

Oracle Database 12c

The Best Oracle Database 12c Tuning Features for Developers and DBAs

Presented by: Alex Zaballa, Oracle DBA 



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ORACLE® Certified Expert Oracle Exadata X3 and Oracle Exadata X4 Administrator	ORACLE® Certified Professional Oracle Database 10g Administrator	ORACLE® Certified Expert Oracle WebLogic Server 10g System Administrator	ORACLE® Certified Associate Oracle Application Server 10g Administrator	ORACLE® Certified Expert Oracle Real Application Clusters 10g Administrator	ORACLE® Certified Expert	ORACLE® PartnerNetwork Certified Specialist

147 and counting...



<http://alexzaballa.blogspot.com/>



@alexzaballa



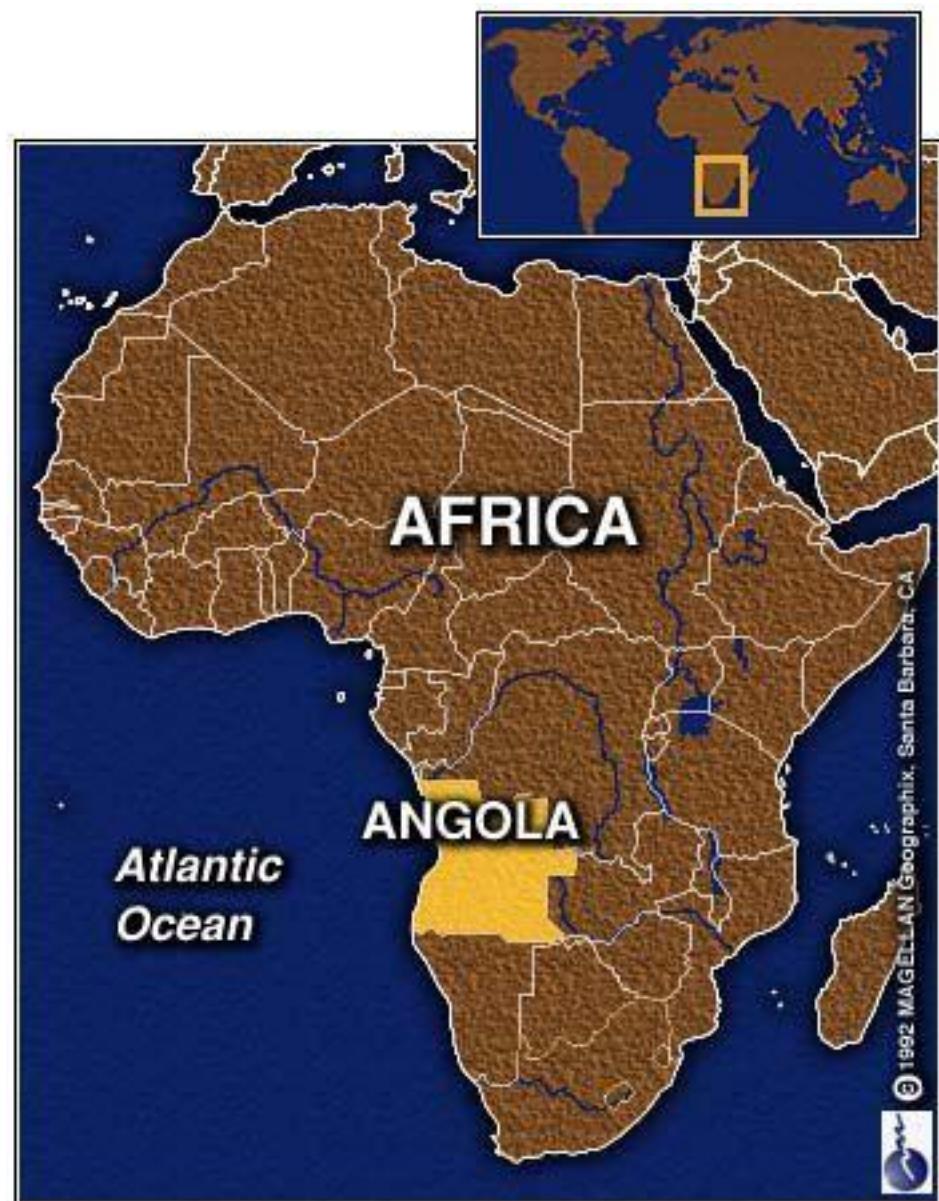
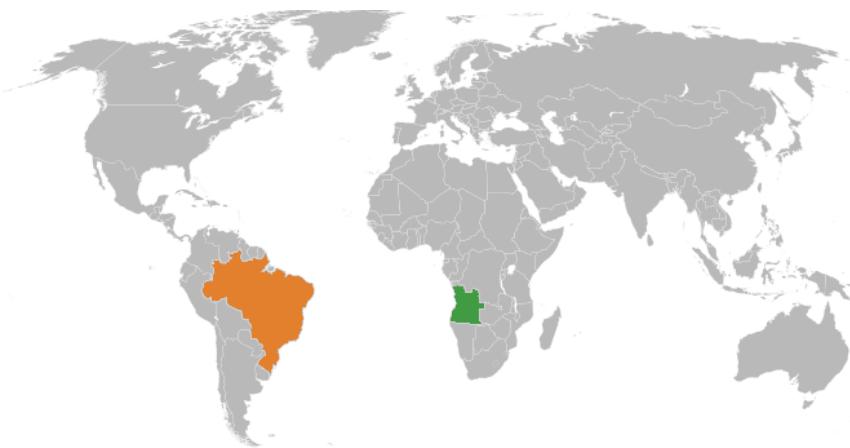
<https://www.linkedin.com/in/alexzaballa>



Worked for **7** years in **Brazil** as a **Developer**

Worked **8** years for the Ministry of Finance
In **Angola** as a **DBA**

March - 2007 until March - 2015





Accenture Enkitec Group



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Oracle Specializations

- Oracle Database
- Oracle Exadata
- Oracle GoldenGate
- Oracle Data Integrator
- Oracle Data Warehouse
- Oracle Real Application Clusters
- Oracle Performance Tuning
- Oracle Database Security



Global systems integrator
focused on the Oracle Database
& Engineered Systems platform



Worldwide leader in Exadata
implementations (600+)

Oracle Database 12c

The Best Oracle Database 12c Tuning Features for Developers and DBAs

Oracle Official Documentation

12.1.0.2

- <http://docs.oracle.com/database/121/NEWFT/chapter12102.htm>

Oracle Learning Library (OLL)

