

收获，不止 SQL 优化

第一章

用工具进行 SQL 整体优化

E-Mail:45240040@qq.com

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1.说说整体分析调优工具有哪些，大致说说获取的方法

1.1 STATSPACK

```
SQL> create tablespace tools datafile '/u02/app/oradata/EMERP/tools01.dbf' size 200m;
Tablespace created.

SQL> !
[oracle@edu ~]$ ll $ORACLE_HOME/rdbms/admin/sp*
-rw-r----- 1 oracle oinstall 1892 05-07 11:33 /u02/app/product/10.2.0/db_1/rdbms/admin/spauto.sql
-rw-r----- 1 oracle oinstall 198869 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/spcpkg.sql
-rw-r----- 1 oracle oinstall 861 2002-05-17 /u02/app/product/10.2.0/db_1/rdbms/admin/spcreate.sql
-rw-r----- 1 oracle oinstall 82281 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/spctab.sql
-rw-r----- 1 oracle oinstall 15247 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/spcusr.sql
-rw-r----- 1 oracle oinstall 149763 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/spdoc.txt
-rw-r----- 1 oracle oinstall 758 2000-06-19 /u02/app/product/10.2.0/db_1/rdbms/admin/spdrop.sql
-rw-r----- 1 oracle oinstall 7479 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/spdtab.sql
-rw-r----- 1 oracle oinstall 1669 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/spdusr.sql
-rw-r----- 1 oracle oinstall 4900 2003-03-07 /u02/app/product/10.2.0/db_1/rdbms/admin/spdpurge.sql
-rw-r----- 1 oracle oinstall 5193 2005-03-31 /u02/app/product/10.2.0/db_1/rdbms/admin/spprepcon.sql
-rw-r----- 1 oracle oinstall 252083 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/sprepins.sql
-rw-r----- 1 oracle oinstall 1284 2001-04-23 /u02/app/product/10.2.0/db_1/rdbms/admin/spreport.sql
-rw-r----- 1 oracle oinstall 1268 2002-10-11 /u02/app/product/10.2.0/db_1/rdbms/admin/sprepst.sql
-rw-r----- 1 oracle oinstall 33643 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/sprsqins.sql
-rw-r----- 1 oracle oinstall 4604 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/sptrunc.sql
-rw-r----- 1 oracle oinstall 588 2000-03-15 /u02/app/product/10.2.0/db_1/rdbms/admin/spuexp.par
-rw-r----- 1 oracle oinstall 23049 2005-05-31 /u02/app/product/10.2.0/db_1/rdbms/admin/spup10.sql
-rw-r----- 1 oracle oinstall 30938 2004-03-23 /u02/app/product/10.2.0/db_1/rdbms/admin/spup816.sql
-rw-r----- 1 oracle oinstall 23615 2004-03-23 /u02/app/product/10.2.0/db_1/rdbms/admin/spup817.sql
-rw-r----- 1 oracle oinstall 19412 2004-03-23 /u02/app/product/10.2.0/db_1/rdbms/admin/spup90.sql
-rw-r----- 1 oracle oinstall 41707 2004-03-23 /u02/app/product/10.2.0/db_1/rdbms/admin/spup92.sql

SQL> @?/rdbms/admin/spcreate.sql
SQL> Rem
SQL> Rem $Header: spcreate.sql 16-apr-2002.11:22:55 vbarrier Exp $
SQL> Rem
SQL> Rem spcreate.sql
SQL> Rem
SQL> Rem copyright (c) 1999, 2002, Oracle Corporation. All rights reserved.
SQL> Rem
SQL> Rem NAME
SQL> Rem spcreate.sql - Statistics Create
SQL> Rem
SQL> Rem DESCRIPTION
SQL> Rem SQL*PLUS command file which creates the STATSPACK user,
SQL> Rem tables and package for the performance diagnostic tool STATSPACK
SQL> Rem
SQL> Rem NOTES
SQL> Rem Note the script connects INTERNAL and so must be run from
SQL> Rem an account which is able to connect internal.
SQL> Rem

SQL> Rem cdialeri 02/16/00 - 1191805
SQL> Rem cdialeri 01/26/00 - 1169401
SQL> Rem cdialeri 11/01/99 - 1059172
SQL> Rem cdialeri 08/13/99 - Created
SQL> Rem
SQL>
SQL> set echo off verify off showmode off feedback off;

Choose the PERFSTAT user's password 设置默认用户perfstat密码
-----
Not specifying a password will result in the installation FAILING
Enter value for perfstat_password: oracle1
```

```
Pressing <return> will result in STATSPACK's recommended default
tablespace (identified by *) being used.
```

```
Enter value for default_tablespace: tools
```

