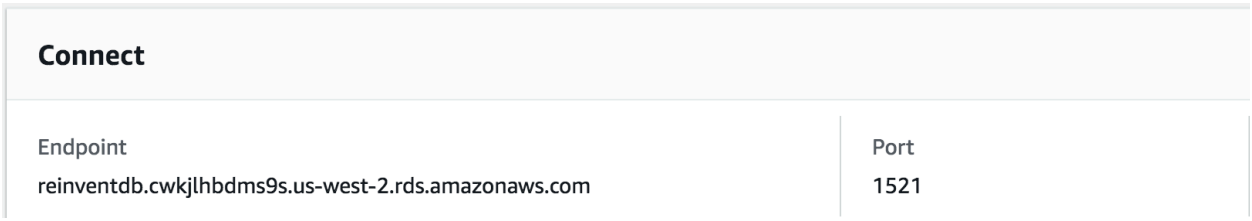
Lab 2: - Connecting to the RDS Oracle DB (ETC ~2 -5 minutes)

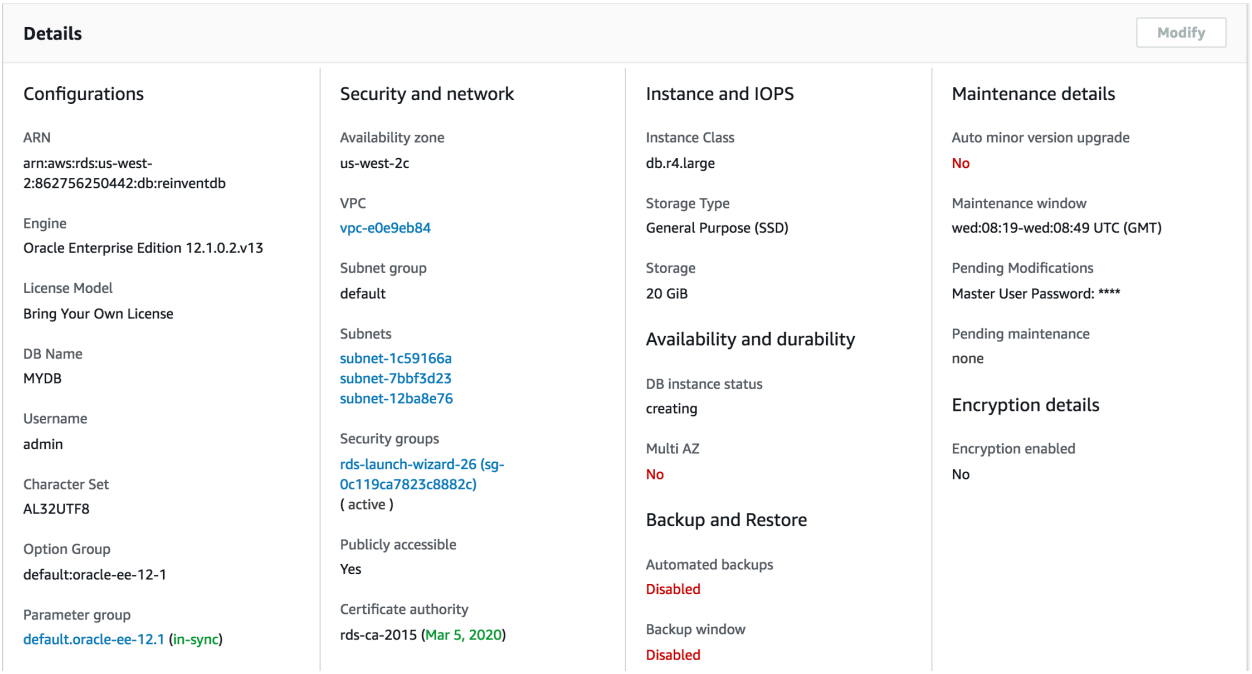
Users are advised to disable firewalls and VPNs where possible so that they we can verify their IP address for whitelisting the connection to the newly created RDS Oracle Database instance. Please refer this website https://checkip.amazonaws.com/ to verify the client IP address.

1. Find the newly created RDS Oracle instance under the "**Instances**" tab and click on the DB Instance name and verify the status column to make sure it shows "available"



2. Scroll down on the screen and go to the section "**Connect**" and copy the endpoint from the screen. Scroll down further to go to the "**Details**" section for additional Instance details.

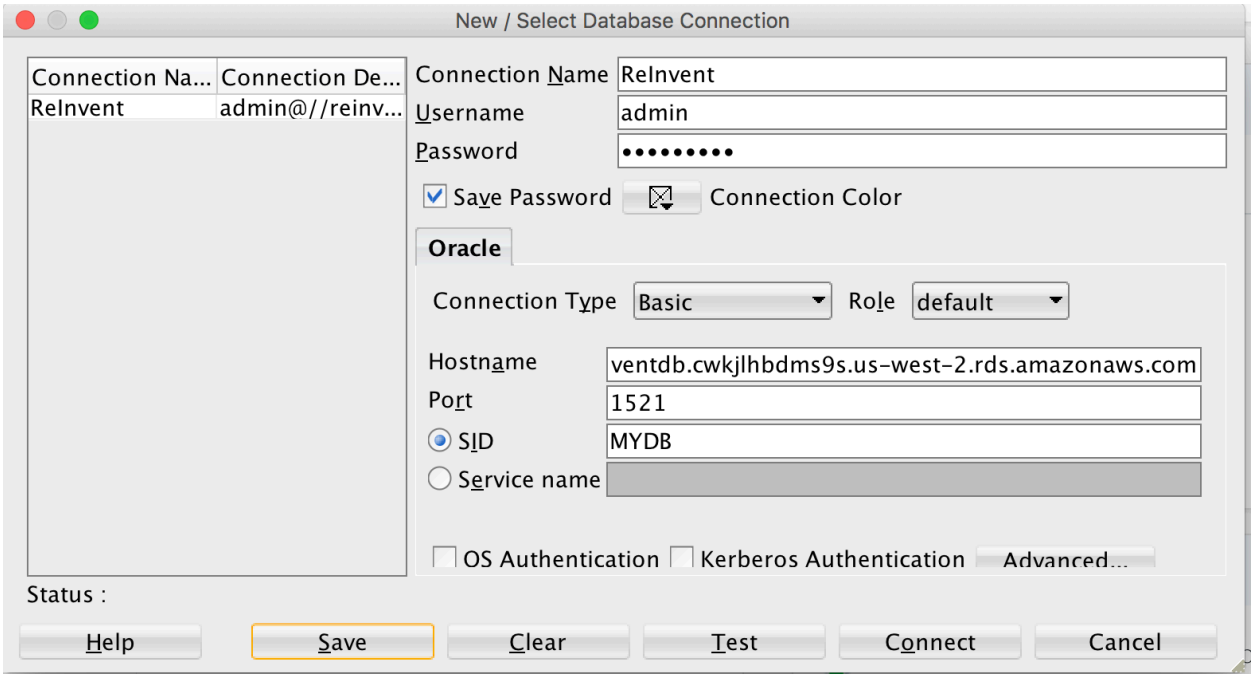




3. Start the SQL Developer -> New Connection, provide following inputs
SQL Developer can be downloaded here

Connection name: - < User defined connection name> ReInvent
Username: - Master username provided during Database creation <admin>
Password: - Password provided for the Master Username during Database creation
Hostname: - Endpoint copied in the step #1 above

SID: - Database name provided during Database Creation <MYDB>



4. In case connection to SQL Developer fails, then do this
   Find the newly created RDS Oracle instance under the “Instances” tab

   Click on Link: Security Groups under the “Security group rules” (takes you to EC2 service)

   Inbound -> Edit -> Add Rule

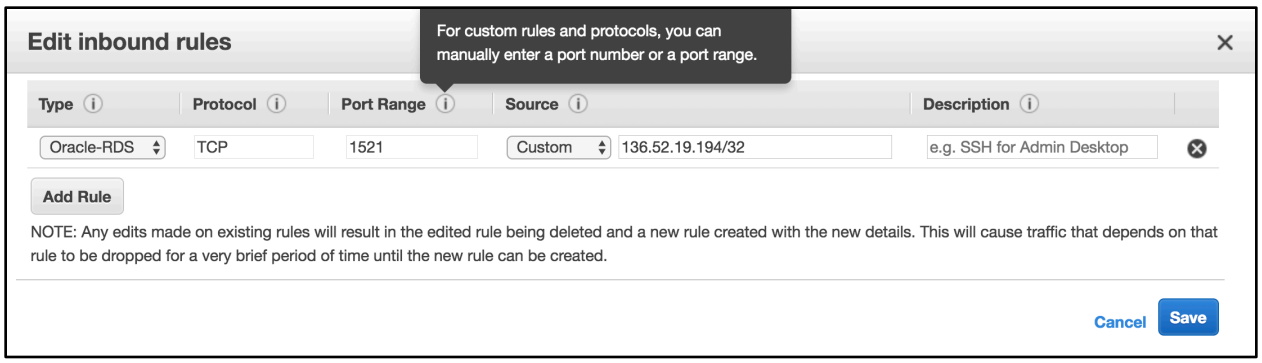
   Type: Oracle-RDS

   Protocol: TCP

   Port Range: 1521

   Source: My IP (avoid 0.0.0.0/0) refer https://checkip.amazonaws.com/

   Save



Test connection again

5. Using SQL*PLUS to connect to RDS Oracle Database Instance
   Launch SQL* PLUS client and use the following command to connect to the DB, replace the host name with the your instance endpoint and SID with the your DB name

   sqlplus
   '<username>@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=<Hostname>)(PORT=1521))(CONNECT_DATA=(SID=<SID>)))'

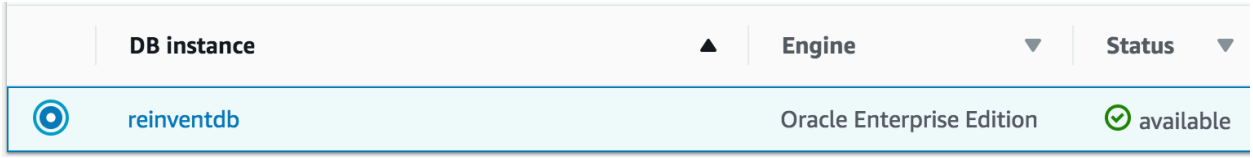
   sqlplus 'admin@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)
   (HOST= reinventdb.cwkjlhbdms9s.us-west-2.rds.amazonaws.com)(PORT=1521))
   (CONNECT_DATA=(SID=MYDB)))'

```
8c85900aa704:Downloads smalik$ sqlplus 'admin@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)
>     (HOST= reinventdb.cwkjlhbdms9s.us-west-2.rds.amazonaws.com)(PORT=1521))
>     (CONNECT_DATA=(SID=MYDB)))'

SQL*Plus: Release 12.1.0.2.0 Production on Sat Nov 17 19:09:00 2018

Copyright (c) 1982, 2016, Oracle.  All rights reserved.

Enter password:
Last Successful login time: Sat Nov 17 2018 19:03:06 -08:00

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

SQL> select name from v$database;

NAME
---------
MYDB

SQL>
```

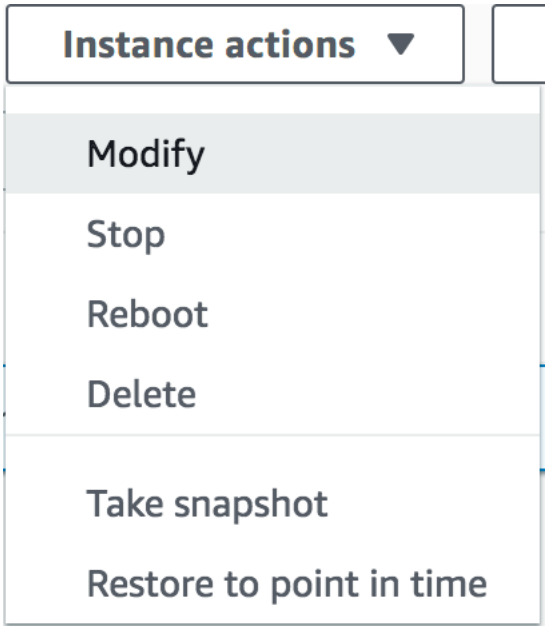
Lab 3: High Availability on RDS Oracle (Multi-AZ) (ETC ~10 -15 minutes)

A) Configuring the Multi-AZ on RDS Oracle Database

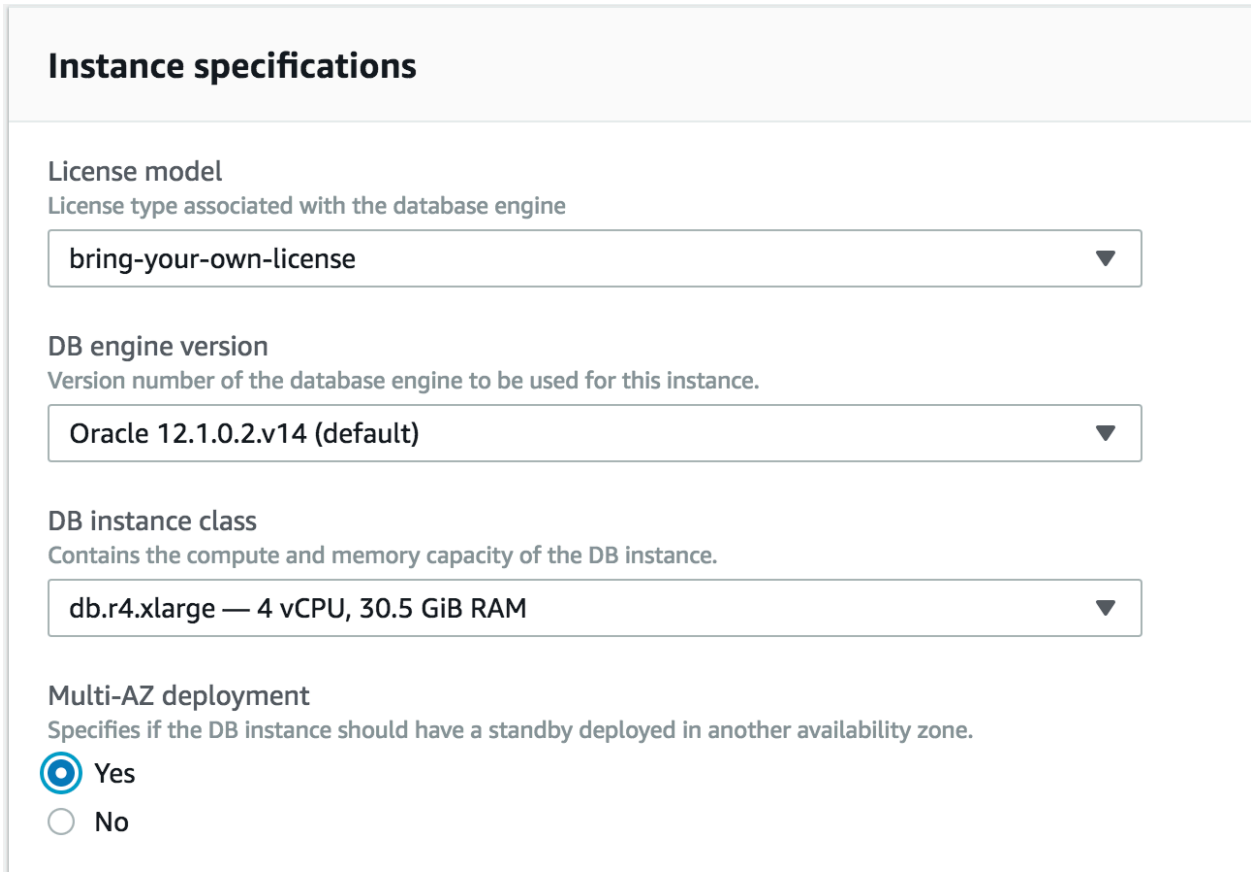
1. Find the newly created RDS Oracle instance under the “Instances” tab and click on the DB Instance name.



2. Click on the “Instance Actions” drop down on the right side and choose “Modify”

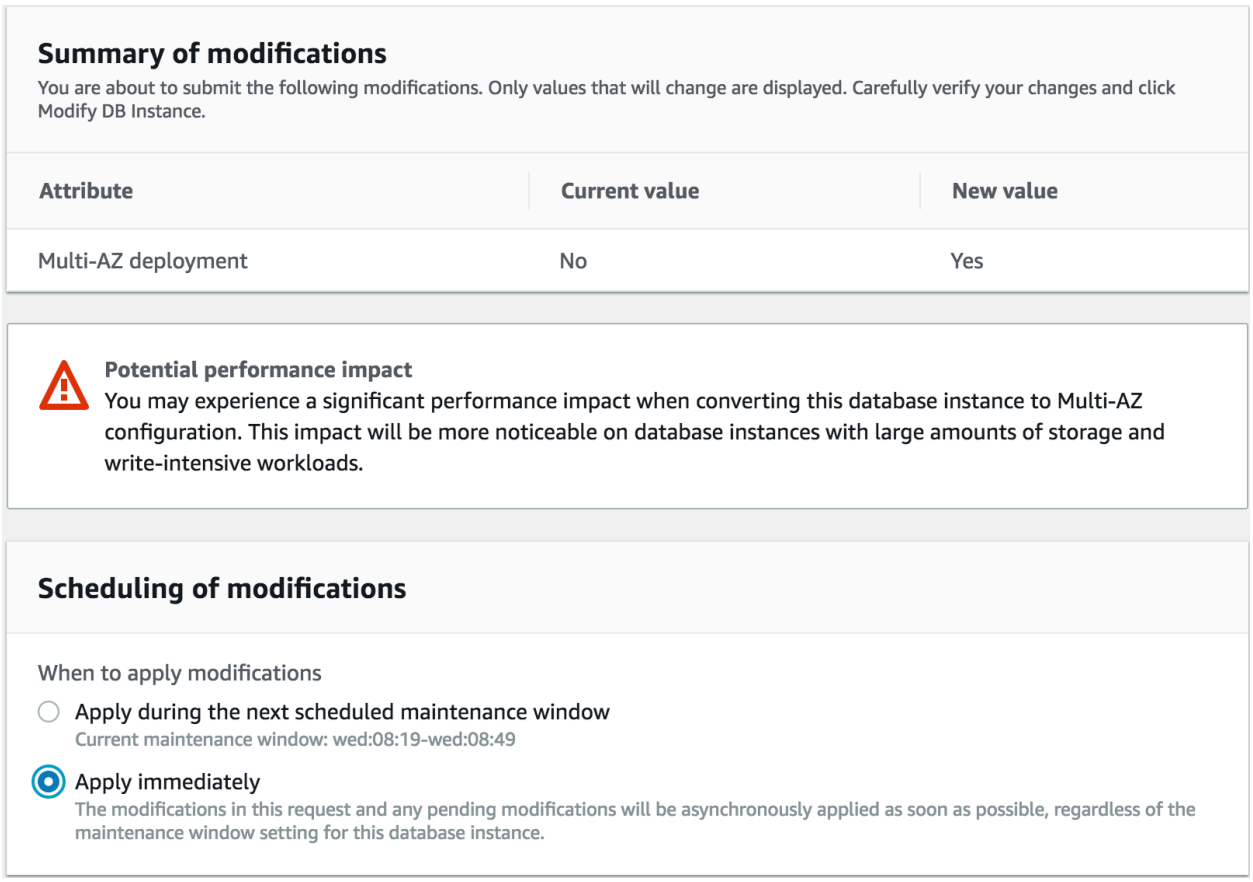


3. On the Instance specification page, under Multi-AZ deployment choose “Yes” and leave other fields as is



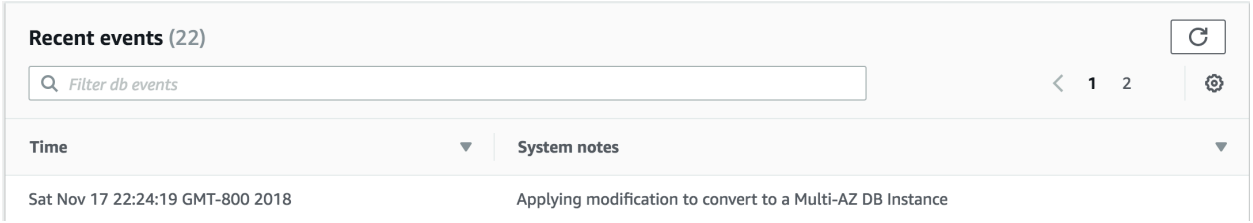
Click “Continue”

4. On the next screen under the “Scheduling of Modifications” choose “Apply immediately”

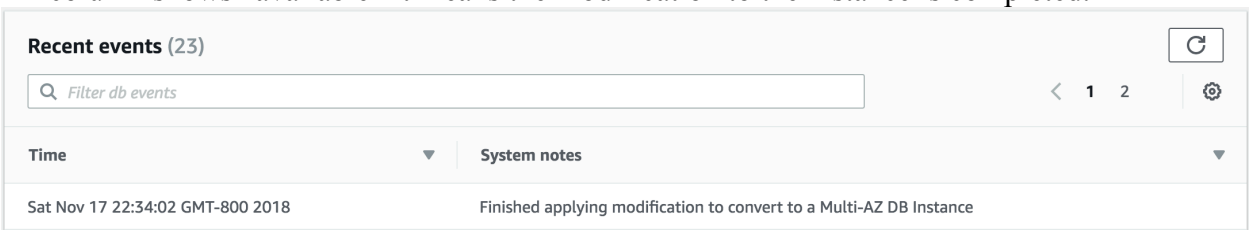


5. Click on “Modify DB Instance” to continue with the modification

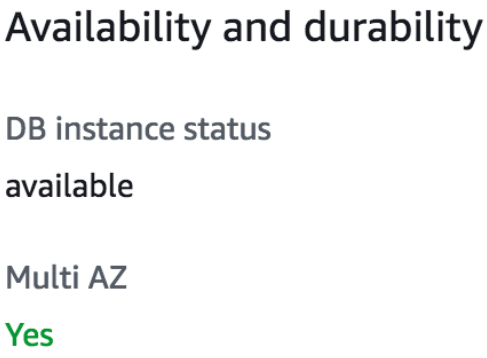
You can also verify the modification is taking place by clicking the Instance name and go to Instance details page and under **“Recent events”** you can find the most recent events on the top



6. Once the modify instance task is completed, this can be verified by looking at the status column for your Database instance on the Instances page. When the status column shows “available” it means the modification to the instance is completed.



7. Verify the Multi-AZ status for your instance on your Instance details page. Click on the Instances tab and select your instance and click to go to the Instance detail page and under the section “Availability and Durability” check the status of Multi-AZ

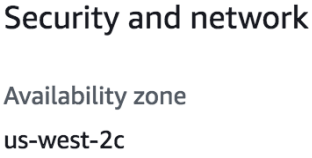


B) Simulating the AZ failover on RDS Oracle Database

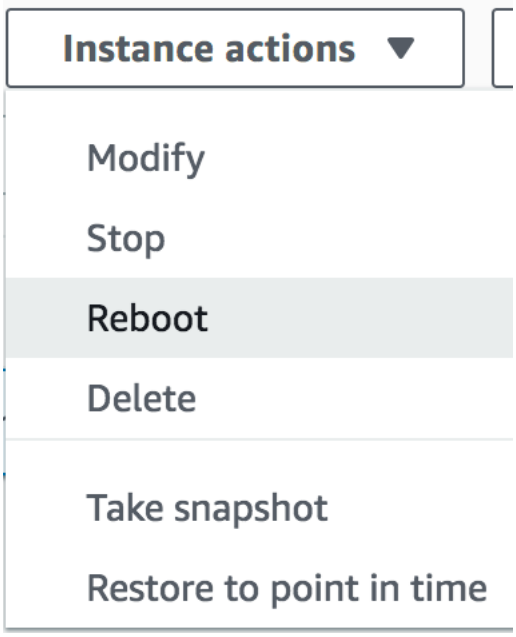
RDS Oracle does provide customer’s an option to simulate the AZ failure and High Availability by offering the option to reboot the RDS Oracle Instance with the failover option. This option will initiate AZ level failover for the Instance, the instance on the secondary AZ will become primary and the instance on the primary become secondary.