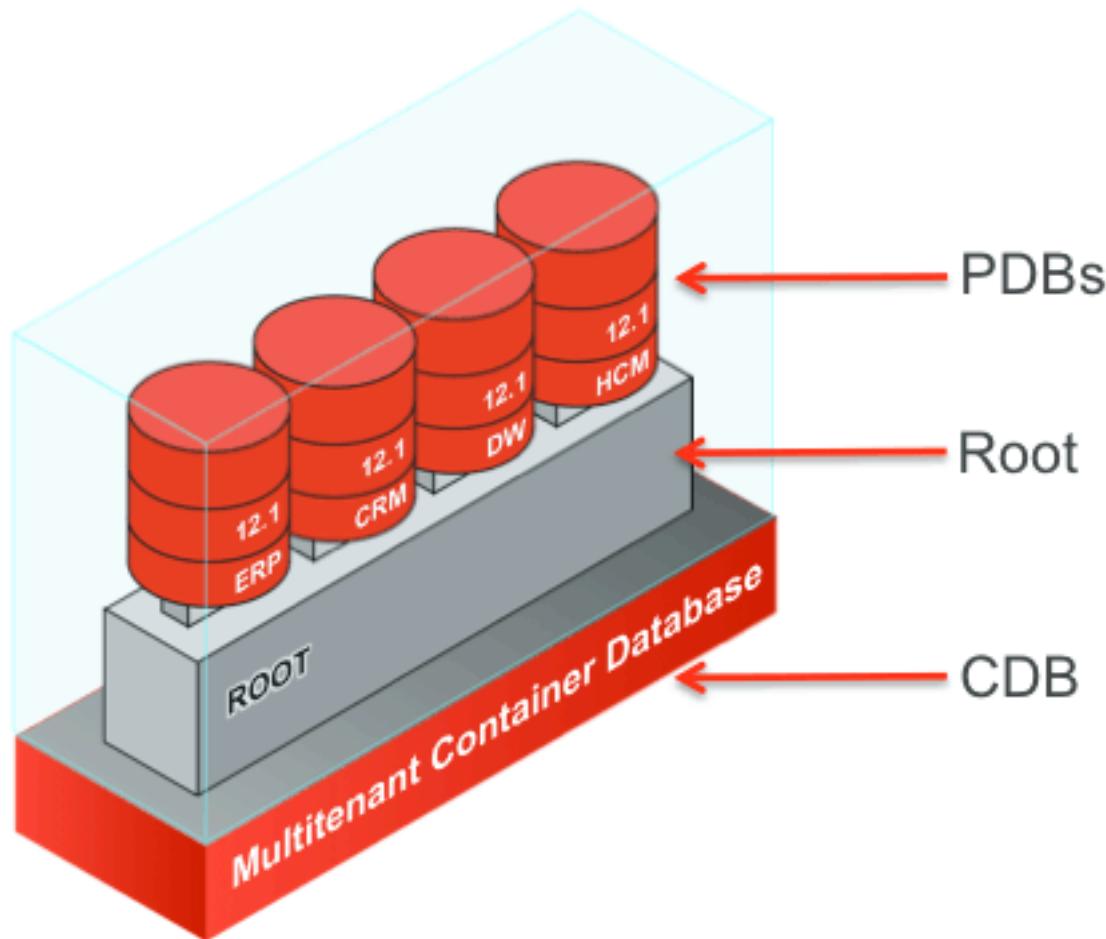
- <https://apexapps.oracle.com/pls/apex/f?p=44785:1:0>

Articles about 12c

- <https://oracle-base.com/articles/12c/articles-12c>
- <http://www.oraclealchemist.com/news/install-oracle-12c-12-1/>
- <http://www.profissionaloracle.com.br/>

“With more than **500 new features**, Oracle Database **12c** is designed to give Oracle customers exactly what they’ve told us they need for cloud computing, big data, security, and availability.”

Multitenant



Source: Oracle Documentation

Multitenant

Is it a Tuning Feature?

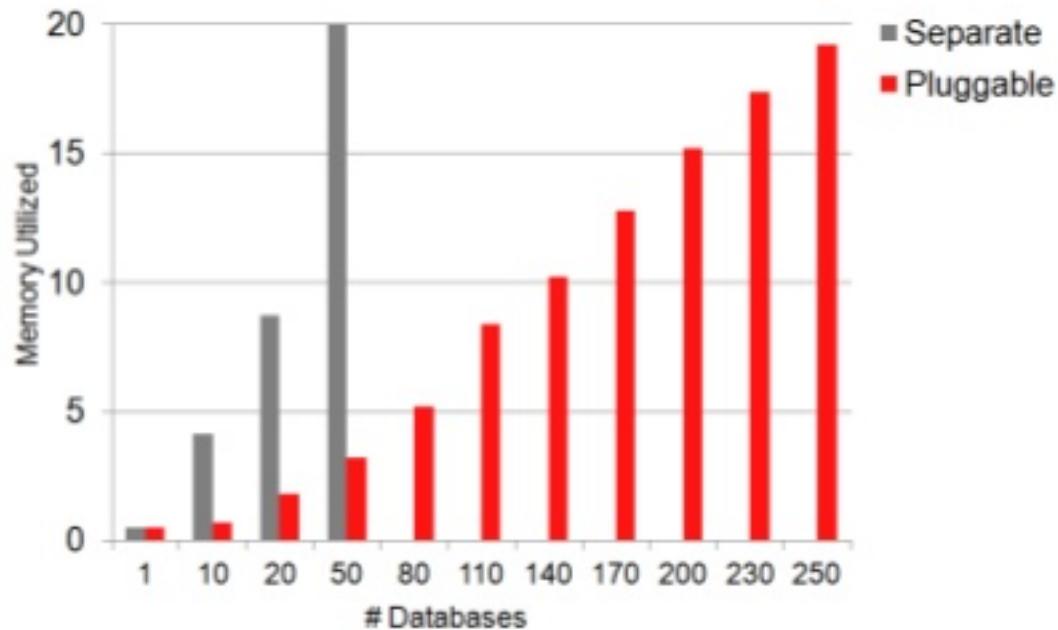
Pluggable vs Separate Databases

Highly Efficient: 6x Less H/W Resource, 5x more Scalable

OLTP benchmark comparison

Only 3GB of memory vs. 20GB memory used for 50 databases

Pluggable databases scaled to over 250 while separate database instances maxed at 50



ORACLE

Multitenant

**Non-CDB architecture of Oracle databases is
DEPRECATED since Oracle Database 12.1.0.2**

By Mike Dietrich-Oracle on Jan 22, 2015

Beginning with Oracle Database 12.1.0.2 a **non-CDB architecture is deprecated**.

8.1.1 Deprecation of Non-CDB Architecture

The non-CDB architecture is deprecated in Oracle Database 12c, and may be unsupported and unavailable in a later Oracle Database release. Oracle recommends use of the CDB architecture.

Note:

There remain a small number of features that do not work with the CDB architecture (see README, section 2.2.1 "Features Restricted or Not Available for a Multitenant Container Database"). If you need these features, then continue to use the non-CDB architecture until your required feature works with the CDB architecture.

Multitenant

What does this mean?

Deprecation first of all does not mean "desupported".

Multitenant

Which features are not supported at the moment?

- Database Change Notification
- Continuous Query Notification (CQN)
- Client Side Cache
- Heat Map
- Automatic Data Optimization
- Oracle Streams
- Oracle Fail Safe
- Flashback Pluggable Database (Flashback Database works but will flashback CDB\$ROOT including all PDBs)
- DBVERIFY
- Data Recovery Advisor (DRA)
- Flashback Transaction Backout

In-Memory



Source: Oracle Documentation

In-Memory

SIMD Vector Processing

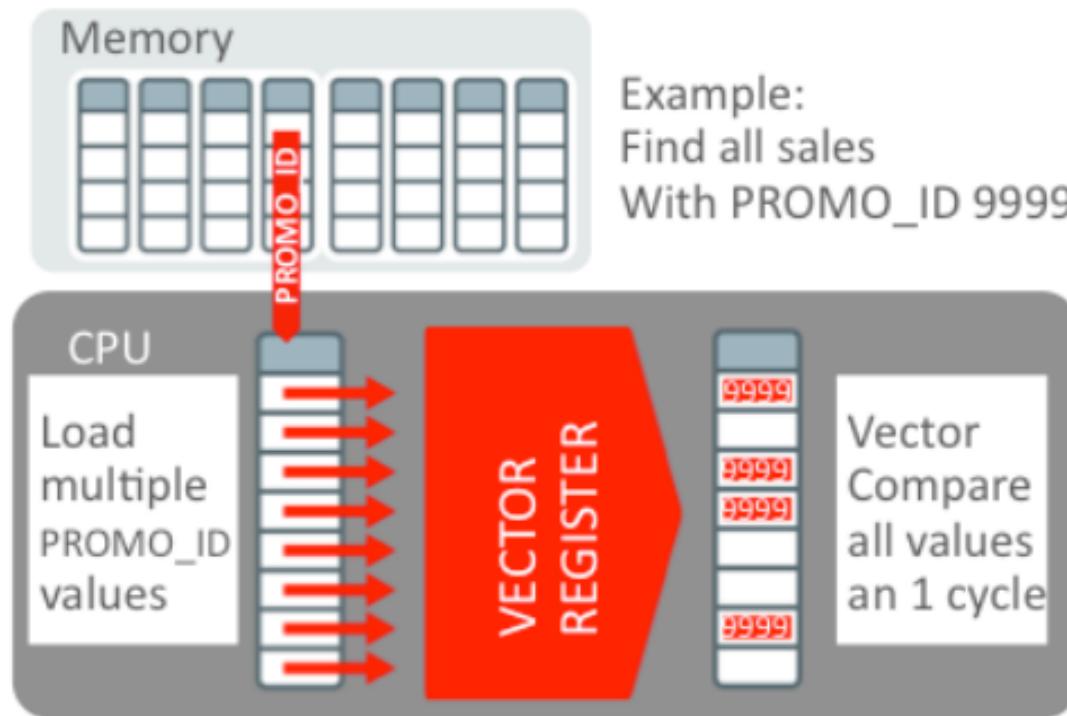


Figure 11. Using SIMD vector processing enables the scanning of billions of rows per second

Source: <http://www.oracle.com/technetwork/database/in-memory/overview/twp-oracle-database-in-memory-2245633.html>

In-Memory

Is it a Tuning Feature?

