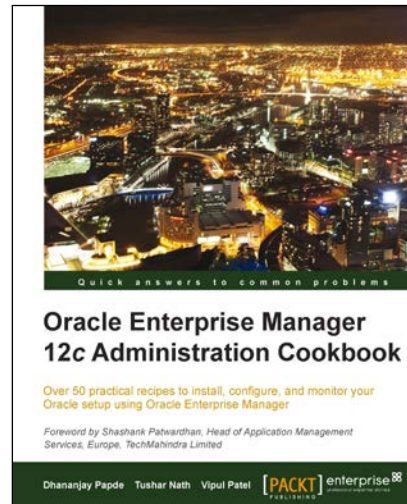


# Oracle Enterprise Manager 12c Administration Cookbook

**Dhananjay Papde**  
**Tushar Nath**  
**Vipul Patel**



## Chapter No. 6

### "Managing Database Performance Using OEM 12c"

## In this package, you will find:

A Biography of the authors of the book

A preview chapter from the book, Chapter NO.6 "Managing Database Performance Using OEM 12c"

A synopsis of the book's content

Information on where to buy this book

## About the Authors

**Dhananjay Papde** has over 18 years of experience in the IT industry, out of which he has worked for over 10 years in UK. He is an experienced Oracle DBA and an Oracle eBusiness Suite Applications DBA, and has experience in Oracle Fusion Middleware Data Integration products such as Oracle GoldenGate, Oracle Business Intelligence, and Oracle Data Integrator. He also has strong experience in project and program management. He is a regular speaker at UK Oracle User Group and also at Oracle events/forums.

Currently, he is based in UK and works as an IT Principal Consultant/IT Operations Head for TechMahindra Ltd. He has worked as a Principal Consultant, Senior Manager, Oracle Production DBA, Oracle Applications DBA, Systems Administrator, and Technical Project Manager with Oracle Corporation, Cognizant Technology Solutions, and Mastech Corporation.

Dhananjay has won the Oracle Fusion Middleware Innovation Award presented at Oracle Open World 2011 in the US. He is an Oracle Certified Professional, Oracle Certified Expert, PMP, and MSP.

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Dhananjay enjoys travelling around the world, watching cricket, and has recently started loving to play a bit of piano.

You can get in touch with Dhananjay at [dpapde@gmail.com](mailto:dpapde@gmail.com). You can also visit his blog at <http://dhananjaypapde.blogspot.co.uk/>.

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I would like to thank my parents, wife, and my daughters for their love and enormous support. Without their understanding, this book would not have been possible.

I would like to thank the team at Packt Publishing for their help and support, especially James Keane, Leena Purkait, Mayur Hule and Kirti Pujari. It has been a year long process with a lot of work, but we are very happy with the result we have achieved! Also many thanks to my employer, TechMahindra, and all my colleagues and managers for their continued support.

I hope you like this book as much as I enjoyed writing it!

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**Tushar Nath** is working as Senior Database Administrator in TechMahindra Ltd. , managing large scale mission critical production database and Fusion Middleware estate. Tushar has over 11 years of IT experience in administration of Oracle Database, Oracle Enterprise Manager and Fusion Middleware products such as Oracle WebLogic Server, Oracle Goldengate, Oracle Business Intelligence, Oracle Data Integrator, and Oracle Service Oriented Architecture with Unix Administration duties. He likes end-to-end troubleshooting involving Oracle Database and Oracle Fusion Middleware products. Tushar holds various Oracle certifications such as Oracle Service Oriented Architecture Infrastructure Implementation Certified Expert (11g), Oracle WebLogic Server 10g System Administrator Certified Expert, Oracle OCP DBA(11g) and Real Application Clusters Administrator Certified Expert (10g).

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This is the first book I've co-authored. It appeared as an impossible mission at the early stage of writing this book. Unconditional support provided by my family transformed this impossible mission to a possible one at the end. I would like to say a big thank you to my wife Chinmayi, for understanding and motivating me throughout the process of writing, without which it would not have been possible to complete this book.

I would also like to thank to my parents, my son, and all of my colleagues from the bottom of my heart for their love and support.

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**Vipul Patel** has been working in the IT industry for the past 20 years, and in the past 12 years mainly in the Telecommunications industry. He started with a brief brush with Oracle 5 and Oracle Forms.