1. Verify the primary and secondary AZ for the RDS Oracle Database Instance. Choose your RDS Oracle Instance from the RDS home page by clicking “Instances” and after selecting your instance click to go the Instance details page

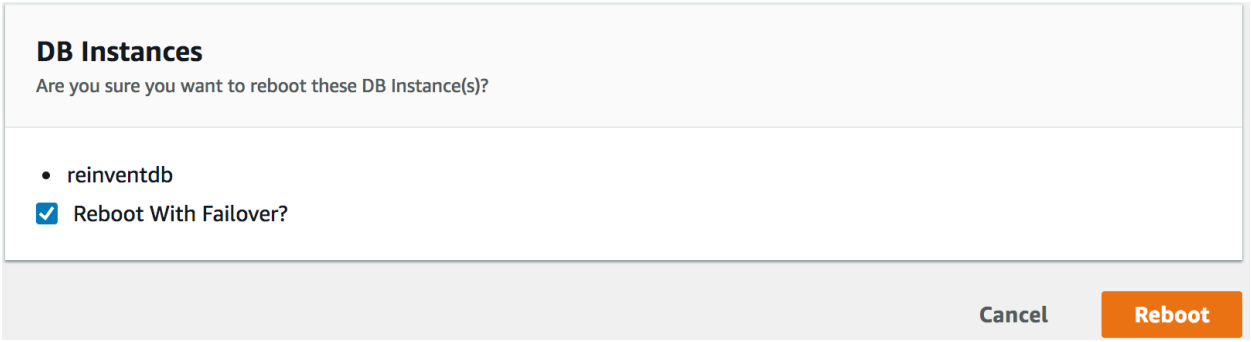
   On the Instance detail page, the primary AZ for the instance is shown under the section “Security Zone”.



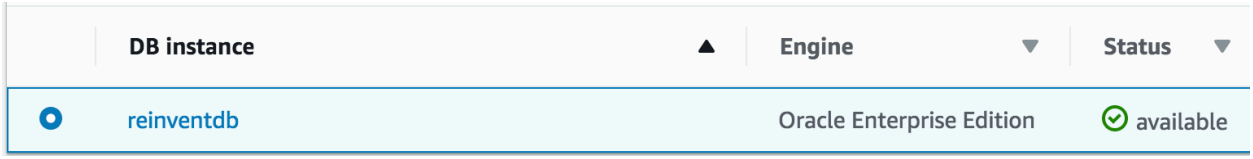
2. To initiate AZ failover, Choose your RDS Oracle Instance from the RDS home page by clicking “Instances” and after selecting your instance click to go the Instance details page and on “Instance actions” drop down choose “Reboot”



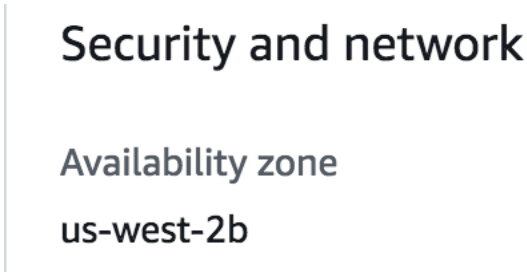
3. Choose the checkbox for “Reboot with Failover” and click on the “Reboot” to initiate the failover.



4. Once the RDS Oracle Database Instance is rebooted and status shows available



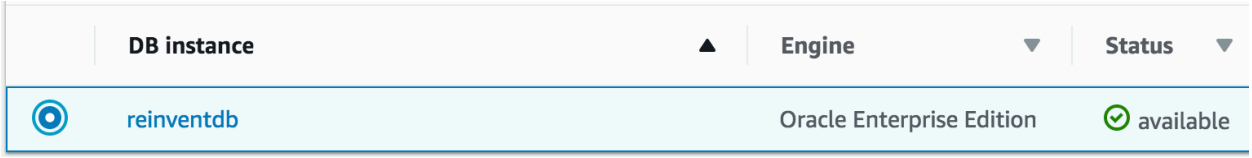
5. Verify the primary AZ for the Instance will be changed



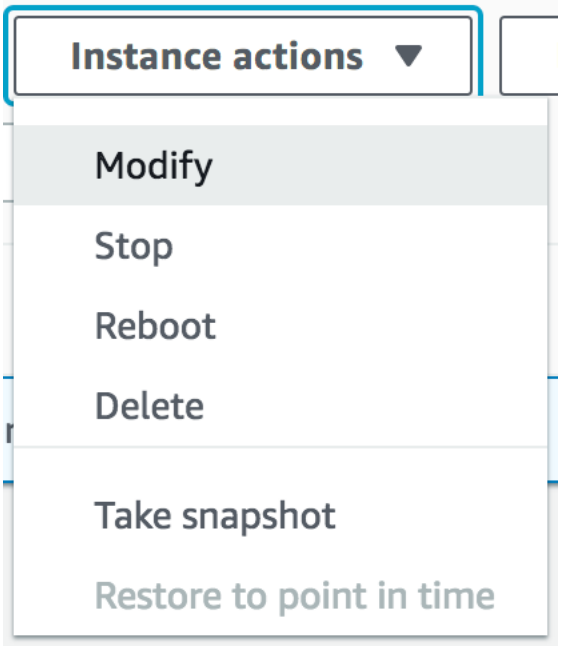
Lab 4: Scaling the RDS Oracle DB Instance (ETC ~10 -15 minutes)

A) Scale Compute

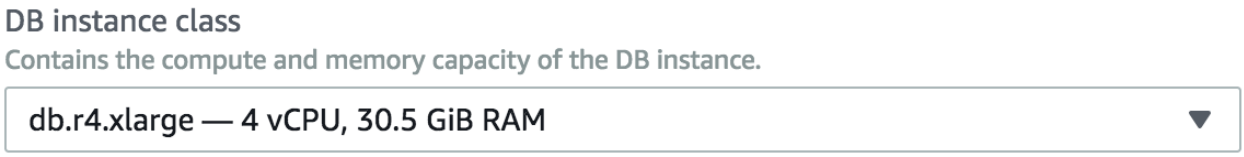
1. Find the newly created RDS Oracle instance under the "**Instances**" tab and click on the DB Instance name.



2. Click on the "Instance Actions" drop down on the right side and choose "Modify"

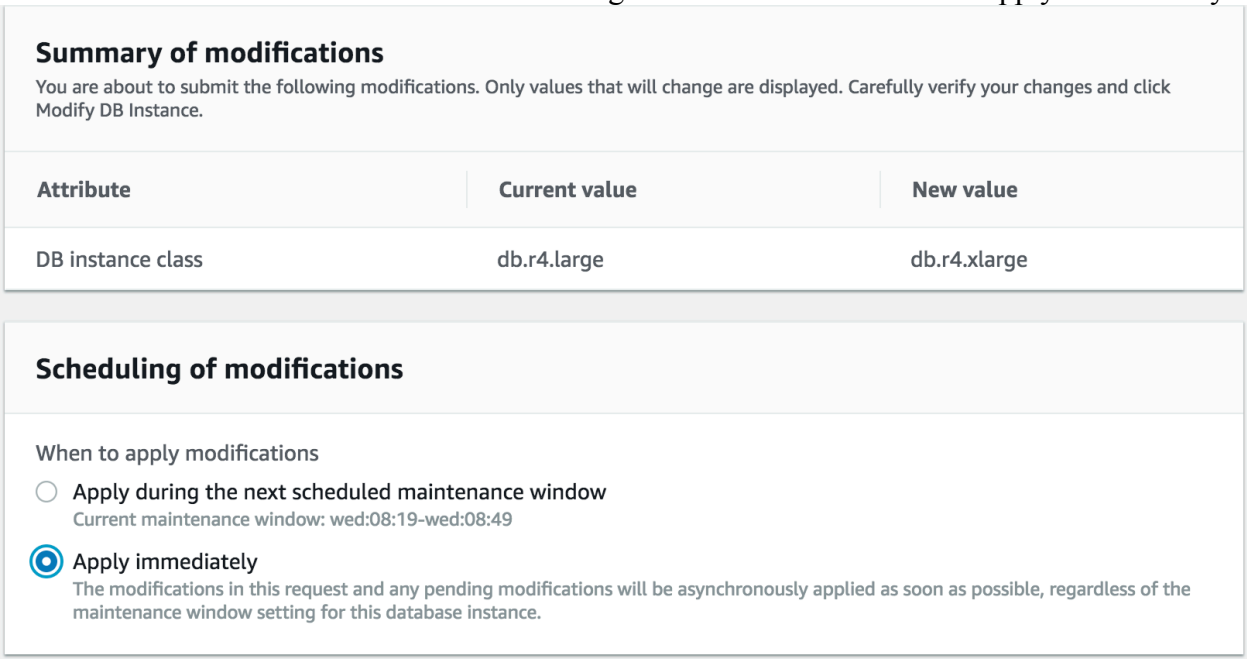


3. On the Modify DB Instance screen change “DB instance class” to “db.r4.xlarge” and leave all other field as is.



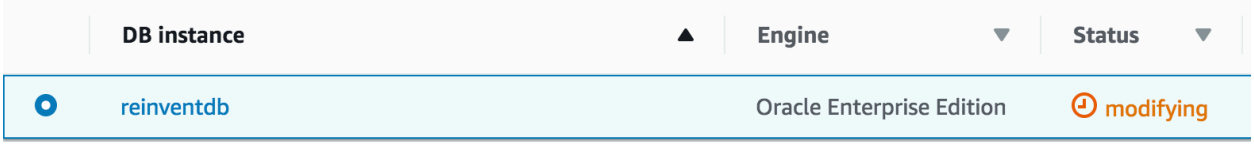
Click **Continue**

4. On the next screen under “scheduling of modifications” choose “Apply Immediately”

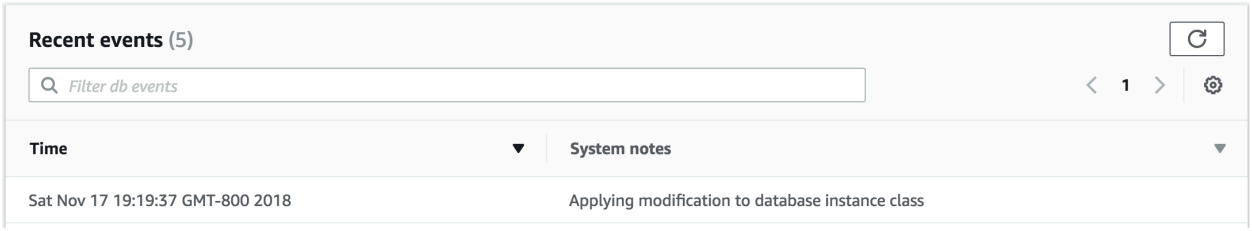


5. Click on “Modify DB Instance” to scale the compute

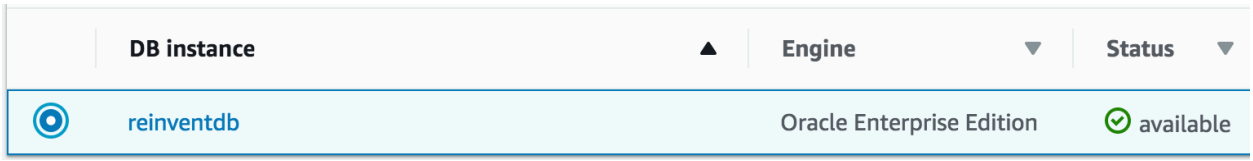
6. Check the Instance status it will show “modifying” and once the changes are done the status will change to “available”.

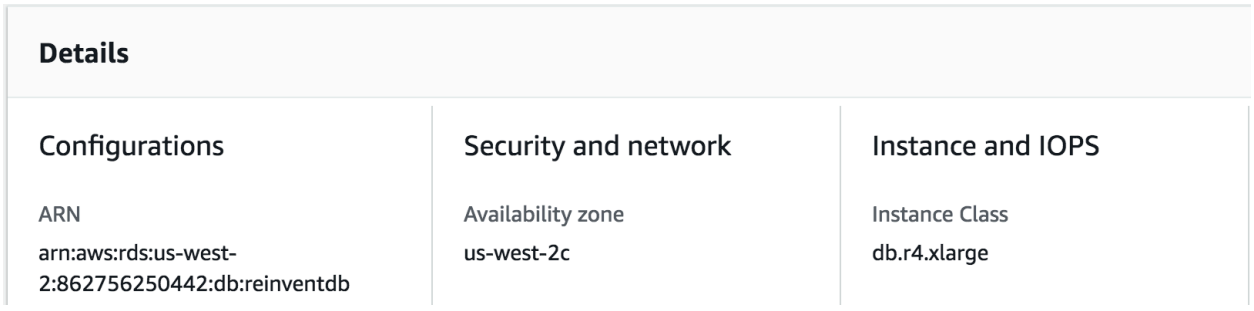


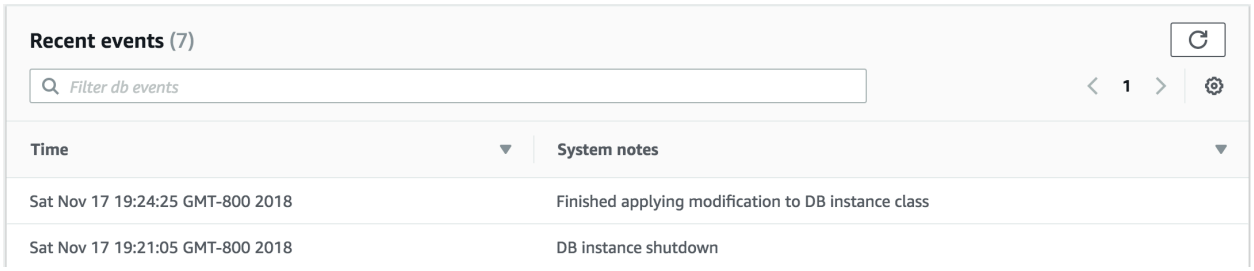
You can also verify the modification is taking place by clicking the Instance name and go to Instance details page and under **"Recent events"** you can find the most recent events on the top



7. Once the status is available/storage-optimization click on the Instance name and look under "Details" section to verify that the DB Instance class has been changed

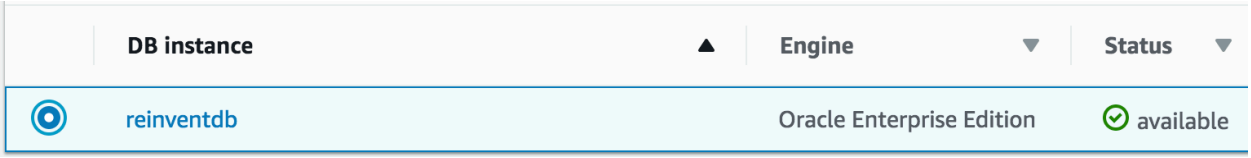




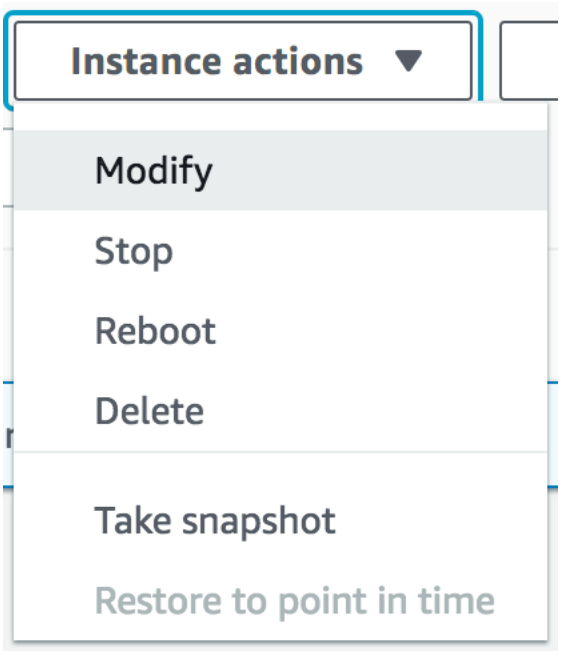


B) Scale Storage

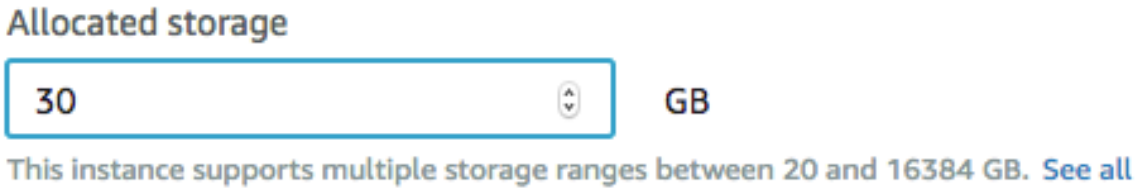
1. Find the newly created RDS Oracle instance under the "**Instances**" tab and click on the DB Instance name.



2. Click on the "Instance Actions" drop down on the right side and choose "Modify"

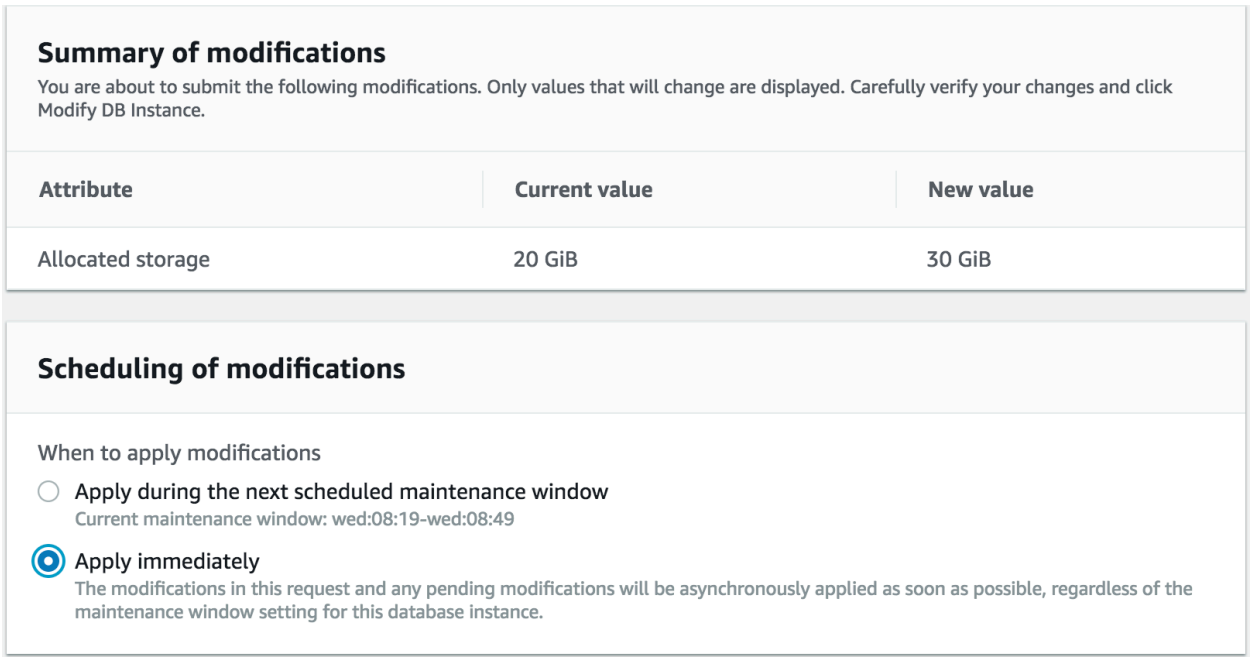


3. On the Modify DB Instance screen change "Allocated Storage" to "30 GB" and leave all other field as is



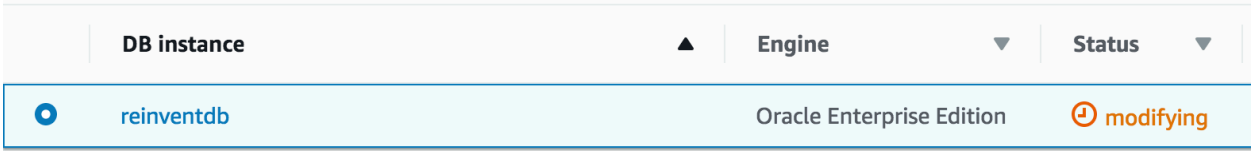
Click Continue

4. On the next screen under "scheduling of modifications" choose "Apply Immediately"

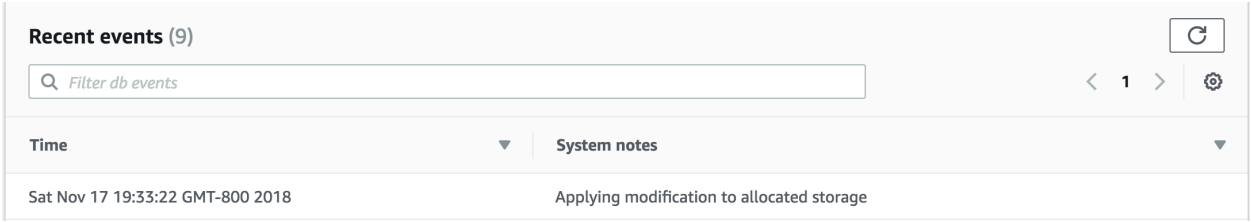


5. Click on “Modify DB Instance” to scale the storage

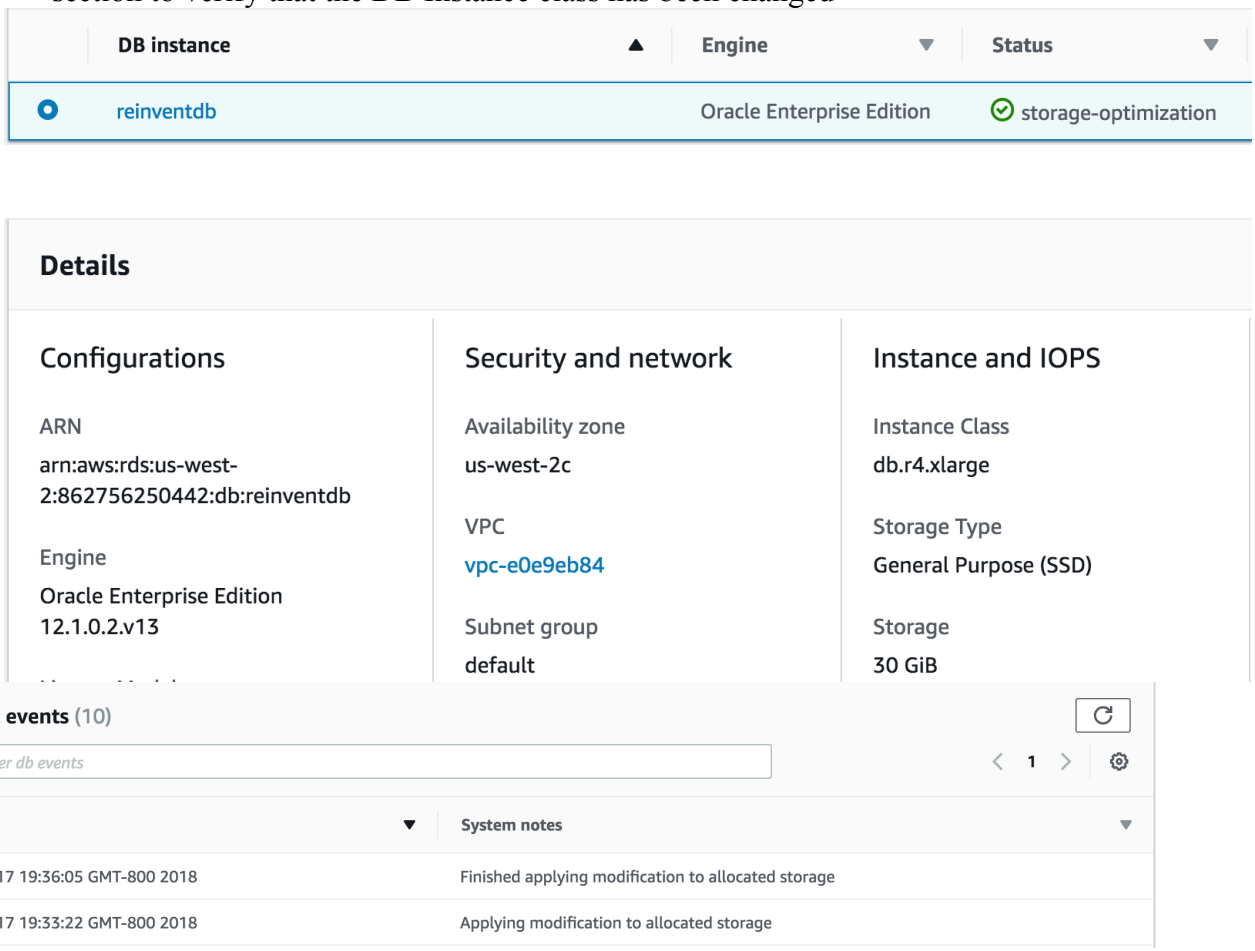
6. Check the Instance status it will show “modifying” and once the changes are done the status will change to “available”.