设置默认用户的表
空间及临时表空间

```
Using tablespace TOOLS as PERFSTAT default tablespace.
```

```
choose the Temporary tablespace for the PERFSTAT user
```

```
Below is the list of online tablespaces in this database which can
store temporary data (e.g. for sort workareas). Specifying the SYSTEM
tablespace for the user's temporary tablespace will result in the
installation FAILING, as using SYSTEM for workareas is not supported.
```

```
Choose the PERFSTAT user's Temporary tablespace.
```

TABLESPACE_NAME	CONTENTS	DB DEFAULT TEMP TABLESPACE
TEMP	TEMPORARY	*

```
Pressing <return> will result in the database's default Temporary
tablespace (identified by *) being used.
```

```
Enter value for temporary_tablespace: temp
```

```
SQL> set echo off;
Creating Package STATSPACK...
```

```
Package created.
```

```
No errors.
```

```
Creating Package Body STATSPACK...
```

```
Package body created.
```

```
No errors.
```

最后提示statspack安装完成

```
NOTE:
```

```
SPCPKG complete. Please check spcpkg.lis for any errors.
```

```
SQL> conn perfstat/oracle1
```

```
Connected.
```

```
SQL> exec statspack.snap;
```

```
PL/SQL procedure successfully completed.
```

手动生成两个快照
也可以创建job自
动生成

```
SQL> exec statspack.snap;
```

```
PL/SQL procedure successfully completed.
```

```
SQL>
```

```
SQL> @?/rdbms/admin/spreport.sql
```

```
Current Instance
```

生成statspack报告

```
2490221765 EMERP
```

```
1 EMERP
```

```
Instances in this Statspack schema
```

```
2490221765
```

```
1 EMERP
```

```
EMERP
```

```
edu
```

```
Using 2490221765 for database Id
```

```
Using 1 for instance number
```


Listing all Completed Snapshots

Instance	DB Name	Snap Id	Snap Started	Snap Level	Comment
EMERP	EMERP	1	07 May 2014 13:37	5	
		2	07 May 2014 13:41	5	

Specify the Begin and End Snapshot Ids

Enter value for begin_snap: 1
Begin Snapshot Id specified: 1

Enter value for end_snap: 2
End Snapshot Id specified: 2

为报告选择快照及设置名称

Specify the Report Name

The default report file name is sp_1_2. To use this name,
press <return> to continue, otherwise enter an alternative.

Enter value for report_name: █

[oracle@edu ~]\$ more sp_1_2.lst
STATSPACK report for

Database	DB Id	报告内容			
Instance	Inst Num				
Startup Time	Release				
RAC		statspack只能生产文本格式的报			
-----	-----	告			
---	---				
	2490221765	EMERP		1	
07-May-14 11:52	10.2.0.1.0	NO			
Host Name:	edu	Num CPUs:	2		
Phys Memory (MB):	1				
-----	-----				
Snapshot	Snap Id	Snap Time	Sessions	Curs/Sess	Comment
-----	-----	-----	-----	-----	-----
Begin Snap:	1	07-May-14 13:37:38	16	3.8	
End Snap:	2	07-May-14 13:41:24	16	5.3	
Elapsed:		3.77 (mins)			
Cache Sizes		Begin	End		
-----	-----	-----	-----		
Buffer Cache:	144M			Std Block size:	8K
Shared Pool Size:	156M				
Log Buffer:	6,892K				
Load Profile		Per Second	Per Transaction		
-----		-----	-----		
Redo size:		4,067.72	29,654.97		
Logical reads:		19.78	144.23		
Block changes:		7.18	52.35		
Physical reads:		0.00	0.00		
Physical writes:		10.13	73.87		
User calls:		0.09	0.68		
Parses:		1.38	10.06		
Hard parses:		0.17	1.23		
Sorts:		0.78	5.71		
Logons:		0.03	0.19		
Executes:		4.23	30.87		
Transactions:		0.14			