He has been involved with the complete software delivery lifecycle to the present day as a DBA for a critical business application. The drive as an individual and philosopher is to be a proactive manager, to capture problems early to prevent them from impacting the system and the users of the system, and to stop them during testing cycles, to prevent the performance issue from reaching production. He was involved in all aspects of management of infrastructure, from commissioning to monitoring while in service, so he moved from the early days of writing bespoke scripts to having a single GUI with OEM.

Vipul is one of the award winners of the Oracle Fusion Middleware Innovation Award for 2011 presented at Oracle Open World 2011 in US. He is also a member of the Oracle Customer Advisory Board for Data Integration Products. To relax and get away from one form of technology to another, Vipul is an avid follower of F1 motor racing, spending weekends away in a field in Silverstone.

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# Oracle Enterprise Manager 12c

## Administration Cookbook

Oracle Enterprise Manager Cloud Control 12c (OEM 12c) is Oracle's integrated, enterprise-wide IT management product for managing applications, middleware, databases, operating systems, virtualization, and Oracle engineered systems, all from a single console. It helps discover and monitor targets in order to detect and resolve problems proactively.

*Oracle Enterprise Manager 12c Administration Cookbook* is a practical cookbook to manage and monitor databases and Oracle Fusion Middleware products.

This book will uncover various installation and upgrade options. Additionally, there are recipes on managing and monitoring Oracle Fusion Middleware products such as Oracle Business Intelligence, Oracle Golden Gate, Oracle Business Intelligence Publisher, and Oracle WebLogic using OEM 12c. It includes recipes on monitoring the infrastructure using Action Session History Analytics and using the Real-time ADDM monitoring report. There are recipes on creating and cloning databases, and creating templates.

Additionally, there are recipes on managing and monitoring Oracle Fusion Middleware Products such as Oracle Business Intelligence, Oracle Golden Gate, Oracle Business Intelligence Publisher, and Oracle WebLogic Using OEM 12c.

Last but not the least, there are recipes on incident and problem management using an iDevice (iPhone, iPod Touch, iPad).

## What This Book Covers

*Chapter 1, Prerequisites for Installation of OEM 12c* Installation explains various pre-requisites for installing OEM 12c.

*Chapter 2, Installation of OEM 12c* describes the installation steps of OEM 12c and its agents, using various options.

*Chapter 3, Upgrade to OEM 12c* provides a step-by-step process to be followed in order to upgrade the OEM 11g release to OEM 12c for all three type of upgrade approaches: 1-System Upgrade, 2-System Upgrade, and 1-System Upgrade on a different host.

*Chapter 4, Configuring OEM 12c* explains automatic discovery, adding host and non-host targets, and configuration of administration groups and the software library.

*Chapter 5, Managing Oracle Database Using OEM 12c* explores the various options available in Cloud Control console to configure, manage, and monitor the Oracle database by using Oracle Enterprise Manager 12c.

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*Chapter 6, Managing Database Performance Using OEM 12c* explains the use of Active Session History analytics, Real-time ADDM, Comparing period ADDM, and comparing period reports.

*Chapter 7, Middleware Management Using OEM 12c* explains the configuration of OEM 12c to manage and monitor Oracle Fusion Middleware products such as Oracle WebLogic Server, Oracle Business Intelligence, Oracle Golden Gate, and Oracle Business Intelligence Publisher.

*Chapter 8, Incident and Problem Management Using iDevice (iPhone, iPod touch, iPad)* explains tracking and managing incidents from an iDevice. The incident and problem details can be viewed, acknowledged, assigned, prioritized, escalated, and annotated. This also provides the ability to connect to My Oracle Support in order to drill down to the service requests associated with a problem.

The *Installing Oracle Management Agent using Cloning Management Agent* recipe in Chapter 2 is available as a free download at [http://www.packtpub.com/sites/default/files/downloads/Recipe\\_1.pdf](http://www.packtpub.com/sites/default/files/downloads/Recipe_1.pdf).

The *Upgrading using 1-system upgrade approach (on a different host)* recipe in Chapter 3 is available as a free download at [http://www.packtpub.com/sites/default/files/downloads/Recipe\\_2.pdf](http://www.packtpub.com/sites/default/files/downloads/Recipe_2.pdf).

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# 6

## Managing Database Performance Using OEM 12c

In this chapter we will cover:

- ▶ Using Active Session History Analytics
- ▶ Using the Real-Time Automatic Database Diagnostics Monitor (ADDM) feature
- ▶ Using the Compare Period Automatic Database Diagnostics Monitor (ADDM) feature
- ▶ Comparing period reports

### Introduction

In this chapter, we will explore various options available in the Cloud Control console for performance troubleshooting using Oracle Enterprise Manager 12c (OEM 12c).