You can also verify the modification is taking place by clicking the Instance name and go to Instance details page and under **“Recent events”** you can find the most recent events on the top



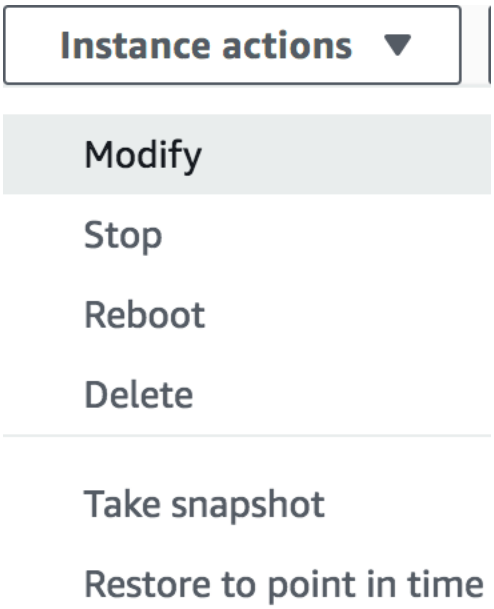
7. Once the status is available click on the Instance name and look under “Details” section to verify that the DB Instance class has been changed



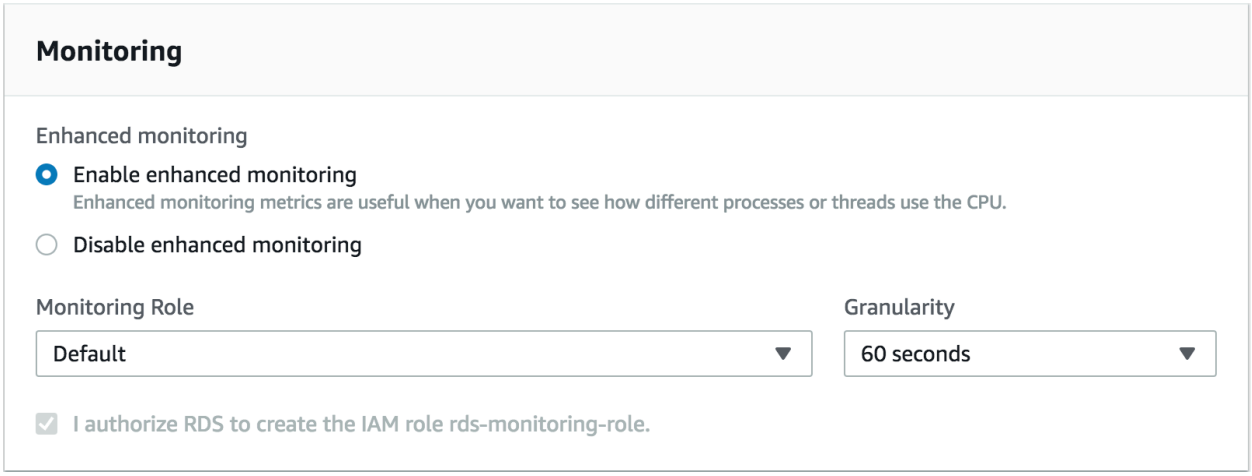
Lab 5: Enabling Performance Insights and logs to Cloudwatch (ETC ~10 - 15 minutes)

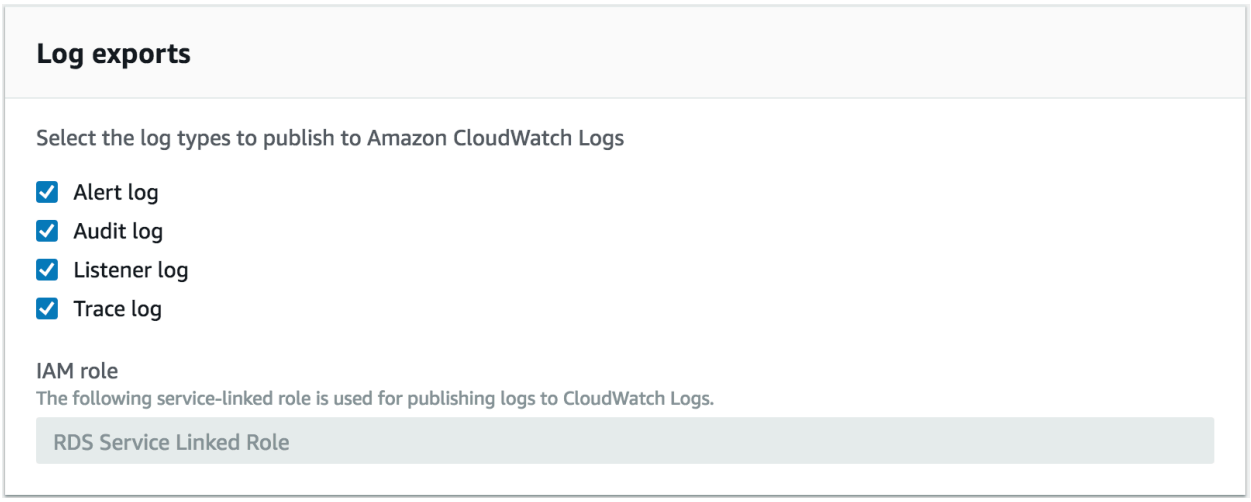
A) Export RDS Oracle logs to CloudWatch

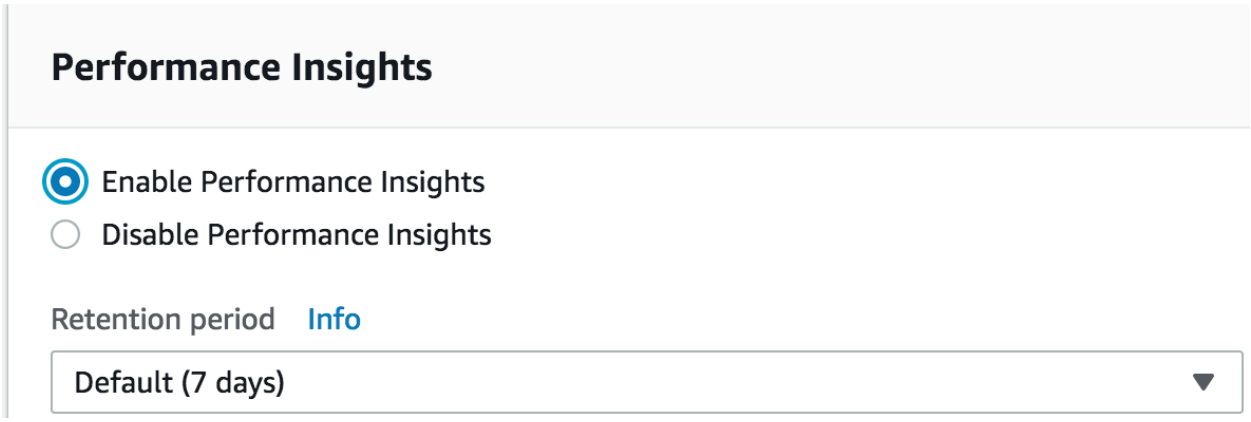
1. Select your instance from the Instance tab
2. Click on the “Instance Actions” drop down on the right side and click “Modify”



3. On the details page under the “Monitoring” section select the Enable enhanced monitoring option. Under “Log Exports” section select the logs which you would like to get publish on the Cloudwatch and click continue

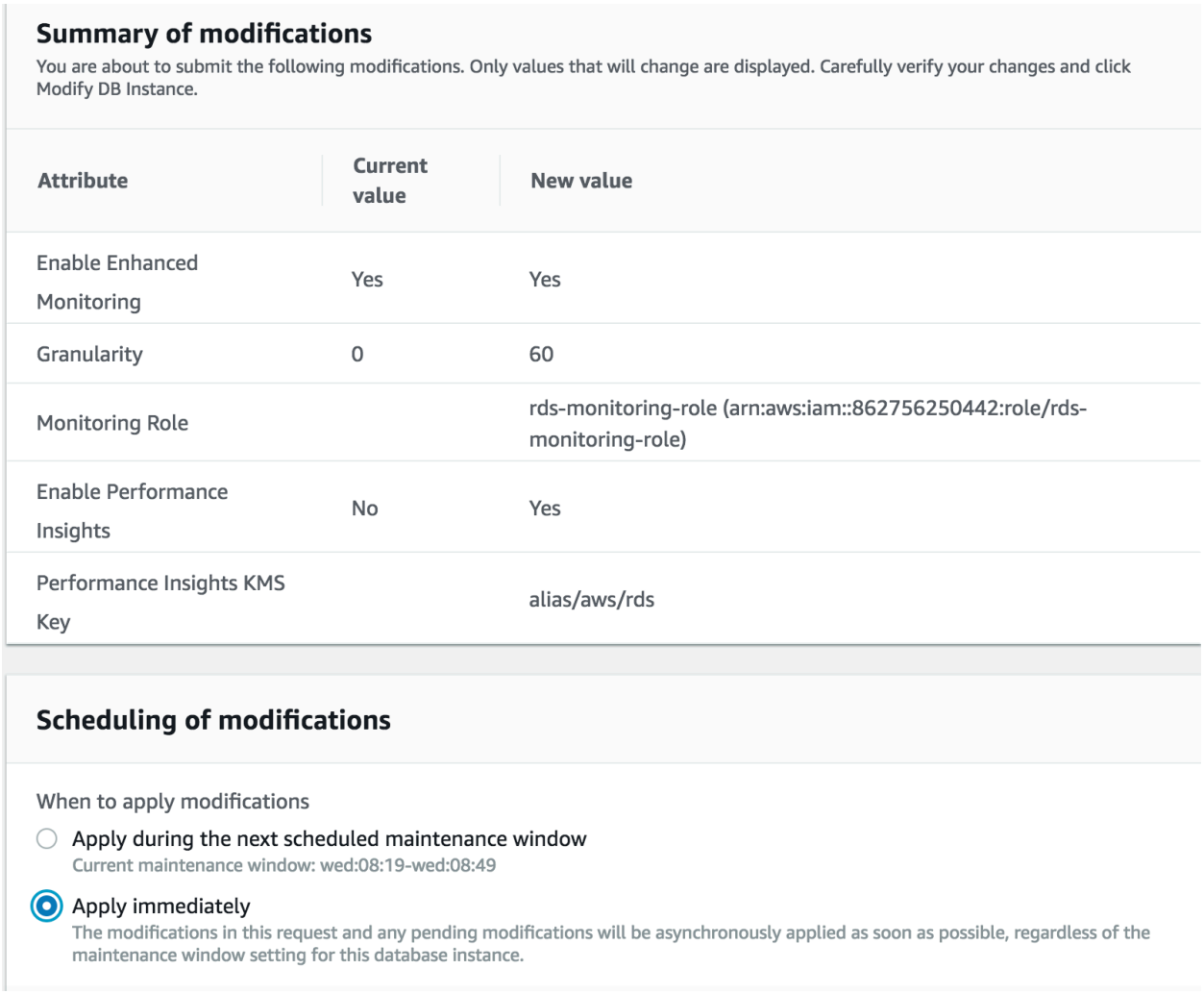






Click “Continue”

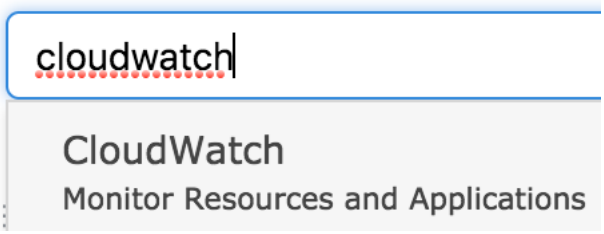
4. Under “Scheduling of Modifications” choose Apply Immediately and click Modify DB Instance.



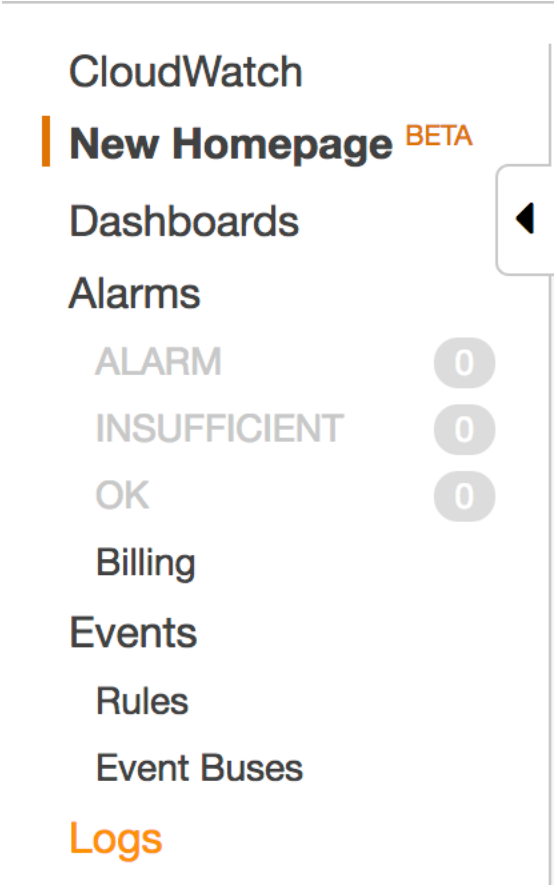
Click on “Modify DB Instance”

B) View RDS Oracle logs on CloudWatch

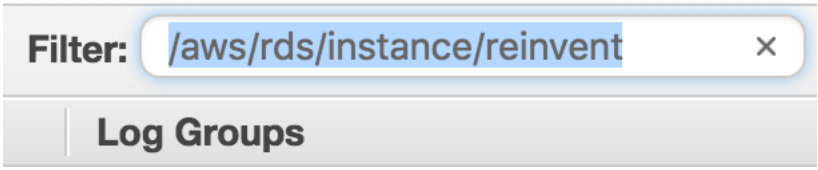
1. On the AWS console home page type CloudWatch in the search box and click on CloudWatch

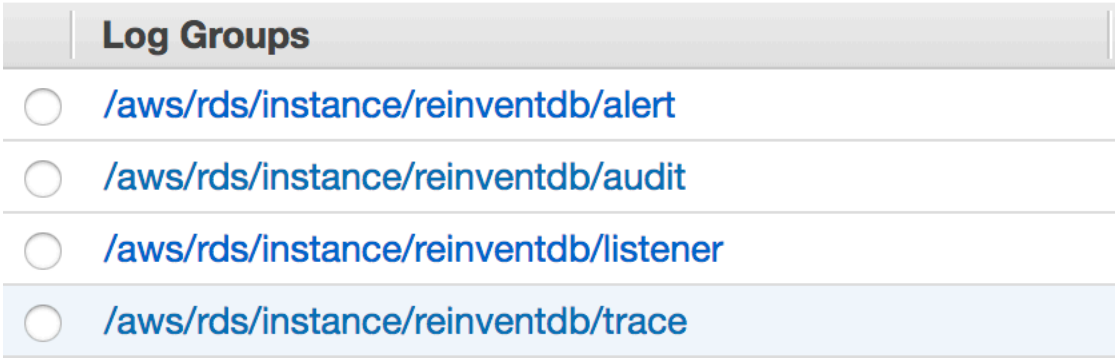


2. On the CloudWatch home page click on “Logs” on the left-hand side

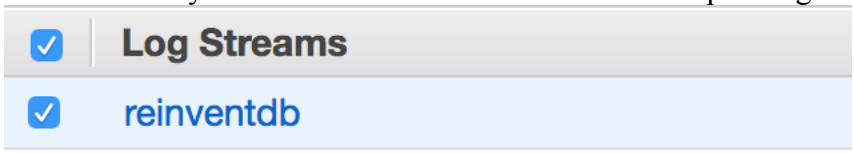


3. On the Filter bar type /aws/rds/instance/<yourinstancename> and hit enter button. Replace the <yourinstancename> with RDS instance you created.





4. Select the file you want to view and click on the corresponding line item

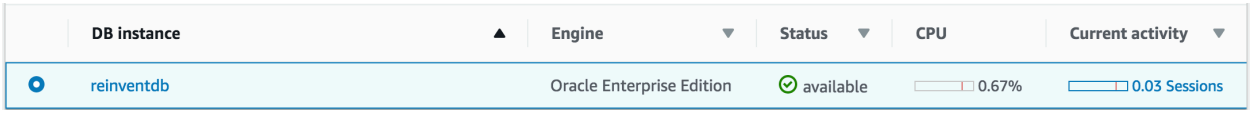


Time (UTC +00:00)	Message
2018-11-17	
07:09:14	Sat Nov 17 07:09:14 2018 TT01: Standby redo logfile selected for thread 1 sequence 4933 for destination LOG_ARCHIVE_DEST_2
07:14:14	Sat Nov 17 07:14:14 2018 Thread 1 advanced to log sequence 4934 (LGWR switch) Current log# 2 seq# 4934 mem# 0: /rdsdbdata/db/MYDB_A/onlinelog/o1_
07:14:14	Sat Nov 17 07:14:14 2018 Archived Log entry 4598 added for thread 1 sequence 4933 ID 0xad389b8d dest 1:
07:14:14	Sat Nov 17 07:14:14 2018 TT01: Standby redo logfile selected for thread 1 sequence 4934 for destination LOG_ARCHIVE_DEST_2
07:19:14	Sat Nov 17 07:19:14 2018 Thread 1 advanced to log sequence 4935 (LGWR switch) Current log# 3 seq# 4935 mem# 0: /rdsdbdata/db/MYDB_A/onlinelog/o1_
07:19:14	Sat Nov 17 07:19:14 2018 Archived Log entry 4600 added for thread 1 sequence 4934 ID 0xad389b8d dest 1:
07:19:15	Sat Nov 17 07:19:15 2018 TT01: Standby redo logfile selected for thread 1 sequence 4935 for destination LOG_ARCHIVE_DEST_2
07:24:15	Sat Nov 17 07:24:15 2018 Thread 1 advanced to log sequence 4936 (LGWR switch) Current log# 4 seq# 4936 mem# 0: /rdsdbdata/db/MYDB_A/onlinelog/o1_

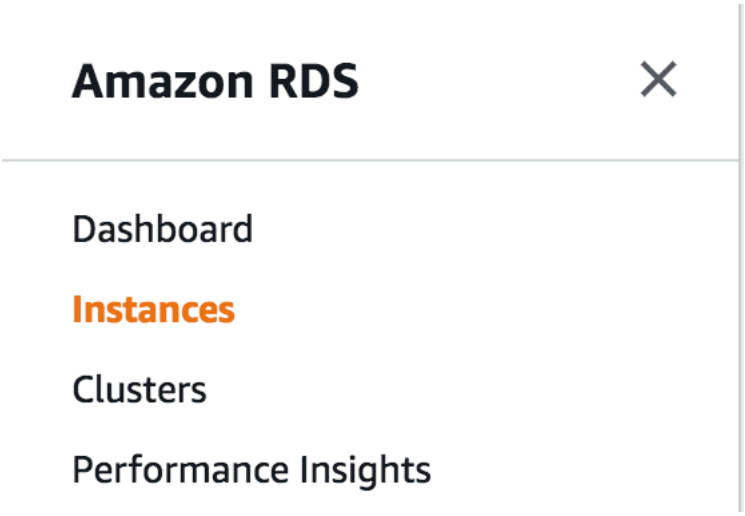
C) Enabling and accessing Performance Insights

1. We have already enabled the Performance insights for this instance with the previous modification. Accessing Performance Insights require "**AmazonRDSFullAccess**" permissions from AWS Identity and Access Management (IAM).

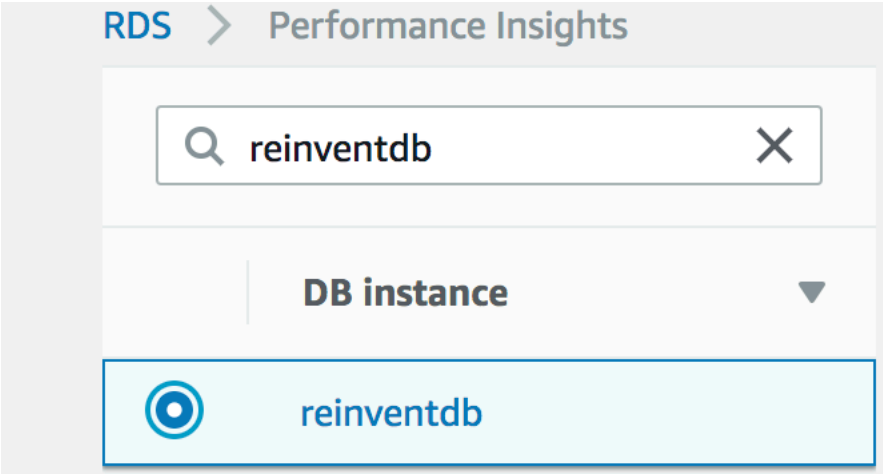
2. To access the Performance Insight Dashboard for specific RDS Database Instance is to go to the Instance page and select the desired Instance name and under the "current activity" column you will see the average number of sessions in last 5 minutes. Click on the "sessions" and it will take you to the Performance Insights Dashboard for that specific Instance.



