Practice 6

Getting Familiar with Oracle EM Database Express

Practice Overview

The target of this practice is getting familiar with Oracle Enterprise Manager Database Express. In high level, you will perform the following:

- Apply workload on the `rac` database using Swingbench
- Use the Oracle EM Database Express to perform basic administration functions
- Use the Oracle EM Database Express to carry out some performance management and monitoring functions.

Note: For the sake of simplicity, in this practice, Oracle EM Database Express will be referred to as Oracle EM Express. The same term is being used by some Oracle documentation.

Note: In my opinion, it would be easier if you watch the video of implementing this practice before performing the practice straight away.

Practice Assumptions

The practice assumes that you have the Oracle RAC database up and running in the virtual machines `srv1` and `srv2`.

Note: Although the EM Express UI dynamically resizes based on the screen resolution, it works best with resolutions of at least 1280x1024

Practice Procedures

A. Getting familiar with EM Express home page

1. Open a Putty session to `srv1`, login as `oracle`, invoke `rman` then delete the archive log files. This step is just to save the disk space.

```
rman target /
delete archivelog all;
```

2. Start Swingbench and start its benchmark run.

a. In the hosting PC, open a command prompt window

b. Change the directory to the Swingbench home folder

c. Start Swingbench

```
cd D:\swingbench\winbin
swingbench.bat
```

d. Review the Ratio Load settings. You may consider lowering the load ratio values set to the insert and update operations to reduce the generated archive logs.

e. Start the Benchmark run.

Note: it might be a good idea to keep the load in operation for 5 minutes before you go to next step.

3. Open the browser and enter the EM Express address in its URL field. You can use either the Firefox browser within the virtualbox machine, the Internet browser, or Chrome browser in your hosting PC.

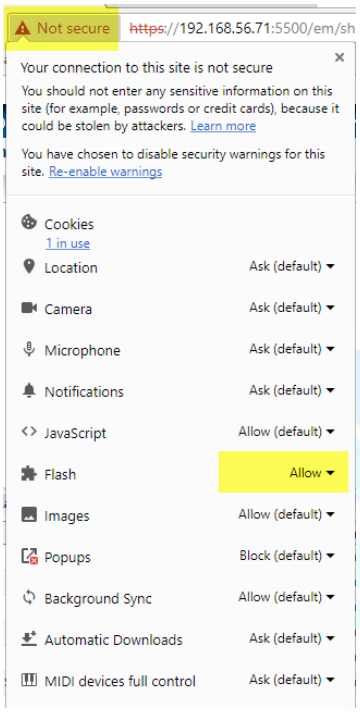
https://192.168.56.71:5500/em

When you receive warning messages in the browser, just click on the links to accept opening the URL.

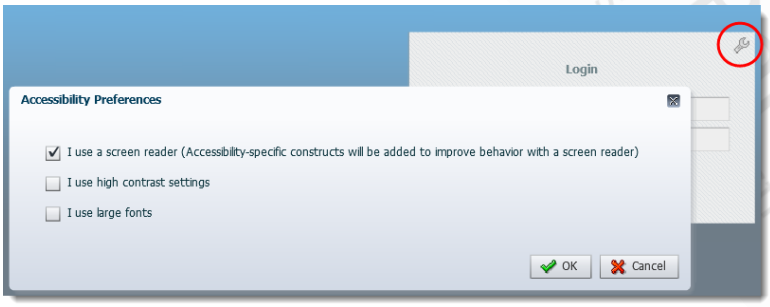
Note: If you want to retrieve the port number that the EM Express is configured, use the following query:

```
-- for https:
select DBMS_XDB_CONFIG.GETHTTPSPORT() from dual;
-- for http:
select DBMS_XDB_CONFIG.GETHTTPPORT() from dual;
```

4. To make **Chrome** browser allows running Flash components in the EM Express, click on the left hand side of the URL and select **Allow** option for the **Flash**, as shown in the following screenshot:

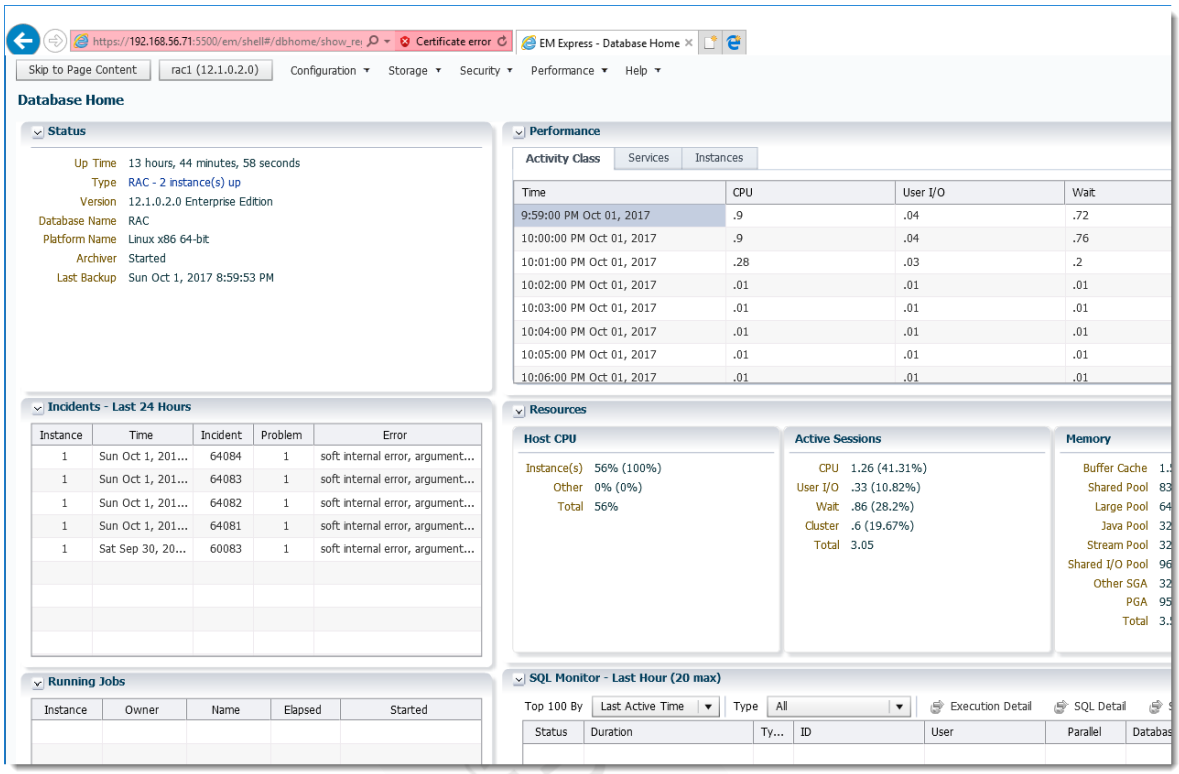


5. In the login screen, you will see in the right corner **Accessibility Preferences** icon. If you click on it, you will see three settings that you can change.



If you tick the first check box, the data will be displayed in EM Express in tabular format, as shown in the following screenshot. Unmark that checkbox to switch the view back to Charts-based view.

Note: all the screenshots and the demonstration of this practice have been implemented using the charts view.



6. Login as `sys` user to EM Express.

7. For the home page, observe the following:

- The figures shown in all the home page sections are of the **entire database**, not for instance-wise. In other words, hope page displays aggregated values over the entire database cluster.
- EM Express, by default, displays **real-time** figures for the past hour and refreshes the page every minute. **Refresh rate** can be controlled from the upper right corner drop down list. You can manually refresh the page by clicking on the "refresh" button.
- The **Status** region displays the number of instances in the database.
- Under the **Performance** region, observe the following:
  - The Y-axe maximum value is the total number of CPUs in all the instances.
  - The X-axe displays the timings of the last hour. This is expected because EX Express displays the real-time data of only the last hour of time.
  - The areas in the chart are clickable. When you click on an area, it gets highlighted.
  - When you stop the mouse cursor on the top edge of an area, it displays the value of the highlighted area in a tooltip box in that particular time. This behavior exists in all the charts across the EM Express.
  - If you stop the mouse cursor on a legend item (like Wait, User I/O, or CPU), a tooltip box appears with the maximum value of the highlighted category.
  - If you click on the **Instances** tab, you see a chart of how the CPU load has been distributed between the instances.

- Under the **Resources** region, observe the following:
  - The memory sub-section displays how the total memory is being distributed among the SGA components.
  - The Data Storage sub-region displays the amount of disk space taken by the tablespaces, based on tablespace types.
- Under the **SQL Monitor** section, observe the top 20 SQL statements that have been consuming the Database Time in the last hour.

B. Displaying Information about Specific Instance

EM Express by default displays the information on the cluster-level. Follow the steps below to display information on a specific instance:

8. In the EM Express home page, under the **Status** region, click the "**RAC - 2 instance(s) up**" link and it will take you to the **Instances** page.

9. You can now select an instance and navigate to the its Instance Home Page, Performance Hub, or the Memory Page for the selected instance. Observe how the status region is updated now with the selected instance name.

C. Displaying and modifying database parameters

EM Express allows you to display and modify the initialization parameters.