1.2 AWR

```

[oracle@edu admin]$ ll /u02/app/product/10.2.0/db_1/rdbms/admin/awr*
-rw-r----- 1 oracle oinstall 20892 May 23 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrddinp.sql
-rw-r----- 1 oracle oinstall 7252 May 27 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrddrpt1.sql
-rw-r----- 1 oracle oinstall 2005 May 27 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrddrpt.sql
-rw-r----- 1 oracle oinstall 11286 Apr 18 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrextr.sql
-rw-r----- 1 oracle oinstall 49166 Sep 1 2004 /u02/app/product/10.2.0/db_1/rdbms/admin/awrinfo.sql
-rw-r----- 1 oracle oinstall 2462 Jan 5 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrinprm.sql
-rw-r----- 1 oracle oinstall 8495 May 23 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrinpt.sql
-rw-r----- 1 oracle oinstall 10324 Apr 18 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrload.sql
-rw-r----- 1 oracle oinstall 7575 Apr 18 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrrpti.sql
-rw-r----- 1 oracle oinstall 1999 Oct 24 2003 /u02/app/product/10.2.0/db_1/rdbms/admin/awrrpt.sql
-rw-r----- 1 oracle oinstall 6676 Jan 5 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrsqrpt1.sql
-rw-r----- 1 oracle oinstall 1469 Jan 5 2005 /u02/app/product/10.2.0/db_1/rdbms/admin/awrsqrpt.sql
[oracle@edu admin]$

```

```

SQL> @?/rdbms/admin/awrrpt.sql
SQL>
SQL> Rem $Header: awrrpt.sql 24-oct-2003.12:04:53 pbelknap Exp $
SQL> Rem
SQL> Rem awrrpt.sql
SQL> Rem
SQL> Rem copyright (c) 1999, 2003, oracle corporation. All rights reserved.
SQL> Rem
SQL> Rem NAME
SQL> Rem awrrpt.sql
SQL> Rem
SQL> Rem DESCRIPTION
SQL> Rem This script defaults the dbid and instance number to that of the
SQL> Rem current instance connected-to, then calls awrrpti.sql to produce
SQL> Rem the workload Repository report.
SQL> Rem
SQL> Rem NOTES
SQL> Rem Run as select catalog privileges

```

```

SQL> set echo off heading on underline on;
Current Instance
-----
DB Id      DB Name      Inst Num Instance
-----
2490221765 EMERP              1 EMERP

Specify the Report Type                                选择生成报告的类型,默认就是html
-----
would you like an HTML report, or a plain text report?
Enter 'html' for an HTML report, or 'text' for plain text
Defaults to 'html'
Enter value for report_type:

```

```

Enter value for num_days: 1
Listing the last day's Completed Snapshots

Instance      DB Name      Snap Id      Snap Started      Snap Level
-----
EMERP          EMERP              26 07 May 2014 09:59      1
                27 07 May 2014 11:01      1
                28 07 May 2014 12:03      1
                29 07 May 2014 13:00      1
                30 07 May 2014 14:01      1

Specify the Begin and End Snapshot Ids                选择最近几天的快照,输入起始和终止ID
-----
Enter value for begin_snap: 28
Begin Snapshot Id specified: 28
Enter value for end_snap: 30

```

Specify the Begin and End Snapshot Ids

Enter value for begin_snap: 28
Begin Snapshot Id specified: 28

Enter value for end_snap: 30
End Snapshot Id specified: 30

给报告起个名字

Specify the Report Name

The default report file name is awrrpt_1_28_30.html. To use this name, press <return> to continue, otherwise enter an alternative.