Diagnosing a slow-performing system is a very time-consuming task and also needs skilled resources to identify the issues.

Oracle Diagnostics Pack provides a complete set of real-time and automatic performance diagnostics and monitoring functionality built into the database and Oracle Enterprise Manager Cloud Control 12c.

Oracle Diagnostics Pack, when used in conjunction with OEM 12c, provides enterprise-wide performance and availability reporting, a centralized performance repository, and also simplifies the task of managing large sets of databases.

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## Using Active Session History Analytics

**Active Session History (ASH)** Analytics is a new built-in functionality in OEM 12c that can be used to monitor a database by providing an enhanced version of database top activity graphics.

The following recipe describes the steps to access Active Session History Analytics in OEM 12C Cloud Control console.

### Getting ready

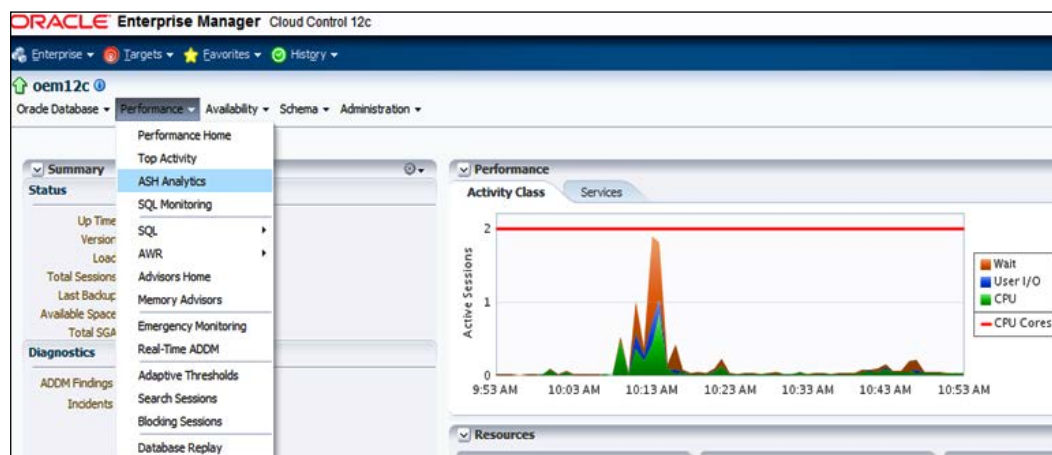
The agent needs to be up and running on a host where a database is installed.

In this example, a sample database called as OEM12c is used to demonstrate ASH Analytics using OEM12c Cloud Control.

### How to do it...

To access ASH Analytics of a database target, perform the following steps:

1. Log in to **Enterprise Manager Cloud Control**.
2. From the **Targets** option, select **Databases** from the drop-down menu.
3. Select the database instance's name from the database's screen.  
The oem12c database instance is selected in this example.
4. From the database instance's home page, select the **Performance** menu tab.





5. Select **ASH Analytics** from the drop-down list.
6. Populate the Database Login credentials screen in order to connect to the database.

In this example, the username is **sys** and the corresponding **Role** is selected as **SYSDBA** and given a meaningful name.

7. Click on the **Login** button.
8. Select the appropriate Installation type in **Package Deployment**.

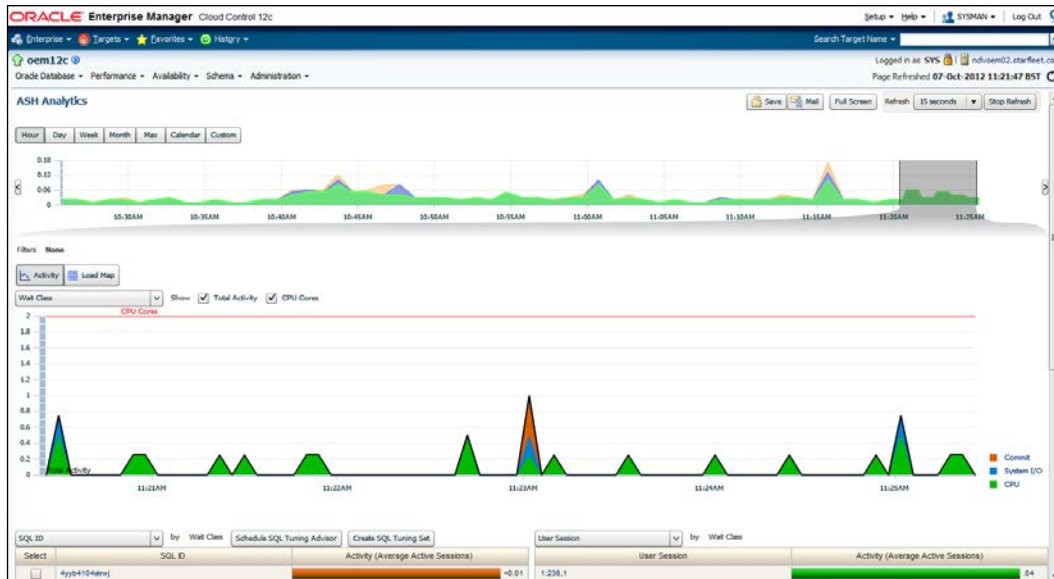
**Simple Installation** is selected in this example, as we want to install the package immediately.