“Using Database In-Memory, businesses can **instantaneously** run analytics and reports that previously took **hours or days**.”

Source: Oracle Documentation

In-Memory

In-Memory Area – a static pool in SGA

In-Memory

```
ALTER SYSTEM SET SGA_TARGET=3G SCOPE=SPFILE;
ALTER SYSTEM SET INMEMORY_SIZE=2G SCOPE=SPFILE;
SHUTDOWN IMMEDIATE;
STARTUP;
```

ORACLE instance started.

Total System Global Area	3221225472 bytes
Fixed Size	2929552 bytes
Variable Size	419433584 bytes
Database Buffers	637534208 bytes
Redo Buffers	13844480 bytes
In-Memory Area	2147483648 bytes
Database mounted.	
Database opened.	

In-Memory

```
Alter table hr.EMPLOYEES inmemory;
```

```
ALTER TABLE sales MODIFY PARTITION SALES_Q1_1998  
NO INMEMORY;
```

```
ALTER TABLE sales INMEMORY NO INMEMORY(prod_id);
```

```
CREATE TABLESPACE tbs_test  
DATAFILE '+DG01' SIZE 100M  
DEFAULT INMEMORY;
```

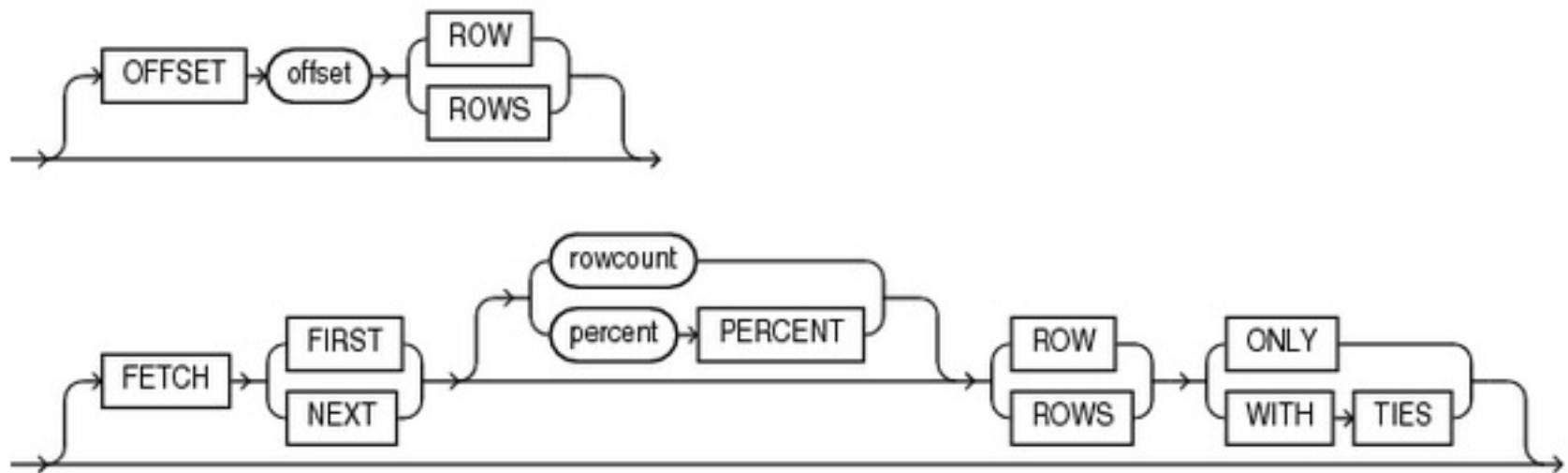
In-Memory

PRIORITY	DESCRIPTION
CRITICAL	Object is populated immediately after the database is opened
HIGH	Object is populated after all CRITICAL objects have been populated, if space remains available in the IM column store
MEDIUM	Object is populated after all CRITICAL and HIGH objects have been populated, and space remains available in the IM column store
LOW	Object is populated after all CRITICAL, HIGH, and MEDIUM objects have been populated, if space remains available in the IM column store
NONE	Objects only populated after they are scanned for the first time (Default), if space is available in the IM column store

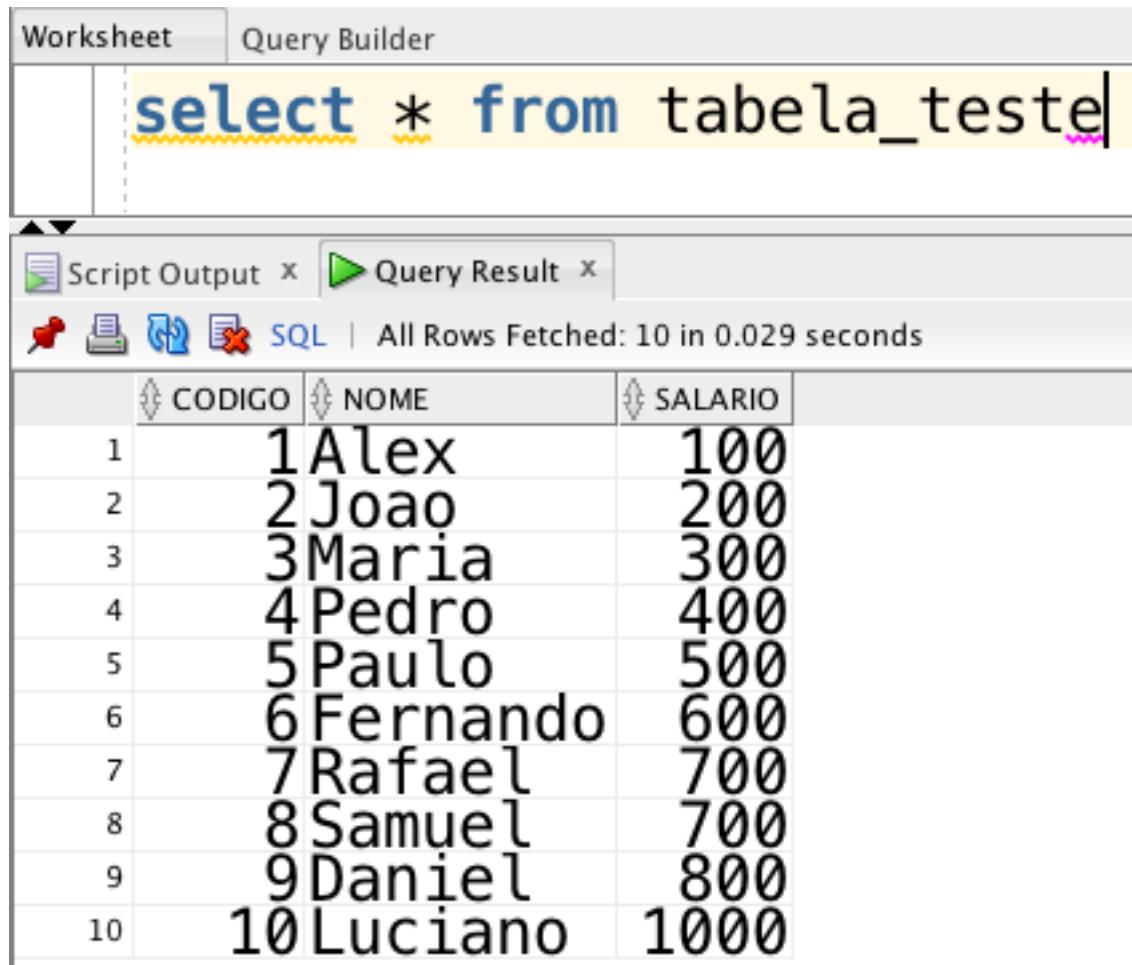
Figure 7. Different priority levels controlled by the PRIORITY sub clause of the INMEMORY clause

