

A man with glasses and a denim shirt is gesturing while talking to a woman in a yellow top. They are sitting at a desk with papers, a coffee cup, and a smartphone. The background is a blurred office environment.

深入解析SQL Monitor Report

Calvin Qiu
Real World Performance Team, 2021年6月11日

Real-World Performance Team

我们是谁

- 用户与数据库研发团队的桥梁
- 成员分布在美国，欧洲，亚洲
- 加在一起几百年的经验

我们是怎样工作的

- 按照产品设计的方法去使用
- 全局视角看问题
- 目标是最好的性能
- 以数据为驱动的分析
- 分享我们所学



Agenda

- 1 SQL Monitor Report的独到之处
- 2 如何使用这个强大的工具
- 3 SQL Monitor Report相关视图

Agenda

- 1 SQL Monitor Report的独到之处
- 2 如何使用这个强大的工具
- 3 SQL Monitor Report相关视图

使用场景

- 对特定SQL语句的性能优化



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你通常使用什么工具？

- AWR / ADDM
- SQL Trace / tkprof
- Explain Plan
- dbms_xplan
- SQL Monitor
- v\$ views, x\$ tables, dba_hist tables, etc.
- 其它第三方工具
 - 哪一个才是最合适的？



Agenda

- 1 SQL Monitor Report的独到之处
- 2 如何使用这个强大的工具
- 3 SQL Monitor Report相关视图

介绍SQL Monitor

- 最早在Oracle Database 11g引入
- 用于SQL语句执行性能相关问题的深入分析
 - 系统内置
 - 捕获每一次执行的数据
 - 包括仍在运行的SQL
- 哪些SQL会被捕获
 - 所有的并行执行SQL
 - 执行时长超过5秒的串行执行SQL
 - 指定/*+ monitor */ hint

Tuning Pack的一部分



介绍SQL Monitor

- 支持以下格式
 - Text
 - HTML
 - Active-HTML ← 建议用这种格式
 - JET now
- 怎么生成
 - Oracle Enterprise Manager: 被监视的SQL
 - 12C之后, EM Express
 - PerfHub
 - 命令行
 - SQL Developer

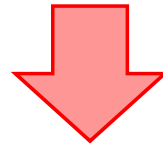
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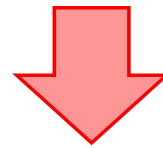
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命令行(SQLplus)

SQLID



```
undefine sqlid
set trimspool on
set pages 0
set linesize 1000
set long 1000000
set longchunksize 1000000
spool sqlmon_&&sqlid..html
select dbms_sqltune.report_sql_monitor(type=>'active',sql_id=>'&&sqlid') from dual;
spool off
```



HTML-file → view in browser

Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text `select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe` ...

Execution Plan 32 8

Execution Started Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time Thu Sep 1, 2016 3:53:42 PM

Execution ID 16777216

User CARS2

Fetch Calls 1

Time & Wait Statistics

Duration 40.0s

Database Time 16.5m

PL/SQL & Java 0s

Activity % 100

IO Statistics

Buffer Gets 13M

IO Requests 804K

IO Bytes 182GB

Cell Offload Efficiency 32%

Details

Plan Statistics Plan Parallel Activity Metrics

Plan Hash Value 1048826780 Plan Note All Parallel Servers ▼

Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Execut...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO B...	Cell Offload Efficie...	Activity %
PX COORDINATOR		2				65	32							
PX SEND QC (RANDOM)	:TQ10001	3	1			32	32							
SORT AGGREGATE		4	1			32	32						.34	
HASH JOIN RIGHT OUTER		5	42M	126K		32	40M	32GB	64GB		699K	80GB		79
PX RECEIVE		6	186K	63K		32	1,280M						9.24	
PX SEND BROADCAST	:TQ10000	7	186K	63K		32	1,280M						8.89	
PX BLOCK ITERATOR		8	186K	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	9	186K	63K		422	40M	225MB			53K	51GB	97	.91
PX BLOCK ITERATOR		10	42M	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	11	42M	63K		422	40M	225MB			53K	51GB	98	1.82

Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: `select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe`

Execution Plan: 32, 8

Execution Started: Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time: Thu Sep 1, 2016 3:53:42 PM

Execution ID: 16777216

User: CARS2

Fetch Calls: 1

Time & Wait Statistics

Duration: 40.0s

Database Time: 16.5m

PL/SQL & Java: 0s

Activity %: 100

IO Statistics

Buffer Gets: 13M

IO Requests: 804K

IO Bytes: 182GB

Cell Offload Efficiency: 32%

Details

Plan Statistics | Plan | Parallel | Activity | Metrics

Plan Hash Value: 1048826780 | Plan Note | All Parallel Servers

Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Execut...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO B...	Cell Offload Effic...	Activity %
PX COORDINATOR		2				65	32							
PX SEND QC (RANDOM)	:TQ10001	3	1			32	32							
SORT AGGREGATE		4	1			32	32						.34	
HASH JOIN RIGHT OUTER		5	42M	126K		32	40M	32GB	64GB		699K	80GB		79
PX RECEIVE		6	186K	63K		32	1,280M						9.24	
PX SEND BROADCAST	:TQ10000	7	186K	63K		32	1,280M						8.89	
PX BLOCK ITERATOR		8	186K	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	9	186K	63K		422	40M	225MB		53K	51GB		97	.91
PX BLOCK ITERATOR		10	42M	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	11	42M	63K		422	40M	225MB		53K	51GB		98	1.82

详解 - 概述

ORACLE Enterprise Manager Database Active Report

Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: `select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe`

Execution Plan: [Icon]

Execution Started: Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time: Thu Sep 1, 2016 3:53:42 PM

Execution ID: 16777216

User: CARS2

Fetch Calls: 1

Time & Wait Statistics

Duration: [Bar]

Database Time: [Bar]

SQL & Java Activity %: [Bar]

Details

Plan Statistics

Plan Hash Value: 1048826780

Plan Note: [Icon]

All Parallel Servers

Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Exec
PX COORDINATOR		2				

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详解 - 概述

ORACLE Enterprise Manager Database Active Report

Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe

Execution Plan: 32 8

Execution Started: Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time: Thu Sep 1, 2016 3:53:42 PM

Execution ID: 16777216

User: CARS2

Fetch Calls: 1

Time & Wait Statistics

Duration: 40.0s

Database Time: 16.5m

PL/SQL & Java: 0s

Activity %: 100

Details

Plan Statistics

Plan Hash Value: 1048826780

Plan Note

All Parallel Servers

Operation

Name

Lin...

