



THE AUSTRALIAN ORACLE USER GROUP IN ASSOCIATION WITH INTEL PRESENTS

masterclass series

CUT TO THE CHASE USING TIPS AND PRACTICAL EXAMPLES FROM EXPERT USERS



FOR DEVELOPERS



FOR DATABASE ADMINISTRATORS

Performance Tuning in Oracle 10g Part 2

SAGE Computing Services
Customised Oracle Training Workshops
and Consulting
www.sagecomputing.com.au



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Agenda

- System Statistics
- Using wait events – Tuning I/O
- Common tuning problems – examples
- Using ADDM

System Statistics

Cost Model

◆ Prior to Oracle 9i

- ◆ Number of I/Os
- ◆ Estimates of index blocks in memory
- ◆ OPTIMIZER_INDEX_CACHING
- ◆ Estimates of cost of index scan
- ◆ OPTIMIZER_INDEX_COST_ADJ

◆ Oracle 9i

- ◆ I/O plus CPU costing if system statistics gathered

◆ Oracle 10g

- ◆ CPU and I/O
- ◆ System statistics or defaults



System Statistics

| | |
|--------------|---------------------------------------------|
| ◆ CPUSPEEDNW | Millions of CPU cycles per second |
| ◆ IOSEEKTIM | Noworkload estimate of IO seek time |
| ◆ IOTFRSPEED | Noworkload estimate of IO transfer time |
| ◆ SREADTIM | Single block read time (milliseconds) |
| ◆ MREADTIM | Multi block read time (milliseconds) |
| ◆ CPUSPEED | Millions of CPU cycles per second |
| ◆ MBRC | Average number of blocks in multiblock read |
| ◆ MAXTHR | Maximum I/O throughput (parallel) |
| ◆ SLAVETHR | Average slave I/O throughput (parallel) |



Gathering System Statistics

- ◆ **Workload statistics**

- ◆ CPUSPEEDNW, IOSEEKTIME, IOTFRSPEED

- ◆ **Noworkload statistics**

- ◆ SREADTIME, MREADTIME, CPUSPEED, MBRC, SLAVETHR

- ◆ **Optimiser uses workload statistics if available**

- ◆ **Gather at times of representative workload**

- ◆ Daytime OLTP set

- ◆ Nighttime batch / reporting set

- ◆ **Import as required**



System Statistics Information

◆ **SYS.AUX_STAT\$**

◆ **PNAME = statistic name or information**

◆ **Information**

◆ **STATUS**

AUTOGATHERING

COMPLETED

BADSTATS

◆ **DSTART Start date/time**

◆ **DSTOP End date/time**

Gathering System Statistics

- ◆ **DBMS_STATS.CREATE_STAT_TABLE**
(**'SYS','OLTP_SYSSTAT','STAT_TS'**);
- ◆ **DBMS_STATS.GATHER_SYSTEM_STATS**
(**gathering_mode => 'INTERVAL',**
 interval => 2, stattab => 'OLTP_SYSSTAT',
 statid => 'OLTP');
- ◆ **DBMS_STATS.DELETE_SYSTEM_STATS;**
- ◆ **DBMS_STATS.IMPORT_SYSTEM_STATS**
(**stattab => 'OLTP_SYSSTAT', statid => 'OLTP', statown**
 => 'SYS');

Effect of CPU Costing

| QUANTITY | COUNT (*) |
|----------|-------------|
| ----- | ----- |
| 1 | 1284488 |
| 20 | 142712 |
| 35 | 71362 |
| 40 | 71358 |

```
SELECT count(comments)
FROM   bookings_large
WHERE  quantity = 1
AND    cost = 25
```

| COST | COUNT (*) |
|-------|-------------|
| ----- | ----- |
| 0 | 998997 |
| 25 | 99 |
| 120 | 71356 |
| 360 | 71349 |
| 420 | 71353 |
| 735 | 71357 |
| 3000 | 71355 |
| 3360 | 71354 |
| 4000 | 71350 |
| 11200 | 71350 |



With CPU Costing

```
EXPLAIN PLAN FOR
SELECT  count(comments)
FROM    bookings_large
WHERE   quantity = 1
AND     cost = 25
```



| Id | Operation | Name | Rows | Bytes | Cost (%CPU) | Time |
|-----|-------------------|----------------|-------|-------|-------------|----------|
| 0 | SELECT STATEMENT | | 1 | 15 | 1982 (6) | 00:00:12 |
| 1 | SORT AGGREGATE | | 1 | 15 | | |
| * 2 | TABLE ACCESS FULL | BOOKINGS_LARGE | 43494 | 637K | 1982 (6) | 00:00:12 |

Predicate Information (identified by operation id):

2 - filter("COST"=25 AND "QUANTITY"=1)

Without CPU Costing

```
EXPLAIN PLAN FOR
SELECT --+ NO_CPU_COSTING
count(comments)
FROM bookings_large
WHERE quantity = 1
AND cost = 25
```



| Id | Operation | Name | Rows | Bytes | Cost |
|-----|-------------------|----------------|-------|-------|------|
| 0 | SELECT STATEMENT | | 1 | 15 | 952 |
| 1 | SORT AGGREGATE | | 1 | 15 | |
| * 2 | TABLE ACCESS FULL | BOOKINGS_LARGE | 43494 | 637K | 952 |

Predicate Information (identified by operation id):

2 - filter("QUANTITY"=1 AND "COST"=25)

Note

- cpu costing is off (consider enabling it)

Using wait events – Tuning I/O

Wait Event Classes

```
SELECT distinct wait_class#, wait_class  
FROM v$event_name  
ORDER BY wait_class#
```



| WAIT_CLASS# | WAIT_CLASS |
|-------------|----------------|
| 0 | Other |
| 1 | Application |
| 2 | Configuration |
| 3 | Administrative |
| 4 | Concurrency |
| 5 | Commit |
| 6 | Idle |
| 7 | Network |
| 8 | User I/O |
| 9 | System I/O |
| 10 | Scheduler |
| 11 | Cluster |

Wait Event Classes

- ◆ Application
- ◆ Configuration
- ◆ Administrative
- ◆ Concurrency
- ◆ Commit
- ◆ Idle
- ◆ Network
- ◆ User I/O
- ◆ System I/O
- ◆ Scheduler
- ◆ Cluster
- ◆ Other

Includes locking problems

Database configuration problems

Caused by database administration

Contention for buffers and latches

log file synchronisation

Waiting for something to do

Network delays

Disk read / write waits by users,
SMON and MMON

Disk read/ write waits by background
process except SMON and MMON

Resource manager waits

RAC waits

Other insignificant waits

What Class is Causing Waits

```
SELECT  wait_class_id, wait_class#, wait_class,
        total_waits, time_waited
FROM    v$system_wait_class
```



| WAIT_CLASS_ID | WAIT_CLASS# | WAIT_CLASS | TOTAL_WAITS | TIME_WAITED |
|---------------|-------------|---------------|-------------|-------------|
| 1893977003 | 0 | Other | 2000 | 52528 |
| 4217450380 | 1 | Application | 320 | 10 |
| 3290255840 | 2 | Configuration | 111 | 523 |
| 3875070507 | 4 | Concurrency | 765 | 3655 |
| 3386400367 | 5 | Commit | 527 | 385 |
| 2723168908 | 6 | Idle | 555098 | 11965178 |
| 2000153315 | 7 | Network | 526262 | 89 |
| 1740759767 | 8 | User I/O | 97884 | 120198 |
| 4108307767 | 9 | System I/O | 8699 | 6811 |

User I/O Events

```
SELECT name
FROM   v$event_name
WHERE  wait_class# = 8
```



```
NAME
-----
local write wait
buffer read retry
read by other session
db file sequential read
db file scattered read
db file single write
db file parallel read
direct path read
direct path read temp
direct path write
direct path write temp
BFILE read
```




What Events are Causing User I/O Waits

◆ System wait events – User I/O

```
SELECT e.event, e.total_waits, e.total_timeouts,  
       e.time_waited, average_wait  
FROM   v$system_event e, v$event_name n  
WHERE  n.event_id = e.event_id  
AND    n.wait_class# = 8 – User I/O
```



| EVENT | TOTAL_WAITS | TOTAL_TIMEOUTS | TIME_WAITED | AVERAGE_WAIT |
|-------------------------|-------------|----------------|-------------|--------------|
| read by other session | 45432 | 0 | 40824 | 1 |
| db file sequential read | 49525 | 0 | 74044 | 1 |
| db file scattered read | 3311 | 0 | 5610 | 2 |
| db file single write | 8 | 0 | 3 | 0 |
| db file parallel read | 1 | 0 | 1 | 1 |
| direct path read | 92 | 0 | 34 | 0 |
| direct path read temp | 6 | 0 | 0 | 0 |
| direct path write | 108 | 0 | 4 | 0 |
| direct path write temp | 35 | 0 | 0 | 0 |



User I/O Class

- ◆ **db file sequential read**
 - ◆ Single block IO
 - ◆ May be index access
- ◆ **db file scattered read**
 - ◆ Multi block IO
 - ◆ Table full scan or index fast full scan
 - ◆ Sort operation
- ◆ **db file single write**
 - ◆ Writing file headers
- ◆ **BFILE read**
 - ◆ Waiting for read of external bfile
- ◆ **Direct path read and direct path read temp**
 - ◆ Sort operations written to disk
 - ◆ Parallel slaves