3. Another way to access Performance Insights, go to the RDS homepage and click on the Performance Insights tab on the left-hand side

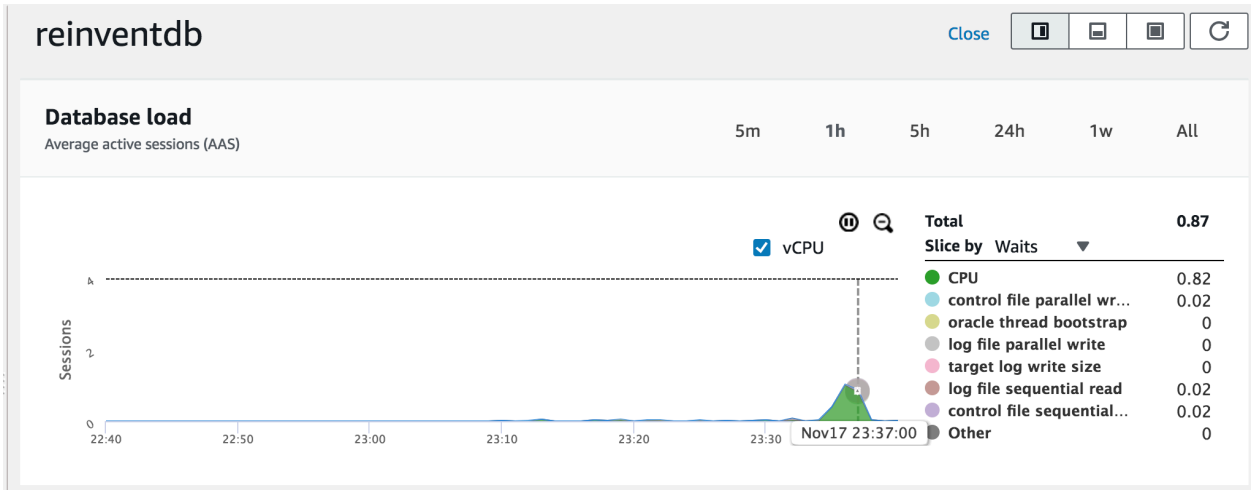


On the next screen type the instance name you want to monitor (in this your RDS Oracle Database Instance) and click on the Instance name

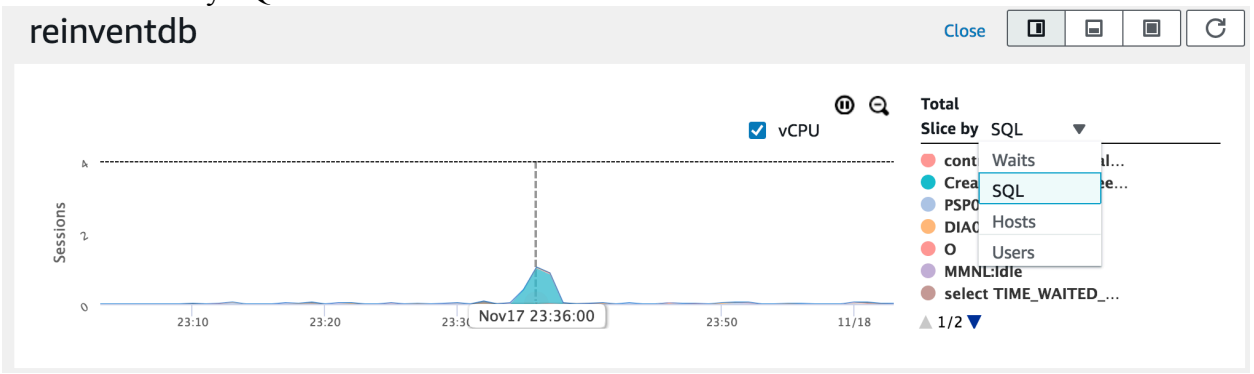


4. With the Performance Insights dashboard, you can visualize the database load and filter the load by waits, SQL statements, hosts, or users. The central metric for Performance Insights is DB Load, which represents the average number of active sessions for the DB engine. An active session is a connection that has submitted work to the DB engine and is waiting for a response from it. The Dashboard is divided into 2 sections on the top half it shows “DB Load” sliced by waits/SQLs/Hosts and users and the bottom half is displayed by either waits/SQLs/Hosts or users for that specific time period

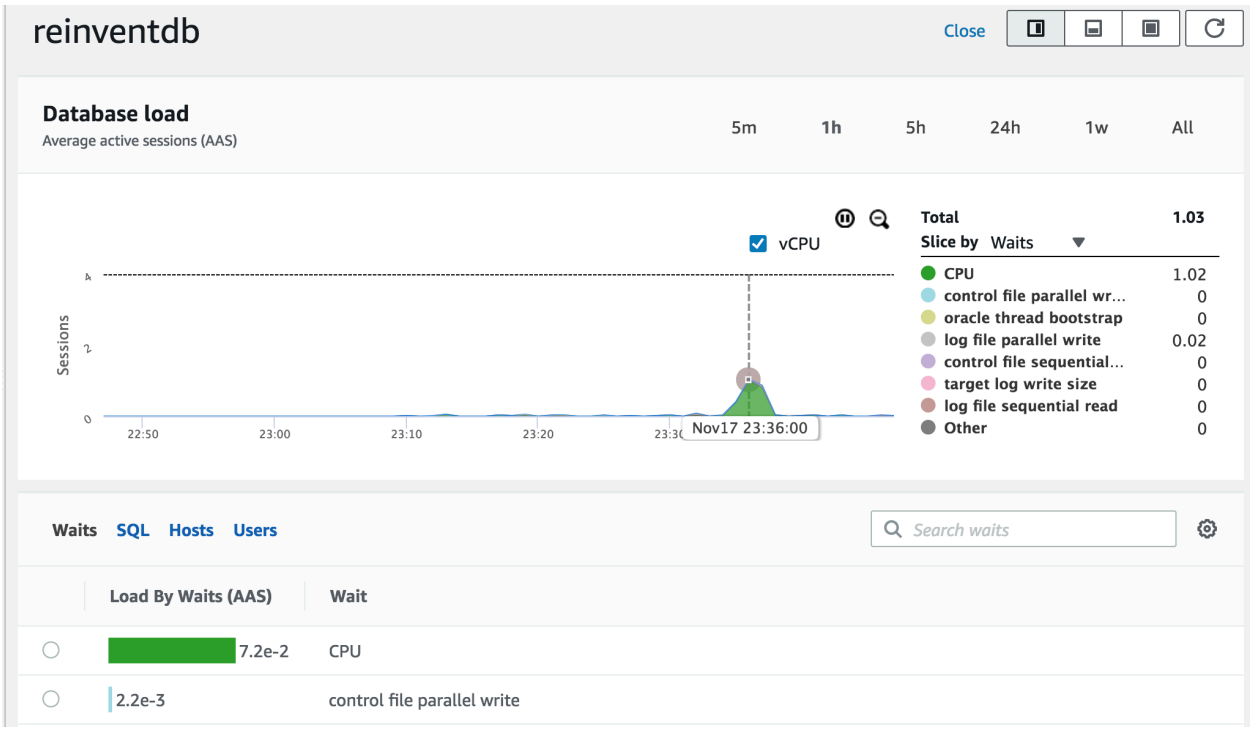
   Database Load by Waits (default)



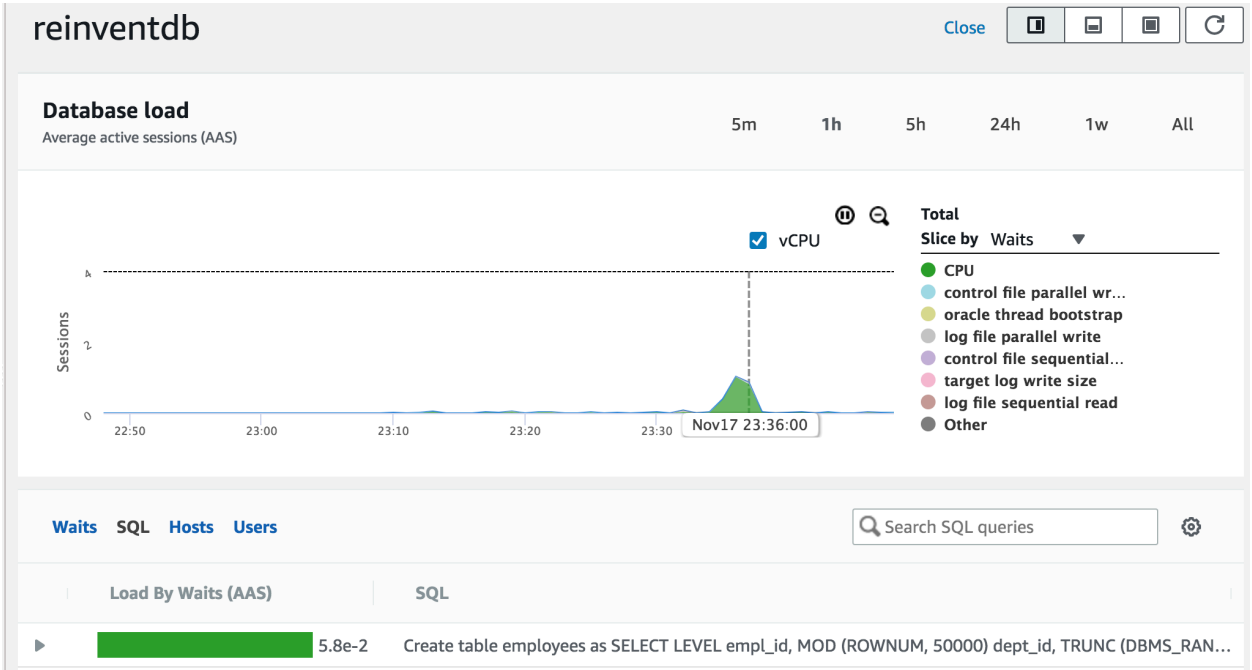
Database load by SQL



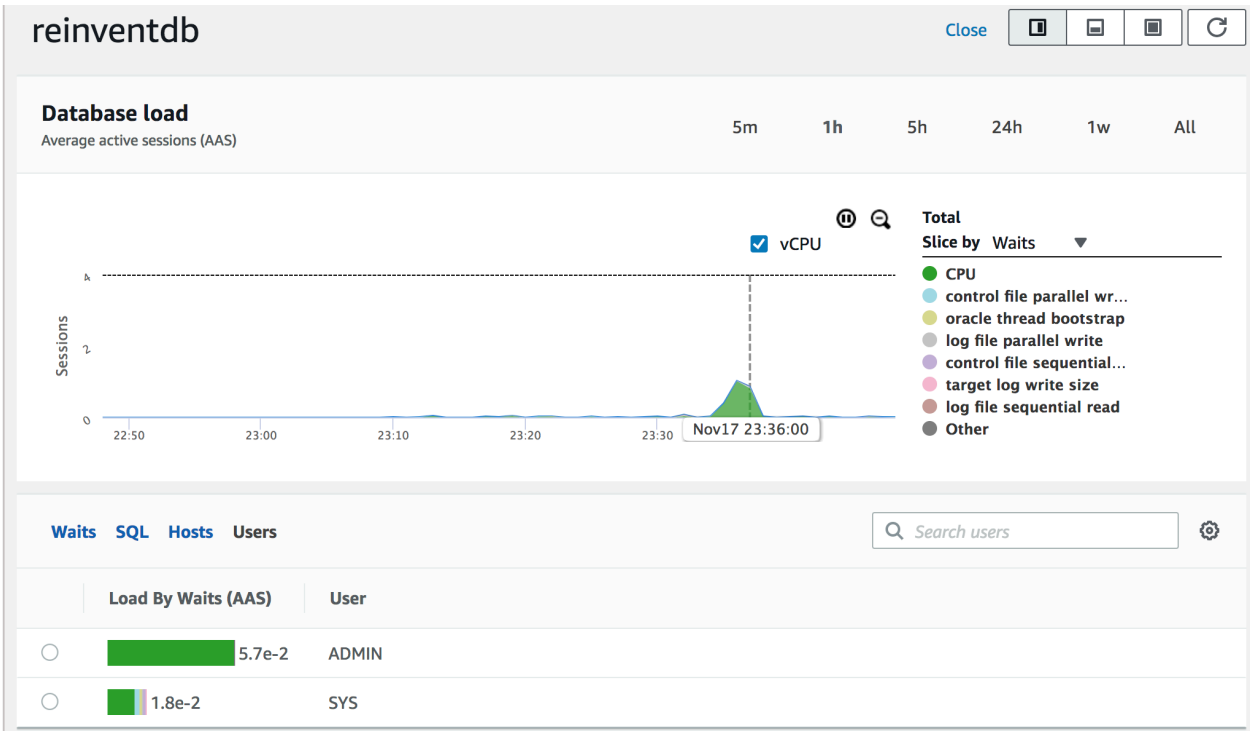
Database Load by waits displayed by top waits



Database Load by waits displayed by top SQLs



Database Load by waits displayed by top users



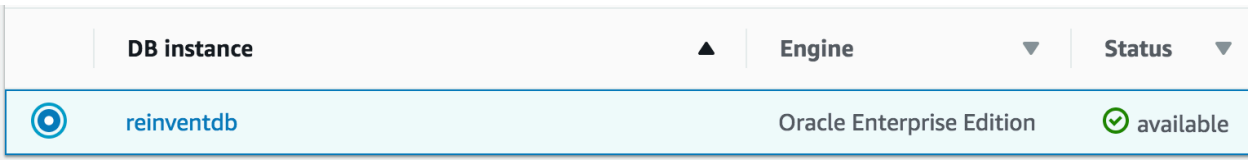
Lab 6: Minor Version upgrade of RDS Oracle DB (ETC ~12 -18 minutes)

1. Verify the current PSU of your Database Instance, connect to the RDS Oracle Database instance from SQL*PLUS and run the following command

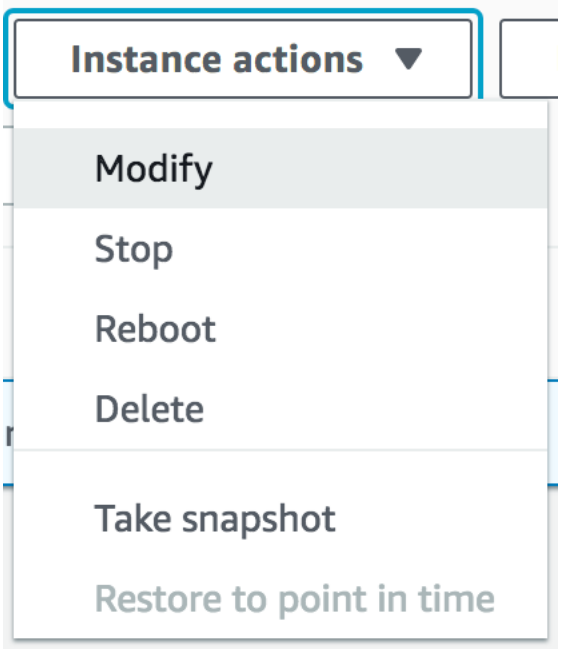
SQL> set serveroutput on
SQL> exec DBMS_QOPATCH.GET_SQLPATCH_STATUS;

```
SQL> set serveroutput on
SQL> exec DBMS_QOPATCH.GET_SQLPATCH_STATUS;

Patch Id : 27923320
        Action : APPLY
        Action Time : 24-SEP-2018 07:04:33
        Description : Database PSU 12.1.0.2.180717, Oracle JavaVM Component (JUL2018)
        Logfile :
/rdsdbbin/oracle/cfgtoollogs/sqlpatch/27923320/22224206/27923320_apply_ORCL_2018
Sep24_07_04_24.log
        Status : SUCCESS
```

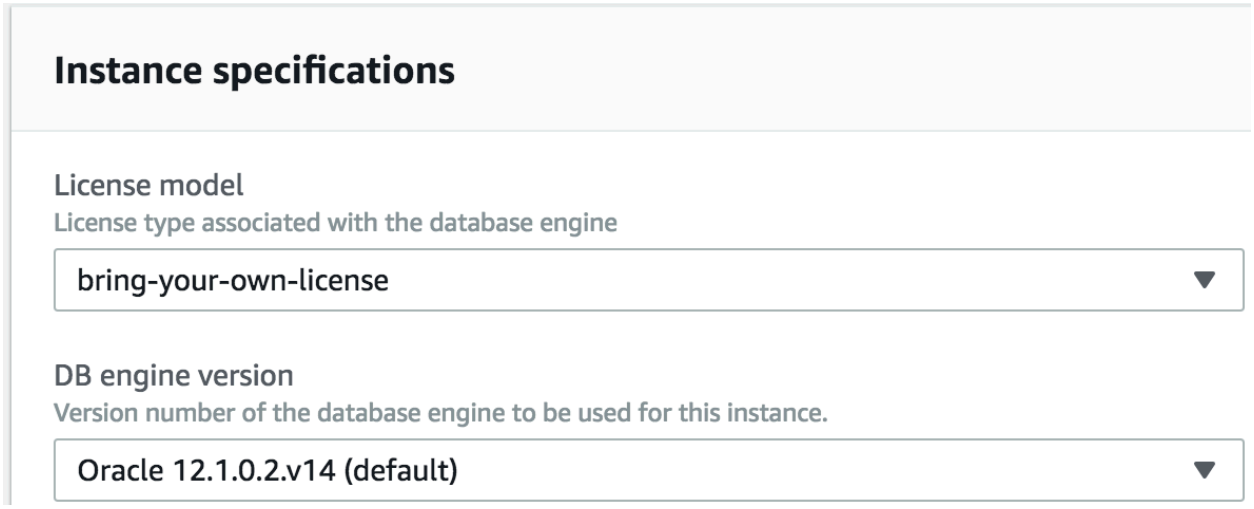
1. Find the newly created RDS Oracle instance under the "**Instances**" tab and click on the DB Instance name.



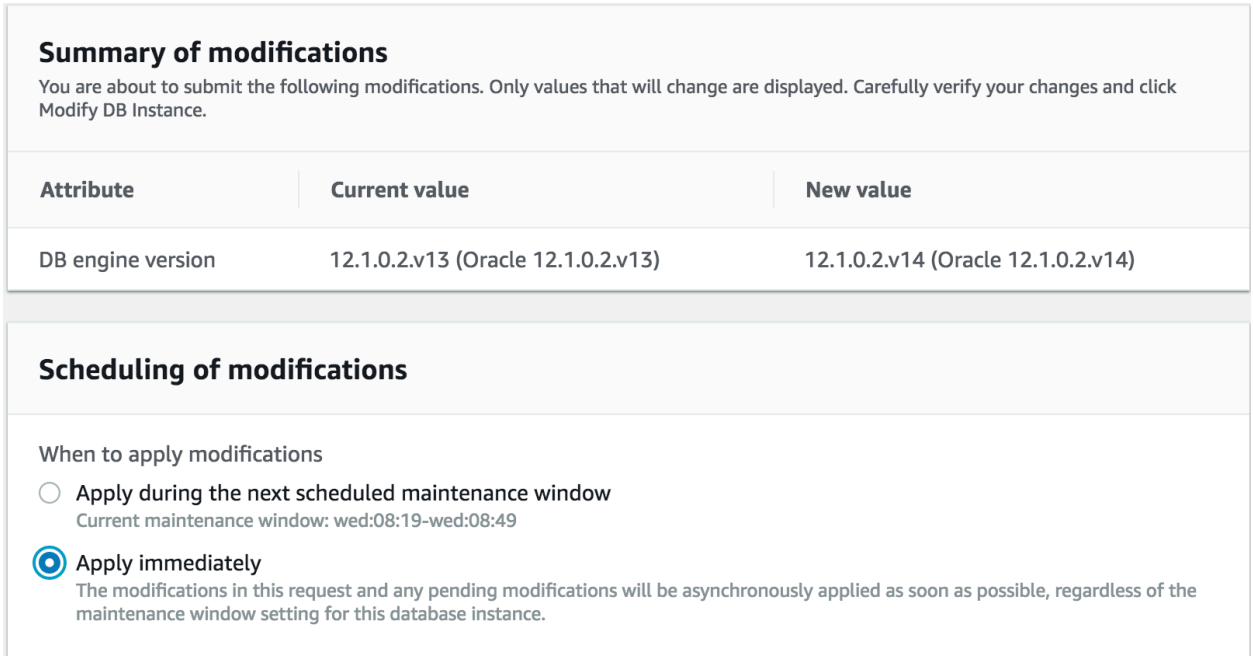
2. Click on the “Instance Actions” drop down on the right side and choose “Modify”



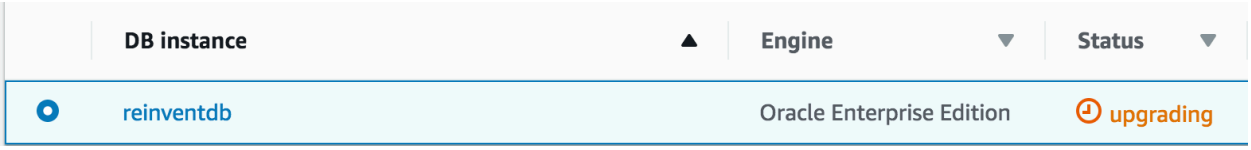
3. On the Modify DB Instance screen change “DB engine version” to “Oracle 12.1.0.2.v14” and leave all other fields as is



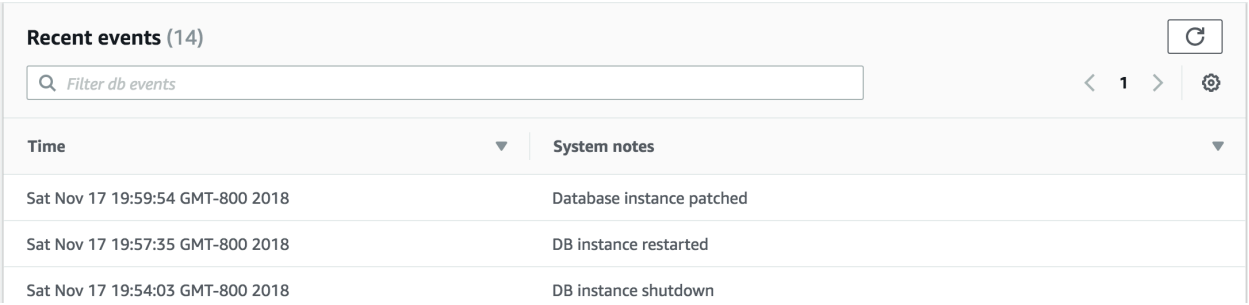
Click **Continue**



4. Click on "Modify DB Instance" to Upgrade the PSU on the Database Instance and the Instance status will change to "**upgrading**"



5. You can verify if the modification to the instance has been completed by looking under the "Recent Events" section on the Instance Details page.