Estimat

PX COORDINATOR

PX SEND QC (RANDOM)

:TQ10001

SORT AGGREGATE

HASH JOIN RIGHT OUTER

PX RECEIVE

SQL Text

select /*+ MONITOR */ /* Query 1 */
count(p1.text) "Ferraris",
count(p2.text) "Ferrari 458s",
sum(decode(p2.text, null, 1, 0
) "Other Ferraris"
from (select owner_id,
"Ferraris" as text
from carguys

Show SQL Bind

Save

OK

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详解 - 概述

ORACLE® Enterprise Manager Database Active Report

Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe

Execution Plan: 32 8

Execution Started: Thu Sep 1 2016 3:53:02 PM

Last Refresh Time: Thu

Execution ID: 1677

User: CARS2

Fetch Calls: 1

Time & Wait Statistics

Duration: [Bar Chart]

Database Time: [Bar Chart]

PL/SQL & Java: [Bar Chart]

Activity: [Bar Chart]

Details

Plan Statistics

Plan Hash Value: 1040020700

Session ID: 266

Session Serial Number: 52090

User ID: 66

Module: SQL*Plus

Service: SYS\$USERS

Program: sqlplus@scao08adm01.us.oracle.com (TNS V1-V3)

Operation	Name	Lin...	Estimated R...	Cost	Timelin
SELECT STATEMENT		0			

并行度 & 参与执行的实例数量

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Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: `select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe`

Execution Plan: 32, 8

Execution Started: Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time: Thu Sep 1, 2016 3:53:42 PM

Execution ID: 16777216

User: CARS2

Fetch Calls: 1

Time & Wait Statistics



IO Statistics



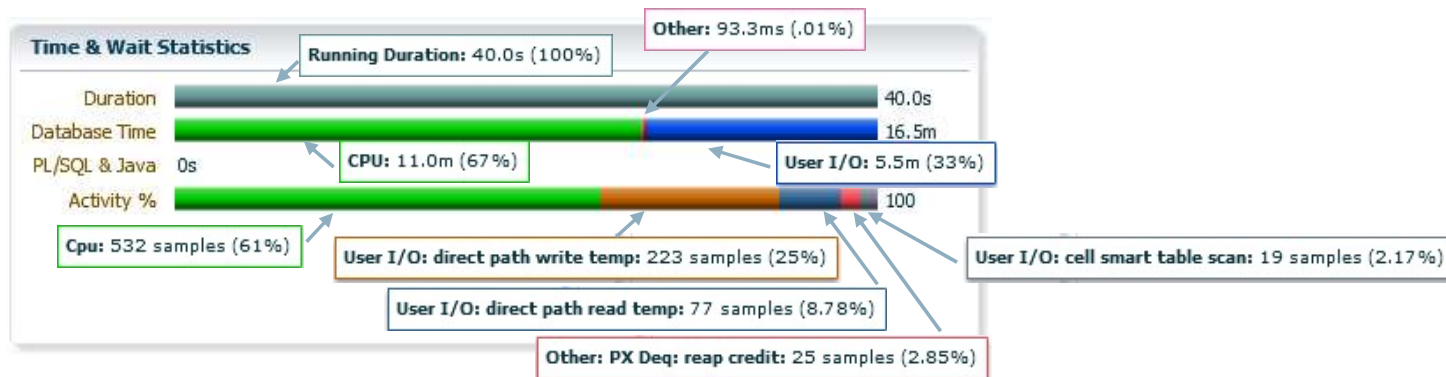
Details

Plan Statistics | Plan | Parallel | Activity | Metrics

Plan Hash Value: 1048826780 | Plan Note | All Parallel Servers

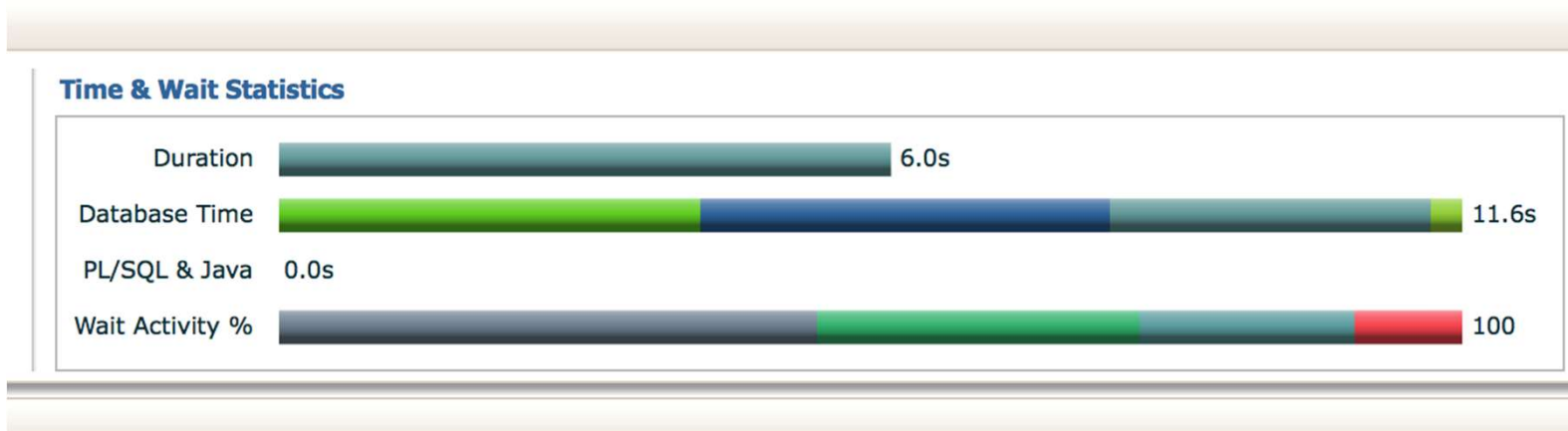
Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Execut...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO B...	Cell Offload Effic...	Activity %
PX COORDINATOR		2				65	32							
PX SEND QC (RANDOM)	:TQ10001	3	1			32	32							
SORT AGGREGATE		4	1			32	32						.34	
HASH JOIN RIGHT OUTER		5	42M	126K		32	40M	32GB	64GB		699K	80GB		79
PX RECEIVE		6	186K	63K		32	1,280M						9.24	
PX SEND BROADCAST	:TQ10000	7	186K	63K		32	1,280M						8.89	
PX BLOCK ITERATOR		8	186K	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	9	186K	63K		422	40M	225MB		53K	51GB		97	.91
PX BLOCK ITERATOR		10	42M	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	11	42M	63K		422	40M	225MB		53K	51GB		98	1.82

详解 - 时间花哪儿去了



详解 – 时间花哪儿去了

- 12c之后, “Activity %” 取代 “Wait Activity%”
 - 包括了CPU时间
 - 按wait classes 做了下钻细分



Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: `select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe`

Execution Plan: 32, 8

Execution Started: Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time: Thu Sep 1, 2016 3:53:42 PM