Source: <http://www.oracle.com/technetwork/database/in-memory/overview/twp-oracle-database-in-memory-2245633.html>

SQL Query Row Limits and Offsets



SQL Query Row Limits and Offsets



The screenshot shows a SQL worksheet interface. The top bar has tabs for 'Worksheet' and 'Query Builder', with 'Worksheet' selected. The main area contains a query editor with the following SQL code:

```
select * from tabela_teste
```

Below the query editor is a toolbar with icons for 'Script Output', 'Query Result', and other database operations. The 'Query Result' tab is active, showing the output of the query. The output indicates that all 10 rows were fetched in 0.029 seconds. The data is presented in a table with columns 'CODIGO', 'NOME', and 'SALARIO'. The data rows are:

	CODIGO	NOME	SALARIO
1	1	Alex	100
2	2	Joao	200
3	3	Maria	300
4	4	Pedro	400
5	5	Paulo	500
6	6	Fernando	600
7	7	Rafael	700
8	8	Samuel	700
9	9	Daniel	800
10	10	Luciano	1000

SQL Query Row Limits and Offsets

Top-N Queries – Pré 12c

```
select * from ( select codigo, nome, salario
                from tabela_teste
                order by salario desc)
               where rownum <= 5
```

SQL Query Row Limits and Offsets

```
select codigo, nome, salario  
  from tabela_teste  
order by salario desc  
FETCH FIRST 5 ROWS ONLY
```

CODIGO	NOME	SALARIO
10	Luciano	1000
9	Daniel	800
7	Rafael	700
8	Samuel	700
6	Fernando	600

SQL Query Row Limits and Offsets

```
select codigo, nome, salario  
  from tabela_teste  
order by salario
```

FETCH FIRST 30 PERCENT ROWS ONLY

CODIGO	NOME	SALARIO
<hr/>		
1	Alex	100
2	Joao	200
3	Maria	300

SQL Query Row Limits and Offsets

```
select codigo, nome, salario  
from tabela_teste  
order by salario desc  
OFFSET 2 ROWS FETCH NEXT 2 ROWS ONLY;
```

CODIGO	NOME	SALARIO

7	Rafael	700
8	Samuel	700

DEMO

Approximate Count Distinct

This function provides an alternative to the COUNT (DISTINCT expr), with **negligible deviation from the exact result**.

```
SQL> SELECT count (distinct manager_id) AS "Gerentes Ativos"  
      FROM hr.employees_big;
```

```
Gerentes Ativos
```

```
-----  
18
```

Elapsed: 00:00:03.02

Utilizando a função *APPROX_COUNT_DISTINCT*:

```
SQL> SELECT APPROX_COUNT_DISTINCT(manager_id) AS "Gerentes Ativos"  
      FROM hr.employees_big;
```

```
Gerentes Ativos
```

```
-----  
18
```

Elapsed: 00:00:00.62

DEMO

PL/SQL From SQL

with

```
function Is_Number
(x in varchar2) return varchar2 is
  Plsql_Num_Error exception;
  pragma exception_init(Plsql_Num_Error, -06502);
begin
  if (To_Number(x) is NOT null) then
    return 'Y';
  else
    return '';
  end if;
exception
  when Plsql_Num_Error then
    return 'N';
end Is_Number;
select rownum, x, is_number(x) is_num from t;
```

DEMO

Session Level Sequences

Session level sequences are used to produce unique values in a session. Once the session ends, the sequence is reset.

Generating Primary Keys for a Global Temporary Table would be a field where those kinds of sequences could be used.

Session Level Sequences

```
CREATE SEQUENCE sequence_teste
```

```
START WITH 1
```

```
INCREMENT BY 1
```

```
SESSION
```

```
/
```

Session Level Sequences

```
ALTER SEQUENCE sequence_teste  
SESSION;
```

```
ALTER SEQUENCE sequence_teste  
GLOBAL;
```

DEMO

Session private statistics for Global Temporary Tables

Pre 12c, statistics gathered for global temporary tables (GTTs) were common to all sessions.

Session private statistics for Global Temporary Tables

On 12c, by default session-private statistics are enabled

```
SELECT DBMS_STATS.get_prefs('GLOBAL_TEMP_TABLE_STATS')  
FROM dual;
```

STATS

SESSION

Session private statistics for Global Temporary Tables

How to change?

Behavior pre 12c:

```
BEGIN
  DBMS_STATS.set_global_prefs (
    pname  => 'GLOBAL_TEMP_TABLE_STATS',
    pvalue => 'SHARED');
END;
/
```

Back to default on 12c:

```
BEGIN
  DBMS_STATS.set_global_prefs (
    pname  => 'GLOBAL_TEMP_TABLE_STATS',
    pvalue => 'SESSION');
END;
/
```

Session private statistics for Global Temporary Tables

How to change for one table?

```
BEGIN
  dbms_stats.set_table_prefs('SCOTT','GTT_TESTE',
  'GLOBAL_TEMP_TABLE_STATS','SHARED');
END;
```

```
BEGIN
  dbms_stats.set_table_prefs('SCOTT','GTT_TESTE',
  'GLOBAL_TEMP_TABLE_STATS','SESSION');
END;
```

DEMO

Temporary Undo

Global Temporary Tables (GTT) hold the data in a temporary tablespace. The data in GTTs are either deleted after commit or kept until the session is connected depending of the definition of the GTT.(ON COMMIT PRESERVE OR DELETE ROWS).

DMLs in a Global Temporary Tables **do not generate REDO, but generate UNDO** and this will result in REDO generating.

Temporary Undo

```
alter session set temp_undo_enabled=true;
```

```
alter system set temp_undo_enabled=true;
```

**you can change for the session or for the database.

*default true

DEMO

Multiple Indexes on the same set of Columns

Pre 12c:

ORA-01408: such column list already indexed
error.

Multiple Indexes on the same set of Columns

Is the ability to create more than one index on the same set of columns in 12c.

****Only one of these indexes can be visible at a time**

Multiple Indexes on the same set of Columns

Why would you want to do that?

- Unique versus nonunique
- B-tree versus bitmap
- Different partitioning strategies

DEMO

Limit the PGA

SQL> show parameter pga

NAME	TYPE	VALUE
<hr/>		
pga_aggregate_limit	big integer	2G

Limit the PGA

PGA_AGGREGATE_LIMIT is set to the greater of:

- 2 GB (default value)
- 200% of **PGA_AGGREGATE_TARGET**
- 3 MB times the **PROCESSES** parameter

Statistics During Loads

The ability to gather statistics automatically during **bulk loads**:

- CREATE TABLE AS SELECT
- INSERT INTO ... SELECT into an empty table using a **direct path insert**

DEMO

Partial Indexes for Partitioned Table

- You can create local and global indexes on a **subset** of the partitions of a table, enabling more flexibility in index creation.
- This feature is not supported for unique indexes, or for indexes used for enforcing unique constraints.

Partial Indexes for Partitioned Table

```
create table tabela_teste
(
    coluna1 number,
    coluna2 number
)
indexing on
partition by range(coluna1)
(
    partition part1 values less than(100) indexing off,
    partition part2 values less than(200) indexing on,
    partition part3 values less than(300),
    partition part4 values less than(400)
);

```

Table created.

DEMO

Full Database Caching

Can be used to cache the entire database in memory. It should be used when the buffer cache size of the database instance **is greater than the whole database size**.

```
SQL> ALTER DATABASE FORCE FULL DATABASE CACHING;  
Database altered.  
  
SQL> SELECT force_full_db_caching FROM v$database;  
FOR  
---  
YES
```

Adaptive Query Optimization



Adaptive Plans



Adaptive Join Method

Adaptive Join Method

Optimizer can change join from Nested Loop to Hash Join and vice versa.