6. Once the DB Instance is patched, query the Database to verify the PSU installation

SQL> set serveroutput on
SQL> exec DBMS_QOPATCH.GET_SQLPATCH_STATUS;

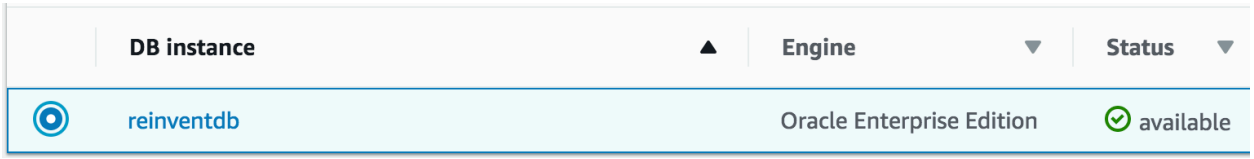
Output is truncated to show the latest PSU

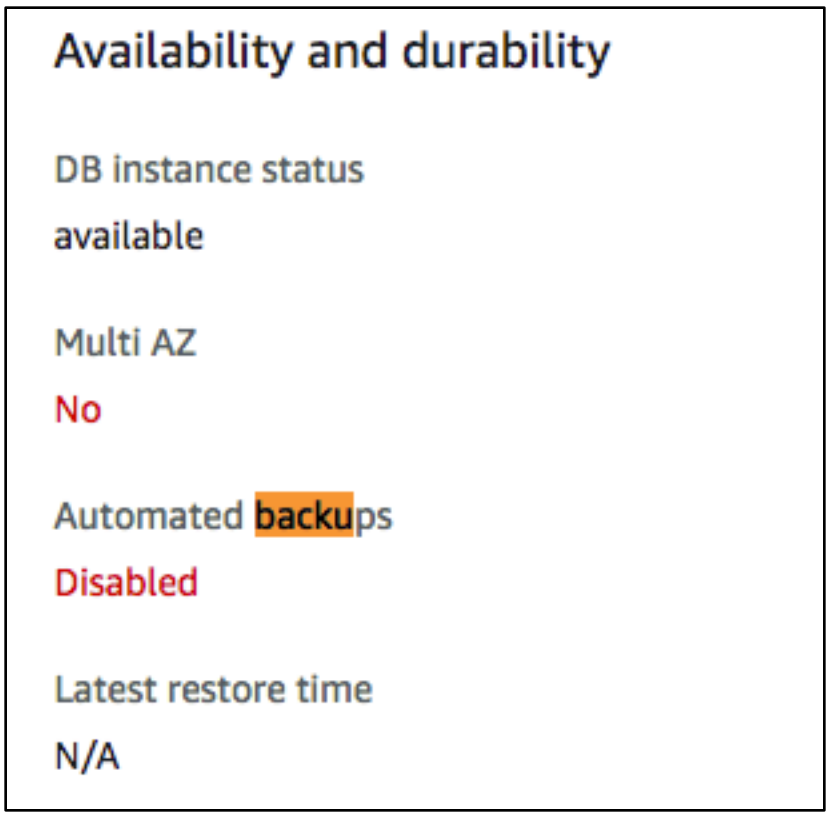
```
SQL> set serveroutput on
SQL> exec DBMS_QOPATCH.GET_SQLPATCH_STATUS;

Patch Id : 28440711
        Action : APPLY
        Action Time : 18-NOV-2018 03:56:10
        Description : Database PSU 12.1.0.2.181016, Oracle JavaVM Component (OCT2018)
        Logfile :
/rdsdbbin/oracle/cfgtoollogs/sqlpatch/28440711/22440644/28440711_apply_MYDB_2018
Nov18_03_56_04.log
        Status : SUCCESS
```

Lab 7: Backup and restore for RDS Oracle DB Instance (ETC ~10 -15 minutes)

A) Automated Backups

1. Verify the Automated backup status for your instance on your Instance details page. Click on the Instances tab and select your instance and click to go to the Instance detail page and under the section "Availability and Durability" check the status of Automated backups.



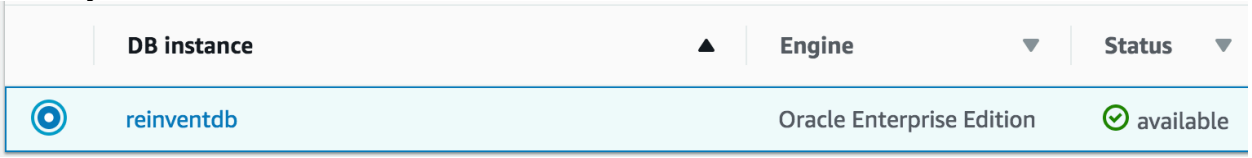


Also, from SQLPLUS

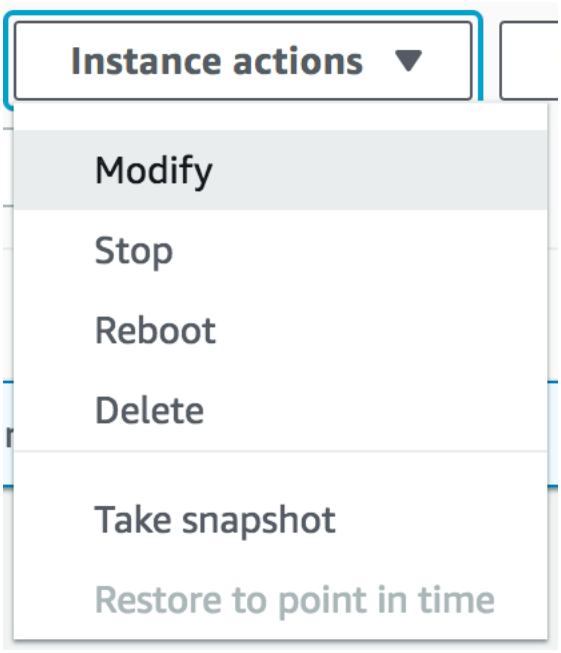
```
SQL> select log_mode from v$database;
```

```
SQL> select log_mode from v$database;

LOG_MODE
------------
NOARCHIVELOG

SQL>
```

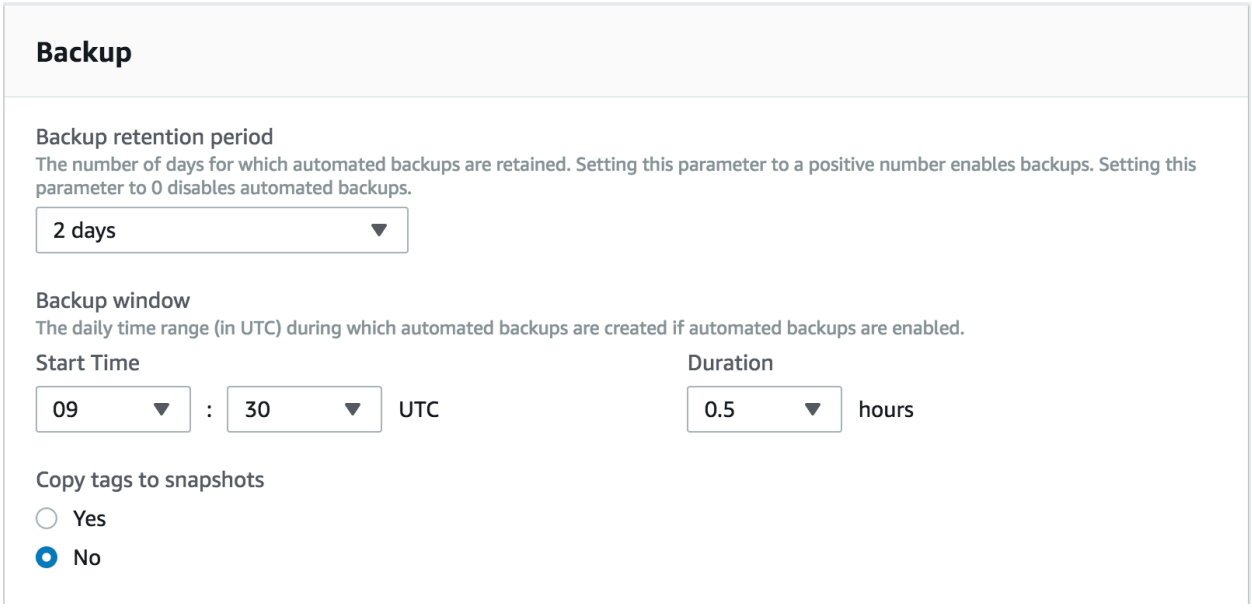
2. Enable Automated backups for your Instance
3. Select your instance from the Instance tab

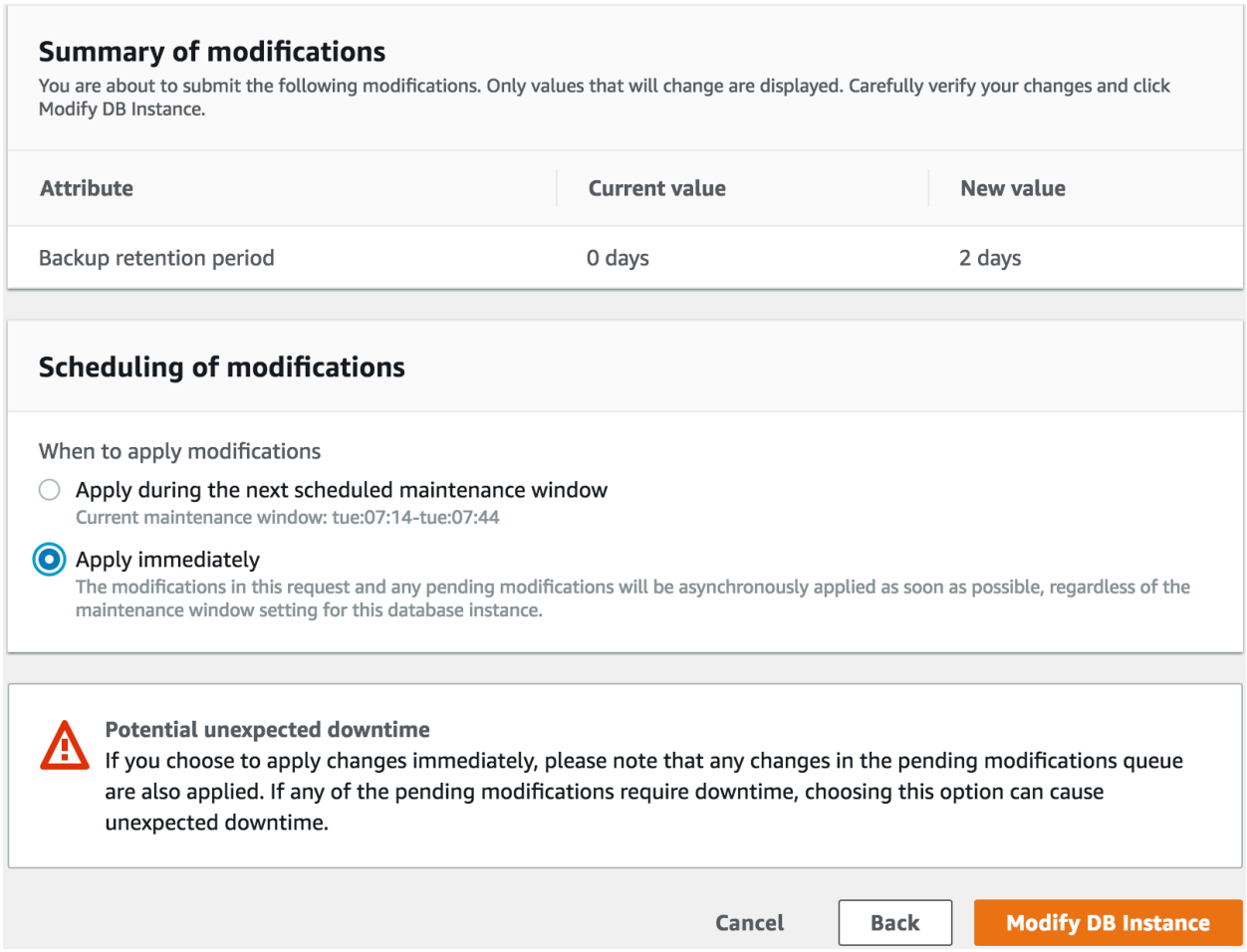


4. Click on the “Instance Actions” drop down on the right side and choose “Modify”



5. On the Modify DB Instance screen under the section backup change “Backup retention period” to 2





6. Click on "Modify DB Instance" to enable Automated backups for your DB instance.

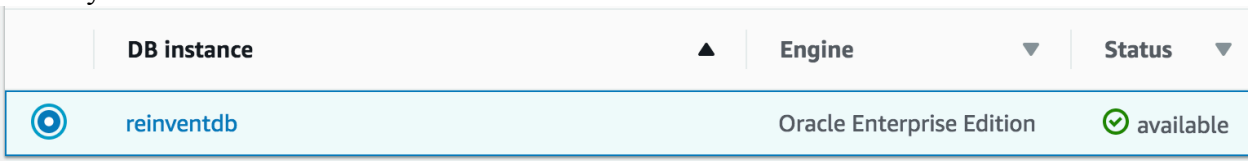
7. Verify that the Automated backups are enabled by querying for the Archivelog status of the Database.

```
SQL> select log_mode from v$database;
```

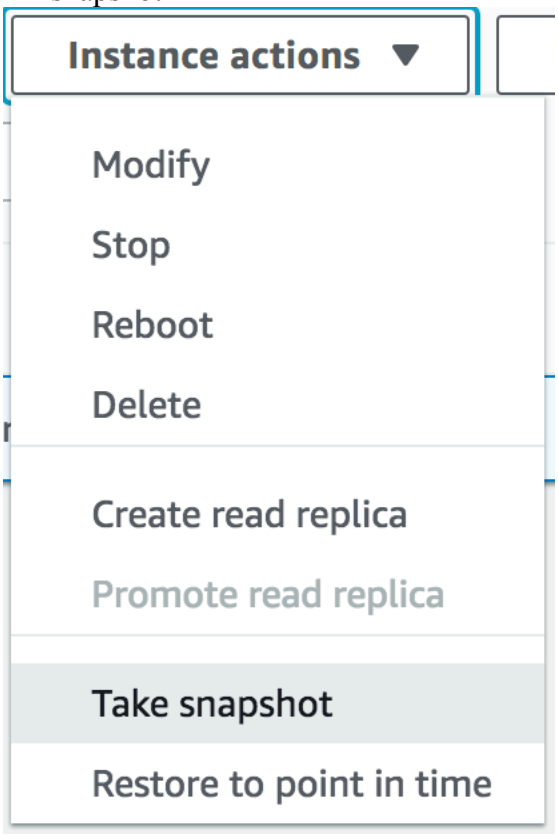
```
SQL> select log_mode from v$database;

LOG_MODE
------------
ARCHIVELOG

SQL>
```

B) Manual Backups

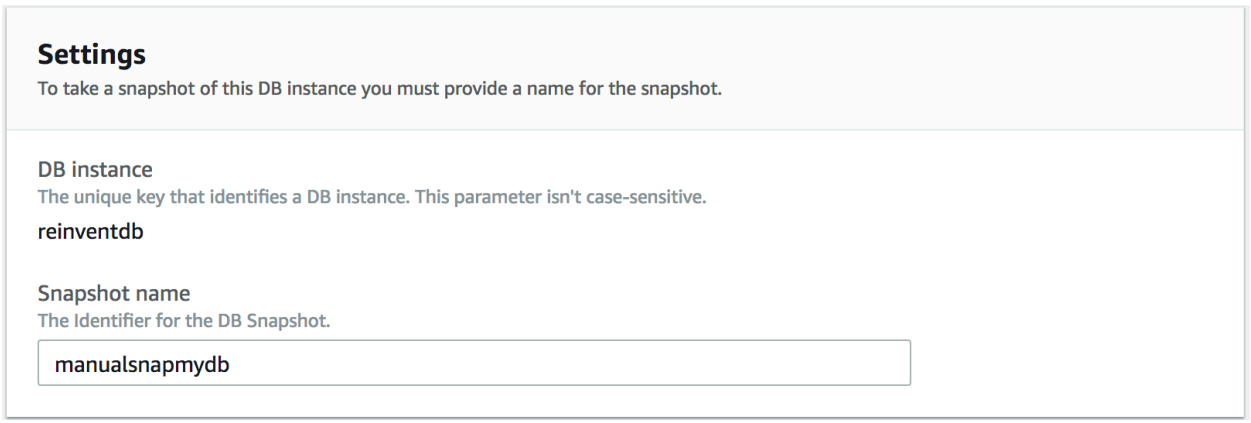
1. Select your instance from the Instance tab



2. Click on the “Instance Actions” drop down on the right side and choose “Take snapshot”

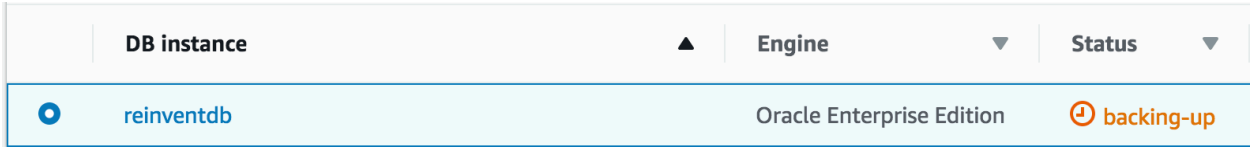


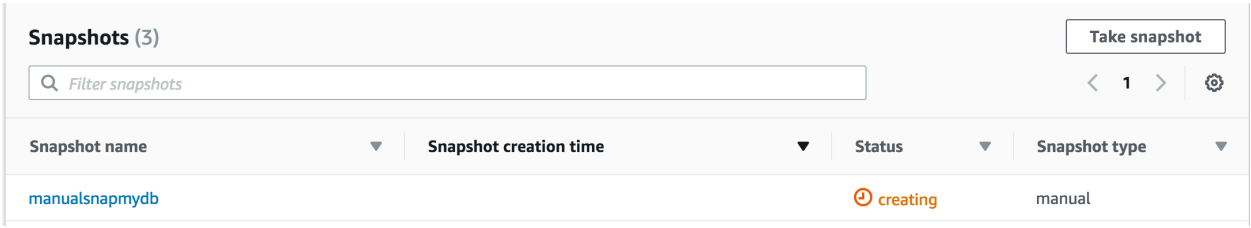
3. On the next screen provide input for the snapshot name <user defined name>
4. Click on “Take Snapshot” to create a manual snapshot



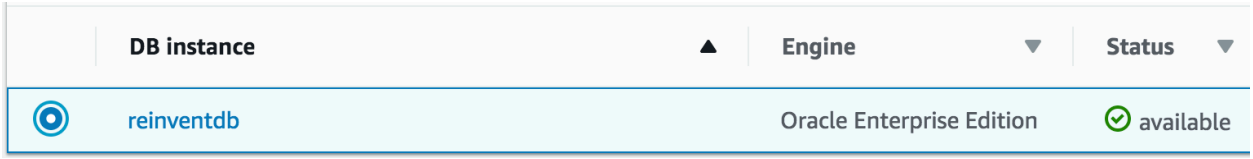
Click Take snapshot

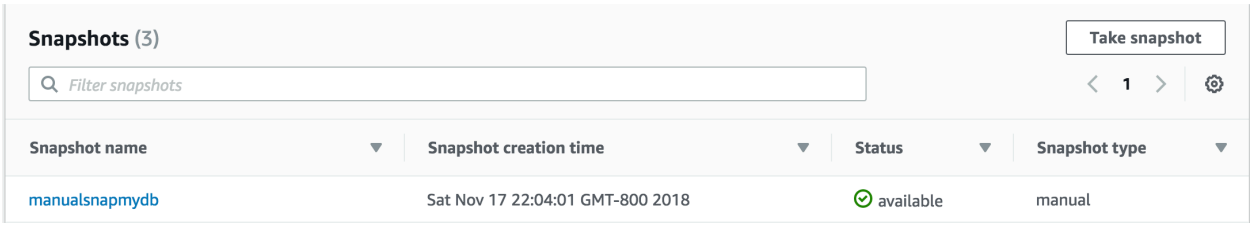
Verify the snapshot is getting created on the “details” page under snapshot section





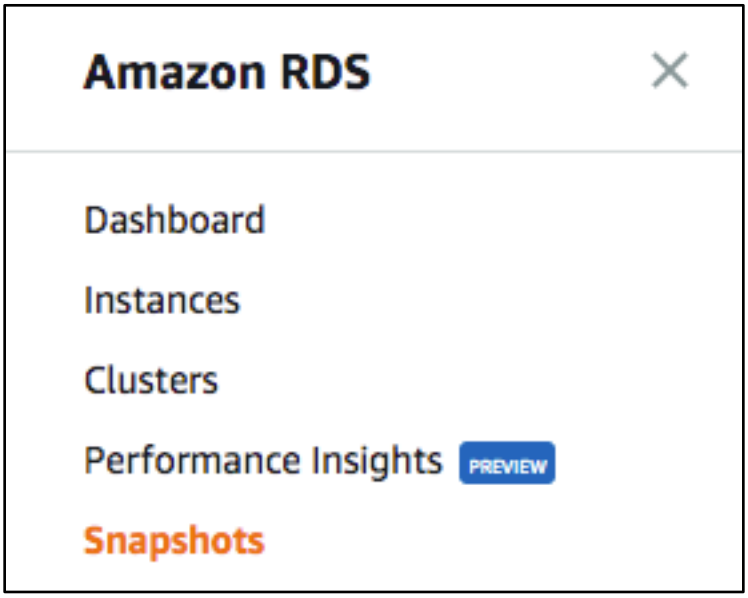
Once the snapshot is created and the instance status change to “available” verify the snapshot status change from “creating” to “available” under the snapshot section of the DB details screen



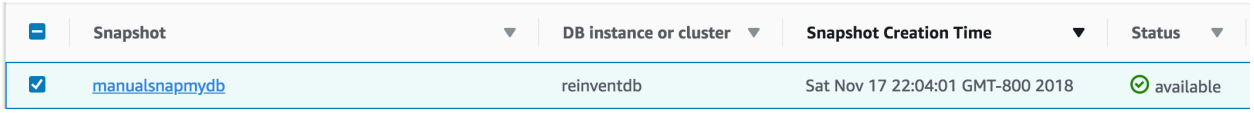


C) **Snapshot Restore on RDS Oracle**.