Execution ID: 16777216

User: CARS2

Fetch Calls: 1

Time & Wait Statistics

Duration: 40.0s

Database Time: 16.5m

PL/SQL & Java: 0s

Activity %: 100

IO Statistics

Buffer Gets: 13M

IO Requests: 804K

IO Bytes: 182GB

Cell Offload Efficiency: 32%

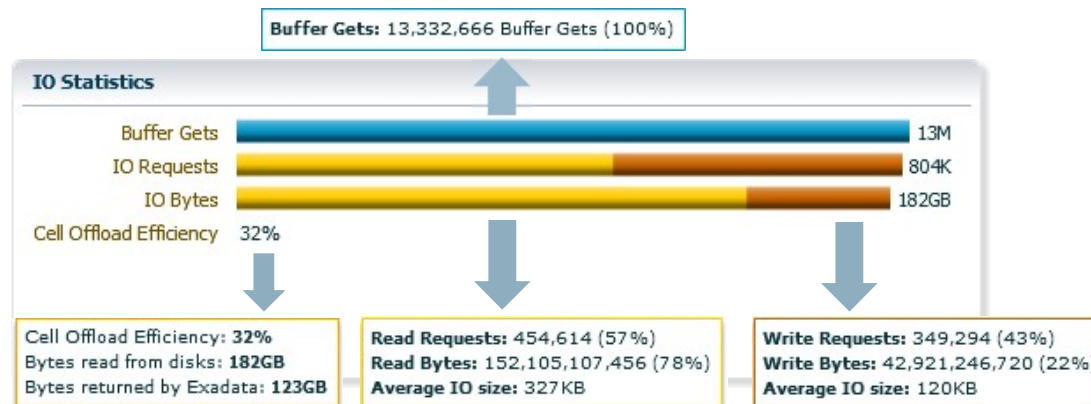
Details

Plan Statistics | Plan | Parallel | Activity | Metrics

Plan Hash Value: 1048826780 | Plan Note | All Parallel Servers

Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Execut...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO B...	Cell Offload Effic...	Activity %
PX COORDINATOR		2				65	32							
PX SEND QC (RANDOM)	:TQ10001	3	1			32	32							
SORT AGGREGATE		4	1			32	32						.34	
HASH JOIN RIGHT OUTER		5	42M	126K		32	40M	32GB	64GB		699K	80GB		79
PX RECEIVE		6	186K	63K		32	1,280M						9.24	
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PX BLOCK ITERATOR		8	186K	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	9	186K	63K		422	40M	225MB			53K	51GB	97	.91
PX BLOCK ITERATOR		10	42M	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	11	42M	63K		422	40M	225MB			53K	51GB	98	1.82

详解 - IO部分



Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: `select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe`

Execution Plan: 32, 8

Execution Started: Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time: Thu Sep 1, 2016 3:53:42 PM

Execution ID: 16777216

User: CARS2

Fetch Calls: 1

Time & Wait Statistics

Duration: 40.0s

Database Time: 16.5m

PL/SQL & Java: 0s

Activity %: 100

IO Statistics

Buffer Gets: 13M

IO Requests: 804K

IO Bytes: 182GB

Cell Offload Efficiency: 32%

Details

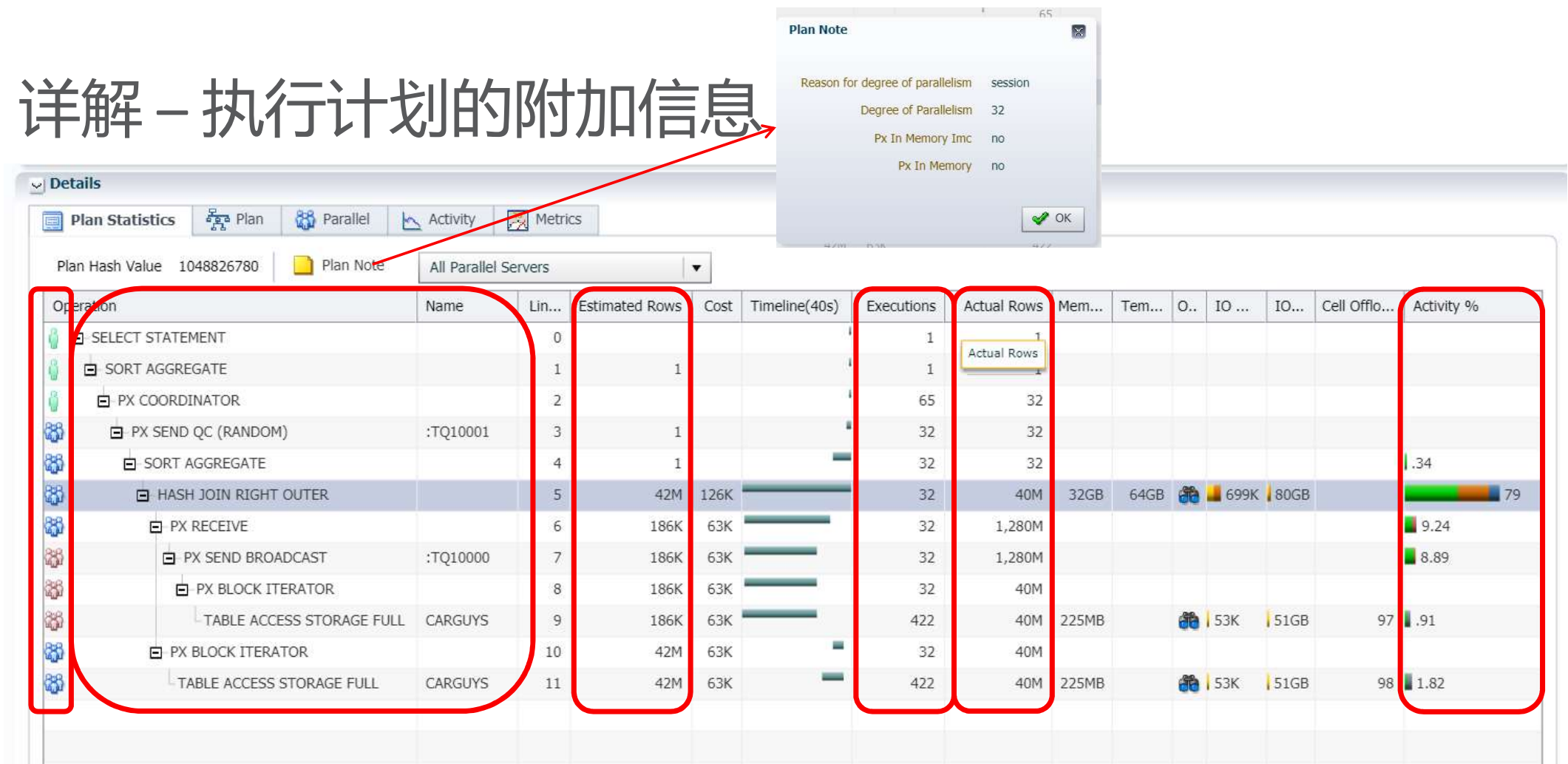
Plan Statistics

Plan Parallel Activity Metrics

Plan Hash Value: 1048826780 Plan Note: All Parallel Servers

Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Execut...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO B...	Cell Offload Effic...	Activity %
PX COORDINATOR		2				65	32							
PX SEND QC (RANDOM)	:TQ10001	3	1			32	32							
SORT AGGREGATE		4	1			32	32						.34	
HASH JOIN RIGHT OUTER		5	42M	126K		32	40M	32GB	64GB		699K	80GB		79
PX RECEIVE		6	186K	63K		32	1,280M						9.24	
PX SEND BROADCAST	:TQ10000	7	186K	63K		32	1,280M						8.89	
PX BLOCK ITERATOR		8	186K	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	9	186K	63K		422	40M	225MB		53K	51GB		97 .91	
PX BLOCK ITERATOR		10	42M	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	11	42M	63K		422	40M	225MB		53K	51GB		98 1.82	