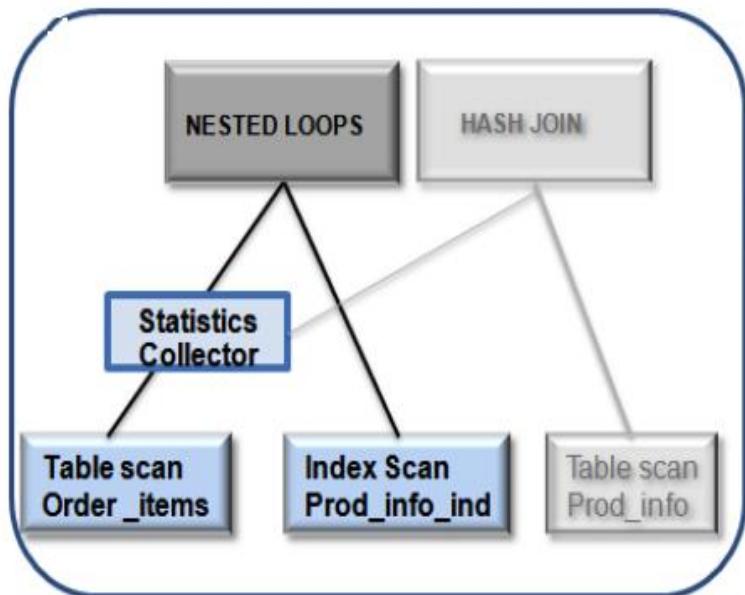
Why?

Optimizer mistakes

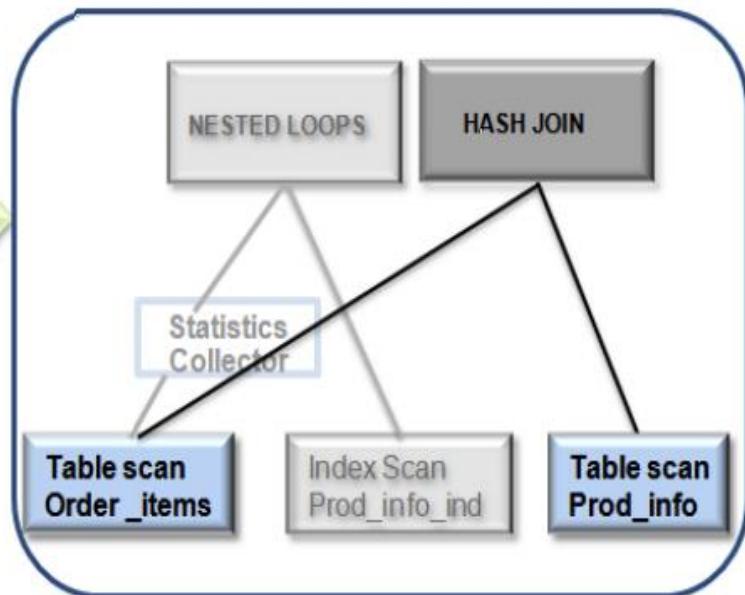
- Estimated Rows and Actual rows are different

Before 12c requires DBA/Developer intervention

Adaptive Join Method



Default Plan is a nested loops join



Final Plan is a hash join

Source: Oracle Documentation

Adaptive Join Method

Parameters that control Adaptive Plans:

Name	Type	Value
optimizer_adaptive_features	boolean	TRUE
optimizer_adaptive_reporting_only	boolean	FALSE
optimizer_features_enable	string	12.1.0.1

Explain Plan command shows the default plan

```
SQL> explain plan for
2  select /*+ gather_plan_statistics*/ p.product_name
3  from order_items2 o, product_information p
4  where o.unit_price = 15
5    and o.quantity > 1
6    and p.product_id = o.product_id;
```

Explained.

```
SQL>
SQL> select * from table(dbms_xplan.display());
```

PLAN_TABLE_OUTPUT

Plan hash value: 983807676

Id	Operation	Name
0	SELECT STATEMENT	
1	NESTED LOOPS	
2	NESTED LOOPS	
3	TABLE ACCESS FULL	ORDER_ITEMS2
4	INDEX UNIQUE SCAN	PRODUCT_INFORMATION_PK
5	TABLE ACCESS BY INDEX ROWID	PRODUCT_INFORMATION

Predicate Information (identified by operation id):

3 - filter("O"."UNIT_PRICE"=15 AND "O"."QUANTITY">>1)

DBMS_XPLAN.DISPLAY_CURSOR

shows the final plan

```
SQL> select * from table(dbms_xplan.display_cursor());
```

```
PLAN_TABLE_OUTPUT
```

```
SQL_ID d3mzk0mzx264d, child number 0
```

```
select /*+ gather_plan_statistics */ p.product_name from order_items2
o, product_information p where o.unit_price = 15 and o.quantity > 1
and p.product_id = o.product_id
```

```
Plan hash value: 2886494722
```

Id	Operation	Name	Rows	Bytes	Cost (%CPU)
0	SELECT STATEMENT				7 (100)
1	HASH JOIN		4	128	7 (0)
2	TABLE ACCESS FULL	ORDER_ITEMS2	4	48	3 (0)
3	TABLE ACCESS FULL	PRODUCT_INFORMATION	1	20	1 (0)

```
Predicate Information (identified by operation id):
```

```
1 - access("P"."PRODUCT_ID"="O"."PRODUCT_ID")
2 - filter(("O"."UNIT_PRICE"=15 AND "O"."QUANTITY">>1))
```

DEMO

Real-Time SQL Monitoring

- Sql Monitoring requires both Diagnostics and Tuning Pack licenses

Real-Time SQL Monitoring

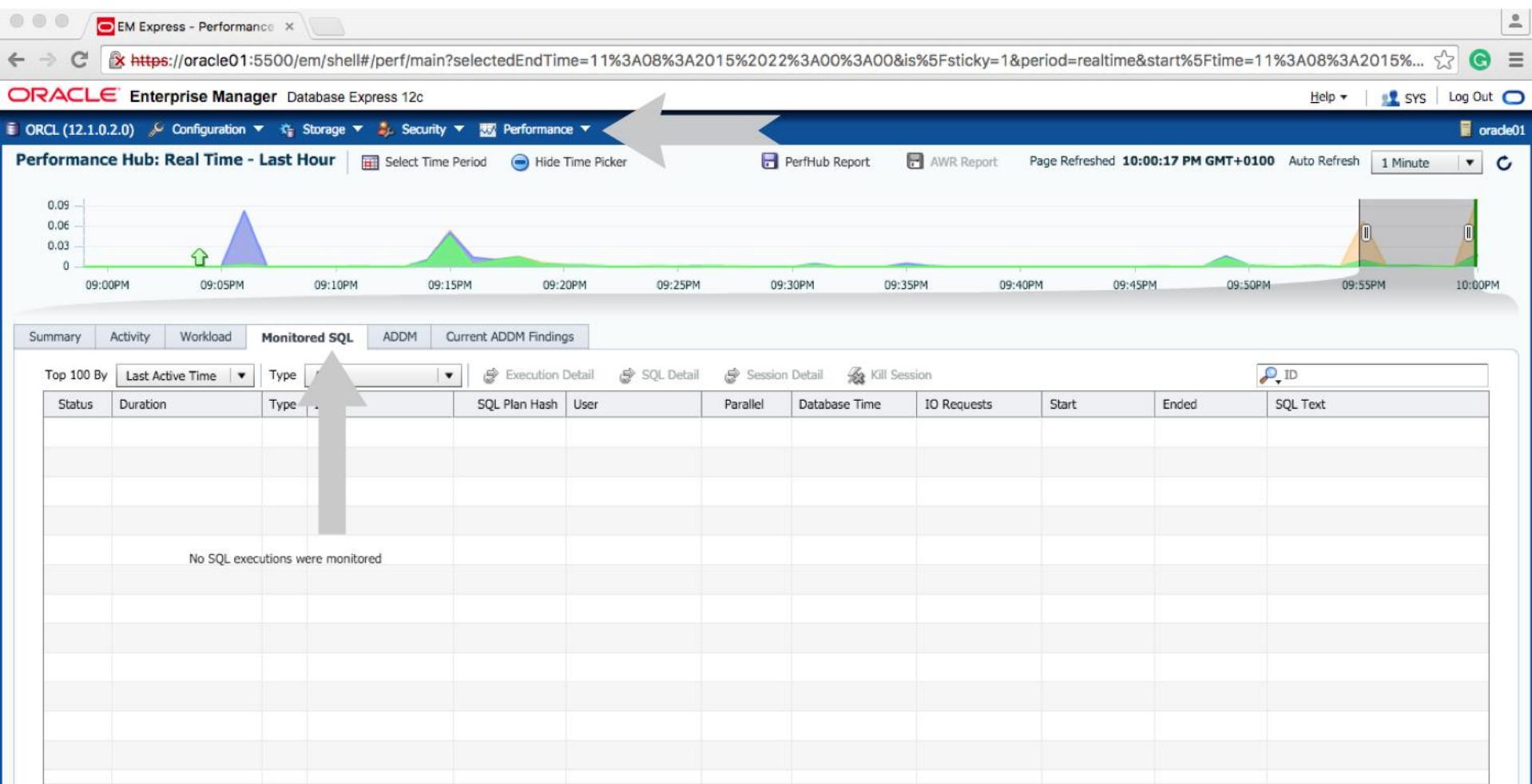
- MONITOR Hint

```
SELECT /*+ MONITOR */
```