The **Named** credential is selected in this example, as we have created a named credential with **SYSDBA** privilege.

- Click on the **Install** button.

The DATABASE MANAGEMENT PL/SQL DEPLOYMENT JOB is submitted. After some time the job status indicates that this was successful.

- Access the database instance's home page and select **ASH Analytics** from the **Performance** tab, in order to access the **ASH Analytics** page.

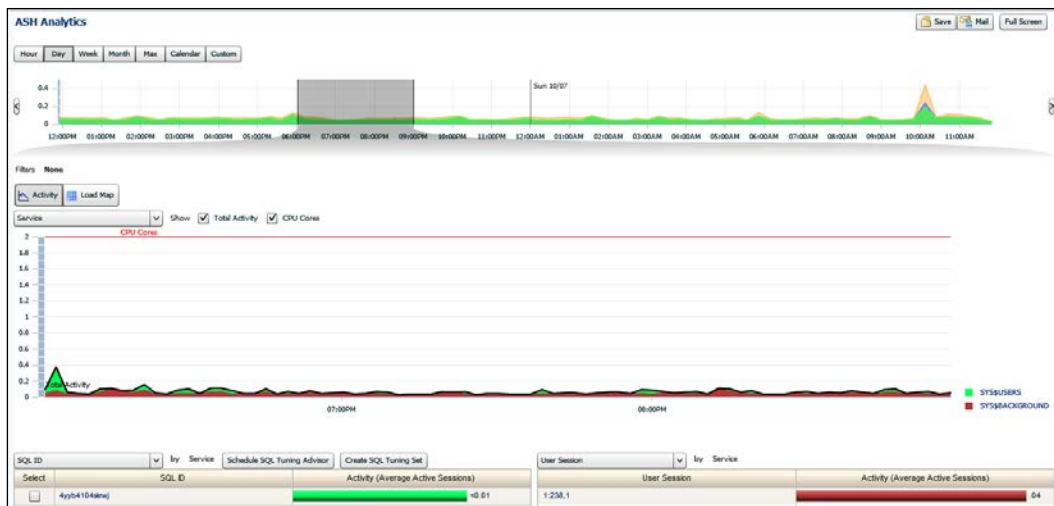


- Click on **Day**, **Week**, **Month**, or other tabs as appropriate under the **ASH Analytics** section, in order to get an overall view of the database. It is possible to drag the bar to the left or right to see a more detailed activity for analysis under the **Activity** or **Load Map** section.

There are a number of selection criteria available under the activity menu, which can be used to analyze the performance in detail.

In this example, selection is done for a day in the **ASH Analytics** section. The time slot chosen is of 3 hours, from 06:00 PM to 09:00 PM.

The slider bar can be moved to the required time slot, and the corresponding information will be displayed accordingly.



- Click on the **Load Map** button to view the top activity in a two-dimension view, in rectangular blocks.

## How it works...

The preceding recipe describes the new feature that can be used to assist in analyzing database performance by using ASH Analytics for various combinations of database wait events and selection criteria.

## There's more...

ASH Analytics is a new tool for exploring the ASH data which allows the administrator to roll up, drill down, and slice the performance data across various performance dimensions. The ability to create filters on various dimensions and to identify performance issues has never been easier. The built-in tree map view allows administrators to explore performance data using predefined performance dimension hierarchies.

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## Using the Real-Time Automatic Database Diagnostics Monitor (ADDM) feature

Real-Time ADDM is a feature that facilitates a completely new way to analyze problems in too slow or hung databases. Real-Time ADDM identifies the source of severe contention in global resources.

The following recipe describes the use of real-time ADDM during a database connection failure, using the OEM 12C Cloud Control console.