详解 - 执行计划的附加信息



Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: `select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe"`

Execution Plan: 32, 8

Execution Started: Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time: Thu Sep 1, 2016 3:53:42 PM

Execution ID: 16777216

User: CARS2

Fetch Calls: 1

Time & Wait Statistics

Duration: 40.0s

Database Time: 16.5m

PL/SQL & Java: 0s

Activity %: 100

IO Statistics

Buffer Gets: 13M

IO Requests: 804K

IO Bytes: 182GB

Cell Offload Efficiency: 32%

Details

Plan Statistics

Plan

Parallel

Activity

Metrics

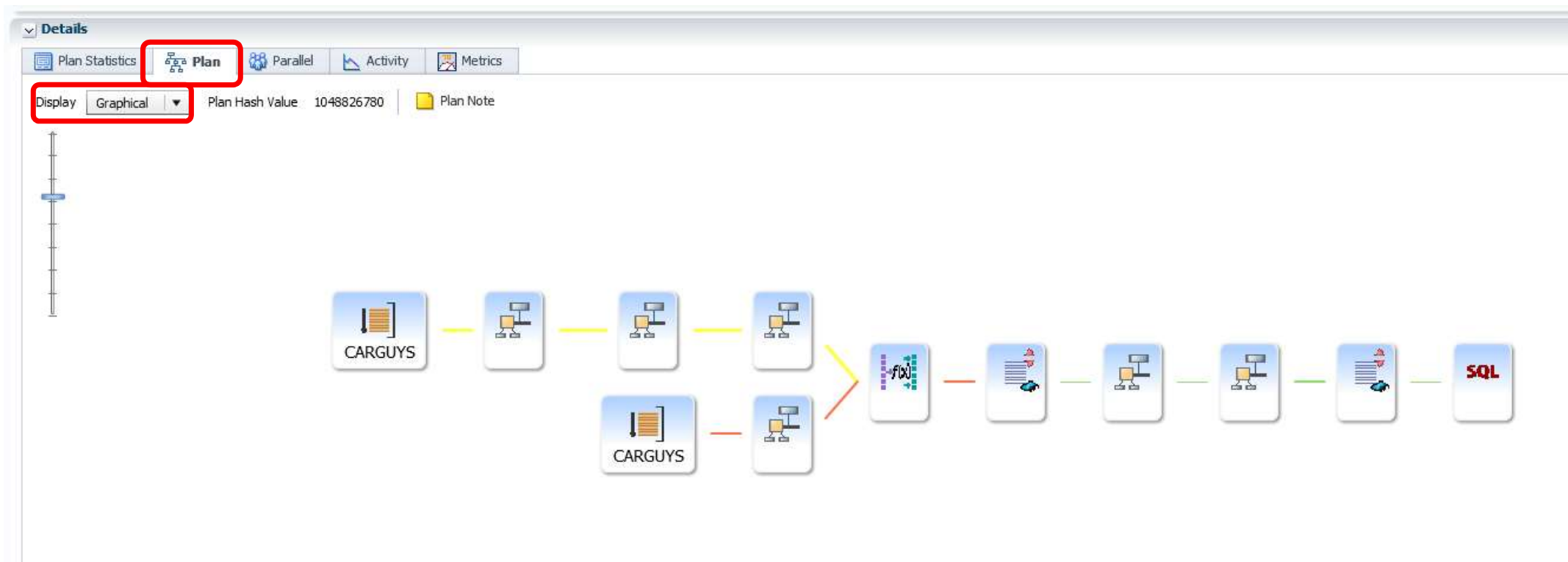
Plan Hash Value: 1048826780

Plan Note

All Parallel Servers

Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Execut...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO B...	Cell Offload Effic...	Activity %
PX COORDINATOR		2				65	32							
PX SEND QC (RANDOM)	:TQ10001	3	1			32	32							
SORT AGGREGATE		4	1			32	32						.34	
HASH JOIN RIGHT OUTER		5	42M	126K		32	40M	32GB	64GB		699K	80GB		79
PX RECEIVE		6	186K	63K		32	1,280M						9.24	
PX SEND BROADCAST	:TQ10000	7	186K	63K		32	1,280M						8.89	
PX BLOCK ITERATOR		8	186K	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	9	186K	63K		422	40M	225MB		53K	51GB		97	.91
PX BLOCK ITERATOR		10	42M	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	11	42M	63K		422	40M	225MB		53K	51GB		98	1.82

详解



详解

Details

Plan Statistics **Plan** Parallel Activity Metrics

Display Tabular ▼ Plan Hash Value 1048826780 Plan Note

Operation	Object	Line ID	Predicate	Pruning	Operation Cost	Estimated Rows	Estimated Bytes
SELECT STATEMENT		0					
SORT AGGREGATE		1				1	64
PX COORDINATOR		2					
PX SEND QC (RANDOM)	:TQ10001	3				1	64
SORT AGGREGATE		4				1	64
HASH JOIN RIGHT OUTER		5			3	42M	2,667M
PX RECEIVE		6				186K	7,813K
PX SEND BROADCAST	:TQ10000	7				186K	7,813K
PX BLOCK ITERATOR		8		1 .. 13		186K	7,813K
TABLE ACCESS STORAGE FULL	CARGUYS	9		1 .. 13	63K	186K	7,813K
PX BLOCK ITERATOR		10		1 .. 13		42M	917M
TABLE ACCESS STORAGE FULL	CARGUYS	11		1 .. 13	63K	42M	917M

过滤条件

分区裁剪

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详解

Oracle SQL Developer interface showing the execution plan for a query. The plan is displayed in a tabular format, and a pop-up window provides detailed statistics for the 'TABLE ACCESS STORAGE FULL' operation.