10. In the EM Express home page, click on **Configuration** menu | **Initialization Parameters**

11. Observe the following in the displayed page:

- The page displays the parameters that are currently active in the memory and also those that are set in the SPFILE.
- You can view the parameters that have been set by ticking the **Modified** check box.
- You can view the basic parameters by ticking the **Basic** check box.
- You can search the parameters by typing in the search field. The search is case insensitive. It also retrieves any parameter whose names contain the characters that you enter. Therefore, wild characters are not supported.
- The parameters are displayed for the entire cluster and for each instance as well.
- When you edit a parameter, you can define its scope, instance, its new value, and add any comments to the change as well.

D. Managing database memory

EM Express allows you to display and manage the memory consumed by Oracle database.

12. In the EM Express home page, click on **Configuration** menu | **Memory**

13. Observe the following in the **Memory Management** page:

- The **Memory Settings** region displays the memory management settings that are currently configured in the database. The data displayed depends on the management mode that you configured. The possible configurations are the following:
  - Automatic Memory Management: in this case the at the top right panel of the Memory page you will see only the Memory Advisor is displayed on the page.
  - Automatic Shared Memory Management (as is the case in our scenario): in this case the SGA Advisor, along with the PGA Advisor is displayed.
  - Manual Shared Memory Management: in this case the Buffer Cache Advisor, along with the PGA Advisor is displayed.
- The Allocation Breakdown displays the amount of memory assigned to every database SGA memory area component.
- In the Allocation History region, you can know how the memory allocation has been changing in the past hour.
- Top Sessions by PGA Consumed region displays the top sessions that consumed from the PGA memory. If you click on a session bar, it will take you to the **Session Details** page.

E. Displaying Database Feature Usage and Current Database Properties

EM Express allows you to display the database feature usage statistics in your database, in addition to the current database properties.

14. In the EM Express home page, click on **Configuration** menu | **Database Feature Usage**

15. Observe the following in the **Database Feature Usage** page:

- If you tick the **Used** checkbox, only the used features will be displayed.
- You can search in the features list.

16. In the EM Express home page, click on **Configuration** menu | **Current Database Properties**

17. Observe the following in the Current Database Properties page:

- The list displays the current database properties and their values.
- You can search in the properties list.

F. Examining the Storage capabilities

EM Express allows you to manage the basic storage functions in the database.

18. In the EM Express home page, click on **Storage** menu | **Tablespaces**

19. Observe the following in the **Tablespaces** page:

- You can create a new tablespace by click on Create button
- Tablespaces are grouped by the tablespace names. You can flatten the view: View | Flatten
- By ticking the Permanent checkbox, you display only Permanent tablespaces.

20. Click on **Storage** menu | **Undo Management**

21. In the Undo Management Summary page, observe the undo tablespace used by each instance.

22. Click on **Storage** menu | **Redo Log Groups**

23. In the Redo Log Groups page, observe the following:

- The list displays the online redo log groups and their members.
- As is the case with most tabular style windows, you can search the list contents and flatten its view.
- You can create a new redo log group.
- You can force checkpoint and switch logfile.

24. Click on **Storage** menu | **Archive Logs**

25. In the Archive Logs page, observe the following:

- The list displays the archived redo log files (or archive logs) and information about the sequence number, thread number, first change time, and completion time for every process.

26. Click on **Storage** menu | **Control Files**

27. In the Control Files page, observe the following:

- General information is displayed under the **Control File Information** region.
- The **Control File Sections** region displays the regions inside the control file and the amount of memory taken from the control file by every section.
- As its named implies, the section **List of Control Files** displays the control files that are currently used by the database.

G. Examining the Security Capabilities

EM Express allows you to perform some basic security functions in the database.

28. In the EM Express home page, click on **Security** menu | **Users**

29. In the **Users** page, observe the following:

- The page displays list of users in the database and some basic information about each.
- You can create new user, search the users, and drop users

30. In the EM Express home page, click on **Security** menu | **Roles**

31. In the **Roles** page, observe the following:

- The page displays list of roles in the database.
- You can create new role, search the roles, and drop roles

H. Monitoring Database Performance

Performance management and monitoring capabilities are probably the most powerful features in EM Express. In the following sub-section, you will examine the EM Express capabilities to monitor the database performance.

Examining the Performance Hub Page

32. Open the Performance Hub Page: **Performance menu** | **Performance Hub**

The Performance Hub page is your starting point for monitoring the database performance in EM Express. The page can be used to view both **realtime** and **historical** data.

In realtime mode (the default mode), performance data is retrieved from in-memory views. In historical mode, data is retrieved from the Automatic Workload Repository (AWR) snapshots.