- All parallel statements

- After 5 seconds of CPU/IO time spent for serial queries

Real-Time SQL Monitoring



EM Express - Performance

<https://oracle01:5500/em/shell#/perf/main?selectedEndTime=11%3A08%3A2015%2022%3A00%3A00&is%5Fsticky=1&period=realtime&start%5Ftime=11%3A08%3A2015%2022%3A00%3A00>

ORACLE Enterprise Manager Database Express 12c

ORCL (12.1.0.2.0) Configuration Storage Security Performance

Performance Hub: Real Time - Last Hour | Select Time Period Hide Time Picker

PerfHub Report AWR Report Page Refreshed 10:00:17 PM GMT+0100 Auto Refresh 1 Minute

0.09
0.06
0.03
0

09:00PM 09:05PM 09:10PM 09:15PM 09:20PM 09:25PM 09:30PM 09:35PM 09:40PM 09:45PM 09:50PM 09:55PM 10:00PM

Summary Activity Workload Monitored SQL ADDM Current ADDM Findings

Top 100 By Last Active Time Type Execution Detail SQL Detail Session Detail Kill Session ID

Status	Duration	Type	SQL Plan Hash	User	Parallel	Database Time	IO Requests	Start	Ended	SQL Text
No SQL executions were monitored										

Real-Time SQL Monitoring

ORACLE Enterprise Manager Database Express 12c

ORCL (12.1.0.2.0) Configuration Storage Security Performance

Monitored SQL Execution Details: 8pkcq5nts37t8   Navigate to SQL Details

Help SYS Log Out 

Overview

General

SQL Text	SELECT /*+ MONITOR */ d.dname, count(e.ename) AS e	
Execution Started	Sun Nov 8, 2015 10:21:21 PM	
Last Refresh Time	Sun Nov 8, 2015 10:21:21 PM	
Execution ID	16777216	
User	SYS	
Fetch Calls	1	

Time & Wait Statistics

Duration	 2.8ms
Database Time	 2.8ms
PL/SQL & Java	0s
Activity %	0

IO Statistics

Buffer Gets	 9
IO Requests	 4
IO Bytes	 64KB

Details

Plan Statistics Plan Activity

Plan Hash Value 2970111170 Plan Note

Operation	Name	Line...	Estimated R...	Cost	Timeline(0.002774s)	Executi...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO By...	Activity %
SELECT STATEMENT		0				1	3						
SORT GROUP BY		1	4	7		1	3	2KB					
MERGE JOIN		2	14	6		1	14						
TABLE ACCESS BY INDEX ROWID	DEPT	3	4	2		1	4			1	8KB		
INDEX FULL SCAN	PK_DEPT	4	4	1		1	4			1	8KB		
SORT JOIN		5	14	4		4	14	2KB					
TABLE ACCESS FULL	EMP	6	14	3		1	14			2	48KB		

Real-Time SQL Monitoring

ORACLE Enterprise Manager Database Express 12c

ORCL (12.1.0.2.0) Configuration Storage Security Performance

Monitored SQL Execution Details: 5dhu4w0j59yp7

Save Page Refreshed 10:23:49 PM GMT+0100

SYS Log Out

oracle01

Overview

General

SQL Text: `SELECT /*+ MONITOR */ d.dname, count(e.ename) AS e`

Execution Started: Sun Nov 8, 2015 10:23:24 PM

Last Refresh Time: Sun Nov 8, 2015 10:23:24 PM

Execution ID: 16777216

User: SYS

Fetch Calls: 1

Time & Wait Statistics

Duration: 3.5ms

SQL Text

```
SELECT /*+ MONITOR */ d.dname, count(e.ename) AS employees
FROM scott.emp e
JOIN scott.dept d ON e.deptno = d.deptno
WHERE e.deptno <> :1
GROUP BY d.dname
ORDER BY d.dname
```

IO Statistics

Buffer Gets	9
IO Requests	0
IO Bytes	0

Details

Plan Statistics Plan Activity

Plan Hash Value: 2970111170

Plan Note

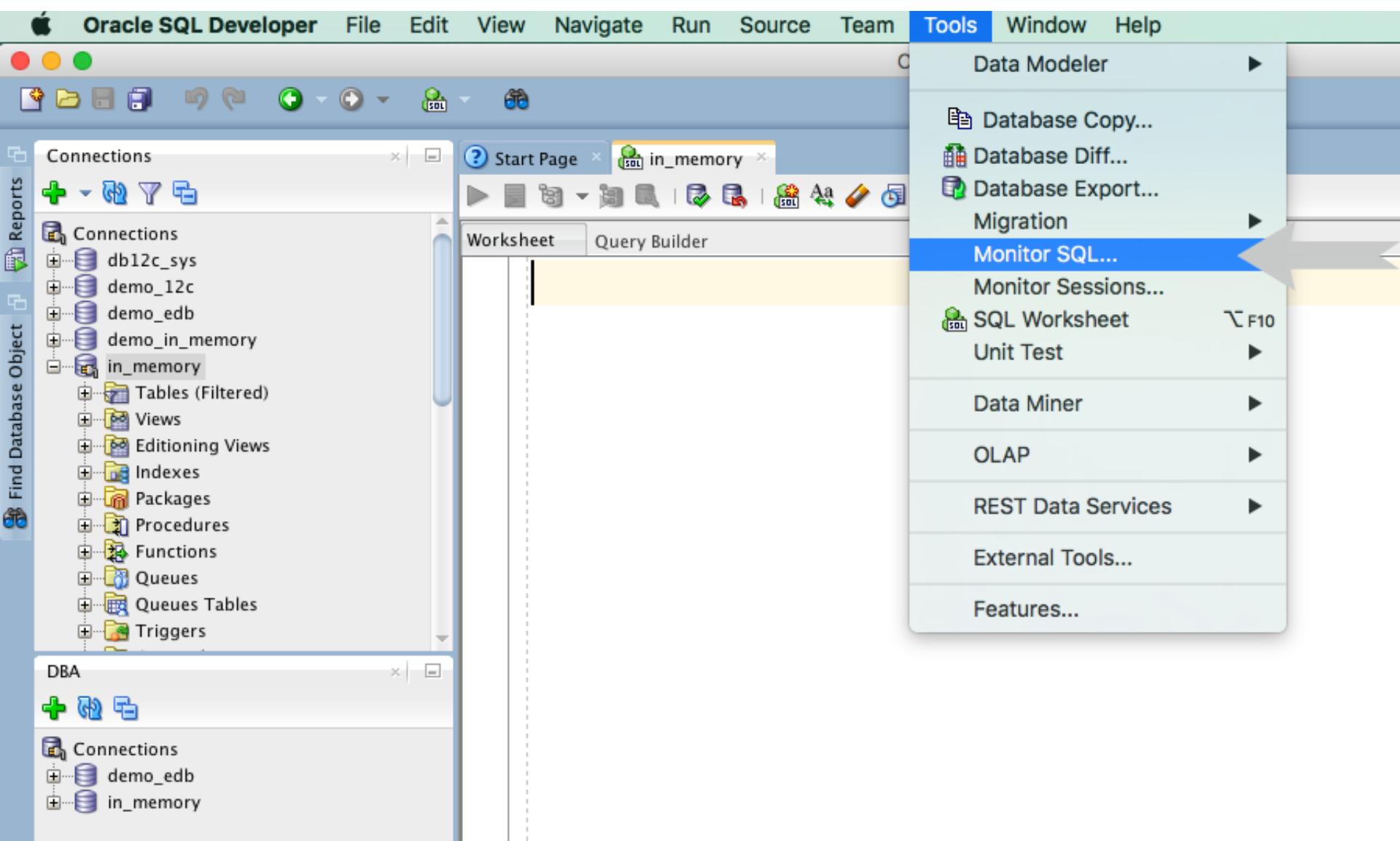
Operation	Name	Line...	Estimated R...	Cost	Timeline(0.003519s)	Executi...	Actual Rows	Memory ...	Temp (Max)	O...	IO Reque...	IO By...	Activity %
SELECT STATEMENT		0											
SORT GROUP BY		1		2									
MERGE JOIN		2		12									
TABLE ACCESS BY INDEX ROWID	DEPT	3		4									
INDEX FULL SCAN	PK_DEPT	4		4									
SORT JOIN		5		12									
TABLE ACCESS FULL	EMP	6		12									