### Getting ready

The agent needs to be up and running on a host where a database is installed.

In this example, a database instance named `test` is used. In order to simulate a condition where the database is not responding (it is hung), a logon trigger is written to insert a row into a table that is already locked. In this example, we connect to the database instance named `test` using `sqlplus`.

```
$ export ORACLE_SID=test
$ sqlplus / as sysdba
SQL*Plus: Release 11.2.0.2.0 Production on Sun Oct 7 14:36:07 2012
Copyright (c) 1982, 2010, Oracle. All rights reserved.
```

The `sqlplus` session, in this case, is not responding and needs investigation to find the root cause of the database performance issues.

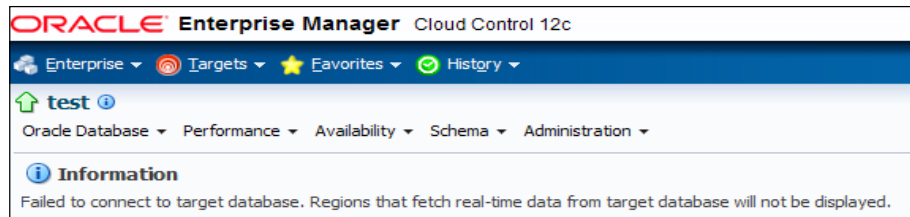
### How to do it...

To verify the performance issues by using the Real-Time ADDM of a database target that is not accessible, perform the following steps:

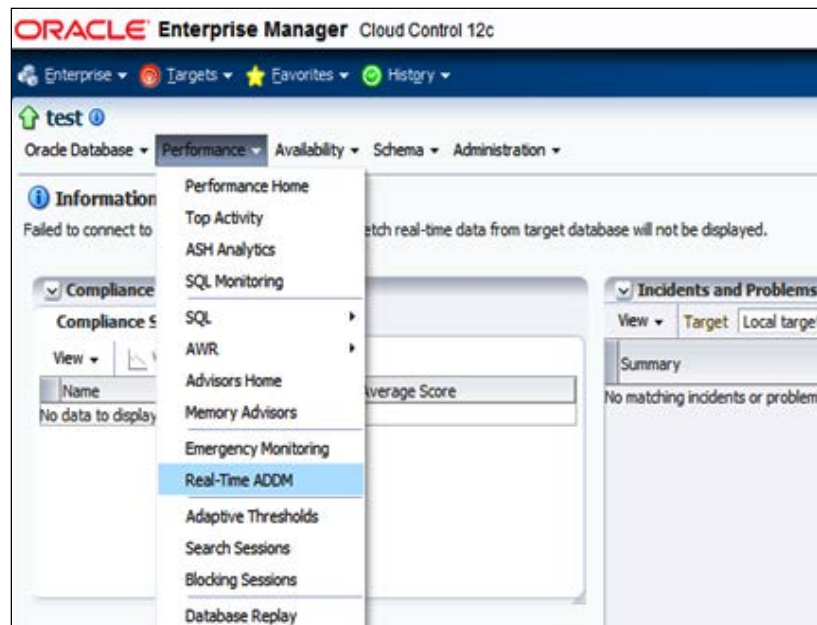
1. Login to **Enterprise Manager Cloud Control**.
2. From the **Targets** option, select **Databases** from the drop-down menu.

3. Select the name of the database instance that is hung or not responding, and, needs to be verified from the databases screen.

The database instance name `test` is selected in this example.



4. From the database instance's home page, select the **Performance** menu tab.



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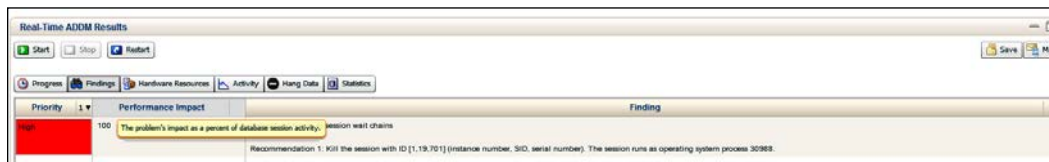
- Click on **Real-Time ADDM**.

In the Provide Credential section, connect as a `sys` privileged user and then click on the **Submit** button.



- Click on **Start** to start the Real-Time ADDM analysis.

Click on **Findings** to display the details of the session which causes the database to hang or slow down, and then click on **Stop** to stop the Real-Time ADDM analysis.



- The finding section advises you to kill the system process' id.

Use a telnet session to connect to the database instance with the owner of the Oracle database instance.