Plan Statistics:

- Plan Hash Value: 1048826780
- Display: Tabular

Operation Details:

- Operation: SELECT STATEMENT
- Sort Aggregate
- PX Coordinator
- PX Send QC (Random)
- Sort Aggregate
- Hash Join Right Outer
- PX Receive
- PX Send Broadcast: :TQ10000
- PX Block Iterator
- Table Access Storage Full: CARGUYS
- PX Block Iterator
- Table Access Storage Full: CARGUYS

TABLE ACCESS STORAGE FULL Statistics:

- Sub-tree Cost: 63K (.41% CPU)
- Operation Cost: 63K (.41% CPU)
- Sub-tree Time: 00:00:03
- Rows: 186K
- Bytes: 7,813K
- Object: CARGUYS
- Access Predicates: :Z>=:Z AND :Z<=:Z AND ("MODEL"='458 Italia' AND "MAKE"='Ferrari' AND "COUNTRY"='Italy')
- Filter Predicates: ("MODEL"='458 Italia' AND "MAKE"='Ferrari' AND "COUNTRY"='Italy')
- Partition Start: 1
- Partition Stop: 13
- Query Block Name/Object Alias: SEL\$A3CF0BA4/CARGUYS@SEL\$3

Execution Plan Table:

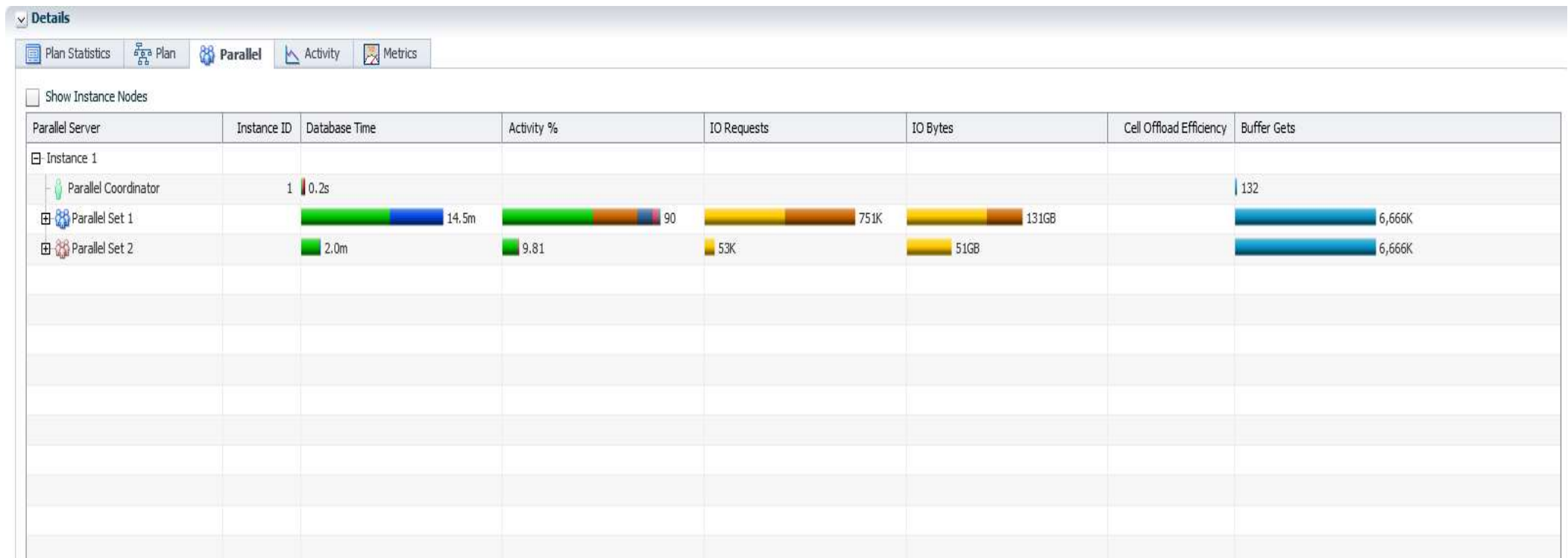
Operation	Cost	Rows	Bytes
5	3	186K	7,813K
6	3	186K	7,813K
7	3	186K	7,813K
8	1 .. 13	186K	7,813K
9	1 .. 13	186K	7,813K
10	1 .. 13	186K	7,813K
11	1 .. 13	186K	7,813K

过滤条件 (Filter Condition)