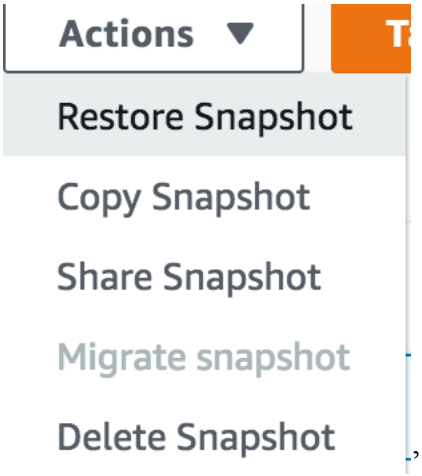
1. On the RDS home page click “Snapshots”



2. Select the snapshot of your Database which you plan to use for the Restore

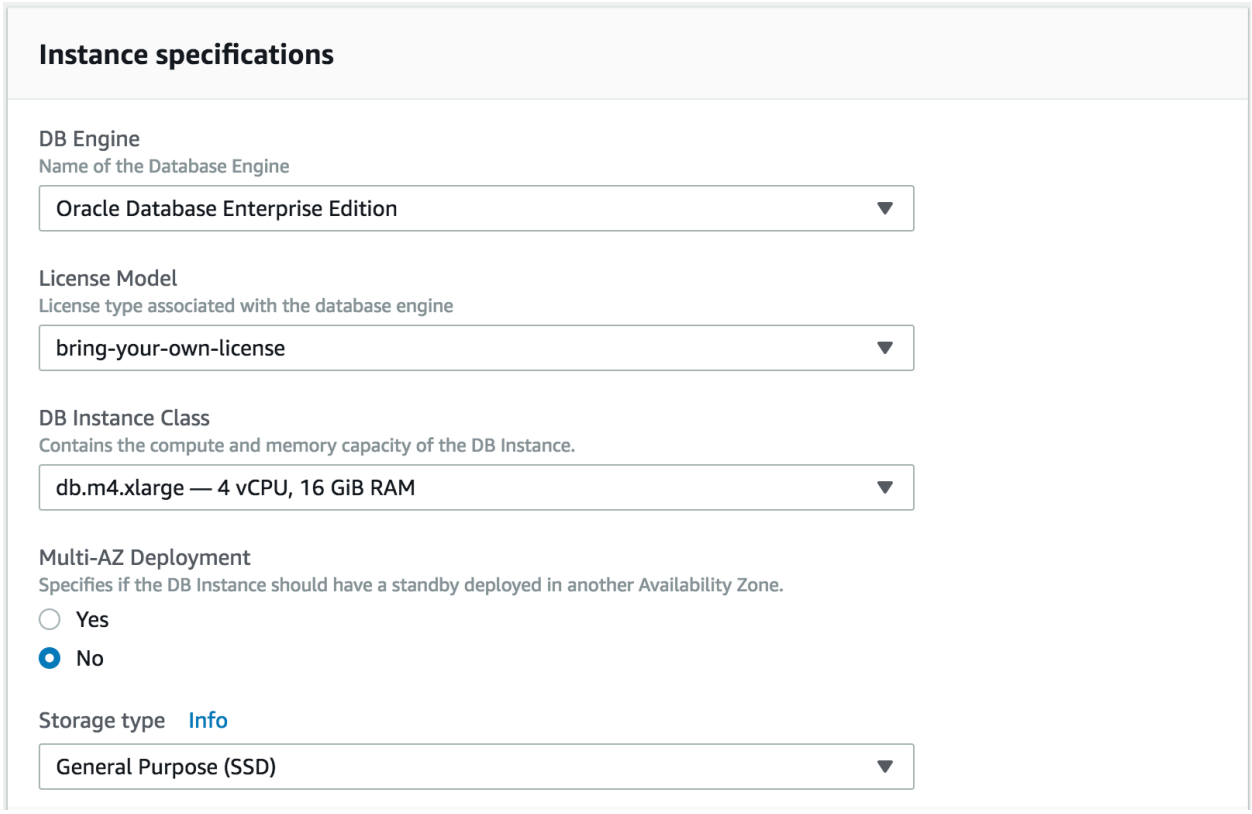


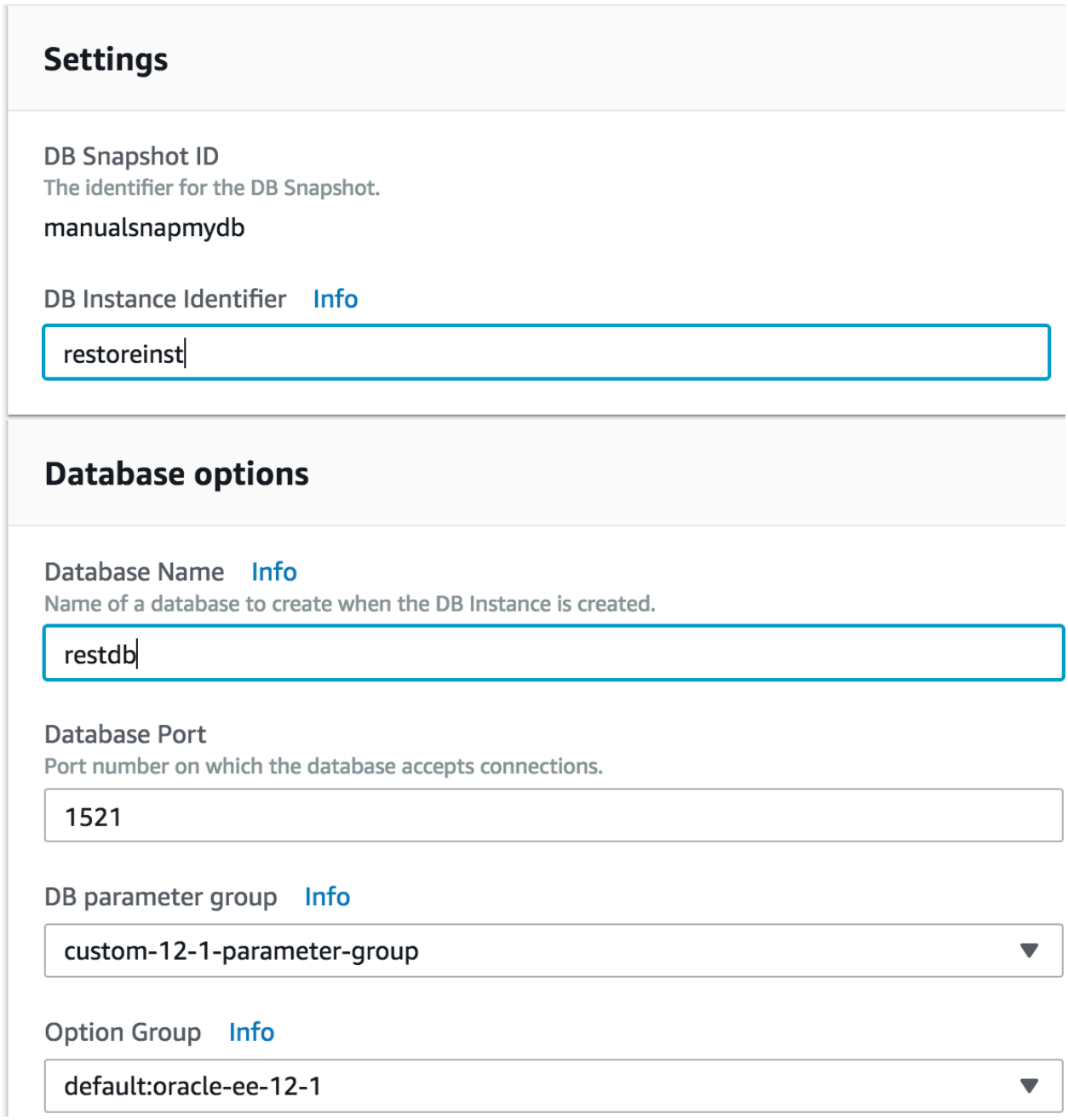
3. Click on the dropdown for “Snapshot Actions” and choose “Restore snapshot”



4. Provide the Input for the following fields to create a new RDS Oracle instance with the manual snapshot created above

DB Engine: - Oracle Database Enterprise Edition
License Model Info: - bring-your-own-license
DB Instance Class: - db.m4.xlarge
Multi-AZ deployment: - No
Storage Type: - General Purpose (SSD)
DB Instance Identifier: - <user defined name> e.g. restoreinst
DB Name – <user defined name> e.g. restdb
Leave all other fields as is and use defaults





5. Click on “Restore DB Instance” to create new RDS Oracle Instance using snapshot restore

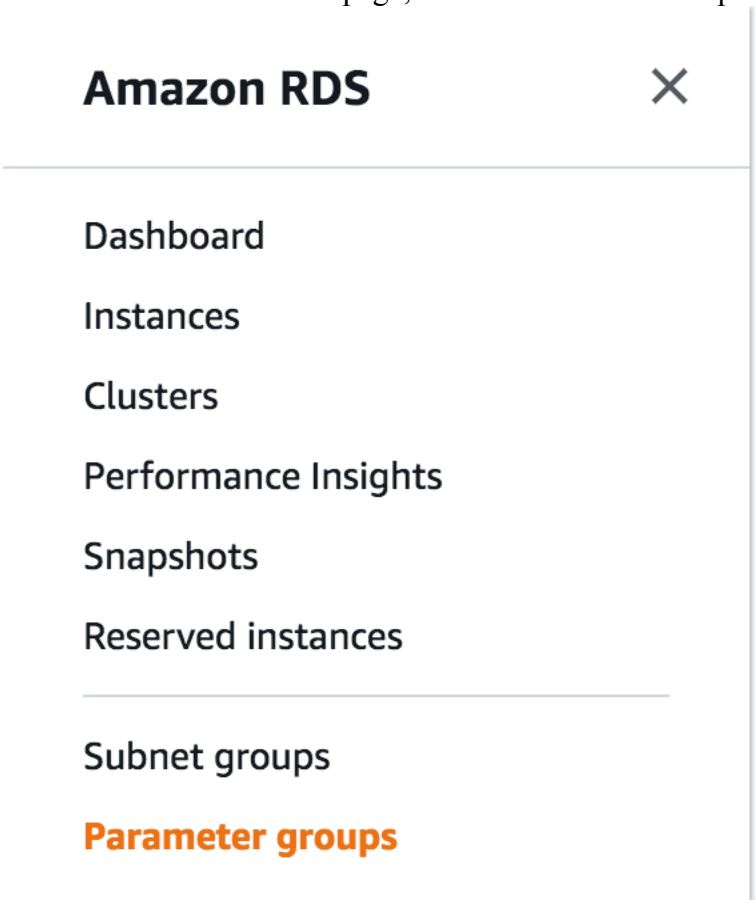
Verify the instance status of the restored Instance

	DB instance	Engine	Status
○	reinventdb	Oracle Enterprise Edition	available
◉	restoreinst	Oracle Enterprise Edition	creating

Lab 8: Parameter Groups and Option Groups on RDS Oracle (ETC ~10 -15 minutes)

A) Creating the Parameter Group

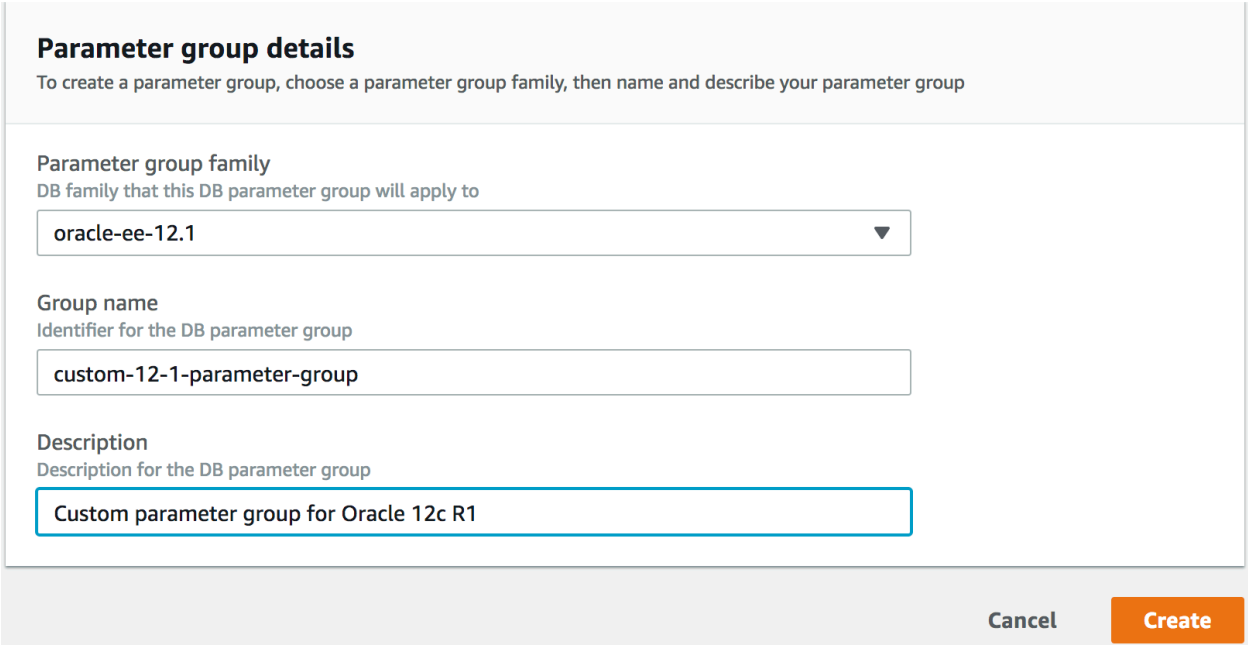
1. On the RDS home page, select "Parameter Groups "on the left-hand side.



2. Click on "Create Parameter Group"

3. On the Create Parameter group provide input as below

Parameter group family choose “oracle-ee-12.1”
Groupname – custom-12-1-parameter-group
Description - Custom parameter group for Oracle 12c R1



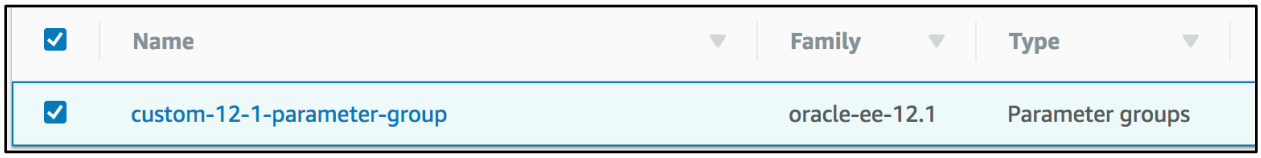
4. Click “create’ to create new parameter group

B) Modifying the Parameter in the parameter Group

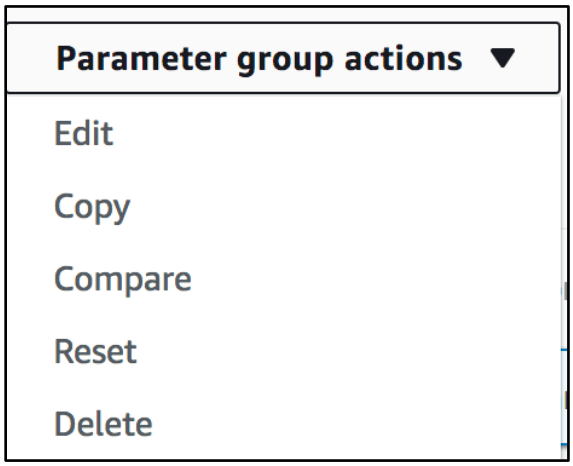
We will modify the parameter “Job_queue_process” from its default value of 50 to 100.
Verify the current value of the parameter by login to the Database

```
SQL> show parameter job_queue

NAME                                 TYPE        VALUE
------------------------------------ ----------- ---------
job_queue_processes                  integer     50
SQL>
```

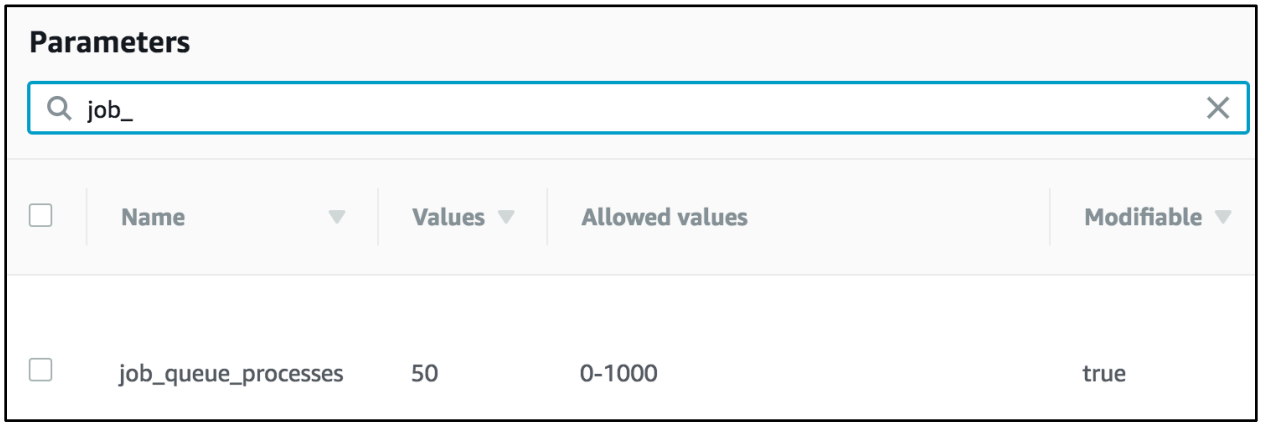
1. Click -> Parameter groups on RDS home page and Select the parameter group created by you



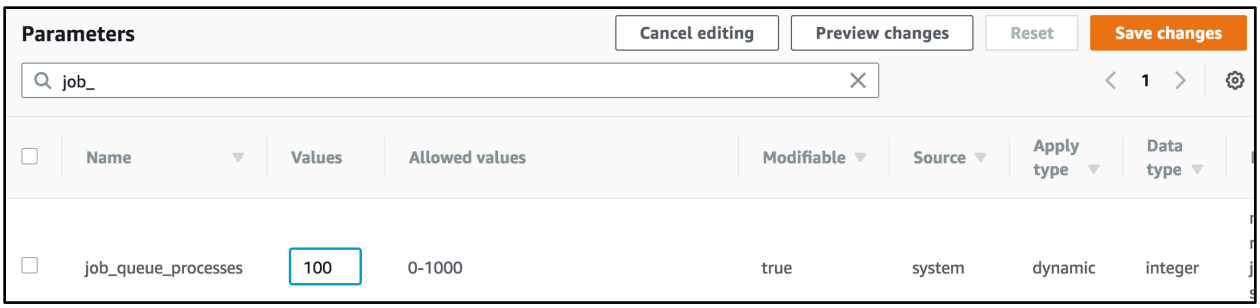
2. Click on the dropdown on the “Parameter group actions” click Edit



3. Under the “filter parameters” type “job_queue_process” and click on “Edit parameters”

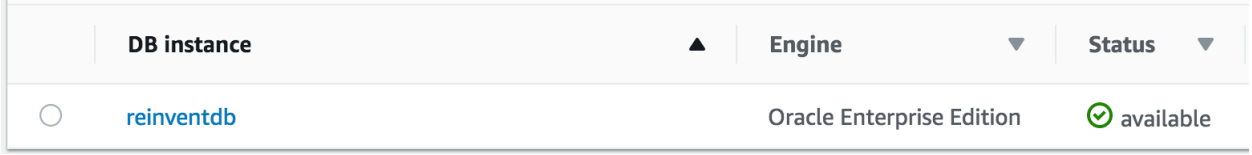


4. Change the value to 100 from the current value of 50 and click on save changes.

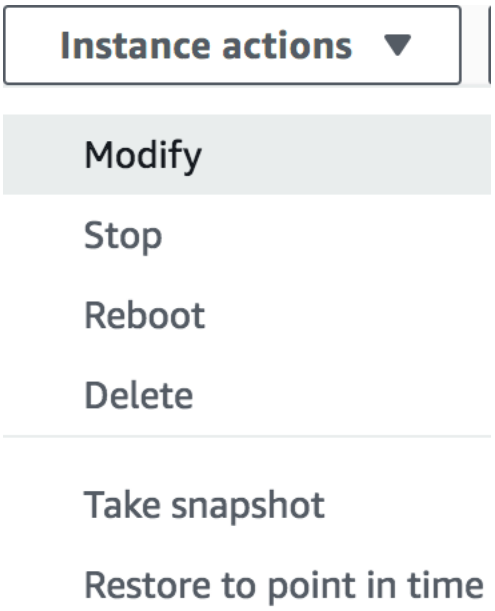


C) Associating new Parameter Group to your Instance

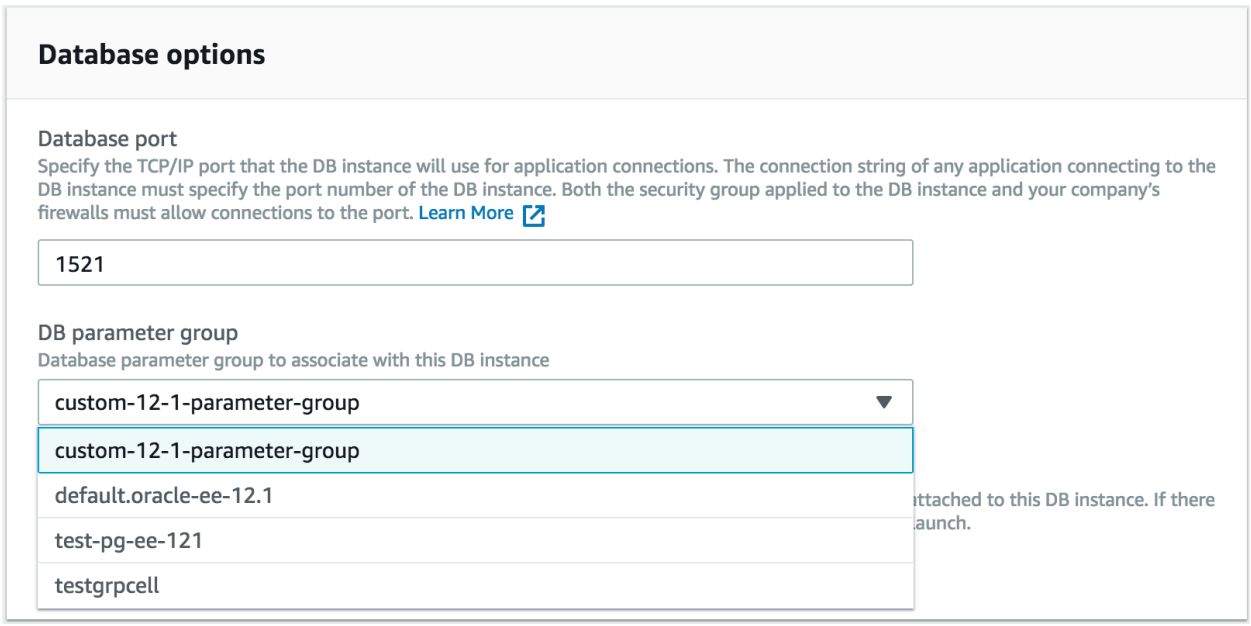
1. Select your instance from the Instance tab



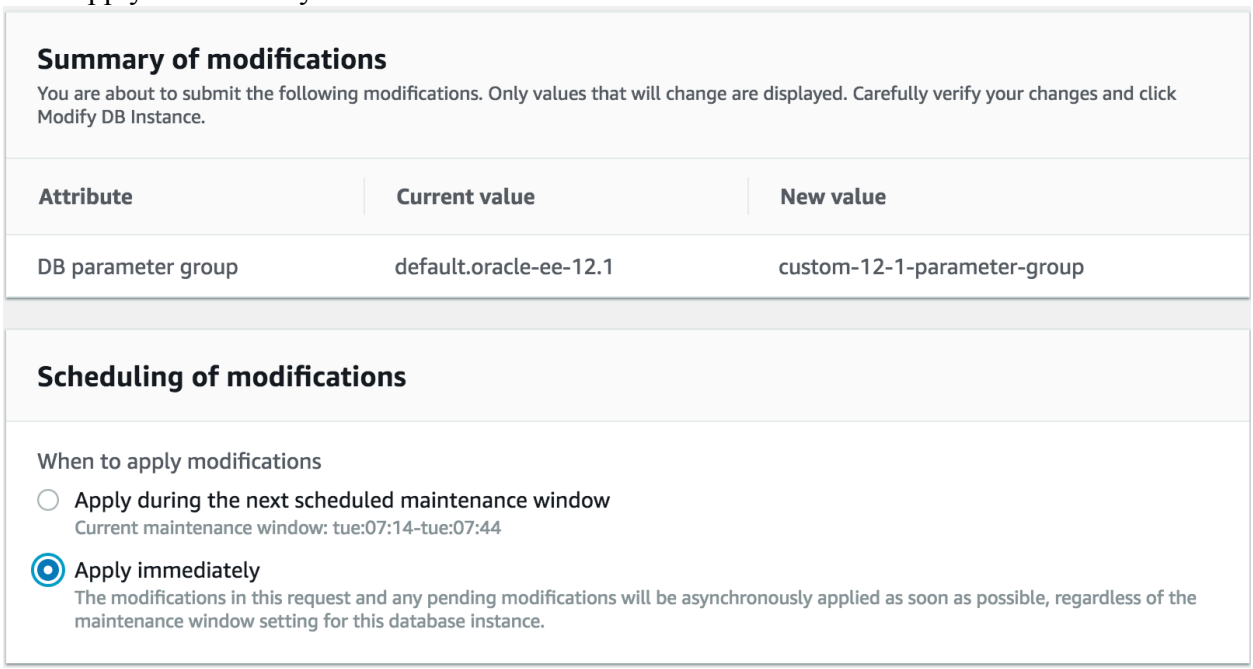
2. Click on the "Instance Actions" drop down on the right side and click "Modify"



3. On the next page under the "Database Options" change the "DB Parameter Group" from the dropdown to the new Parameter Group "custom-12-1-parameter-group "created in the previous step.