What Objects are Causing Sequential reads

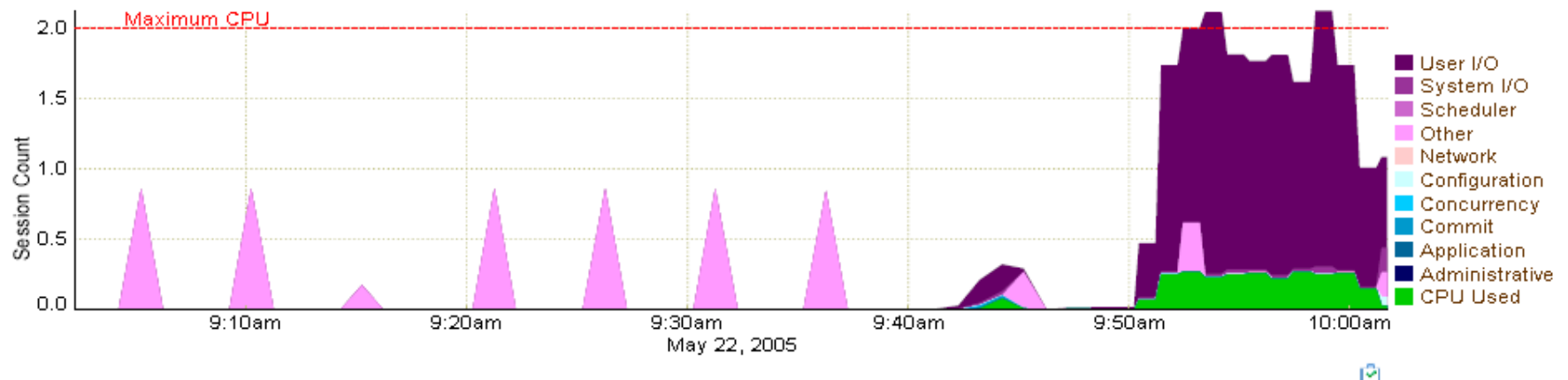
```
SELECT object_name, current_obj#, current_file#,  
       current_block#, wait_time, time_waited  
FROM   v$active_session_history h, dba_objects o  
WHERE  session_id = 141  
AND    session_serial# = 2  
AND    o.object_id = h.current_obj#  
AND    event = 'db file sequential read'
```



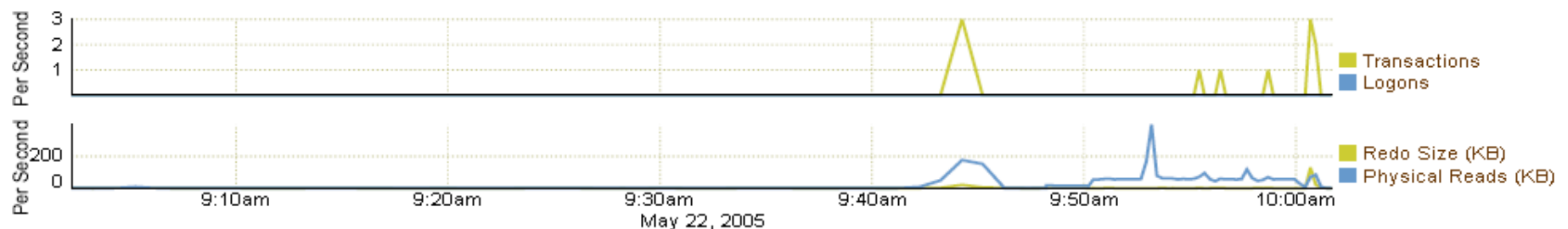
| OBJECT_NAME | CURRENT_OBJ# | CURRENT_FILE# | CURRENT_BLOCK# | WAIT_TIME | TIME_WAITED |
|----------------|--------------|---------------|----------------|-----------|-------------|
| BK_LG_EVTNO | 54674 | 8 | 16442 | 0 | 2440 |
| BK_LG_EVTNO | 54674 | 8 | 16374 | 0 | 180 |
| BOOKINGS_LARGE | 54577 | 8 | 9645 | 0 | 20874 |
| BOOKINGS_LARGE | 54577 | 8 | 8904 | 0 | 63567 |
| BOOKINGS_LARGE | 54577 | 8 | 12850 | 0 | 6029 |
| BOOKINGS_LARGE | 54577 | 8 | 4011 | 0 | 13001 |
| BK_LG_EVTNO | 54674 | 8 | 16265 | 0 | 14899 |
| BK_LG_EVTNO | 54674 | 8 | 16229 | 0 | 173 |
| BK_LG_EVTNO | 54674 | 8 | 16216 | 0 | 14479 |

Example – Sequential Reads

Sessions: Waiting and Working



Instance Throughput



View ☒ Per Second ☐ Per Transaction

Additional Monitoring Links

- [Top Sessions](#)
- [Top SQL](#)
- [Blocking Sessions](#)
- [Database Locks](#)
- [Instance Activity](#)
- [Top Consumers](#)
- [Snapshots](#)

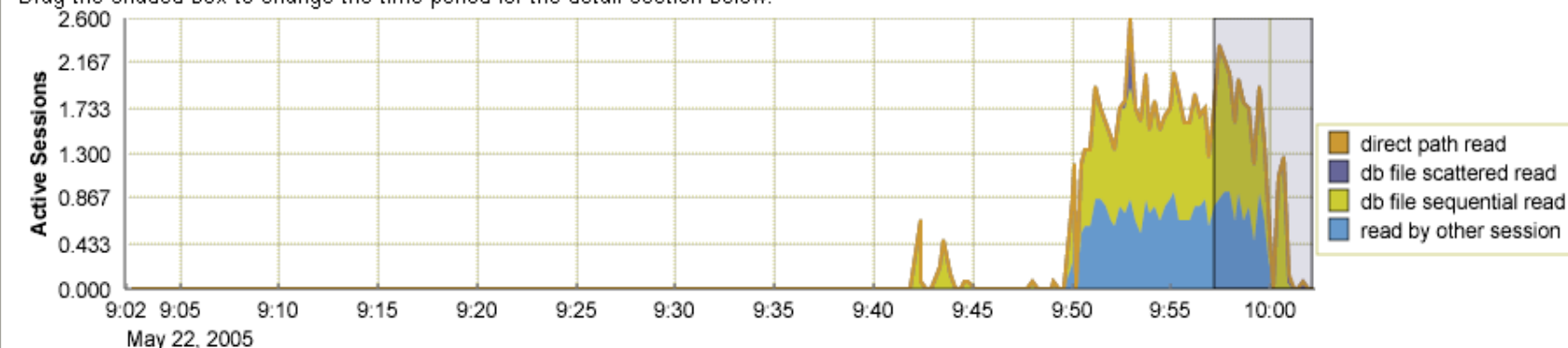
Database: ora10g > Active Sessions Waiting: User I/O

Logged in As SYS

View Data Real Time: 15 Second Refresh

Active Sessions Waiting: User I/O

Drag the shaded box to change the time period for the detail section below.

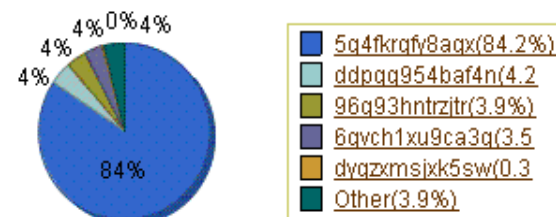


Detail for Selected 5 minute Interval

Start Time **May 22, 2005 9:57:12 AM**
[Overview](#)
[Top SQL](#)
[Top Sessions](#)
[Top Files](#)
[Top Objects](#)

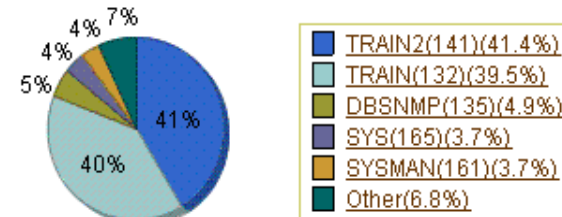
Top Waiting SQL

Total Sample Count: 311



Top Waiting Sessions

Total Sample Count: 324


[Overview](#)
[Top SQL](#)
[Top Sessions](#)
[Top Files](#)
[Top Objects](#)

SQL Details: 3fr78x2rvajt4

[Run SQL Tuning Advisor](#)

SQL Text

```
SELECT count(comments)
FROM bookings_large
WHERE resource_code = :b1
```

[Execution Plan](#) [Current Statistics](#) [Execution History](#) [Tuning History](#)Collected From Target **May 21, 2005 6:18:41 PM**

Data Source **Cursor Cache** Plan Hash Value **4006345215** Module **SQL*Plus**
Capture Time **May 21, 2005 6:18:41 PM** Optimizer Mode **FIRST_ROWS** Action **Unavailable**
Parsing Schema **TRAIN2**

[Expand All](#) | [Collapse All](#)

| Operation | Object | Object Type | Order | Rows | KB | Cost | Time (seconds) | CPU Cost | IO Cost | Object Node |
|-------------------------------|---------------------------------------|-------------|-------|-------|---------|------|----------------|----------|---------|-------------|
| ▼ SELECT STATEMENT | | | 4 | | | 422 | | | | |
| ▼ SORT AGGREGATE | | | 3 | 1 | 0.014 | | | | | |
| ▼ TABLE ACCESS BY INDEX ROWID | TRAIN2.BOOKINGS_LARGE | TABLE | 2 | 10117 | 138.318 | 422 | 3 | 8161876 | 421 | |
| INDEX RANGE SCAN | TRAIN2.BK_RES2 | INDEX | 1 | 10117 | | 25 | 1 | 2203036 | 25 | |

[Execution Plan](#) [Current Statistics](#) [Execution History](#) [Tuning History](#)[Run SQL Tuning Advisor](#)[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Database: ora10g > [Top SQL](#) > SQL Details: 5g4fkrfy8agx

Logged in As SYS

SQL Details: 5g4fkrfy8agx

[Run SQL Tuning Advisor](#)

SQL Text

```
SELECT event_no, cost
FROM train2.bookings_large
WHERE event_no < 90000
```

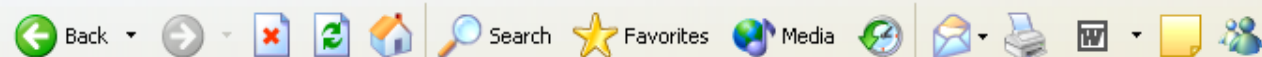
[Execution Plan](#) [Current Statistics](#) [Execution History](#) [Tuning History](#)Collected From Target **May 22, 2005 10:03:00 AM**

Data Source **Cursor Cache** Plan Hash Value **421824506** Module **SQL*Plus**
 Capture Time **May 22, 2005 10:03:00 AM** Optimizer Mode **FIRST_ROWS** Action **Unavailable**
 Parsing Schema **TRAIN**