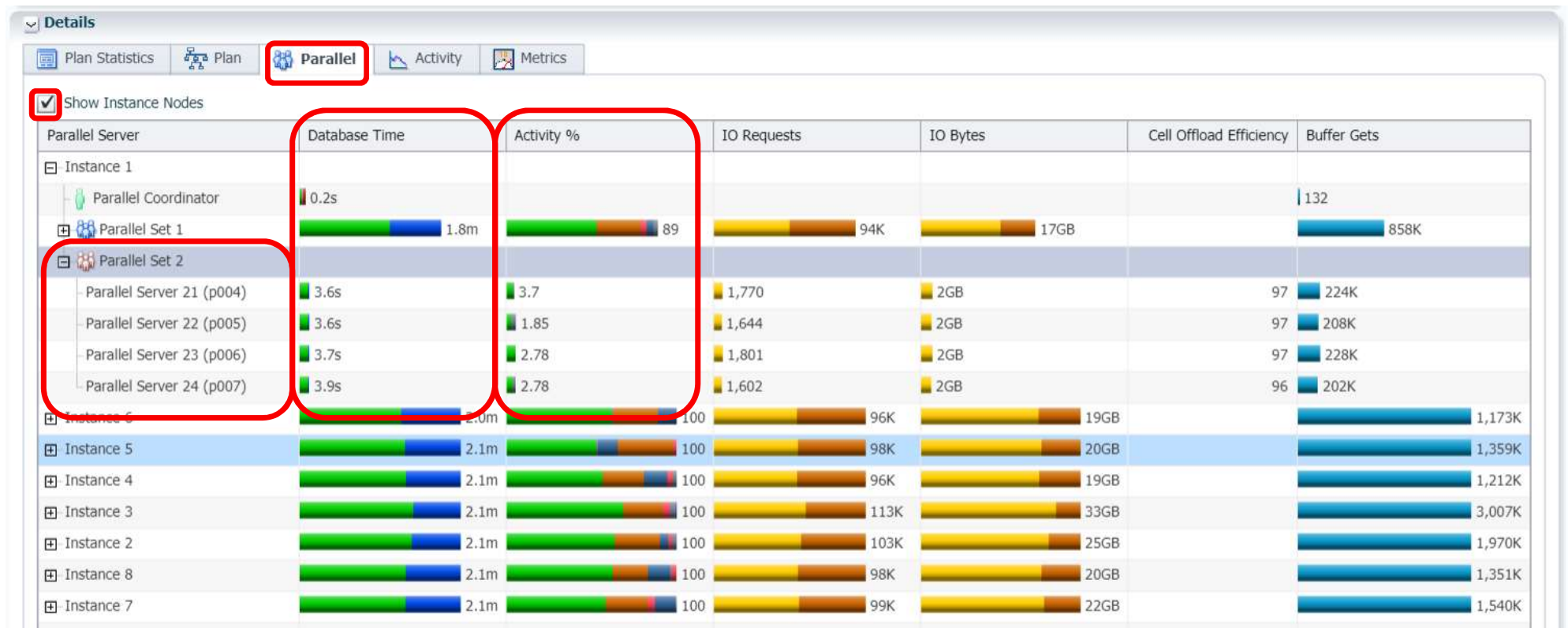


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详解



详解



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详解

Details

Plan Statistics SQL Plan Parallel Activity Metrics

☐ Show Instance Nodes

Parallel Server	Instance ID	Database Time	Activity %	IO Requests	IO Bytes	Cell Offload Efficiency	Buffer Gets
Parallel Coordinator	1	0.2s					132
Parallel Set 1							
Parallel Server 1 (p000)	6	27.5s	2.74	22K	3GB	-20.48	80K
Parallel Server 2 (p001)	6	26.7s	2.74	22K	3GB	-16.28	96K
Parallel Server 3 (p002)	6	26.6s	3.08	22K	3GB	-16.28	96K
Parallel Server 4 (p003)	6	26.1s	2.96	23K	3GB	-11.11	116K
Parallel Server 5 (p000)	5	26.6s	2.62	23K	3GB	-12.36	112K
Parallel Server 6 (p001)	5	27.2s	2.51	22K	3GB	-42.86	16K
Parallel Server 7 (p002)	5	27.2s	2.96	23K	4GB	1.96	176K
Parallel Server 8 (p003)	5	27.5s	2.74	23K	4GB	6.54	202K
Parallel Server 9 (p000)	4	26.6s	2.85	23K	3GB	-8.7	128K
Parallel Server 10 (p001)	4	26.8s	3.19	23K	3GB	-8.7	128K
Parallel Server 11 (p002)	4	28.0s	2.96	23K	4GB	-5.26	144K
Parallel Server 12 (p003)	4	26.4s	2.51	22K	3GB	-42.86	16K
Parallel Server 13 (p000)	3	27.0s	3.08	27K	7GB	45	592K
Parallel Server 14 (p001)	3	26.8s	3.19	28K	8GB	48	656K
Parallel Server 15 (p002)	3	27.1s	2.96	24K	5GB	17	272K
Parallel Server 16 (p003)	3	27.4s	2.96	27K	7GB	44	570K
Parallel Server 17 (p000)	2	27.2s	2.74	24K	5GB	21	304K
Parallel Server 18 (p001)	2	26.6s	2.51	23K	4GB	-5.26	144K
Parallel Server 19 (p002)	2	28.2s	2.39	24K	5GB	19	288K
Parallel Server 20 (p003)	2	27.7s	2.96	25K	5GB	29	374K
Parallel Server 21 (p000)	1	27.9s	2.74	23K	3GB	-12.36	112K
Parallel Server 22 (p001)	1	26.3s	2.62	23K	4GB	7.41	208K
Parallel Server 23 (p002)	1	27.2s	2.74	23K	4GB	6.54	202K
Parallel Server 24 (p003)	1	27.9s	2.85	25K	5GB	25	336K

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Monitored SQL Execution Details: gnfg27wyqpj77

Overview

General

SQL Text: select /*+ MONITOR */ /* Query 1 */ count(p1.text) "Fe ...

Execution Plan: 32, 8

Execution Started: Thu Sep 1, 2016 3:53:02 PM

Last Refresh Time: Thu Sep 1, 2016 3:53:42 PM

Execution ID: 16777216

User: CARS2

Fetch Calls: 1

Time & Wait Statistics

Duration: 40.0s

Database Time: 16.5m

PL/SQL & Java: 0s

Activity %: 100

IO Statistics

Buffer Gets: 13M

IO Requests: 804K

IO Bytes: 182GB

Cell Offload Efficiency: 32%

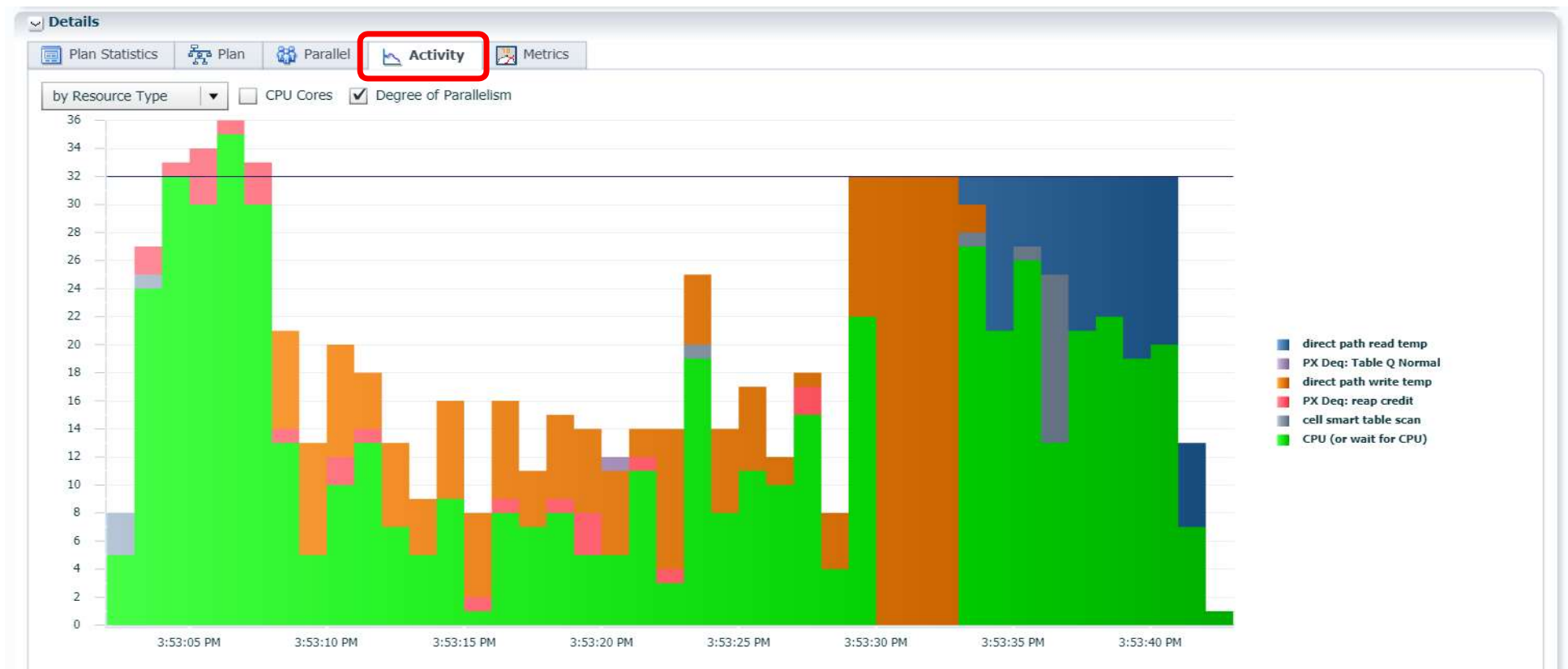
Details

Plan Statistics | Plan | Parallel | **Activity** | Metrics

Plan Hash Value: 1048826780 | Plan Note | All Parallel Servers

Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Execut...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO B...	Cell Offload Effic...	Activity %
PX COORDINATOR		2				65	32							
PX SEND QC (RANDOM)	:TQ10001	3	1			32	32							
SORT AGGREGATE		4	1			32	32						.34	
HASH JOIN RIGHT OUTER		5	42M	126K		32	40M	32GB	64GB		699K	80GB		79
PX RECEIVE		6	186K	63K		32	1,280M						9.24	
PX SEND BROADCAST	:TQ10000	7	186K	63K		32	1,280M						8.89	
PX BLOCK ITERATOR		8	186K	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	9	186K	63K		422	40M	225MB		53K	51GB		97	.91
PX BLOCK ITERATOR		10	42M	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	11	42M	63K		422	40M	225MB		53K	51GB		98	1.82