Verify the process ID and kill the session as a database user, in order to get access to the database.

```
$ kill -9 30988
```

Move back to the original `sqlplus` session to check whether the same session is able to connect to the database or not.

```
$ sqlplus / as sysdba
```

```
SQL*Plus: Release 11.2.0.2.0 Production on Sun Oct 7 14:36:07 2012  
Copyright (c) 1982, 2010, Oracle. All rights reserved.
```

```
Connected to:
```

```
Oracle Database 11g Enterprise Edition Release 11.2.0.2.0 - 64bit  
Production
```

---

```
With the Partitioning, OLAP, Data Mining and Real Application
Testing options
SQL>
```

The database session is accessible after killing the process identified by the Real-ADDM analysis findings.

### How it works...

The Real-Time ADDM uses the diagnostic connection mode to access ASH data in the SGA of the database instance by passing a normal connection path without using any global resources such as enqueue, latches, or an excessive amount of host resources. It is a very important feature that can be used by database administrators to identify the source of contention during severe database performance issues.

### There's more...

Real-Time ADDM can be used to identify potential causes of performance issues that are caused by resource constraints such as memory paging and I/O Bound; hangs such as instance shutdown, unresponsive ASM, and top blocker analysis; memory issues such as excessive PGA growth, library cache issues; and resources limits reached such as sessions, processes, and deadlocks.

## Using the Compare Period Automatic Database Diagnostics Monitor (ADDM) feature

The Compare Period ADDM feature performs an analysis of two AWR snapshot periods and detects causes, measures effects, and correlates them. It also makes actionable recommendations, and provides a quantified impact.

The following recipe describes the steps to use the Compare Period ADDM feature by using the OEM 12C Cloud Control console.

### Getting ready

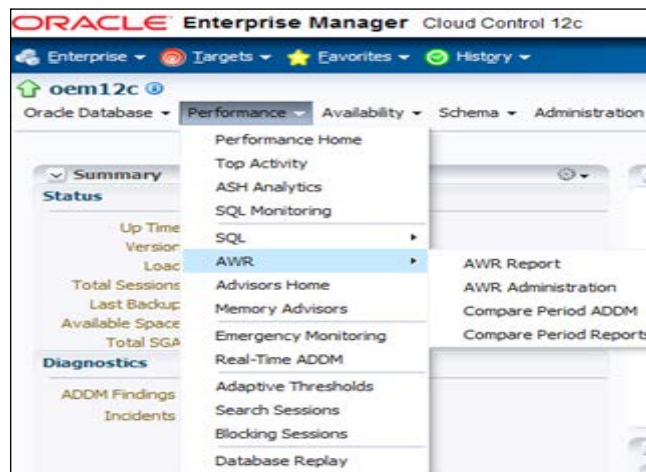
The agent needs to be up and running on a host where a database is installed.

In this example, the database instance called OEM12c is used to demonstrate the Compare Period ADDM feature using OEM12C Cloud Control.

## How to do it...

To access Compare Period ADDM, perform the following steps:

1. Login to **Enterprise Manager Cloud Control**.
2. From the **Targets** option, select **Databases** from the drop-down menu.  
Select the database instance's name of interest.  
Select **AWR** under the **Performance** tab.



3. Select the **Compare Period ADDM** option from the drop-down menu of **AWR**.
4. Connect as **sys** privileged user credential on the **Database Login** page.  
Click on **Login**.

Add the desired **Begin Time** and **End Time** values under the **Step 1: Select a Comparison Period** section on the **Run Compare Period ADDM** screen.

Select an appropriate option under **Step-2: Select a Base Period**.



The **Customize** option is selected in this example in order to specify the desired time slot.

**Run Compare Period ADDM**

**Step 1: Select a Comparison Period**

Begin Time: 07-Oct-2012 14:09:32  
 End Time: 07-Oct-2012 14:55:32  
 TIP: Time will be adjusted to the capture time of the closest snapshot