[Expand All](#) | [Collapse All](#)

| Operation | Object | Object Type | Order | Rows | KB | Cost | Time (seconds) | CPU Cost | IO Cost | Object Node |
|-------------------------------|---------------------------------------|-------------|-------|---------|------------|---------|----------------|------------|---------|-------------|
| ▼ SELECT STATEMENT | | | 3 | | | 1299481 | | | | |
| ▼ TABLE ACCESS BY INDEX ROWID | TRAIN2.BOOKINGS_LARGE | TABLE | 2 | 1293940 | 10,108.906 | 1299481 | 7469 | 9850118144 | 1297707 | |
| INDEX RANGE SCAN | TRAIN2.BK_LG_EVTNO | INDEX | 1 | 1293940 | | 2917 | 17 | 279385376 | 2867 | |

[Execution Plan](#) [Current Statistics](#) [Execution History](#) [Tuning History](#)[Run SQL Tuning Advisor](#)

Database: ora10g > [Top Sessions](#) > Session Details: SID 141

Logged in As SYS

Session Details: SID 141

Page Refreshed May 22, 2005 10:03:33 AM [Refresh](#)[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)

| | | | |
|-------------------------|----------|------------------|-----------------------------|
| Serial Number | 2 | Logged On Since | May 22, 2005 8:45:51 AM |
| Current Status | INACTIVE | Last Activity On | May 22, 2005 9:59:53 AM |
| Wait Event | IDLE | Connection Type | DEDICATED |
| OS Server Process ID | 3804 | SQL ID | Not currently executing SQL |
| DB User Name | TRAIN2 | | |
| Resource Consumer Group | 0 | | |

Application Information

Program **sqlplusw.exe**
Module **SQL*Plus**
Command **UNKNOWN**

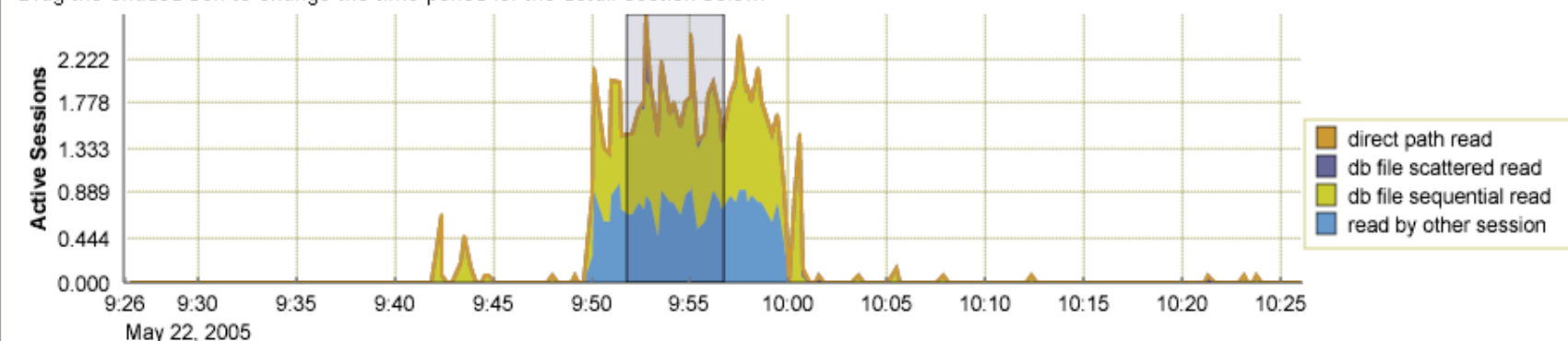
Client Information

OS Client Process ID **3172:3176**
OS User Name **SAGE3\sage**
Terminal **SAGE3**
Host **WORKGROUP\SAGE3**

[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)[Kill Session](#)[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Active Sessions Waiting: User I/O

Drag the shaded box to change the time period for the detail section below.

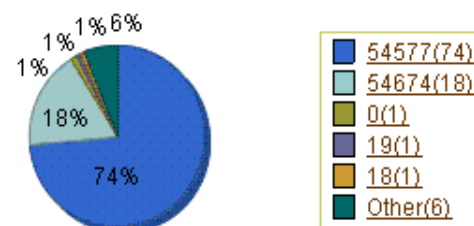


Detail for Selected 5 minute Interval

Start Time **May 22, 2005 9:51:48 AM**
[Overview](#) [Top SQL](#) [Top Sessions](#) [Top Files](#) [Top Objects](#)

Top Waited Objects

Total Sample Count: 521




Top Wait Events per Object

| Object Number | Wait Event | Activity (%) |
|---------------|-------------------------|--------------|
| 54577 | db file sequential read | 38.96 |
| 54577 | read by other session | 34.55 |
| 54674 | db file sequential read | 9.40 |
| 54674 | read by other session | 8.25 |
| 0 | db file sequential read | 1.15 |
| 19 | db file scattered read | .96 |
| 18 | db file sequential read | .58 |
| 18 | db file scattered read | .19 |

[Overview](#) [Top SQL](#) [Top Sessions](#) [Top Files](#) [Top Objects](#)

[Database: ora10g](#) > [Sessions Waiting](#) > Histogram for Wait Event: db file sequential read

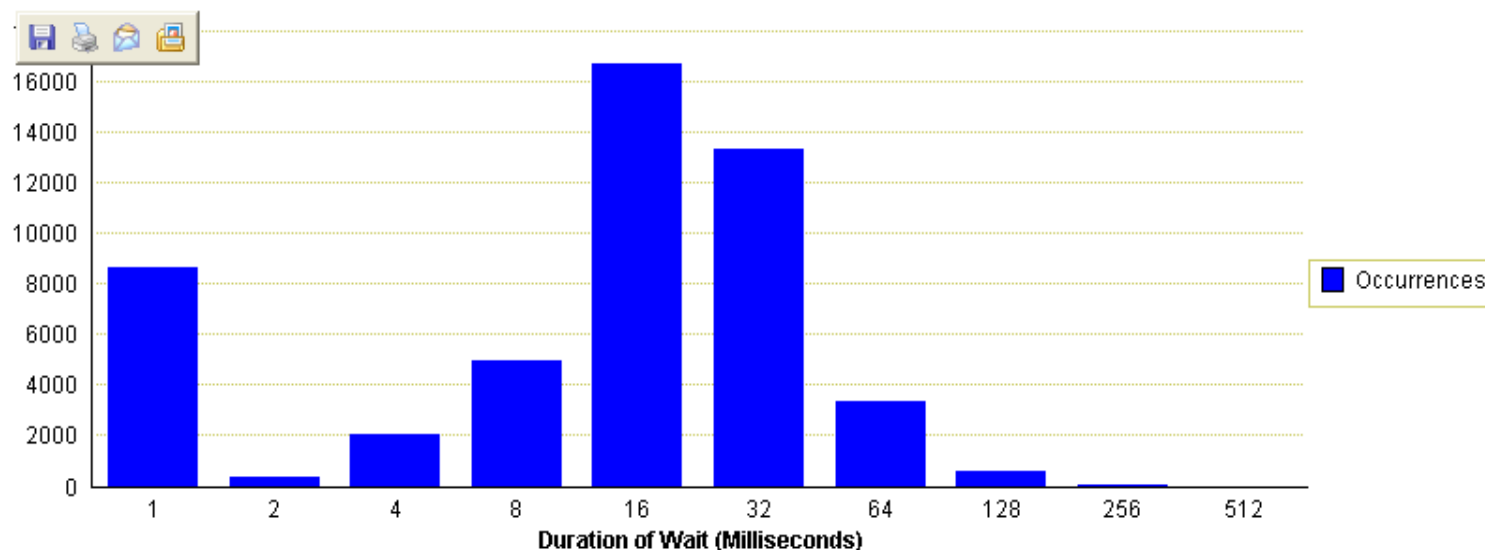
Logged in As SYS

View Data 

Histogram for Wait Event: db file sequential read

Page Refreshed May 22, 2005 10:26:50 AM 

Wait Event Occurrences Per Duration

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Database: ora10g > [Tables](#) > Edit Table: TRAIN2.BOOKINGS_LARGE









Logged in As SYS

Edit Table: TRAIN2.BOOKINGS_LARGE

[Show SQL](#)[Revert](#)[Apply](#)[General](#) [Constraints](#) [Segments](#) [Storage](#) [Options](#) [Statistics](#)* Name Schema Tablespace Organization **Standard, Heap Organized**Number of Indexes [3](#)

Columns

[Set Default LOB Attributes](#)[Insert Abstract Data Type Column](#)[Advanced Attributes](#)[Delete](#)

| Select | Name | Data Type | Size | Scale | Not NULL | Default Value |
|----------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------|--------------------------------|-------------------------------------|----------------------|
| <input checked="" type="radio"/> | <input type="text" value="BOOKING_NO"/> | NUMBER  | <input type="text" value="0"/> | <input type="text"/> | <input checked="" type="checkbox"/> | <input type="text"/> |
| <input type="radio"/> | <input type="text" value="EVENT_NO"/> | NUMBER  | <input type="text" value="6"/> | <input type="text"/> | <input checked="" type="checkbox"/> | <input type="text"/> |
| <input type="radio"/> | <input type="text" value="RESOURCE_CODE"/> | VARCHAR2  | <input type="text" value="4"/> | <input type="text"/> | <input checked="" type="checkbox"/> | <input type="text"/> |
| <input type="radio"/> | <input type="text" value="CHARGEABLE"/> | VARCHAR2  | <input type="text" value="1"/> | <input type="text"/> | <input type="checkbox"/> | <input type="text"/> |
| <input type="radio"/> | <input type="text" value="MADE_BY"/> | VARCHAR2  | <input type="text" value="15"/> | <input type="text"/> | <input type="checkbox"/> | <input type="text"/> |
| <input type="radio"/> | <input type="text" value="QUANTITY"/> | NUMBER  | <input type="text" value="4"/> | <input type="text"/> | <input type="checkbox"/> | <input type="text"/> |
| <input type="radio"/> | <input type="text" value="COST"/> | NUMBER  | <input type="text" value="9"/> | <input type="text" value="2"/> | <input type="checkbox"/> | <input type="text"/> |
| <input type="radio"/> | <input type="text" value="STATUS"/> | VARCHAR2  | <input type="text" value="1"/> | <input type="text"/> | <input type="checkbox"/> | <input type="text"/> |

Database: ora10g > [Indexes](#) > Edit Index: TRAIN2.BK_LG_EVTNO

Logged in As SYS

Edit Index: TRAIN2.BK_LG_EVTNO

[Show SQL](#)[Revert](#)[Apply](#)