Enter value for report_name: █



WORKLOAD REPOSITORY report for

DB Name	DB Id	Instance	Inst num	Release	RAC	Host
EMERP	2490221765	EMERP	1	10.2.0.1.0	NO	edu

	Snap Id	Snap Time	Sessions	Cursors/Session
Begin Snap:	28	07-May-14 12:03:31	17	2.2
End Snap:	30	07-May-14 14:01:03	17	3.4
Elapsed:		117.53 (mins)		
DB Time:		2.70 (mins)		

Report Summary

报告的内容，相比statspack则要易读的多

Cache Sizes

	Begin	End		
Buffer Cache:	132M	128M	Std Block Size:	8K
Shared Pool Size:	152M	156M	Log Buffer:	7,000K

1.3 ASH



specify the timeframe to generate the ASH report

Enter begin time for report:

```
-- Valid input formats:
--   To specify absolute begin time:
--       [MM/DD[/YY]] HH24:MI[:SS]
--       Examples: 02/23/03 14:30:15
--                   02/23 14:30:15
--                   14:30:15
--                   14:30
--   To specify relative begin time: (start with '-' sign)
--       -[HH24:]MI
--       Examples: -1:15 (SYSDATE - 1 Hr 15 Mins)
--                 -25  (SYSDATE - 25 Mins)
```

Defaults to -15 mins

Enter value for begin_time: 指定报告采集的时间间隔，默认为5分钟

Report begin time specified:

Enter duration in minutes starting from begin time:

Defaults to SYSDATE - begin_time

Press Enter to analyze till current time

Enter value for duration: █

Specify ACTION name (eg: from V\$SESSION.ACTION) report target:

Defaults to NULL: (% and _ wildcards allowed)

ACTION report target specified:

Specify CLIENT_ID (eg: from V\$SESSION.CLIENT_IDENTIFIER) report target:

Defaults to NULL: (% and _ wildcards allowed)

CLIENT_ID report target specified:

Specify the Report Name

执行报告的名称

The default report file name is ashprt_1_0507_1435.html. To use this name, press <return> to continue, otherwise enter an alternative.

Enter value for report_name: █



ASH Report For EMERP/EMERP

DB Name	DB Id	Instance	Inst num	Release	RAC	Host
EMERP	2490221765	EMERP	1	10.2.0.1.0	NO	edu

CPUs	SGA Size	Buffer Cache	Shared Pool	ASH Buffer Size
2	512M (100%)	144M (28.1%)	148M (29.0%)	4.0M (0.8%)

	Sample Time	Data Source
Analysis Begin Time:	07-May-14 14:18:22	V\$ACTIVE_SESSION_HISTORY
Analysis End Time:	07-May-14 14:35:07	V\$ACTIVE_SESSION_HISTORY
Elapsed Time:	16.8 (mins)	
Sample Count:	23	
Average Active Sessions:	0.02	
Avg. Active Session per CPU:	0.01	
Report Target:	None specified	

ASH Report

ASH报告的内容

1.4 ADDM

```
SQL> @?/rdbms/admin/addmrpt.sql

Current Instance
~~~~~
```

DB Id	DB Name	Inst Num	Instance
2490221765	EMERP	1	EMERP

```

Instances in this workload Repository schema
~~~~~
```

DB Id	Inst Num	DB Name	Instance	Host
* 2490221765	1	EMERP	EMERP	edu

```

Using 2490221765 for database Id
Using          1 for instance number

```

```

28 07 May 2014 12:03      1
29 07 May 2014 13:00      1
30 07 May 2014 14:01      1

Specify the Begin and End Snapshot Ids
~~~~~
Enter value for begin_snap: 28
Begin Snapshot Id specified: 28

Enter value for end_snap: 29
End Snapshot Id specified: 29

Specify the Report Name
~~~~~
The default report file name is addmrpt_1_28_29.txt. To use this name,
press <return> to continue, otherwise enter an alternative.
Enter value for report_name:

```

指定快照区间及报告名称

```
addmrpt_1_28_29.txt x
```

```

~~~~~
THERE WAS NOT ENOUGH DATABASE TIME FOR ADDM ANALYSIS.
~~~~~

      ADDITIONAL INFORMATION
      ~~~~~
There was no significant database activity to run the ADDM.

The analysis of I/O performance is based on the default
assumption that the
average read time for one database block is 10000 micro-
seconds.

An explanation of the terminology used in this report is
available when you

```


1.5 ADRDD

```
SQL> @?/rdbms/admin/awrddrpt.sql

Current Instance
~~~~~
```

DB Id	DB Id	DB Name	Inst Num	Inst Num	Instance
2490221765	2490221765	EMERP	1	1	EMERP

```

Specify the Report Type
~~~~~
Would you like an HTML report, or a plain text report?
Enter 'html' for an HTML report, or 'text' for plain text
Defaults to 'html'
Enter value for report_type: █

```

```

Enter value for num_days: 1
Listing the last day's Completed Snapshots

```

Instance	DB Name	Snap Id	Snap Started	Snap Level
EMERP	EMERP	26	07 May 2014 09:59	1
		27	07 May 2014 11:01	1
		28	07 May 2014 12:03	1
		29	07 May 2014 13:00	1
		30	07 May 2014 14:01	1

指定快照区间

```

Specify the First Pair of Begin and End Snapshot Ids
~~~~~
Enter value for begin_snap: 28
First Begin Snapshot Id specified: 28
Enter value for end_snap: 29█

```

```

Enter value for num_days2: 1
Listing the last day's Completed Snapshots

```

Instance	DB Name	Snap Id	Snap Started	Snap Level
EMERP	EMERP	26	07 May 2014 09:59	1
		27	07 May 2014 11:01	1
		28	07 May 2014 12:03	1
		29	07 May 2014 13:00	1
		30	07 May 2014 14:01	1

指定第2个快照区间

```

Specify the Second Pair of Begin and End Snapshot Ids
~~~~~
Enter value for begin_snap2: 29
Second Begin Snapshot Id specified: 29
Enter value for end_snap2: 30█

```

WORKLOAD REPOSITORY COMPARE PERIOD REPORT

Snapshot Set	DB Name	DB Id	Instance	Inst num	Release	Cluster	Host
First (1st)	EMERP	2490221765	EMERP	1	10.2.0.1.0	NO	edu
Second (2nd)	EMERP	2490221765	EMERP	1	10.2.0.1.0	NO	edu

Snapshot Set	Begin Snap Id	Begin Snap Time	End Snap Id	End Snap Time	Elapsed Time (min)	DB Time (min)	Avg Active Users
1st	28	07-May-14 12:03:31	29	07-May-14 13:00:27	56.93	0.18	0.00
2nd	29	07-May-14 13:00:27	30	07-May-14 14:01:03	60.60	2.52	0.04

Configuration Comparison

	1st	2nd	%Diff
Buffer Cache:	132M	128M	-3.03
Std Block Size:	8K	8K	0.00
Shared Pool Size:	152M	156M	2.63
Log Buffer:	7,000K	7,000K	0.00
SGA Target:	537M	537M	0.00
PGA Aggregate Target:	157M	157M	0.00
Undo Management:	AUTO	AUTO	

1.6 AWRSQRPT

```

SQL> exec dbms_workload_repository.create_snapshot();
PL/SQL procedure successfully completed.

SQL> conn /as sysdba
Connected.
SQL> create table test2 as select * from dba_objects;
Table created.

SQL> create index idx_test2 on test2(object_id);
Index created.

SQL> select count(*) from test2 where object_id>20000;
   COUNT(*)
   -----
        30820

SQL> select sql_id from v$sql where sql_text like 'select count(*) from test2%';
SQL_ID
-----
82385vtwnhuky

生成两个快照及查询出快照期间对应SQL的sql_id

SQL> conn /as sysdba
Connected.
SQL> exec dbms_workload_repository.create_snapshot();
PL/SQL procedure successfully completed.