SQL Binds

Position	Name	Value	Type
1	:1	0	VARCHAR2(32)

Save OK

Real-Time SQL Monitoring



Real-Time SQL Monitoring

Oracle SQL Developer : Real Time SQL Monitoring

STATUS	DURATION	SQL_ID	SESSION_ID	SESSION_SERIAL	INSTANCE_DOP	CPU_TIME	IO_TIME	START_TIME
DONE (ALL ROWS)	05dbu4w0i59vp7	261	7733110		0	0	0	008-NOV-2015
DONE (ALL ROWS)	ca5nts37t8	261	7733110		0	0	0	008-NOV-2015

Connections

- Connections
 - db12c_sys
 - demo_12c
 - demo_edb
 - demo_in_memory
 - in_memory
 - Tables (Filtered)
 - Views
 - Editoring Views
 - Indexes
 - Packages
 - Procedures
 - Functions
 - Queues
 - Queues Tables
 - Triggers

DBA

- Connections
 - demo_edb
 - in_memory

Real Time SQL Monitoring

Refresh Refresh 0

Save Grid as Report...
Single Record View...
Count Rows...
Find/Highlight...
Publish to APEX...
Show SQL Details
Export...

Real-Time SQL Monitoring

Oracle SQL Developer : Real Time SQL Monitoring

Connections

- db12c_sys
- demo_12c
- demo_edb
- demo_in_memory
- in_memory**
- Tables (Filtered)
- Views
- Partitioning Views
- Indexes
- Packages
- Procedures
- Functions
- Queues
- Queues Tables
- Triggers

Find Database Object

DBA

Real Time SQL Monitoring

Overview

SQL Id: 5dhu4w0j59yp7
Execution Started: 11/08/2015 22:23:24
Last Refresh time: 11/08/2015 22:23:24
Execution Id: 16777216
Session: 261
Fetch Calls: 1
Run Status: DONE (ALL ROWS)

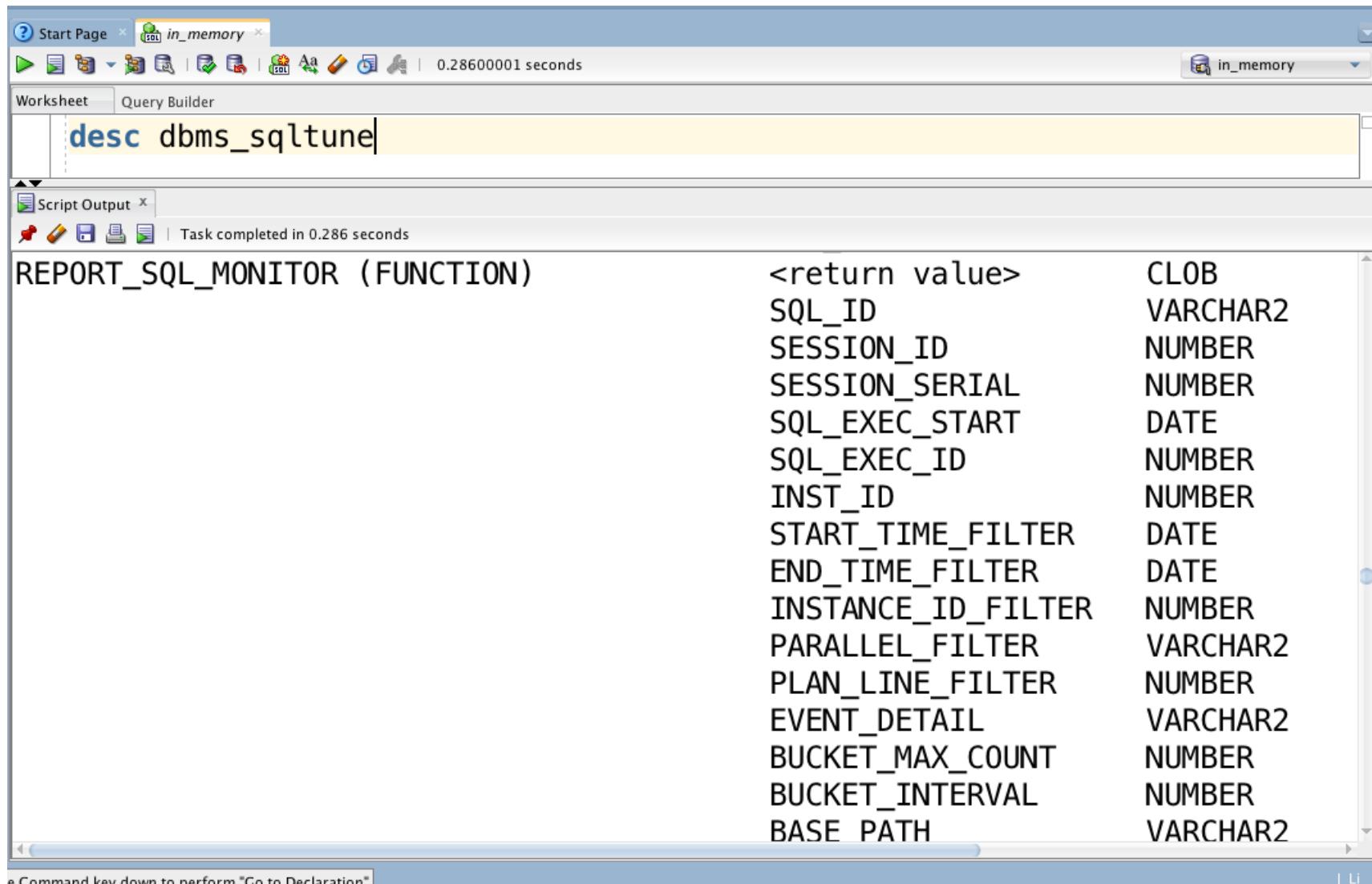
User Information:

User Name: SYS
OS User: alexzaballa
Process: 51558
Machine: Alexs-MacBook-Pro.local
Program: SQL Developer
Module: SQL Developer
Client Info:

**SELECT /*+ MONITOR */ d.dname, count(e.empno) AS empno
FROM scott.emp e
JOIN scott.dept d ON e.deptno = d.deptno
WHERE e.deptno <> :1**

OPERATION	NAME	ESTIMATED_RO...	COST	TIMELINE	EXECUTIONS	ACTUAL_ROWS	MEMORY/MEMO...	TEMP/TEMP(MAX)	CPU
SELECT STATEMENT					1	3 0 / 0	0 / 0		
-SORT (GROUP BY)		2	7		1	3 0 / 2048	0 / 0		
-MERGE JOIN		12	6		1	14 0 / 0	0 / 0		
-TABLE ACC DEPT		4	2		1	4 0 / 0	0 / 0		
-INDEX PK_DEPT		4	1		1	4 0 / 0	0 / 0		
-SORT (JOIN)		12	4		4	14 0 / 2048	0 / 0		
-TABLE EMP		12	3		1	14 0 / 0	0 / 0		