General

[Storage](#) [Options](#) [Segments](#)Name Schema Tablespace Index Type **Normal**Status **VALID**

Indexed Table Object

Index On **Table**Object Name

Indexed Table Columns

| Column Name | Data Type | Sorting Order |
|-------------|-----------|---------------|
| EVENT_NO | NUMBER | ASC |

General

[Storage](#) [Options](#) [Segments](#)[Show SQL](#)[Revert](#)[Apply](#)[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Tuning – Sequential Reads

- ◆ Abnormally high wait level may be an index that should not be used
 - ◆ For table access
 - ◆ For nested loop join
- ◆ Check
 - ◆ Statistics on the index are current
 - ◆ Optimiser mode is not FIRST_ROWS
 - ◆ Column has a histogram if data is skewed
 - ◆ There is not an old SQL*Profile
 - ◆ Bind peeking
- ◆ If all this is OK – tune the SQL



Example – Scattered Reads

```
DECLARE
v_1 VARCHAR2(4) := 'VCR1';
v_2 NUMBER;
BEGIN
  SELECT count(b.comments)
  INTO v_2
  FROM bookings_large b
  WHERE b.resource_code = v_1;

v_1 := 'PC1';

FOR counter IN 1..20 LOOP
  SELECT count(b.comments)
  INTO v_2
  FROM bookings_large b
  WHERE b.resource_code = v_1;

END LOOP;
END;
```

Skewed data + Histogram

```
SELECT resource_code, COUNT(*)
FROM bookings_large
GROUP BY resource_code
```

| RESO | COUNT (*) |
|------|-------------|
| ---- | ----- |
| BRLG | 297763 |
| BRSM | 148879 |
| CONF | 99255 |
| FLPC | 99252 |
| LNCH | 148881 |
| PC1 | 9629 |
| TAP1 | 49626 |
| VCR1 | 489252 |
| VCR2 | 99255 |

```
SELECT endpoint_number, endpoint_value
FROM user_histograms
WHERE table_name = 'BOOKINGS_LARGE'
AND column_name = 'RESOURCE_CODE'
```

| ENDPOINT_NUMBER | ENDPOINT_VALUE |
|-----------------|----------------|
| ----- | ----- |
| 1198 | 3.4436E+35 |
| 1760 | 3.4436E+35 |
| 2124 | 3.4949E+35 |
| 2456 | 3.6501E+35 |
| 3040 | 3.9620E+35 |
| 3079 | 4.1675E+35 |
| 3279 | 4.3748E+35 |
| 5173 | 4.4790E+35 |
| 5554 | 4.4790E+35 |

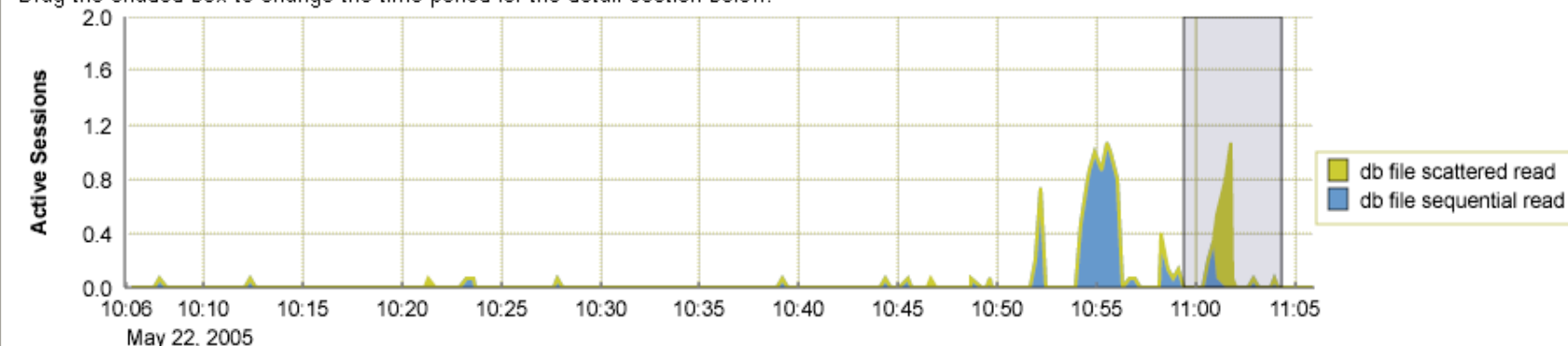
Database: ora10g > Active Sessions Waiting: User I/O

Logged in As SYS

View Data

Active Sessions Waiting: User I/O

Drag the shaded box to change the time period for the detail section below.

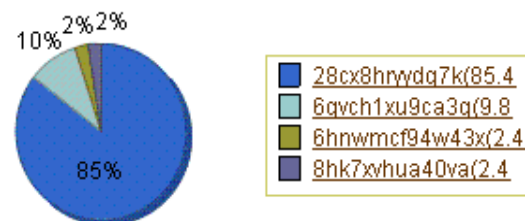


Detail for Selected 5 minute Interval

Start Time **May 22, 2005 10:59:23 AM**
[Overview](#)
[Top SQL](#)
[Top Sessions](#)
[Top Files](#)
[Top Objects](#)

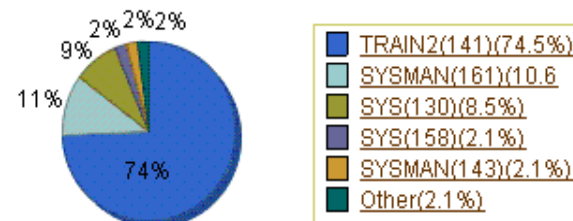
Top Waiting SQL

Total Sample Count: 41



Top Waiting Sessions

Total Sample Count: 47


[Overview](#)
[Top SQL](#)
[Top Sessions](#)
[Top Files](#)
[Top Objects](#)

SQL Details: 28cx8hryydg7k

[Run SQL Tuning Advisor](#)

SQL Text

```
SELECT count(b.comments)
FROM bookings_large b
WHERE b.resource_code = :b1
```

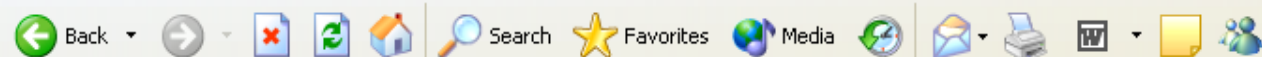
Execution Plan [Current Statistics](#) [Execution History](#) [Tuning History](#)Collected From Target **May 22, 2005 11:06:41 AM**

Data Source **Cursor Cache** Plan Hash Value **3106780909** Module **SQL*Plus**
 Capture Time **May 22, 2005 11:06:41 AM** Optimizer Mode **ALL_ROWS** Action **Unavailable**
 Parsing Schema **TRAIN2**

[Expand All](#) | [Collapse All](#)

| Operation | Object | Object Type | Order | Rows | KB | Cost | Time (seconds) | CPU Cost | IO Cost | Object Node |
|--------------------|---------------------------------------|-------------|-------|--------|-----------|------|----------------|-----------|---------|-------------|
| ▼ SELECT STATEMENT | | | 3 | | | 1737 | | | | |
| ▼ SORT AGGREGATE | | | 2 | 1 | 0.014 | | | | | |
| TABLE ACCESS FULL | TRAIN2.BOOKINGS_LARGE | TABLE | 1 | 491331 | 6,717.416 | 1737 | 10 | 466748352 | 1653 | |

Execution Plan [Current Statistics](#) [Execution History](#) [Tuning History](#)[Run SQL Tuning Advisor](#)



ORACLE Enterprise Manager 10g

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Database Control

[Database](#)[Database: ora10g](#) > [Top Sessions](#) > Session Details: SID 141

Logged in As SYS

Session Details: SID 141

Page Refreshed May 22, 2005 11:06:54 AM [Refresh](#)[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)

| | | | |
|-------------------------|----------|------------------|-----------------------------|
| Serial Number | 2 | Logged On Since | May 22, 2005 8:45:51 AM |
| Current Status | INACTIVE | Last Activity On | May 22, 2005 11:01:50 AM |
| Wait Event | IDLE | Connection Type | DEDICATED |
| OS Server Process ID | 3804 | SQL ID | Not currently executing SQL |
| DB User Name | TRAIN2 | | |
| Resource Consumer Group | 0 | | |

Application Information

Program **sqlplusw.exe**
Module **SQL*Plus**
Command **UNKNOWN**

Client Information

OS Client Process ID **3172:3176**
OS User Name **SAGE3\sage**
Terminal **SAGE3**
Host **WORKGROUP\SAGE3**

[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)[Kill Session](#)[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Session Details: SID 141

Collected From Target **May 22, 2005 11:07:02 AM**[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)

| Wait Class | Wait Event | P1 | P1 Text | P2 | P2 Text | P3 | P3 Text | Wait Time (Centiseconds) |
|------------|---------------------------|------------------------------------------|-----------|-------|---------|----|---------|--------------------------|
| User I/O | db file scattered read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 13051 | block# | 16 | blocks | 0 |
| User I/O | db file scattered read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 13035 | block# | 16 | blocks | 0 |
| User I/O | db file scattered read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 13019 | block# | 16 | blocks | 0 |
| User I/O | db file scattered read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 13003 | block# | 16 | blocks | 0 |
| User I/O | db file scattered read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 12982 | block# | 16 | blocks | 2 |
| User I/O | db file scattered read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 11593 | block# | 3 | blocks | 0 |
| User I/O | db file scattered read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 11577 | block# | 16 | blocks | 0 |
| User I/O | db file scattered read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 11561 | block# | 16 | blocks | 0 |
| Network | SQL*Net message to client | 1413697536 | driver id | 1 | #bytes | 0 | | 0 |
| User I/O | db file sequential read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 13067 | block# | 1 | blocks | 0 |

[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)

Kill Session

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)



Tuning – Scattered Reads

- ✦ Abnormally high levels may be a full scan of large table
- ✦ Check
 - ✦ Statistics on the table and indexes are current
 - ✦ System statistics are gathered
 - ✦ Column has a histogram if data is skewed
 - ✦ There is not an old SQL*Profile
 - ✦ Bind peeking
- ✦ If all this is OK – tune the SQL