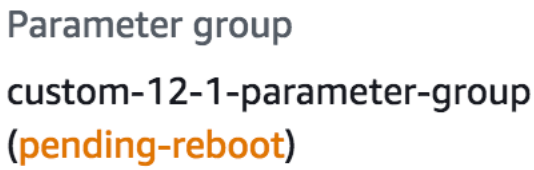
4. Click Continue to go the next page, under the "Scheduling of notifications" choose "Apply Immediately"



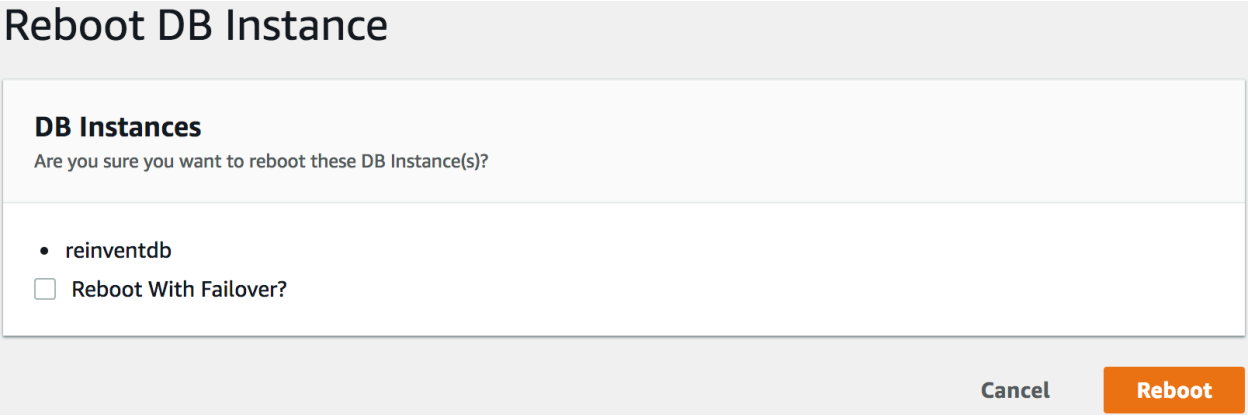
5. Click "Modify DB Instance" to apply the changes on the DB instance.

6. Once the modify instance task is completed, this can be verified by looking at the status column for your Database instance on the Instances page. When the status column shows “available” it means the modification to the instance is completed.

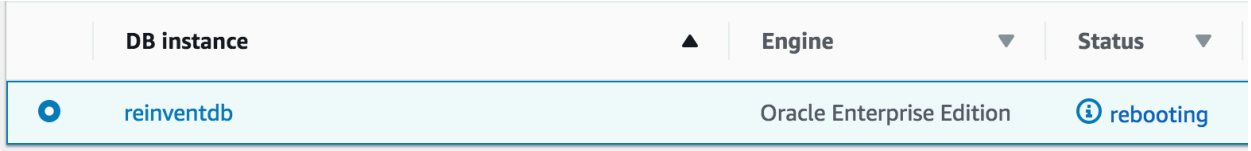
7. We need to reboot the Instance manually to apply the new parameter group to the Instance. This can be verified on the Instance details page under the parameter Group section which will show “Pending-reboot”



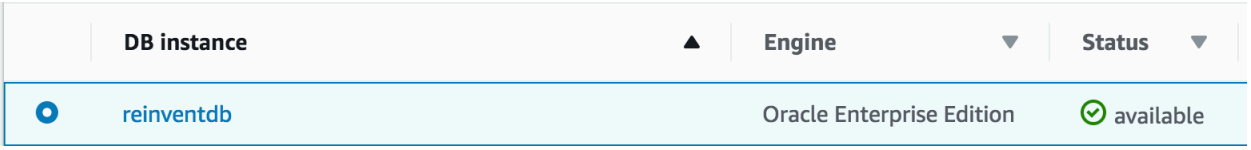
8. Reboot the instance manually, choose your Instance from the RDS home page and under Instance actions choose “Reboot”. Since we are running the Instance in the multi-AZ mode we will have the option to do the “reboot with the failover”



9. Verify the status of the instance on the RDS home page



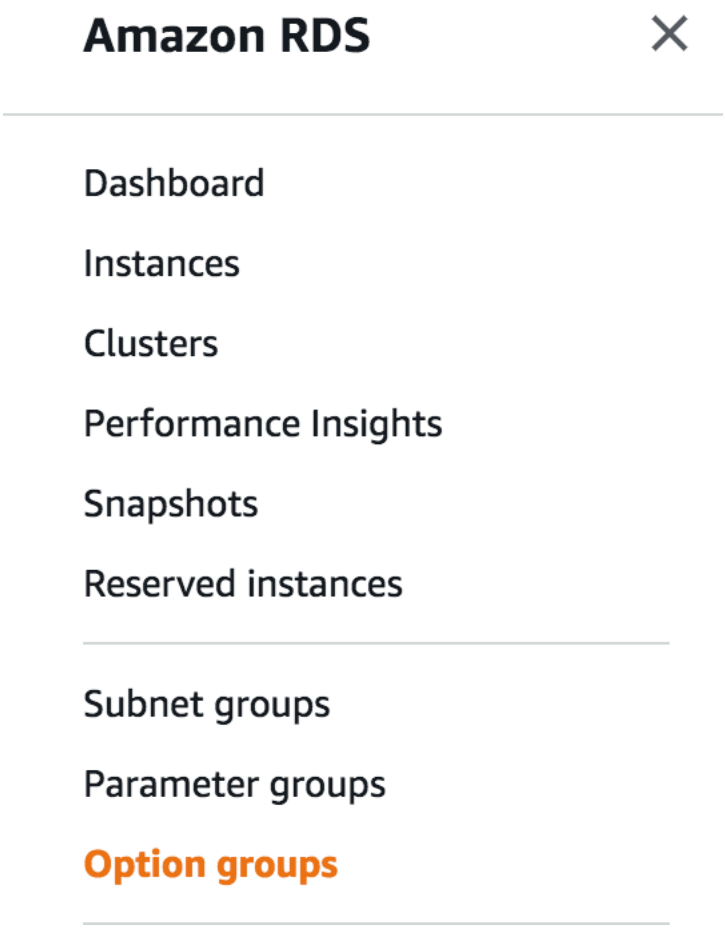
10. Once the status of the instance become available, verify the value of the parameter “Job_queue_process” to make sure it is change to 100.




```
SQL> show parameter job_queue

NAME                                 TYPE        VALUE
------------------------------------ ----------- ------
job_queue_processes                  integer     100
SQL>
```

D) Creating Option Groups

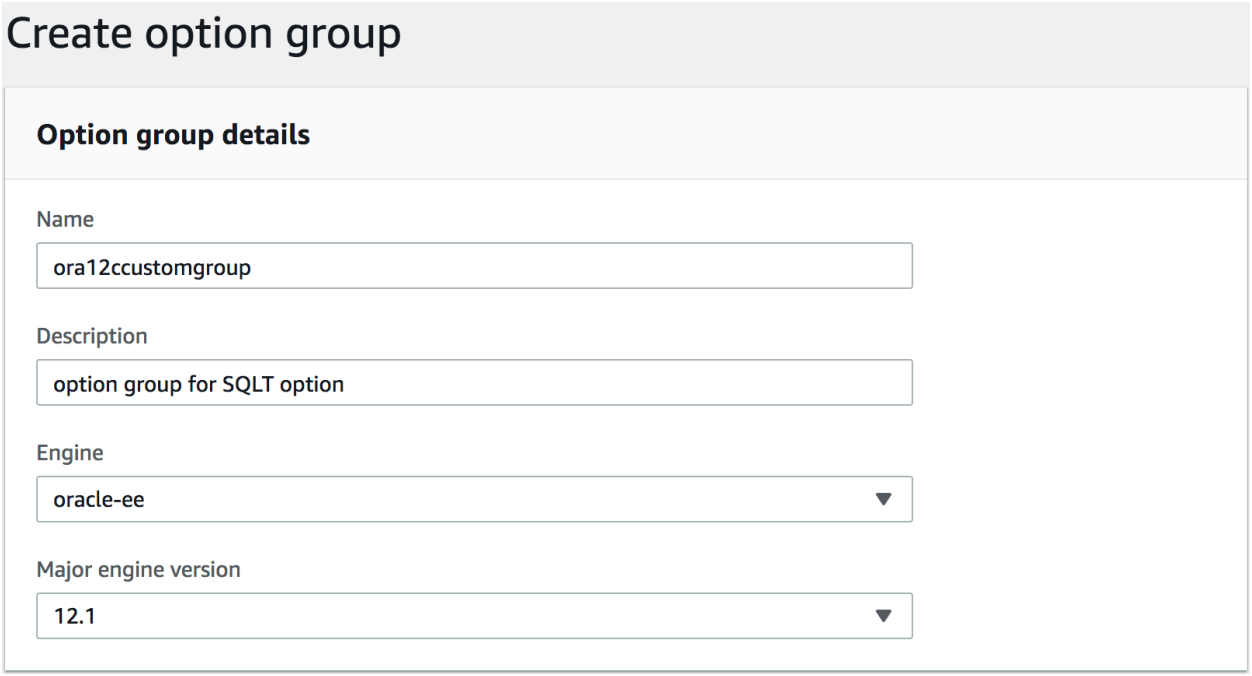
1. On the RDS home page, select “Option Groups “on the left-hand side.



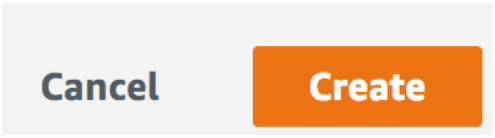
2. Click on the “Create Group” to create new option group

3. On the Create option group page provide the following inputs

   Name – User defined custom name (ora12ccustomgroup)
   Description – Description for the option group (option group for SQLT option)
   Engine – oracle - ee
   Major engine version – 12.1

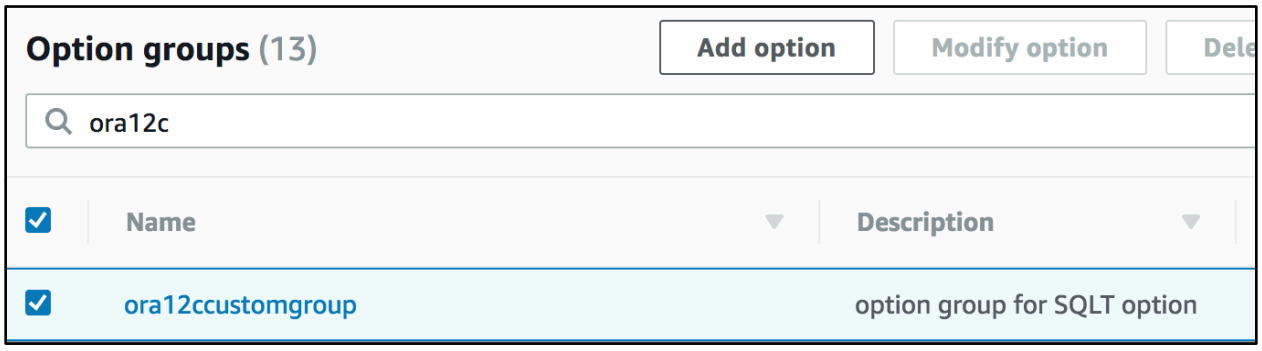


4. Click create to create new option group



E) Adding options to the Option Groups

1. On the RDS home page, click “Option Groups “on the left-hand side.
2. Select the option group created in the previous step and click on the “Add option”

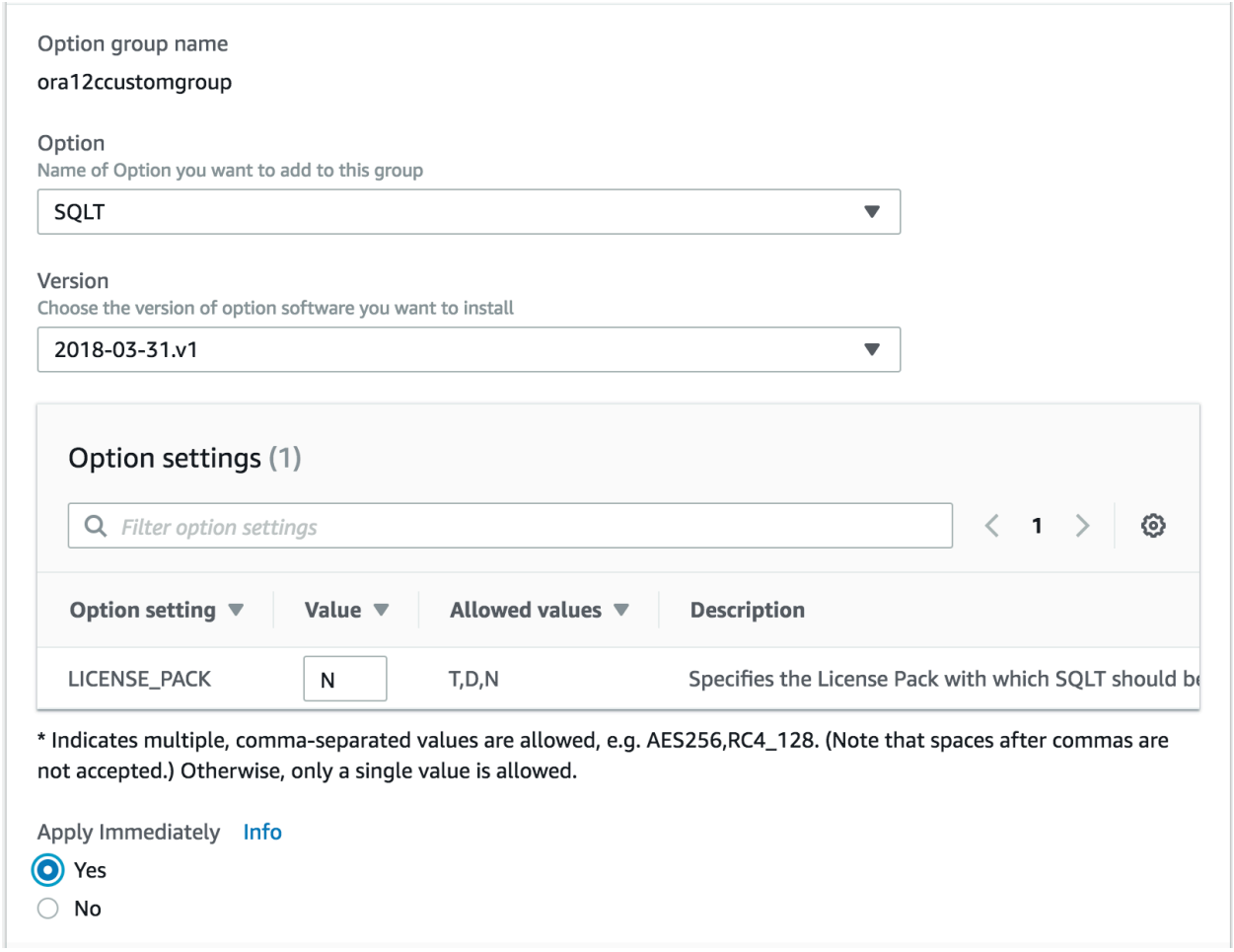


3. In this option Group, we are adding “SQLT” option, query the Database to verify it is not installed currently

SELECT sqltxplain.sqlt$a.get_param('tool_version') sqlt_version FROM DUAL;

```
SQL> SELECT sqltxplain.sqlt$a.get_param('tool_version') sqlt_version FROM DUAL;
SELECT sqltxplain.sqlt$a.get_param('tool_version') sqlt_version FROM DUAL
       *
ERROR at line 1:
ORA-00904: "SQLTXPLAIN"."SQLT$A"."GET_PARAM": invalid identifier


SQL>
```

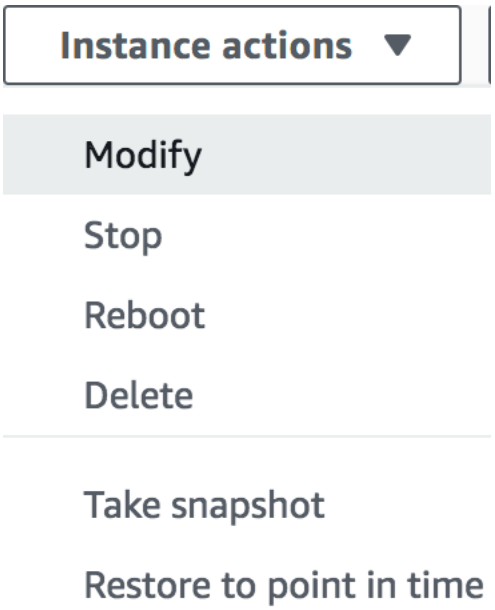
4. On the Option Details page, provide following inputs
   For the option, choose the option "SQLT" from the dropdown
   For the version field leave the default value
   For the License_pack field provide "T"
   Apply Immediately field provide "Yes"



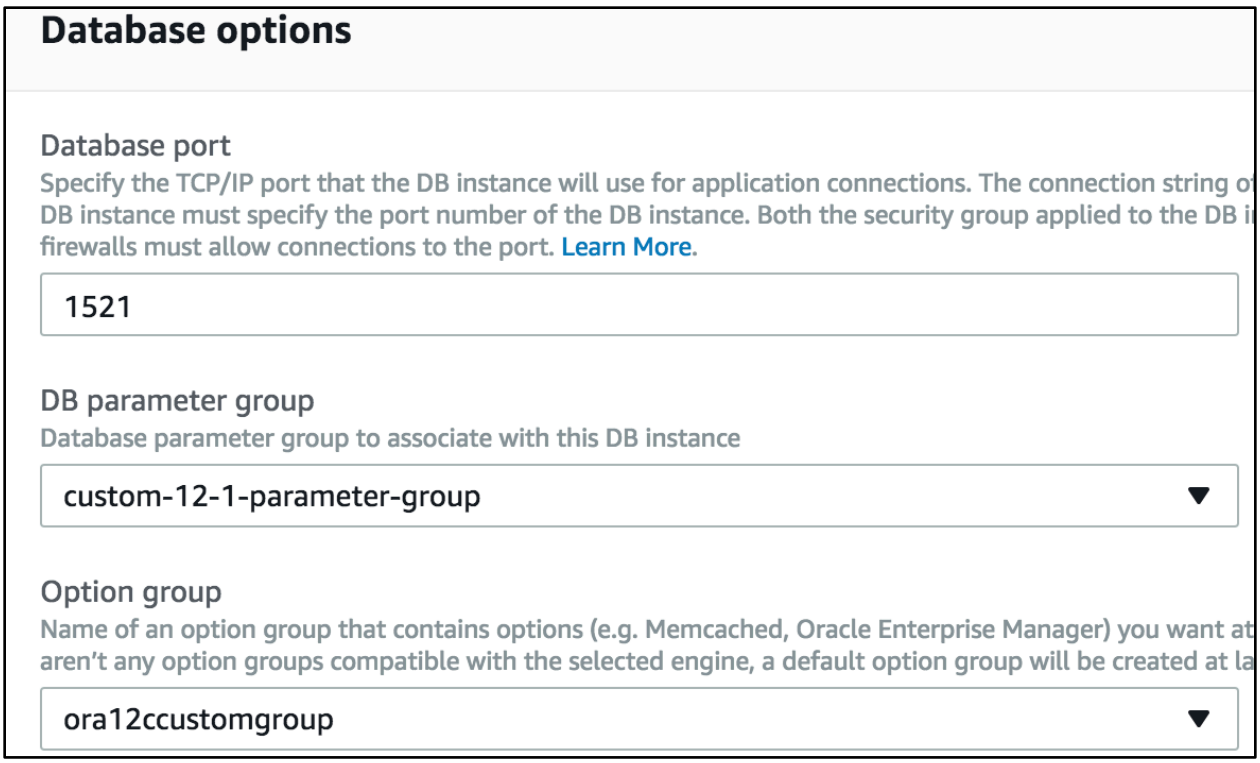
5. Click on the "Add option" to add SQLT to the option groups

F) Associating Option Group to your Instance

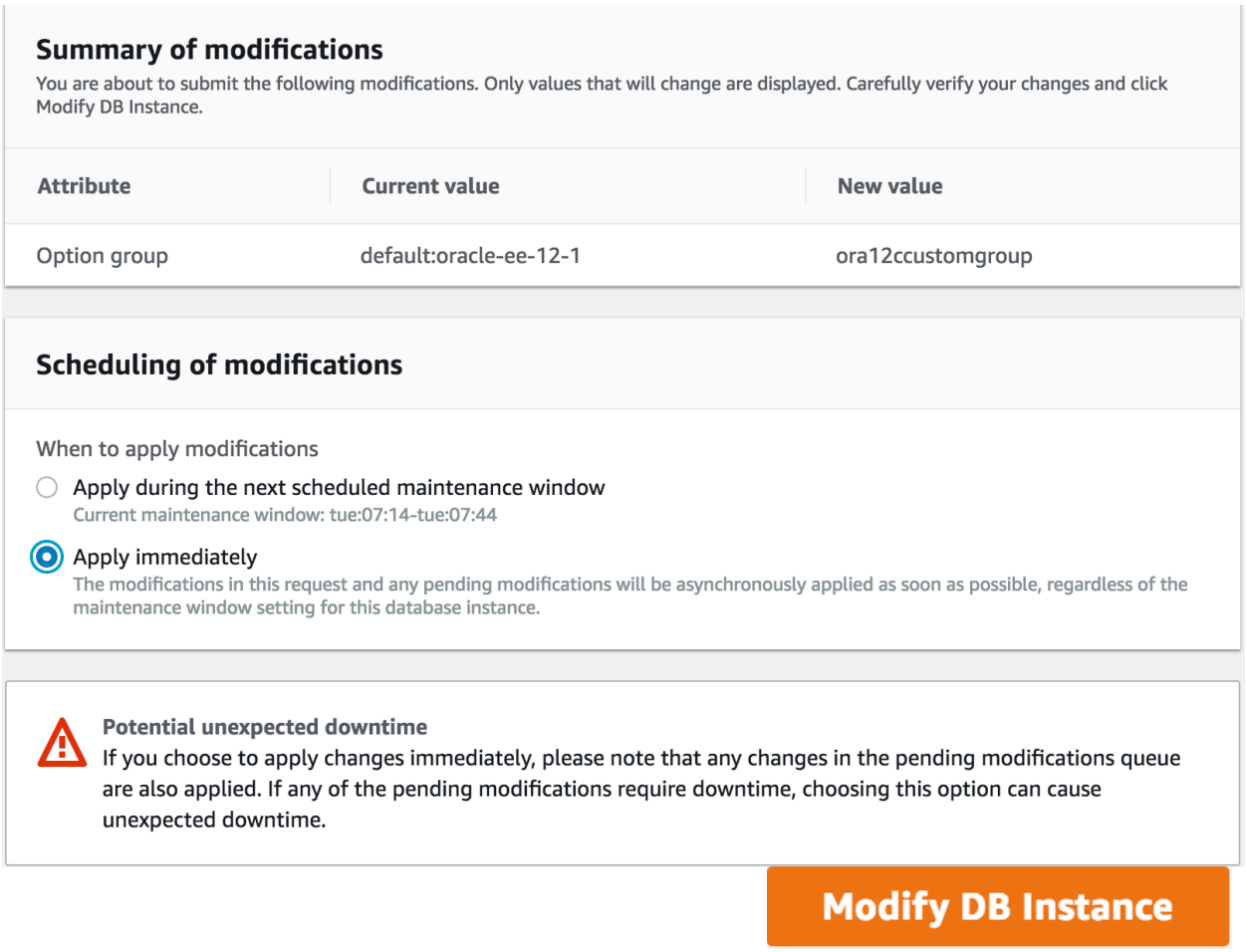
1. Select your instance from the Instance tab
2. Click on the “Instance Actions” drop down on the right side and click “Modify”



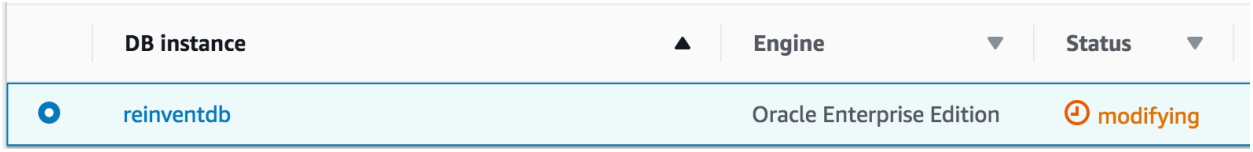
3. On the modify Instance page under the section “Database options” change the Option group from the dropdown and choose the newly created option Group with the SQLT option.