In realtime mode, the **Summary** tab shows metrics data that gives an overview of system performance in terms of Host Resource Consumption (CPU, I/O and Memory), and Average Active Sessions. In historical mode, the tab displays system performance figures on resource consumption, average active sessions, and load profile information.

The **timepicker** shows data for the past hour and the user can select any time range from within this period. The default selection is the past 5 minutes.

33. Use the handles on the left and right edges of the **timepicker** window to change the window time period length. Click on the middle of the window and pull the window over to an interesting time period of activity.

Notice the grayed areas change in the charts to match the window slider.

34. To display the historical data, click on the "**Select Time Period**" button in the top of the Performance Hub page. Select from the drop list the historical period that you want to display: last day, week, or custom range of dates.

Observe that when the Performance Hub page displays the historical data, the charts it displays get changed.

The major difference is that when the historical data is being displayed, the page displays the load profile information in the page.

35. Set the Performance Hub to display back the **realtime** information.

Explore the Activity Tab

36. Click the **Activity** tab to see details about the activity that occurred during the selected time window.

By default, the chart displays its data by **Wait Class**.

37. Click **Wait Class** | **Session Identifiers** | **User ID** to see the users who are responsible for the workload.

38. Place the cursor on the largest area in the graph.

It will turn the largest User workload into a highlighted yellow.

39. Hover the mouse cursor on the top edge of the highlighted area.

A tooltip box will display to you the load figure of the selected user.

40. Click on the highlighted area to make the selected user a filter condition.

You should now see that user's workload. Other workloads will not be shown and will appear as blank space in the graphs. That allows you to focus on that single user.

41. Click on the **Wait Class** drop-down | **Top Dimensions** | **Module** to isolate the modules the user is running.

42. Click on the largest area to add a condition of the selected module.

43. Remove the filter conditions by clicking on the **X** on the right of each condition.

Explore the Workload Tab

44. Click the **Workload** tab to see details about the workloads that occurred during the selected time window.

The Workload tab has Workload Profile, Sessions, and Top SQL sections.

45. In the **Workload Profile** section, click on each tab in that section and examine its contents.

46. In the **Top SQL** section, we see the SQL IDs ranked from most to least activity.

47. Click the **SQL ID** with the most activity.

You can examine detailed information about that particular SQL, like Database Time, IO Bytes, and Buffer Gets.

48. Click the **Activity** tab to see to what percentage that specific SQL ID represented a load on the CPU.

Observe that you cannot delete the SQL ID filter. This is because all the tabs now describe activity for that specific SQL ID.

49. Click on the **Wait Class** drop-down list, then select Session **Identifiers** | **Instance**

You will see how the load from that specific SQL was distributed between the instances.

50. Activity not related to this SQL ID is the blank area under the curves.

Explore the RAC Specific Information

RAC specific information including the wait events related to RAC database.

51. Click on **Performance** menu | **Performance Hub** and then click on the **RAC** tab.

You will see the sections: Global Cache Blocks Received, Global Cache Blocks Get Time, and Instances.

52. Examine the contents of the sections.

Generating EM Express Active Reports

An Active Report is an offline interactive report with full interactive UI capabilities. A Composite Active Report is a single HTML file that embeds a set of correlated active reports, allowing the user to navigate from one active report to another without requiring a connection to the database.

53. Click on **Performance** menu | **Performance Hub** and click the **PerfHub Report** button at the top of the page.

This will issue a request to the database to retrieve the data needed for the report. Once the data has been retrieved, you will be prompted for a location and filename; you can now click **OK** and save the report locally.

54. Open the saved file with a browser.

The file could not be opened in Chrome in my testing case. I opened it successfully on Internet Browser.

Observe that the timepicker cannot be moved in the active report. Also, filters cannot be created.

55. Sign out from EM Express by clicking on **Sing out** link in the top right corner of the page.

When you want to close EM Express, I recommend to sign out from EM Express rather than closing the browser window.

56. In Putty session delete the archive logs.

```
rman target /
delete archivelog all;
```

Note: you will learn in another practice how to use EM Express to narrow down the performance bottleneck and use it to invoke ADDM.

Summary

Oracle EM Express Capabilities

- Overview of the database components and performance
- Displays real time information in the last hour
- Can view the history data (as much as AWR has)
- RAC-aware: database-level as well as instance-level information
- Can be used to:
    - manage the initialization parameters
    - database memory
    - view database features and database properties
    - Manage the tablespaces
    - Manage the users and the roles
    - Monitor database performance

- About monitoring database performance:
    - View the performance statistics by wait class, session identifiers, user id, module, action and more.
    - Manage workload profiles
    - Identify the top SQL statements
    - Generate performance active reports