Bind Peeking

- ✦ Values of bind variable inspected on hard parse
- ✦ Subsequent executions use the same plan
- ✦ If selective value first, subsequent executions may use inappropriate index
- ✦ If non selective value first, subsequent executions may full scan
- ✦ Set `_optim_peek_user_binds` to FALSE

Tuning – I/O

- ◆ Minimise I/O
- ◆ Distribute I/O
- ◆ Tune sorts
- ◆ Tune buffer cache
- ◆ Use KEEP buffer pool for
 - ◆ small scans on commonly used tables
 - ◆ tables with sequential reads and commonly used data
- ◆ Use RECYCLE buffer pool for
 - ◆ random access to large tables

Common Tuning Problems - examples

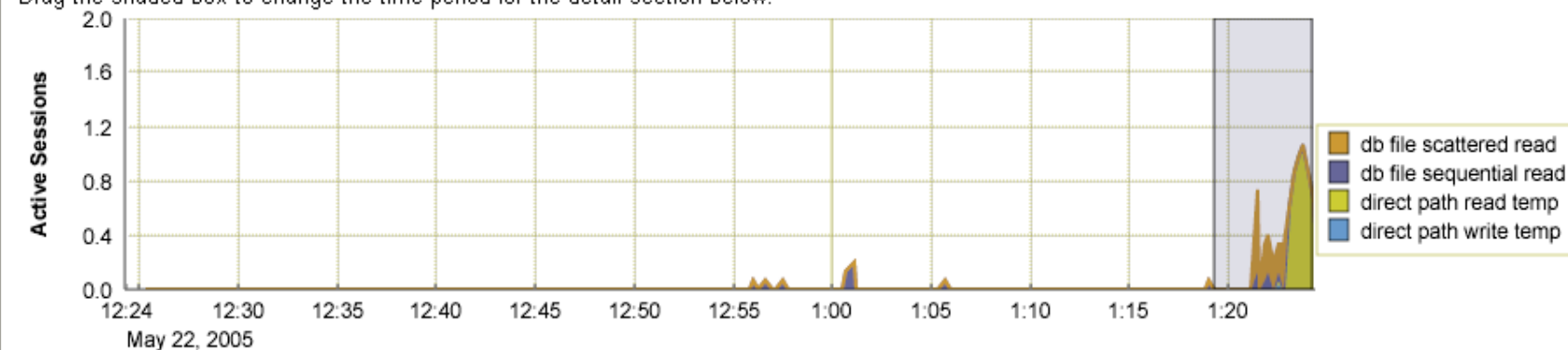
Database: ora10g > Active Sessions Waiting: User I/O

Logged in As SYS

View Data Real Time: 15 Second Refresh

Active Sessions Waiting: User I/O

Drag the shaded box to change the time period for the detail section below.

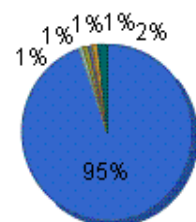


Detail for Selected 5 minute Interval

Start Time **May 22, 2005 1:20:18 PM****Overview** [Top SQL](#) [Top Sessions](#) [Top Files](#) [Top Objects](#)

Top Waiting SQL

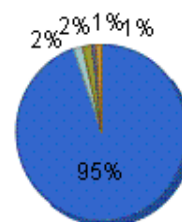
Total Sample Count: 112



- b3v954qixzd5x(94.6)
- 6v5w9k2k7m5b3(0.9)
- 62x5t2ffvdc86(0.9%)
- fc2535z239paw(0.9)
- 1583aypkbc97m(0.9)
- Other(1.8%)

Top Waiting Sessions

Total Sample Count: 112



- TRAIN2(141)(94.6%)
- SYSMAN(159)(1.8%)
- SYSMAN(143)(1.8%)
- DBSNMP(121)(0.9%)
- DBSNMP(135)(0.9%)

Database: ora10g > [Top Sessions](#) > Session Details: SID 141

Logged in As SYS

Session Details: SID 141

Page Refreshed May 22, 2005 1:25:40 PM [Refresh](#)[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)

| | | | |
|-------------------------|----------|------------------|-------------------------|
| Serial Number | 2 | Logged On Since | May 22, 2005 8:45:51 AM |
| Current Status | INACTIVE | Last Activity On | May 22, 2005 1:24:21 PM |
| Wait Event | IDLE | Connection Type | DEDICATED |
| OS Server Process ID | 3804 | SQL ID | b3v954qjxzd5x |
| DB User Name | TRAIN2 | | |
| Resource Consumer Group | 0 | | |

Application Information

Program **sqlplusw.exe**
Module **SQL*Plus**
Command **UNKNOWN**

Client Information

OS Client Process ID **3172:3176**
OS User Name **SAGE3\sage**
Terminal **SAGE3**
Host **WORKGROUP\SAGE3**

[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)[Kill Session](#)[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Database: ora10g > [Top Sessions](#) > Session Details: SID 141

Logged in As SYS

View Data

Session Details: SID 141

Collected From Target May 22, 2005 1:25:48 PM

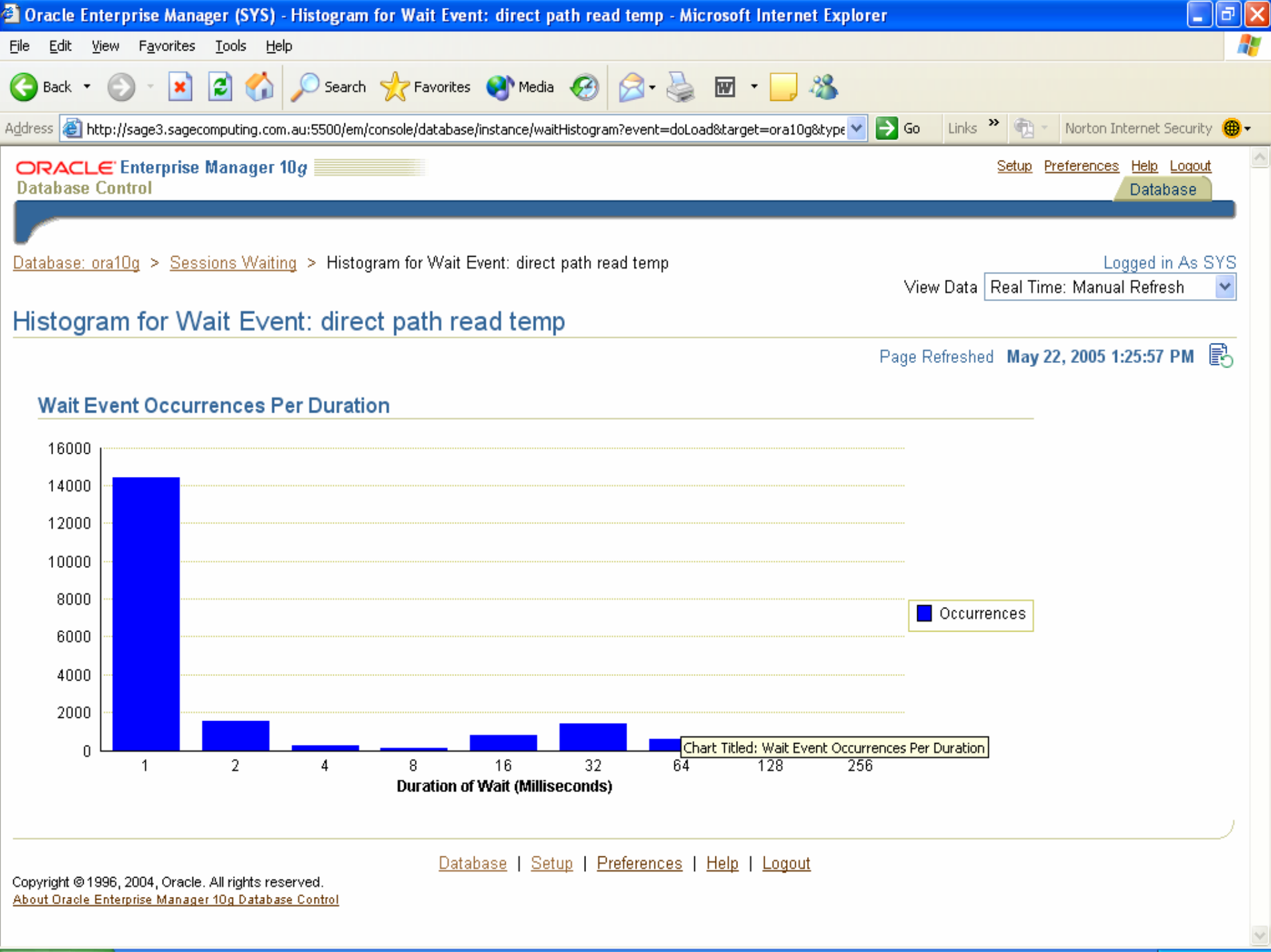
[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)

| Wait Class | Wait Event | P1 | P1 Text | P2 | P2 Text | P3 | P3 Text | Wait Time (Centiseconds) |
|------------|-----------------------------|------------------------------------------|-------------|-------|-----------|----|-----------|--------------------------|
| User I/O | direct path read temp | E:\ORACLE\PRODUCT\10.1.0\...G\TEMP01.DBF | file number | 19998 | first dba | 3 | block cnt | 0 |
| User I/O | direct path read temp | E:\ORACLE\PRODUCT\10.1.0\...G\TEMP01.DBF | file number | 19991 | first dba | 7 | block cnt | 0 |
| User I/O | direct path read temp | E:\ORACLE\PRODUCT\10.1.0\...G\TEMP01.DBF | file number | 19984 | first dba | 7 | block cnt | 0 |
| User I/O | direct path read temp | E:\ORACLE\PRODUCT\10.1.0\...G\TEMP01.DBF | file number | 19977 | first dba | 7 | block cnt | 0 |
| User I/O | direct path read temp | E:\ORACLE\PRODUCT\10.1.0\...G\TEMP01.DBF | file number | 19970 | first dba | 7 | block cnt | 0 |
| User I/O | direct path read temp | E:\ORACLE\PRODUCT\10.1.0\...G\TEMP01.DBF | file number | 19963 | first dba | 7 | block cnt | 0 |
| User I/O | direct path read temp | E:\ORACLE\PRODUCT\10.1.0\...G\TEMP01.DBF | file number | 19956 | first dba | 7 | block cnt | 0 |
| User I/O | direct path read temp | E:\ORACLE\PRODUCT\10.1.0\...G\TEMP01.DBF | file number | 19949 | first dba | 7 | block cnt | 0 |
| Network | SQL*Net message to client | 1413697536 | driver id | 1 | #bytes | 0 | | 0 |
| Idle | SQL*Net message from client | 1413697536 | driver id | 1 | #bytes | 0 | | 0 |