Real-Time SQL Monitoring



The screenshot shows the Oracle SQL Developer interface. The top navigation bar has tabs for 'Start Page' and 'in_memory'. The status bar shows '0.28600001 seconds'. The main area has tabs for 'Worksheet' and 'Query Builder', with 'Worksheet' selected. The query 'desc dbms_sqltune' is entered in the worksheet. Below the worksheet is a 'Script Output' tab showing the results of the query. The results are as follows:

REPORT_SQL_MONITOR (FUNCTION)	<return value>	CLOB
	SQL_ID	VARCHAR2
	SESSION_ID	NUMBER
	SESSION_SERIAL	NUMBER
	SQL_EXEC_START	DATE
	SQL_EXEC_ID	NUMBER
	INST_ID	NUMBER
	START_TIME_FILTER	DATE
	END_TIME_FILTER	DATE
	INSTANCE_ID_FILTER	NUMBER
	PARALLEL_FILTER	VARCHAR2
	PLAN_LINE_FILTER	NUMBER
	EVENT_DETAIL	VARCHAR2
	BUCKET_MAX_COUNT	NUMBER
	BUCKET_INTERVAL	NUMBER
	BASE_PATH	VARCHAR2

At the bottom of the interface, there is a status bar with the text 'Command key down to perform "Go to Declaration"' and a page number '1 / 1'.

Real-Time SQL Monitoring

SPOOL /tmp/report_sql_monitor.htm

```
SELECT DBMS_SQLTUNE.report_sql_monitor(  
    sql_id      => '5dhu4w0j59yp7',  
    type        => 'HTML',  
    report_level => 'ALL') AS report  
FROM dual;
```

SPOOL OFF

Real-Time SQL Monitoring

SQL Monitoring Report

SQL Text

```
SELECT /*+ MONITOR */ d.dname, count(e.ename) AS employees FROM scott.emp e JOIN scott.dept d ON e.deptno = d.deptno WHERE e.deptno <> :1 GROUP BY d.dname ORDER BY d.dname
```

Global Information: DONE (ALL ROWS)

Instance ID	: 1
Session	: SYS (261:7733)
SQL ID	: 5duh4w0j59yp7
SQL Execution ID	: 16777216
Execution Started	: 11/08/2015 22:23:24
First Refresh Time	: 11/08/2015 22:23:24
Last Refresh Time	: 11/08/2015 22:23:24
Duration	: .003519s
Module/Action	: SQL Developer/-
Service	: SYS\$USERS
Program	: SQL Developer
Fetch Calls	: 1



Binds

Name	Position	Type	Value
:1	1	VARCHAR2(32)	0

SQL Plan Monitoring Details (Plan Hash Value=2970111170)

Id	Operation	Name	Estimated Rows	Cost	Active Period (.003519s)	Execs	Rows	Memory (Max)	Temp (Max)	IO Requests	CPU Activity	Wait Activity
0	SELECT STATEMENT					1	3					
1	SORT GROUP BY			2	7	1	3	2.0KB				
2	MERGE JOIN			12	6	1	14					
3	TABLE ACCESS BY INDEX ROWID	DEPT	4	2		1	4					
4	INDEX FULL SCAN	PK_DEPT	4	1		1	4					
5	SORT JOIN		12	4		4	14	2.0KB				
6	TABLE ACCESS FULL	EMP	12	3		1	14					

```
SQL> SPool OFF
```

DEMO

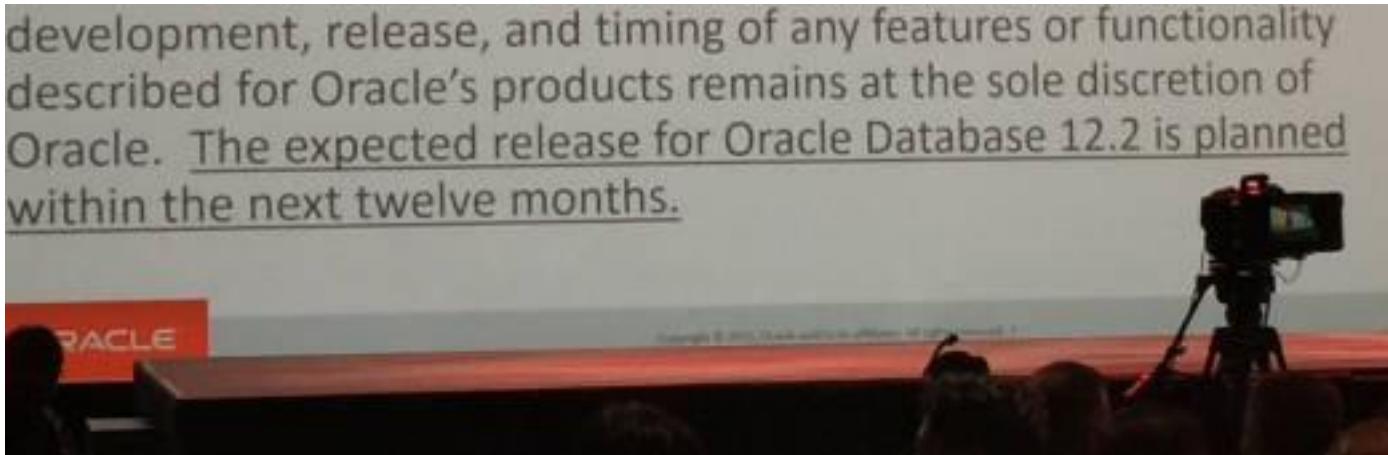
Oracle Database 12.2

Oracle Announces Beta Availability of Oracle Database 12c Release 2 - Oct 26, 2015

- PLUGGABLE DATABASES
From 252 to 4096
- HOT CLONING
Don't need to put the source in read-only for cloning
- SHARDING
It's like partitioning in a shared nothing database
The data is split into multiple databases
- In-Memory
In-Memory column Store on Active Data Guard
Heat Map
- APPLICATION CONTAINER
Pluggable Databases will share application objects
- More isolation, resource manager will limit the memory in addition to CPU and I/O.
- AWR will work on Active Data Guard Database: you can tune your reporting database

Availability of Oracle Database 12.2

development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle. The expected release for Oracle Database 12.2 is planned within the next twelve months.



Oracle Database Release Status

MOS Note:742060.1

Release	Patching Ends	Notes and Exceptions*
12.1.0.2	31-Jul-2021	Extended Support begins 1-Aug-2018
12.1.0.1	31-Aug-2016	
11.2.0.4	31-Dec-2020	Extended Support fees waived until May 31, 2017. An ES service contract is required starting 1-Jun-2017.
11.2.0.3	27-Aug-2015	
11.2.0.2	31-Oct-2013	End date extended beyond normal.
11.2.0.1	13-Sep-2011	Patch end date for Exadata is 30-Apr-2012
11.1.0.7	31-Aug-2015⁷	HP-UX Itanium - Patching ends Dec 2015. Beginning Sep 1, 2015 Sev 1 fixes only (no PSU or CPU will be produced). Extended Support required starting 1-Sep-2012
11.1.0.6	18-Sep-2009	
10.2.0.5	31-Jul-2015⁷	All platforms - standard Extended Support ended 31-Jul-2013. After that, Limited Extended Support is available from Aug 2013 through July 2015, Sev 1 fixes only (no PSU or SPU will be produced). See Oracle Software Technical Support Policies . HP-UX, Linux, and Windows Itanium - patching ends Dec 2015. Beginning Aug 1, 2013, Sev 1 fixes only (no PSU or CPU will be produced).

SQLcl

Oracle SQL Developer 4.1 EA2 (4.1.0.18.37)

March 9, 2015



Thank you for accepting the OTN License Agreement; you may now download this software.

- Bugs Fixed
- Release Notes
- New Features
- Documentation

SQL Developer requires JDK 8	Java 8 Download Page
Platform	
Windows 32/64-bit - Installation Notes	 Download 307 M
Mac OS X - Installation Notes	 Download 307 M
Linux RPM - Installation Notes	 Download 301 M
Other Platforms - Installation Notes	 Download 307 M

Command Line - SQLcl <i>Update Apr 16, 2015</i>	
All Platforms	 Download 12 M
● Over 350+ Bugs Fixed	
 Getting Started Video	



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Thank You