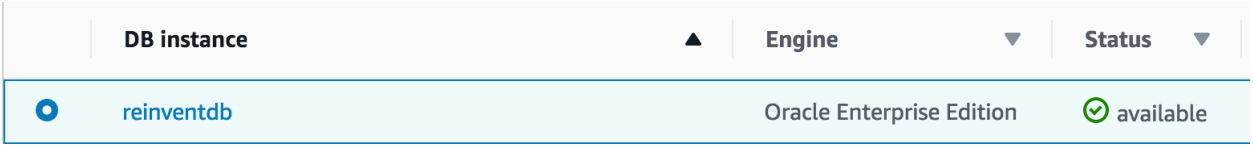
4. Click Continue to go to the next page
5. Under Scheduling of Modifications choose "Apply Immediately" and click "Modify DB Instance"



6. Check the status of Instance and wait till it become “available”



7. Once the status of the Instance becomes available, connect to the Database Instance and verify if the SQLT is installed on the Database.



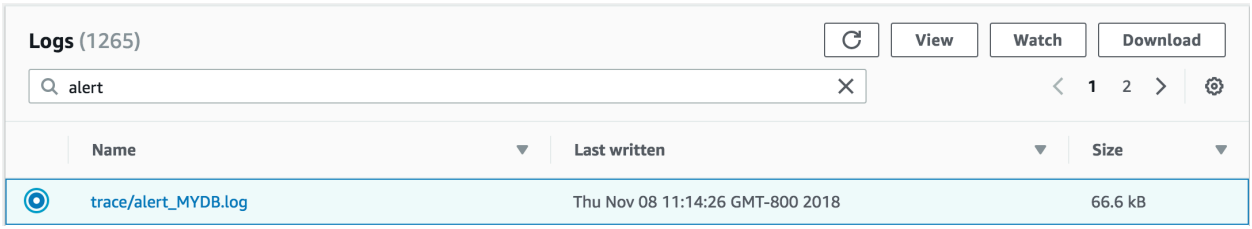
SELECT sqltxplain.sqlt$a.get_param('tool_version') sqlt_version FROM DUAL;

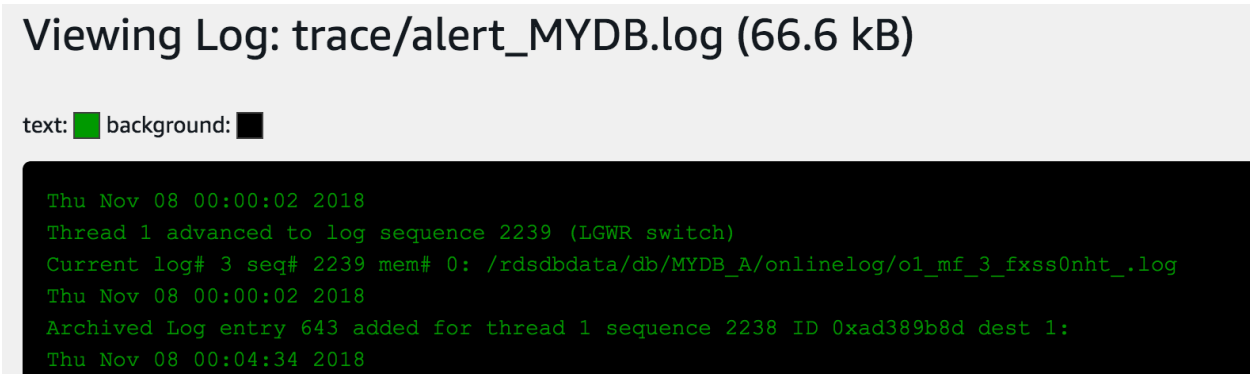
```
SQL> SELECT sqltxplain.sqlt$a.get_param('tool_version') sqlt_version FROM DUAL;

SQLT_VERSION
--------------------------------------------------------------------------------
12.2.180331

SQL>
```

Lab 9: Common DBA tasks on RDS Oracle (ETC ~10 -15 minutes)

https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/Appendix.Oracle.CommonDBATasks.Log.html

A) View/ Download Logs from AWS console





B) View logs using RDS PL/SQL packages

SQL>select message_text from ALERTLOG where rownum<=10 order by `indx;`

SQL> SELECT text FROM table(rdsadmin.rds_file_util.read_text_file('BDUMP','alert_MYDB.log'))

where rownum<=10;

C) Common DBA tasks for redo log, archive log and other logging.

1. Retaining Archived Log files, You can use the Amazon RDS procedure `rdsadmin.rdsadmin_util.show_configuration` to view how long archived redo logs are retained for your DB instance.

SQL> set serveroutput on
SQL> exec rdsadmin.rdsadmin_util.show_configuration ;

```
SQL> exec rdsadmin.rdsadmin_util.show_configuration;
NAME:archivelog retention hours
VALUE:24
DESCRIPTION:ArchiveLog expiration specifies the duration in hours before
archive/redo log files are automatically deleted.
NAME:tracefile retention
VALUE:10080
DESCRIPTION:tracefile expiration specifies the duration in minutes before
tracefiles in bdump are automatically deleted.

PL/SQL procedure successfully completed.

SQL>
```

2. Setting the retention of Archive log retention, you can use the Amazon RDS procedure rdsadmin.rdsadmin_util.set_configuration to retain archived redo logs. The below example set the archive retention to 48 hours.

```
SQL> begin
rdsadmin.rdsadmin_util.set_configuration(
name=> 'archivelog retention hours',
value=> '48');
end;
/
```

```
SQL>  begin
    rdsadmin.rdsadmin_util.set_configuration(
        name  => 'archivelog retention hours',
        value => '48');
end;
/   2    3    4    5    6
1 rows updated

PL/SQL procedure successfully completed.

SQL> exec rdsadmin.rdsadmin_util.show_configuration;
NAME:archivelog retention hours
VALUE:48
DESCRIPTION:ArchiveLog expiration specifies the duration in hours before
archive/redo log files are automatically deleted.
NAME:tracefile retention
VALUE:10080
DESCRIPTION:tracefile expiration specifies the duration in minutes before
tracefiles in bdump are automatically deleted.

PL/SQL procedure successfully completed.

SQL>
```

3. Switching Online redo log file – you can use the Amazon RDS procedure rdsadmin.rdsadmin_util.switch_logfile to switch files.

   Verify the current log sequence number in the database as shown below and then run the command to switch the log file and query the current log sequence number again

```
SQL> select sequence# from v$log where status='CURRENT';
SQL> exec rdsadmin.rdsadmin_util.switch_logfile;
SQL> select sequence# from v$log where status='CURRENT';

SQL> select sequence# from v$log where status='CURRENT';

 SEQUENCE#
----------
      2476
```

```
SQL> exec rdsadmin.rdsadmin_util.switch_logfile;

PL/SQL procedure successfully completed.

SQL> select sequence# from v$log where status='CURRENT';

 SEQUENCE#
----------
      2477

SQL>
```

4. Working with Directory object and the files

You can use the Amazon RDS procedure rdsadmin.rdsadmin_util.create_directory to create directories. You can create up to 10,000 directories, all located in your main data storage space.

The following example creates a new directory named product_descriptions:

SQL> exec rdsadmin.rdsadmin_util.create_directory(p_directory_name=> 'product_descriptions');
SQL> select directory_path from dba_directories where directory_name='PRODUCT_DESCRIPTIONS';

```
SQL> exec rdsadmin.rdsadmin_util.create_directory(p_directory_name => 'product_descriptions');

PL/SQL procedure successfully completed.
```

```
SQL> select DIRECTORY_PATH
  from DBA_DIRECTORIES
 where DIRECTORY_NAME='PRODUCT_DESCRIPTIONS';  2    3

DIRECTORY_PATH
--------------------------------------------------------------------------------
/rdsdbdata/userdirs/01

SQL>
```

Create a sample file in the newly created directory as shown below

```
SQL>  DECLARE
   out_file UTL_FILE.FILE_TYPE;
   BEGIN
   out_file := UTL_FILE.FOPEN('PRODUCT_DESCRIPTIONS','test.txt','W');
   UTL_FILE.PUT_LINE(out_file,'this is a text file');
   UTL_FILE.FCLOSE(out_file);
   end;
   /
SQL> select * from table
   (rdsadmin.rds_file_util.listdir(p_directory => 'PRODUCT_DESCRIPTIONS'));
```

```
SQL> DECLARE
  out_File  UTL_FILE.FILE_TYPE;
BEGIN
  out_File := UTL_FILE.FOPEN('PRODUCT_DESCRIPTIONS', 'test.txt' , 'W');
  UTL_FILE.PUT_LINE(out_file , ' this is text file!');
  UTL_FILE.FCLOSE(out_file);
END;  2    3    4    5    6    7
  8  /

PL/SQL procedure successfully completed.
```

List the file created on the directory as show below

```
SQL> select * from table
   (rdsadmin.rds_file_util.listdir(p_directory => 'PRODUCT_DESCRIPTIONS'));
```

```
SQL> select * from table
    (rdsadmin.rds_file_util.listdir(p_directory => 'PRODUCT_DESCRIPTIONS'));

FILENAME
--------------------------------------------------------------------------------
TYPE         FILESIZE MTIME
---------- ---------- ---------
01/
directory        4096 18-FEB-18

test.txt
file               20 18-FEB-18
```

List the content of the file test.txt as shown below

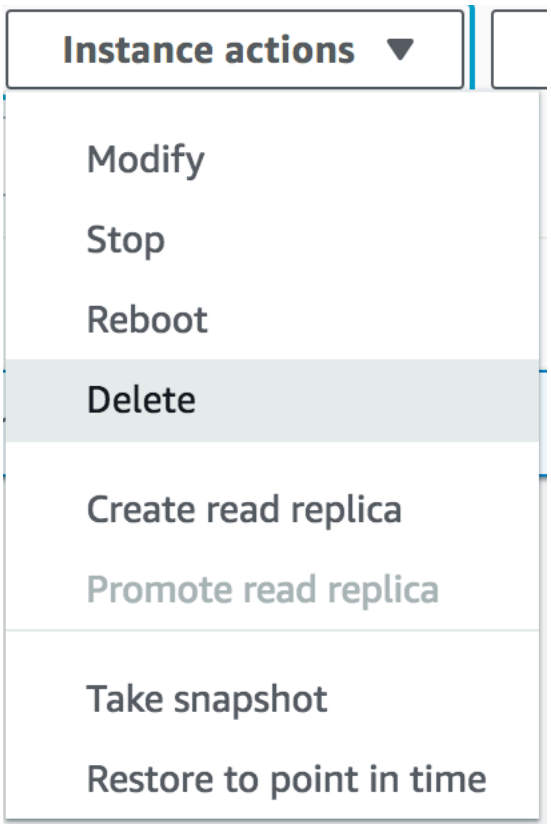
```
SQL> select * from table
   (rdsadmin.rds_file_util.read_text_file(
      p_directory => 'PRODUCT_DESCRIPTIONS',
      p_filename  => 'test.txt'));
```

```
SQL>  select * from table
    (rdsadmin.rds_file_util.read_text_file(
        p_directory => 'PRODUCT_DESCRIPTIONS',
        p_filename  => 'test.txt'));
  2    3    4
TEXT
--------------------------------------------------------------------------------
 this is text file!
```

Lab 10: Cleaning up the RDS Oracle resources created for the labs (ETC ~5 minutes)

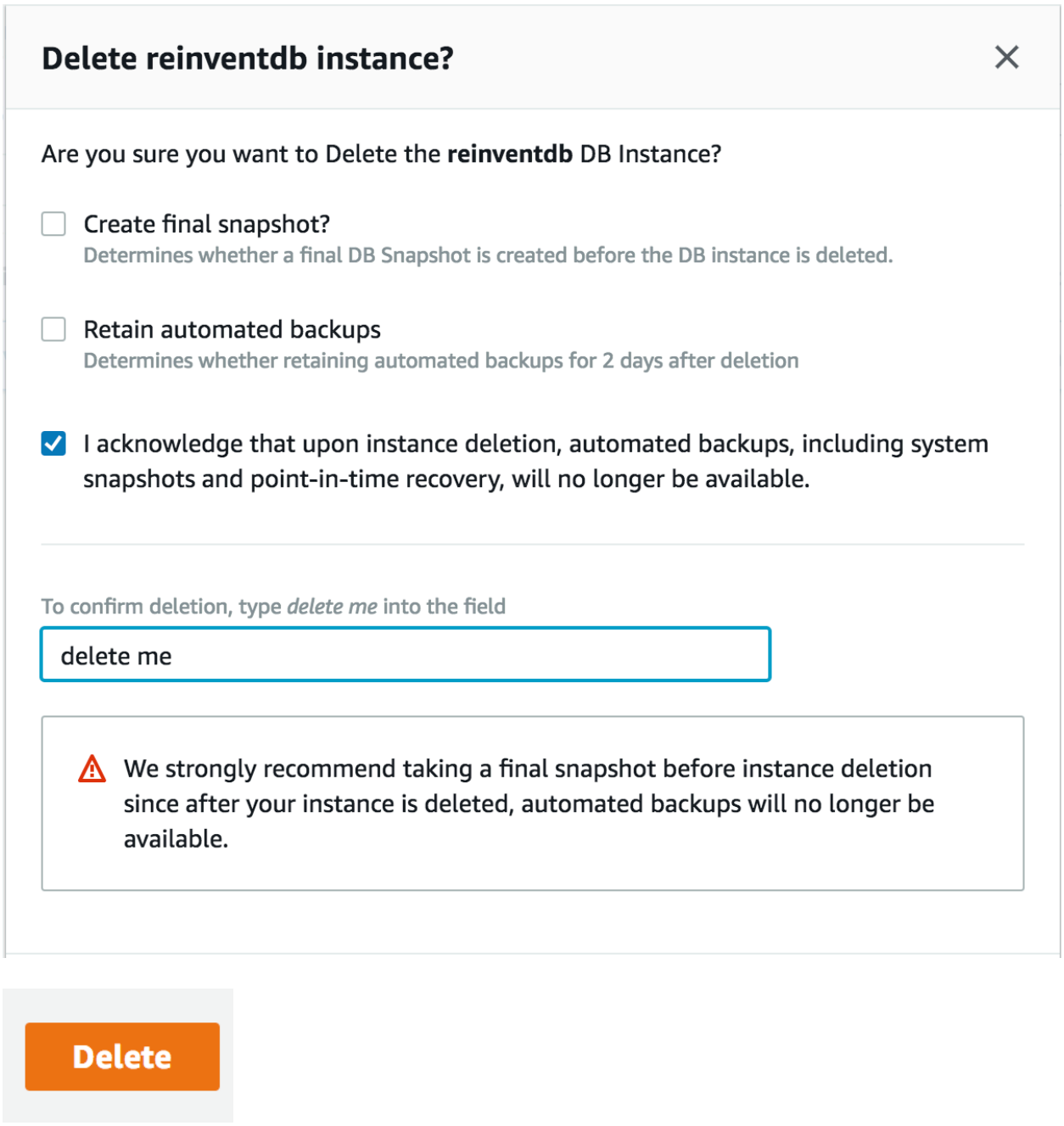
Make sure to delete all the instance and the manual snapshotscreated during the lab including the one created for Restore and Point-in-time recovery Instances. Please note that we are providing credits to all the attendees to cover the cost associated with creating all the AWS resources for the duration of this workshop only. Therefore, it is very important that all the resources created as a part of this workshop needs to be deleted at the end of the lab to avoid any additional cost associated with creating those resources.

1. Select your instance from the Instance tab
2. Click on the “Instance Actions” drop down on the right side and click “Delete”

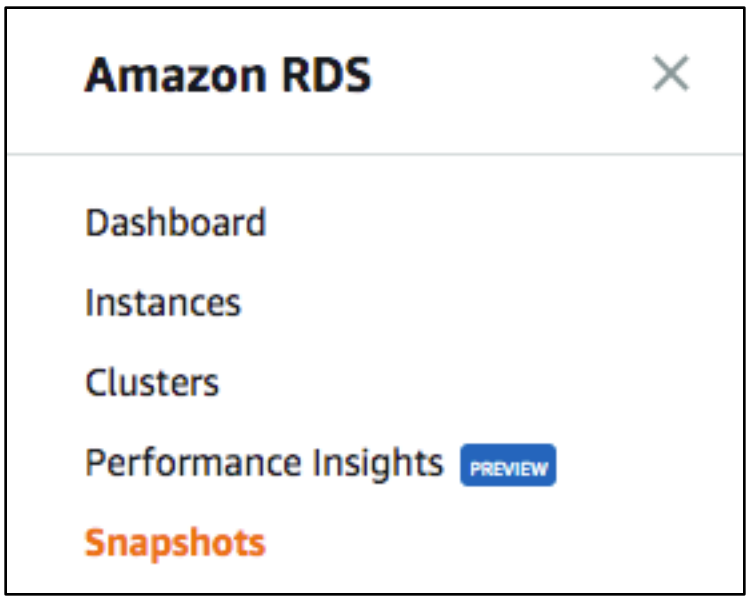


1. Under the delete instance page

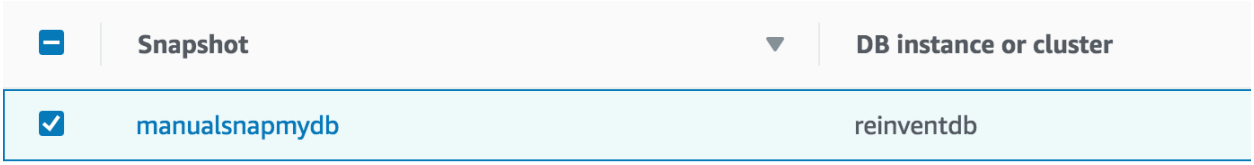
   Uncheck Create final snapshot
   Uncheck Retain automated backups
   Check the I acknowledge and enter phrase “delete me”
   Click “Delete”



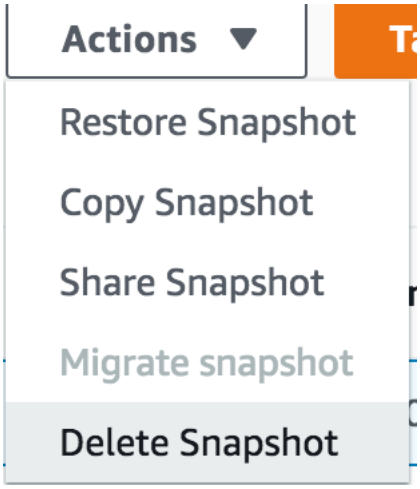
2. Delete all the manual snapshot you have created for the Database
   On the RDS home page select “Snapshots” from the left-hand side

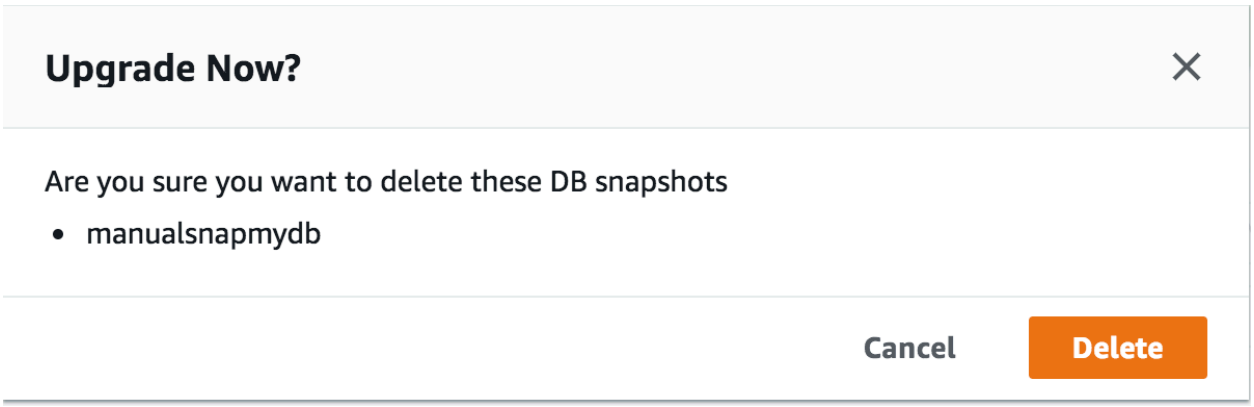


Select the manual snapshot you have created for the Database during this workshop



On the Actions tab select “Delete Snapshot” to delete the manual snapshot selected





Click Delete

3. AWS Billing – check this to make sure you're not surprised by your bill
   AWS Simple Monthly Calculator
   https://calculator.s3.amazonaws.com/index.html