[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)

Kill Session

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)





Wait Event – direct path read temp

- ✦ Blocks read directly to the user
- ✦ Occurs when sorting performed on disk
- ✦ Sort area determined:
 - ✦ By PGA_AGGREGATE target
 - ✦ By SORT_AREA_SIZE if manual
- ✦ Default = 20% of SGA
- ✦ Increase for DSS databases

[Database: ora10g](#) > [Advisor Central](#) > [Automatic Database Diagnostic Monitor \(ADDM\)](#) > Performance Finding Details

Logged in As SYS

Performance Finding Details

Database Time (minutes) **5.27** Period Start Time **May 21, 2005 3:00:56 PM** Period Duration (minutes) **59.43**
Task Owner **SYS** Task Name **ADDM:3843294908_1_831** Average Active Sessions **0.09**

Finding **The PGA was inadequately sized, causing additional I/O to temporary tablespaces to consume significant database time.**
Impact (minutes) **0.26**
Impact (%) **4.9**

Recommendations


[Show All Details](#) | [Hide All Details](#)

| Details | Category | Benefit (%) ▾ |
|------------------------------------------------------------------------------------------------------|------------------|---------------|
|  Hide | DB Configuration | 3.68 |

Message **Increase the size of the PGA by setting the value of parameter "pga_aggregate_target" to 43 M.** [Implement](#)

Findings Path

[Expand All](#) | [Collapse All](#)

| Findings | Impact (%) | Additional Information |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------|
|  The PGA was inadequately sized, causing additional I/O to temporary tablespaces to consume significant database time. | 4.9 | |
| Wait class "User I/O" was consuming significant database time. | 61.56 | |

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)



Wait Event – buffer busy waits

- ✦ Wait for a specific buffer that someone else is using
- ✦ Another session may be reading the buffer in
- ✦ Another session may have the block pinned in the buffer
- ✦ Index hot spots
- ✦ Table insert hot spots

Database: ora10g > [Top Sessions](#) > Session Details: SID 121

Logged in As SYS

View Data

Session Details: SID 121

Collected From Target **May 22, 2005 2:09:54 PM** [General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)

| Wait Class | Wait Event | P1 | P1 Text | P2 | P2 Text | P3 | P3 Text | Wait Time (Centiseconds) |
|---------------|--------------------------------------------|------------------------------------------|-----------|-------|----------|----|---------|--------------------------|
| Configuration | eng: SQ - contention | | name mode | | object # | 0 | | 0 |
| Configuration | eng: SQ - contention | | name mode | | object # | 0 | | 0 |
| User I/O | db file sequential read | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 15105 | block# | 1 | blocks | 0 |
| Concurrency | buffer busy waits | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 22562 | block# | 1 | class# | 0 |
| Configuration | log file switch completion | | | | | | | 23 |
| Configuration | eng: SQ - contention | | name mode | | object # | 0 | | 0 |
| Configuration | eng: SQ - contention | | name mode | | object # | 0 | | 0 |
| Configuration | eng: SQ - contention | | name mode | | object # | 0 | | 0 |
| Concurrency | buffer busy waits | E:\ORACLE\PRODUCT\10.1.0\...T_DATA01.DBF | file# | 20746 | block# | 1 | class# | 0 |
| Configuration | eng: SQ - contention | | name mode | | object # | 0 | | 0 |

[General](#) [Statistics](#) [Wait Events](#) [Open Cursors](#) [Locks](#)[Kill Session](#)[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Database Control

Database

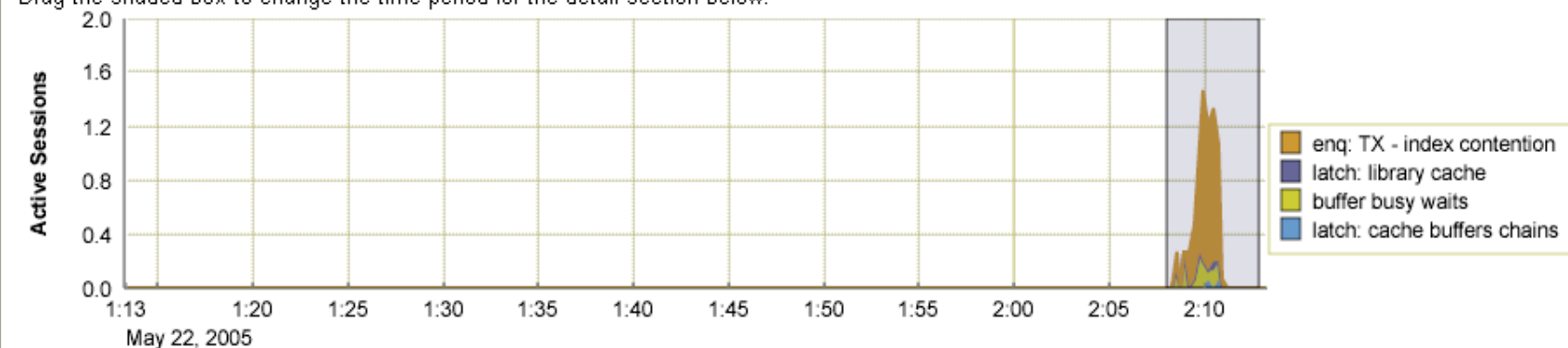
[Database: ora10g](#) > Active Sessions Waiting: Concurrency

Logged in As SYS

View Data Real Time: 15 Second Refresh

Active Sessions Waiting: Concurrency

Drag the shaded box to change the time period for the detail section below.



Detail for Selected 5 minute Interval

Start Time **May 22, 2005 2:07:59 PM****Overview** [Top SQL](#) [Top Sessions](#)

Top Waiting SQL

Total Sample Count: 111

 [3cp0w1nudvtw0\(100\)](#)

Top Waiting Sessions

Total Sample Count: 111

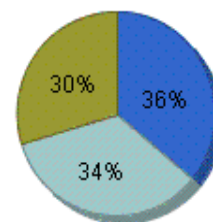

[TRAIN\(132\)\(36%\)](#)
[TRAIN2\(141\)\(34.2%\)](#)
[TRAIN2\(121\)\(29.7%\)](#)

Chart Titled: Top Waiting Sessions

[Database: ora10g](#) > [Advisor Central](#) > [Automatic Database Diagnostic Monitor \(ADDM\)](#) > Performance Finding Details

Logged in As SYS

Performance Finding Details

Database Time (minutes) **7.57** Period Start Time **May 22, 2005 2:00:38 PM** Period Duration (minutes) **59.55**
Task Owner **SYS** Task Name **ADDM:3843294908_1_840** Average Active Sessions **0.13**

Finding **Contention on index block splits was consuming significant database time. However, no single index was the predominant cause for this contention.**
Impact (minutes) **1.59**
Impact (%) **21.04**

Recommendations

No recommendation is available

Findings Path

[Expand All](#) | [Collapse All](#)

Findings

| | Impact (%) | Additional Information |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------|
| ▼ Contention on index block splits was consuming significant database time. However, no single index was the predominant cause for this contention. | 21.04 | |
| Wait class "Concurrency" was consuming significant database time. | 27.06 | |

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Find the Object

```
SELECT object_name, current_obj#, current_file#, current_block#,
       wait_time, time_waited
FROM   v$active_session_history h, dba_objects o
WHERE  o.object_id = h.current_obj#
AND    event = 'buffer busy waits'
```



| OBJECT_NAME | CURRENT_OBJ# | CURRENT_FILE# | CURRENT_BLOCK# | WAIT_TIME | TIME_WAITED |
|----------------|--------------|---------------|----------------|-----------|-------------|
| BK_LG_EVTNO | 54674 | 8 | 14477 | 0 | 391 |
| BK_LG_EVTNO | 54674 | 8 | 15194 | 17 | 0 |
| BK_LG_EVTNO | 54674 | 8 | 15294 | 1 | 0 |
| BK_LG_EVTNO | 54674 | 8 | 22947 | 0 | 281891 |
| BK_LG_EVTNO | 54674 | 8 | 16774 | 30 | 0 |
| BK_RES2 | 54692 | 8 | 20465 | 0 | 1022386 |
| BK_RES2 | 54692 | 8 | 21655 | 0 | 961881 |
| BK_RES2 | 54692 | 8 | 21655 | 0 | 961218 |
| BK_RES2 | 54692 | 8 | 21741 | 0 | 475933 |
| BK_RES2 | 54692 | 8 | 21741 | 0 | 475356 |
| BOOKINGS_LARGE | 54577 | 8 | 20636 | 3 | 0 |
| BOOKINGS_LARGE | 54577 | 8 | 20746 | 0 | 1027986 |
| BOOKINGS_LARGE | 54577 | 8 | 20844 | 44 | 0 |
| BOOKLG_PK | 54578 | 8 | 19995 | 0 | 269731 |
| BOOKLG_PK | 54578 | 8 | 19995 | 0 | 269694 |



Wait Event – buffer busy waits

- ✦ Automatic segment storage management
- ✦ Freelists if not ASSM
- ✦ Reverse key indexes
- ✦ Hash Partitioning
- ✦ Use automatic undo management



Wait Event – log buffer space

- ✦ Wait to write to the log buffer
- ✦ I/O to the log file is not keeping up with write requests to the buffer
- ✦ Move log files to faster drives
- ✦ Increase log buffer

[Database: ora10g](#) > [Advisor Central](#) > [Automatic Database Diagnostic Monitor \(ADDM\)](#) > Performance Finding Details

Logged in As SYS



Performance Finding Details

Database Time (minutes) **9.6** Period Start Time **May 21, 2005 8:00:09 AM** Period Duration (minutes) **60.57**
Task Owner **SYS** Task Name **ADDM:3843294908_1_824** Average Active Sessions **0.16**