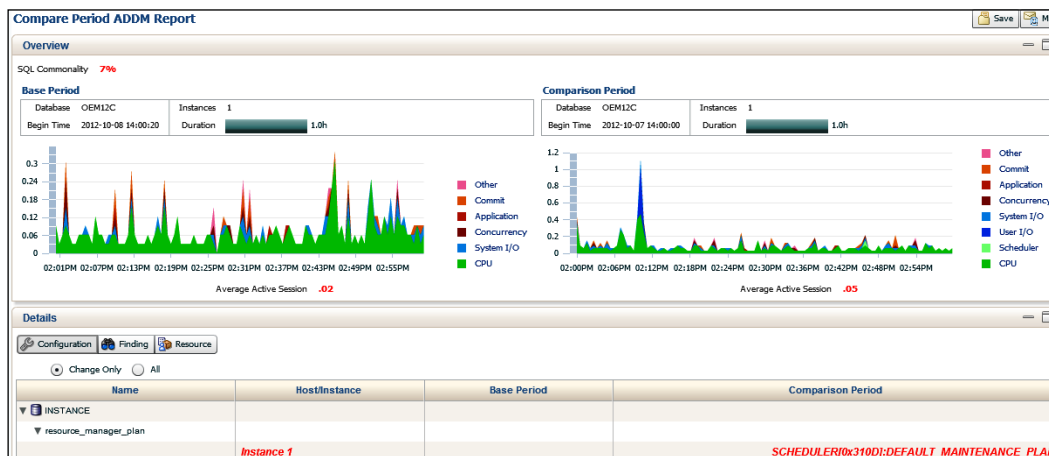
**Step 2: Select a Base Period**

Offset: ☐ Offset  
 Offset: Preceding Period  
☐ Baseline  
 Baseline: SYSTEM\_MOVING\_WINDOW  
☒ **Customize**  
 Begin Time: 08-Oct-2012 14:11:32  
 End Time: 08-Oct-2012 14:51:32  
 TIP: Time will be adjusted to the capture time of the closest snapshot

**Run**

- Click on **Run** to view the performance difference between the base period and the comparison period.

The comparison period is typically the time slot when the performance issues exist and the base period is when the system was working fine.



- Click on the **Finding** tab to see the difference between the two periods.  
Expand **Show SQL Breakdown** to find the SQL details.

Performance Difference	Change Impact(%)	Base Period	Comparison Period
Top New SQLs	-133	0	.03
Top Missing SQLs	48	.01	0
Checkpoints Due to Tablesp	-25	0	.01
Undersized Buffer Cache	-25	0	.01
Undo I/O	-13	0	0

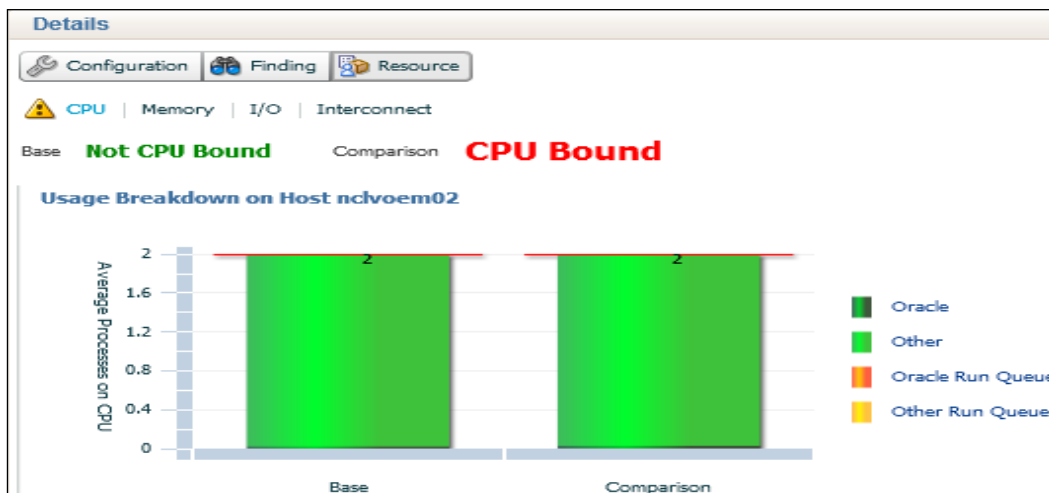
Display: Change Impact (Absolute Value) >= 5 % ☒ Regression ☒ Improvement

**Description**  
A significant part of database activity is due to SQL statements found in the comparison period but not in the base period.  
Impact changed from 0 active sessions to 0.03 active sessions by -133%

☒ Hide SQL Breakdown

SQL ID	Change Impact(%)	Base Period	Comparison Period
09214han015hr	-12	0	<0.01
cc073q2vzbzbas	-12	0	<0.01
7b4us3z0boofrm	-12	0	<0.01
9h4w8nb3bby	-12	0	<0.01

- Click on **Resources** to view the difference between resource usages in **CPU**, **Memory**, **I/O**, and **Interconnect**, as per your analysis requirement, such as CPU or I/O bound.