详解



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Monitored SQL Execution Details: gnfg27wyqpj77

Overview

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Duration: 40.0s

Database Time: 16.5m

PL/SQL & Java: 0s

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IO Statistics

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Details

Plan Statistics



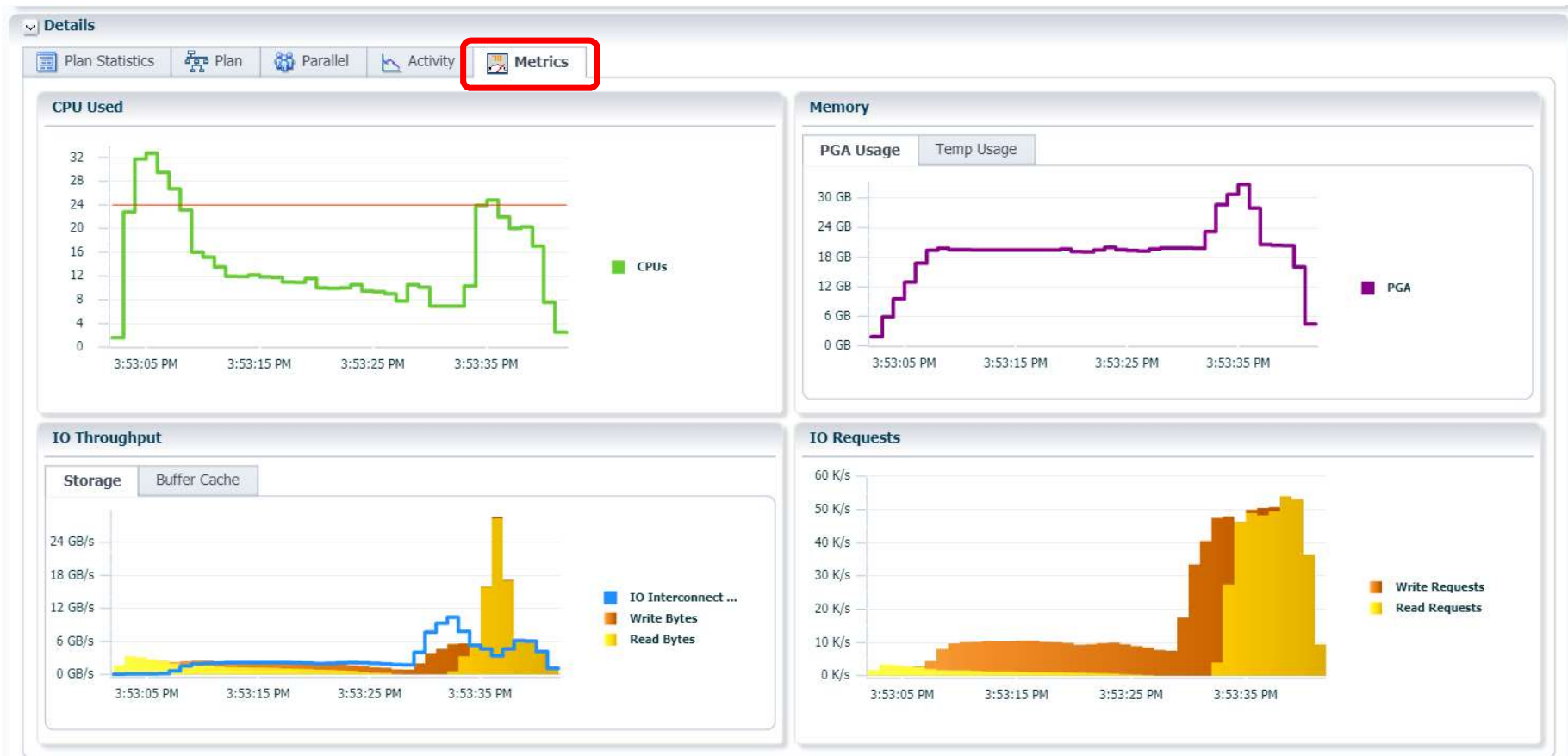
Plan Hash Value: 1048826780

Plan Note

All Parallel Servers

Operation	Name	Lin...	Estimated R...	Cost	Timeline(40s)	Execut...	Actual Rows	Memory (...)	Temp (Max)	O...	IO Reque...	IO B...	Cell Offload Effic...	Activity %
PX COORDINATOR		2				65	32							
PX SEND QC (RANDOM)	:TQ10001	3	1			32	32							
SORT AGGREGATE		4	1			32	32						.34	
HASH JOIN RIGHT OUTER		5	42M	126K		32	40M	32GB	64GB		699K	80GB		79
PX RECEIVE		6	186K	63K		32	1,280M						9.24	
PX SEND BROADCAST	:TQ10000	7	186K	63K		32	1,280M						8.89	
PX BLOCK ITERATOR		8	186K	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	9	186K	63K		422	40M	225MB			53K	51GB	97	.91
PX BLOCK ITERATOR		10	42M	63K		32	40M							
TABLE ACCESS STORAGE FULL	CARGUYS	11	42M	63K		422	40M	225MB			53K	51GB	98	1.82

详解



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如何正确使用SQL Monitor Report

- 自上而下的分析方法
 - 时间消耗在哪些资源上?
 - 执行计划中的哪一步消耗最多时间?
 - 相关执行步骤中预估的返回行数与实际行数有没有数量级差异?
 - 特别关注执行次数超出预期的执行步骤
 - 与之相关联的执行步骤也可能超出，继续探索以找出问题的起因
 - 并行执行：Slave进程是否有工作量的分配不平衡



什么情形下不适合使用SQL Monitor Report 分析问题

- 非单条SQL语句的性能分析
- OLTP 交易型应用
 - 执行时长短 (i.e. < 10 sec), 不容易出现返回记录数的误判 (estimated vs actuals)

案例分析

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Monitored SQL Execution Details: 6hnj008s4r9pd

Overview
General
SQL Text: SELECT /*+ monitor */ SUM(lo_quantity) lo_quantity, SU
Execution Started: Mon May 4, 2015 12:05:02 PM
Last Refresh Time: Mon May 4, 2015 12:06:43 PM
Execution ID: 33554432
User: OPT123
Fetch Calls: 1