Finding **Waits for redo log buffer space were consuming significant database time.**
Impact (minutes) **0.68**
Impact (%) **7.12**


Recommendations

[Show All Details](#) | [Hide All Details](#)

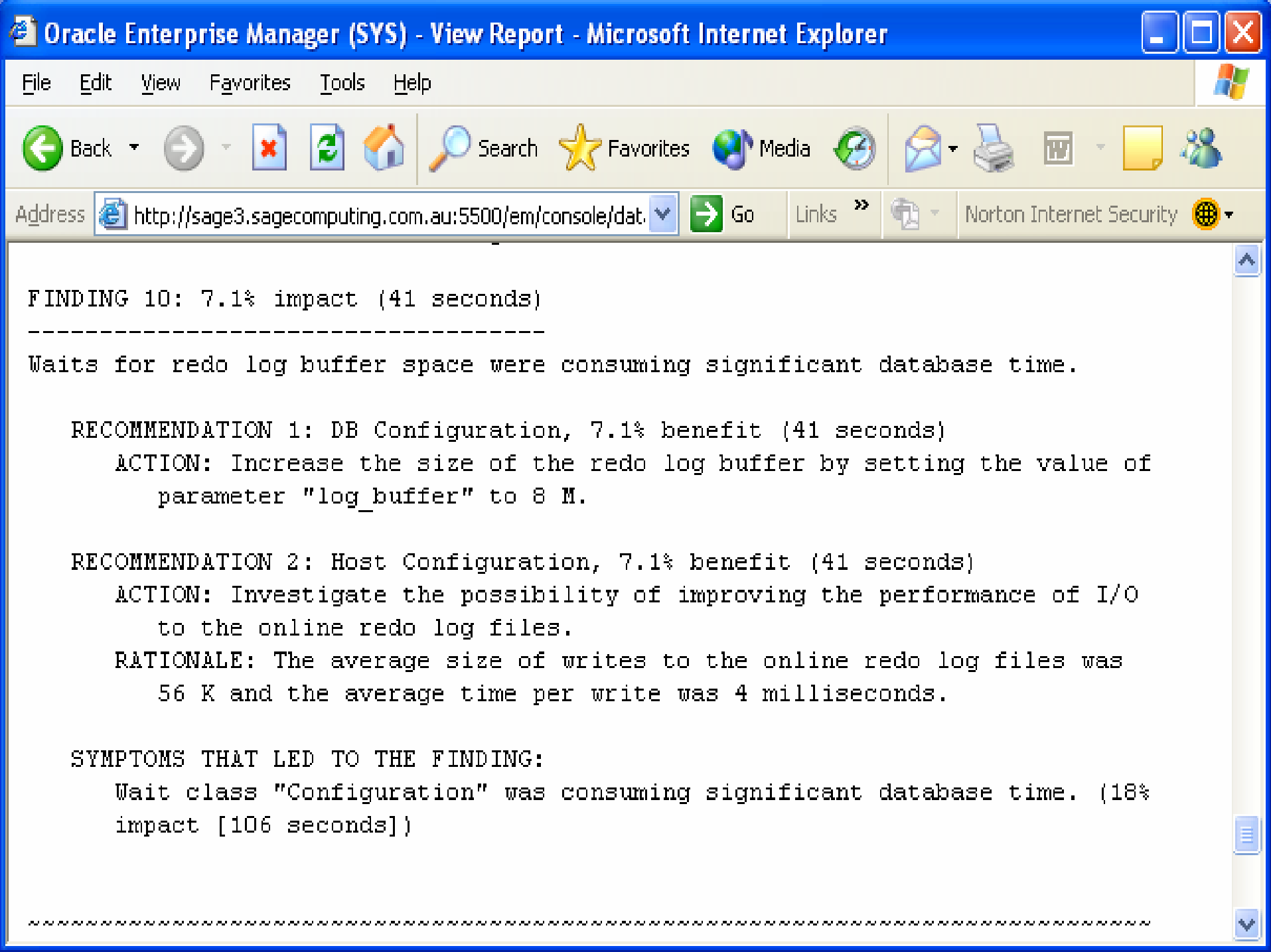
| Details | Category | Benefit (%) ▾ |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|
|  Hide | DB Configuration | 7.12 |
| Message Increase the size of the redo log buffer by setting the value of parameter "log_buffer" to 8 M. Implement | | |
|  Show | Host Configuration | 7.12 |

Findings Path

[Expand All](#) | [Collapse All](#)

| Findings | Impact (%) | Additional Information |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------|
|  Waits for redo log buffer space were consuming significant database time. | 7.12 | |
| Wait class "Configuration" was consuming significant database time. | 18.34 | |

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)



FINDING 10: 7.1% impact (41 seconds)

Waits for redo log buffer space were consuming significant database time.

RECOMMENDATION 1: DB Configuration, 7.1% benefit (41 seconds)

ACTION: Increase the size of the redo log buffer by setting the value of parameter "log_buffer" to 8 M.

RECOMMENDATION 2: Host Configuration, 7.1% benefit (41 seconds)

ACTION: Investigate the possibility of improving the performance of I/O to the online redo log files.

RATIONALE: The average size of writes to the online redo log files was 56 K and the average time per write was 4 milliseconds.

SYMPTOMS THAT LED TO THE FINDING:

Wait class "Configuration" was consuming significant database time. (18% impact [106 seconds])

=====



Wait Event – log file sync

- ✦ Wait class = Commit
- ✦ Write redo information from log buffer to redo log files
- ✦ On user commit
- ✦ Reduce commit frequency
- ✦ Move redo log files to faster disk



Wait Event – log file parallel write

- ✦ Wait class = System I/O
- ✦ LGWR waiting to write to redo log files
- ✦ May occur in conjunction with log file sync
- ✦ Move redo log files to faster disk
- ✦ Don't overdo number of redo group members
- ✦ Reduce amount of redo
 - ✦ No logging
 - ✦ Global temporary tables

Wait Event – log file switch

◆(archiving needed)

- ◆Required redo not finished being archived
- ◆Check alert log
- ◆Increase archiver processes

◆(checkpoint incomplete)

- ◆Required log needed to complete checkpoint
- ◆Check sufficient redo log files

◆(clearing log file)

- ◆Required logfile waiting to be cleared

◆(completion)

- ◆Normal log file switch not complete

FINDING 9: 9.3% impact (54 seconds)

Wait event "log file switch completion" in wait class "Configuration" was consuming significant database time.

RECOMMENDATION 1: Application Analysis, 9.3% benefit (54 seconds)

ACTION: Investigate the cause for high "log file switch completion" waits. Refer to Oracle's "Database Reference" for the description of this wait event. Use given SQL for further investigation.

RATIONALE: The SQL statement with SQL_ID "3s0z04m9qdusq" was found waiting for "log file switch completion" wait event.

RELEVANT OBJECT: SQL statement with SQL_ID 3s0z04m9qdusq
insert into bookings_large
select booking_seq.nextval, mod(event2_seq.nextval,100000)+201,
resource_code, chargeable, made_by, quantity,
cost, status, comments
from bookings_large

RECOMMENDATION 2: Application Analysis, 9.3% benefit (54 seconds)

ACTION: Investigate the cause for high "log file switch completion" waits in Module "SQL*Plus".

RECOMMENDATION 3: Application Analysis, 9.3% benefit (54 seconds)

ACTION: Investigate the cause for high "log file switch completion" waits in Service "ora10g".

FINDING 10: 7.1% impact (41 seconds)



Wait Event – library cache latch waits

- ✦ Library cache latch taken to add new statement
- ✦ Reduce hard parsing
- ✦ Use bind variables
- ✦ Use cursor_sharing = SIMILAR
- ✦ Consider increasing the SGA



Wait Event – free buffer wait

- ✦ DBWR not keeping up
- ✦ Look at wait events for DBWR
- ✦ Optimise I/O
- ✦ Buffer cache too big
- ✦ Buffer cache too small

Background Processes

```
SELECT program, serial#, sid
FROM v$session
WHERE program like 'ORACLE.EXE%'
```



| PROGRAM | SERIAL# | SID |
|-------------------|---------|-------|
| ----- | ----- | ----- |
| ORACLE.EXE (q002) | 2208 | 128 |
| ORACLE.EXE (MMNL) | 1 | 156 |
| ORACLE.EXE (MMON) | 1 | 158 |
| ORACLE.EXE (QMNC) | 3 | 160 |
| ORACLE.EXE (CJQ0) | 1 | 163 |
| ORACLE.EXE (RECO) | 1 | 164 |
| ORACLE.EXE (SMON) | 1 | 165 |
| ORACLE.EXE (CKPT) | 1 | 166 |
| ORACLE.EXE (LGWR) | 1 | 167 |
| ORACLE.EXE (DBW0) | 1 | 168 |
| ORACLE.EXE (MMAN) | 1 | 169 |
| ORACLE.EXE (PMON) | 1 | 170 |

Background Process – Wait Events

```
SELECT event, wait_time, time_waited
FROM v$active_session_history
WHERE session_id = 168
AND session_serial# = 1
```



| EVENT | WAIT_TIME | TIME_WAITED |
|------------------------------|-----------|-------------|
| ----- | ----- | ----- |
| rdbms ipc message | 3078109 | 0 |
| db file parallel write | 0 | 1074 |
| rdbms ipc message | 3077900 | 0 |
| rdbms ipc message | 3077814 | 0 |
| db file parallel write | 0 | 68898 |
| db file parallel write | 0 | 2664 |
| db file parallel write | 0 | 62162 |
| rdbms ipc message | 3077741 | 0 |
| rdbms ipc message | 3077854 | 0 |
| db file parallel write | 0 | 5607 |
| db file parallel write | 0 | 166 |
| db file parallel write | 1596 | 0 |
| db file parallel write | 0 | 161 |
| control file sequential read | 222 | 0 |
| control file sequential read | 0 | 20607 |
| control file sequential read | 0 | 46275 |
| control file sequential read | 0 | 20838 |

Using ADDM

ADDMM

- ◆ Automatic Database Diagnostic Monitor
- ◆ Performs self diagnosis
- ◆ Run for each AWR snapshot (hourly)
- ◆ Aim is to reduce DB time
- ◆ Identify bottlenecks
- ◆ Make recommendations
 - ◆ Impact
 - ◆ Benefit
 - ◆ Action and rationale
- ◆ **STATISTICS_LEVEL TYPICAL or ALL**