## How it works...

The Compare Period ADDM feature allows administrators to visually compare two periods of time in order to identify differences in database performance. It identifies what has changed, such as configuration changes and workload changes, quantifies the performance difference by using DB time as the basis for measuring performance, and also identifies the root cause of performance issues.

## There's more...

The Compare Period ADDM feature can be used by database administrators to identify the potential cause of performance issues between two different periods for the same execution of queries. An SQL commonality number of 100 percent in the Compare Period ADDM screen would imply that identical queries are being executed during the base and comparison period.

## Comparing period reports

The AWR report shows AWR data between two snapshots. The AWR Compare Periods Report indicates the difference between two periods, that is, two reports that are equal to four snapshots. The Compare Periods Report feature helps database administrators to identify detailed attributes in the performance and configuration settings that differ between two time periods.

The following recipe describes the steps to use Compare Periods Report by using the OEM12C cloud control console.

## Getting ready

The agent needs to be up and running on a host where a database is installed.

In this example, the database instance called as OEM12c is used to demonstrate Compare Periods Report using the OEM 12C Cloud Control.

## How to do it...

To access the Compare Period ADDM, perform the following steps:

1. Log in to **Enterprise Manager Cloud Control**.
2. From the **Targets** option, select **Databases** from the drop-down menu.  
Select the name of the database instance in which you are interested.  
Select **AWR** under the **Performance** tab.
3. Select **Compare Period Reports** from the drop-down menu of **AWR**.
4. Connect as `sys` privileged user credential on the **Database Login** page.  
Click on **Login**.  
For the **First Period** and **Second Period** values, populate **Begin Snapshot** and **End Snapshot** or **Baseline** on the **Run Compare Periods Report** screen.

In this example, the **By Snapshot** option is selected for both **First period** and **Second Period**.

ORACLE Enterprise Manager Cloud Control 12c

Enterprise ▾ Targets ▾ Favorites ▾ History ▾

oem12c

Oracle Database ▾ Performance ▾ Availability ▾ Schema ▾ Administration ▾

Automatic Workload Repository > Run AWR Report

**Run Compare Periods Report**

Specify two periods for comparison. For each period, you can either pick one baseline or a pair of snapshots. [Generate Report](#)

First Period	Second Period
<input type="radio"/> By Baseline	<input type="radio"/> By Baseline
Baseline <input type="text"/>	Baseline <input type="text"/>
<input checked="" type="radio"/> By Snapshot	<input checked="" type="radio"/> By Snapshot
Begin Snapshot: <input type="text" value="4072"/>	Begin Snapshot: <input type="text" value="4074"/>
End Snapshot: <input type="text" value="4073"/>	End Snapshot: <input type="text" value="4075"/>

5. Click on **Generate Report**.

Automatic Workload Repository > Run AWR Report

**Run Compare Periods Report**

Specify two periods for comparison. For each period, you can either pick one baseline or a pair of snapshots. [Generate Report](#)

First Period	Second Period
<input type="radio"/> By Baseline	<input type="radio"/> By Baseline
Baseline <input type="text"/>	Baseline <input type="text"/>
<input checked="" type="radio"/> By Snapshot	<input checked="" type="radio"/> By Snapshot
Begin Snapshot: <input type="text" value="4072"/>	Begin Snapshot: <input type="text" value="4074"/>
End Snapshot: <input type="text" value="4073"/>	End Snapshot: <input type="text" value="4075"/>

Report Results [Save to File](#)

**WORKLOAD REPOSITORY COMPARE PERIOD REPORT**

6. Click on **Save to File** to save the Compare Periods Report for further analysis.
7. Analyze the Compare Periods Report for various sections such as Host configuration comparison, Cache sizes, Time Model Statistics and Operating System Statistics.

## How it works...

The Compare Periods Report helps to identify the cause of performance degradation. If the application workload is known to be stable during a particular period each day, but the performance on a particular day was poor between the same period, running the Compare Periods Report for these two AWR snapshots identifies configuration settings, workload profile, and statistics that are different between those two periods. The cause of performance degradation can be more easily diagnosed based on the difference identified in the report.

The AWR Compare Periods Report is divided into multiple sections and the report includes links that can be used to navigate between the different sections.

## There's more...

The OEM 12c Cloud Control is the primary interface for generating the AWR Compare Periods Report. The same report can also be generated by the SQL script `awrddrpt.sql`, which is a part of the Oracle software installation. The path of the script is `$ORACLE_HOME/rdbms/admin/awrddrpt.sql`.

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