Time & Wait Statistics
Duration: 1.7m
Database Time: 2.0m
PL/SQL & Java: 0s
Activity %: 100

User I/O: cell single block physical read: 28 samples (28%)

User I/O: cell list of blocks physical read: 31 samples (31%)

User I/O: cell multiblock physical read: 16 samples (16%)

Cluster: gc cr multi block request: 11 samples (11%)

IO Statistics
Buffer Gets: 433K
IO Requests: 331K
IO Bytes: 3GB

Details
Plan Statistics
Plan Hash Value: 1798545296
Plan Note

Operation	Name	Line ID	Estimated Rows	Cost	Timeline(10 ls)	Executions	Actual Rows	Memory (Max)	Temp (Max)	Ot...	IO Requests	IO Bytes	Activity %
SELECT STATEMENT		0				1	1						
SORT AGGREGATE		1	1			1	1						
TABLE ACCESS BY GLOBAL INDEX ROWID BATCHED	LINEORDER	2	360	6,183		1	33K				327K	3GB	99
INDEX RANGE SCAN	LO_PROMOTION	3	13K	41		1	1,134K				3,481	27MB	1

Monitored SQL Execution Details: bnpzav5rxzwr

Overview

General

SQL Text: SELECT /*+ monitor */ SUM(lo_quantity) lo_quantity, SU
 Execution Plan: 4
 Execution Started: Mon May 4, 2015 12:38:02 PM
 Last Refresh Time: Mon May 4, 2015 12:38:39 PM
 Execution ID: 33554432
 User: OPT123
 Fetch Calls: 1

Time & Wait Statistics

Duration: 37.0s
 Database Time: 2.9m
 PL/SQL & Java: 0s
 Activity %

IO Statistics

Buffer Gets: 2,240K
 IO Requests: 1,232K
 9GB

不太方便比较“Estimated rows”
and Actual Rows” 列

Details

Plan Statistics

Plan

Parallel

Activity

Metrics

Plan Hash Value: 3332925148
 Plan Note: All Parallel Servers

Operation	Name	Line ID	Estimated Rows	Cost	Timeline(37s)	Executions	Actual Rows	Memory (Max)	Temp (Max)	Ot...	IO Requests	IO Bytes	Activity %
SELECT STATEMENT		0				1	1						
SORT AGGREGATE		1	1			1	1						
PX COORDINATOR		2				5	4				1	8KB	
PX SEND QC (RANDOM)	:TQ10000	3	1			4	4						
SORT AGGREGATE		4	1			4	4						
NESTED LOOPS		5	3,314	853		4	2,124K						.74
NESTED LOOPS		6	3,314	853		4	2,124K						
PX BLOCK ITERATOR		7				4	708						
TABLE ACCESS STORAGE FULL	SUPPLIER	8	1	2		44	708			50	2MB		
INDEX RANGE SCAN	LO_SUPPLIER	9	3,060	3		7,492	2,124K			18K	141MB		
TABLE ACCESS BY GLOBAL INDEX ROWID	LINEORDER	10	2,983	851		3,345K	2,124K			1,214K	9GB		99



Monitored SQL Execution Details: bnpzav5rxzwrđ

Overview

General

SQL Text: SELECT /*+ monitor */ SUM(lo_quantity) lo_quantity, SU
Execution Plan: 4
Execution Started: Mon May 4, 2015 12:38:02 PM
Last Refresh Time: Mon May 4, 2015 12:38:39 PM
Execution ID: 33554432
User: OPT123
Fetch Calls: 1

Time & Wait Statistics

Duration: 37.0s
Database Time: 2.9m
PL/SQL & Java: 0s
Activity %: 100

IO Statistics

Buffer Gets: 2,240K
IO Requests: 1,232K
IO Bytes: 9GB

Details

Plan Statistics

Plan

Parallel

Activity

Metrics

Plan Hash Value: 3332925148

Plan Note

All Parallel Servers

Operation	Name	Line ID	Cost	Timeline(37s)	Executions	Estimated Rows	Actual Rows	Memory (Max)	Temp (Max)	Ot...	IO Requests	IO Bytes	Activity %
SELECT STATEMENT		0			1		1						
SORT AGGREGATE		1			1	1	1						
PX COORDINATOR		2			5		4				1	8KB	
PX SEND QC (RANDOM)	:TQ10000	3			4	1	4						
SORT AGGREGATE		4			4	1	4						
NESTED LOOPS		5	853		4	3,314	2,124K						.74
NESTED LOOPS		6	853		4	3,314	2,124K						
PX BLOCK ITERATOR		7			4		708						
TABLE ACCESS STORAGE FULL	SUPPLIER	8	2		44	1	708				50	2MB	
INDEX RANGE SCAN	LO_SUPPLIER	9	3		7,492	3,060	2,124K				18K	141MB	
TABLE ACCESS BY GLOBAL INDEX ROWID	LINEORDER	10	851		3,345K	2,983	2,124K				1,214K	9GB	99

Agenda

- 1 SQL Monitor Report的独到之处
- 2 如何使用这个强大的工具
- 3 SQL Monitor Report相关视图?



SQL Monitor reports的数据来源

- 内存

- [g]v\$sql_[plan_]monitor
- 每秒刷新一次，执行完成一段时间后会被清除
- 用DBMS_SQLTUNE.REPORT_SQL_MONITOR可生成报告

- AWR

- dba_hist_reports[_details]
- 在每分钟周期内，已执行完且耗时最长的前5条SQL将被保存
- 用DBMS_AUTO_REPORT.REPORT_REPOSITORY_DETAIL生成报告
- 参数: SQL_ID, SQL_EXEC_START, SQL_EXEC_ID

为何SQL未被捕获

- 检查alert log
- 修改 SQLMON 相关的初始化参数

与SQL Monitor report相关的初始化参数

- `_sqlmon_threshold`
 - 执行时长的监控阈值，缺省值为5秒
- `_sqlmon_max_plan`
 - 最大允许被监控的执行计划数量，缺省是CPU数量的20倍
- `_sqlmon_max_planlines`
 - 单个执行计划的最大行数，缺省是300行
- `_sqlmon_recycle_time`
 - 被监视SQL清除出内存前的最少驻留时长
- `_report_capture_cycle_time`
 - 筛选Top SQLs进入AWR历史表的统计周期



SQL Monitor Report的数据源

- [g]v\$active_session_history
- [g]v\$session_longops
- v\$sql[_plan]
- Internal (for actual rows)



参考资料:

- <https://www.oracle.com/technetwork/database/manageability/owp-sql-monitoring-128746.pdf>
- <https://sqlmaria.com/2017/08/01/getting-the-most-out-of-oracle-sql-monitor/>

如何解读执行计划:

- <https://www.oracle.com/technetwork/database/bi-datawarehousing/twp-explain-the-explain-plan-052011-393674.pdf>



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Questions?



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