ADDM

- ◆ Hot objects
- ◆ High resource SQL / PL/SQL / Java
- ◆ Memory structures
- ◆ I/O Performance
- ◆ Log files / archiving / checkpoints
- ◆ Contention
- ◆ RAC issues
- ◆ Documents wait classes not causing problems



ADDM Recommendations

- ◆ Tune the SQL
- ◆ Application changes
 - ◆ Use of bind variables
 - ◆ Sequence caching
- ◆ Schema changes
 - ◆ Partitioning
- ◆ Configuration
 - ◆ Changes to init parameters
 - ◆ Changes to file sizes
- ◆ Hardware changes



Accessed through Enterprise Manager

❖ View ADDM output for up to 7 days

http://sage3.sagecomputing.com.au:5500/em/console/database/instance/advisorTasks?advisorURL=&ad - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Mail Print Address Bar

Address http://sage3.sagecomputing.com.au:5500/em/console/database/instance/advisorTasks?advisorURL=&advisoryCentralURL=& Go Links Norton Internet Security

ORACLE Enterprise Manager 10g Database Control Setup Preferences Help Logout Database

Database: ora10g > Advisor Central Logged in As SYS

Advisor Central Page Refreshed May 22, 2005 12:21:54 PM Refresh

Advisors

[ADDM](#) [Memory Advisor](#) [Segment Advisor](#)
[SQL Tuning Advisor](#) [MTTR Advisor](#) [Undo Management](#)
[SQL Access Advisor](#)

Advisor Tasks Change Default Expiration

Search

Select an advisory type and optionally enter a task name to filter the data that is displayed in your results set.

Advisory Type Task Name Advisor Runs
ADDM Last 7 Days Go

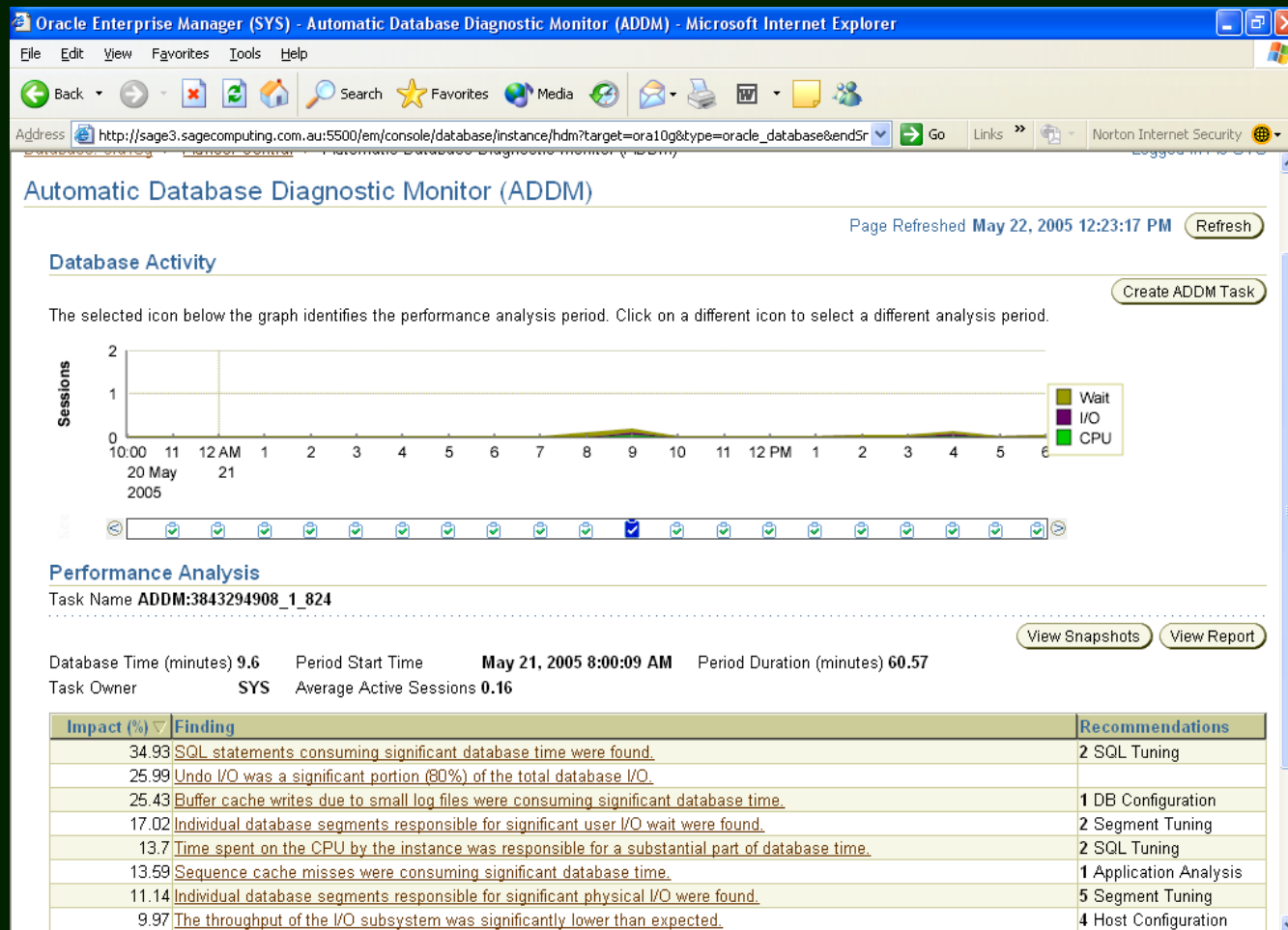
Results View Result Delete Actions Re-schedule Go

Previous 1-25 of 34 Next 9

| Select | Advisory Type | Name | Description | User | Status | Start Time | End Time | Expires In (days) |
|----------------------------------|---------------|-----------------------|-------------------------------------------------------------------------|------|-----------|--------------------------|--------------------------|-------------------|
| <input checked="" type="radio"/> | ADDM | ADDM:3843294908_1_837 | ADDM auto run: snapshots [836, 837], instance 1, database id 3843294908 | SYS | COMPLETED | May 22, 2005 12:00:42 PM | May 22, 2005 12:00:42 PM | 30 |
| <input type="radio"/> | ADDM | ADDM:3843294908_1_836 | ADDM auto run: snapshots [835, 836], instance 1, database id 3843294908 | SYS | COMPLETED | May 22, 2005 11:01:09 AM | May 22, 2005 11:01:10 AM | 30 |
| <input type="radio"/> | ADDM | TASK_1085 | | SYS | COMPLETED | May 22, 2005 10:48:52 AM | May 22, 2005 10:48:53 AM | 30 |
| <input type="radio"/> | ADDM | TASK_1082 | | SYS | COMPLETED | May 22, 2005 | May 22, 2005 | 30 |

Accessed through Enterprise Manager

View ADDM output for a snapshot





ADDM Analysis

- ◆ Perform analysis between two snapshots
 - ◆ No shutdown between snapshots
- ◆ Run from Enterprise Manager
- ◆ Run using
@`$ORACLE_HOME/rdbms/admin/addmrpt.sql`
- ◆ Run using DBMS_ADVISOR
- ◆ Produces report
 - ◆ Text
 - ◆ HTML



ADDM Analysis

✦ Results in the following views

✦ DBA_ADVISOR_TASKS

✦ DBA_ADVISOR_LOG

✦ DBA_ADVISOR_RECOMMENDATIONS

✦ DBA_ADVISOR_FINDINGS



DBA_ADVISOR_FINDINGS

◆ Top 10 findings

```
SELECT type, message
FROM (SELECT type, message, count(*) num
      FROM dba_advisor_findings
      GROUP BY type, message
      ORDER BY num desc)
WHERE rownum < 10
```



| TYPE | MESSAGE |
|-------------|-----------------------------------------------------------------------------------------|
| SYNTHOM | Wait class "User I/O" was consuming significant database time. |
| INFORMATION | There was no significant database activity to run the ADDM. |
| PROBLEM | SQL statements consuming significant database time were found. |
| PROBLEM | Wait event "class slave wait" in wait class "Other" was consuming significant database |
| SYNTHOM | Wait class "Other" was consuming significant database time. |
| PROBLEM | PL/SQL execution consumed significant database time. |
| SYNTHOM | The throughput of the I/O subsystem was significantly lower than expected. |
| PROBLEM | Individual database segments responsible for significant user I/O wait were found. |
| PROBLEM | Time spent on the CPU by the instance was responsible for a substantial part of databas |

Database Control

Database

Database: ora10g > Advisor Central

Logged in As SYS

Advisor Central

Page Refreshed May 24, 2005 8:25:20 AM

Advisors

[ADDM](#)
[Memory Advisor](#)
[Segment Advisor](#)
[SQL Tuning Advisor](#)
[MTTR Advisor](#)
[Undo Management](#)
[SQL Access Advisor](#)

Advisor Tasks

Search

Select an advisory type and optionally enter a task name to filter the data that is displayed in your results set.

Advisory Type Task Name Advisor Runs

Results

 Actions

| Select | Advisory Type | Name | Description | User | Status | Start Time ▾ | End Time | Expires In (days) |
|----------------------------------|--------------------|------------------------------------------|-------------------------------------------------------------------------|------|-----------|--------------------------|--------------------------|-------------------|
| <input checked="" type="radio"/> | ADDM | ADDM:3843294908_1_881 | ADDM auto run: snapshots [880, 881], instance 1, database id 3843294908 | SYS | COMPLETED | May 24, 2005 8:00:28 AM | May 24, 2005 8:00:29 AM | 30 |
| <input type="radio"/> | SQL Tuning Advisor | SQL_TUNING_1116731323812 | | SYS | COMPLETED | May 22, 2005 11:08:51 AM | May 22, 2005 11:08:53 AM | 28 |
| <input type="radio"/> | SQL Access Advisor | MIN_MAX_BOOKING_COST | SQL Access Advisor | SYS | COMPLETED | May 21, 2005 5:02:08 PM | May 21, 2005 5:02:17 PM | 27 |



Thank You For Your Attention

Any Questions?

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