```

```
SQL> @?/rdbms/admin/awrsqrpt.sql
```

```
Current Instance
```

```
~~~~~
```

DB Id	DB Name	Inst Num	Instance
2490221765	EMERP	1	EMERP

```
Specify the Report Type
```

```
~~~~~
```

```
Would you like an HTML report, or a plain text report?
```

```
Enter 'html' for an HTML report, or 'text' for plain text
```

```
Defaults to 'html'
```

```
Enter value for report_type:
```

```
Type specified:          html
```

```
Enter value for num_days: 1
```

```
Listing the last day's Completed Snapshots
```

Instance	DB Name	Snap Id	Snap Started	Snap Level
EMERP	EMERP	26	07 May 2014 09:59	1
		27	07 May 2014 11:01	1
		28	07 May 2014 12:03	1
		29	07 May 2014 13:00	1
		30	07 May 2014 14:01	1
		31	07 May 2014 15:00	1
		32	07 May 2014 15:07	1
		33	07 May 2014 15:08	1
		34	07 May 2014 15:09	1
		35	07 May 2014 15:10	1
		36	07 May 2014 15:10	1
		37	07 May 2014 15:12	1

```
Specify the Begin and End Snapshot Ids
```

```
~~~~~
```

```
Enter value for begin_snap: 36
```

```
Begin snapshot Id specified: 36
```

```
Enter value for end_snap: 37
```

```
End snapshot Id specified: 37
```

指定快照区间及指定区间内SQL的SQL_ID，使用默认报告名字

```
Specify the SQL Id
```

```
~~~~~
```

```
Enter value for sql_id: 82385vtwnhuky
```

```
SQL ID specified: 82385vtwnhuky
```

```
Specify the Report Name
```

```
~~~~~
```

```
The default report file name is awrsqrpt_1_36_37.html. To use this name, press <return> to continue, otherwise enter an alternative.
```

```
Enter value for report_name: █
```




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SQL ID: 82385vtwnhuky

- 1st Capture and Last Capture Snap IDs refer to Snapshot IDs within the snapshot range
- `select count(*) from test2 where object_id = 'SYS B 0'`

#	Plan Hash Value	Total Elapsed Time(ms)	Executions	1st Capture Snap ID	Last Capture Snap ID
1	3825363728	24	1	37	37

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Plan 1(PHV: 3825363728)

- [Plan Statistics](#)
- [Execution Plan](#)

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Plan Statistics

2.说说各个整体调优工具之间的关系，并说说关注点是什么

2.1 STATSPACK

STATSPACK 是出现比较早的一个整体调优工具，他与目前比较流行的 AWT 工具比较类似，在使用 STATSPACK 工具调优的时候主要的关注的是数据库的各种参数的指标，由此可见以前的优化调整思想。

2.1.1 Cache Size

```

Cache Sizes
~~~~~
              Begin      End
-----
Buffer Cache: 148M      Std Block Size: 8K
Shared Pool Size: 152M
Log Buffer:      6,892K
  
```

2.1.2 Load Profile

```

Load Profile
~~~~~
          Redo size:                2,689.80          25,468.16
        Logical reads:              17.95           169.92
        Block changes:               4.75           44.98
        Physical reads:              0.37            3.51
        Physical writes:             0.68            6.47
        User calls:                  0.08            0.76
        Parses:                      1.52           14.41
        Hard parses:                 0.06            0.61
        Sorts:                       0.91            8.64
        Logons:                     0.03            0.25
        Executes:                    3.20           30.32
        Transactions:                0.11

      % Blocks changed per Read:  26.47   Recursive Call %:      99.71
Rollback per transaction %:      0.00   Rows per Sort:        30.91
  
```

2.1.3 Instance Efficiency Percentages

```

Instance Efficiency Percentages
~~~~~
      Buffer Nowait %: 100.00      Redo NoWait %: 100.00
      Buffer Hit %: 97.93      In-memory Sort %: 100.00
      Library Hit %: 95.25      Soft Parse %: 95.76
      Execute to Parse %: 52.47      Latch Hit %: 99.98
Parse CPU to Parse Elapsed %: 75.68      % Non-Parse CPU: 95.49

Shared Pool Statistics      Begin      End
-----
      Memory Usage %: 42.75      44.11
      % SQL with executions>1: 70.71      85.29
      % Memory for SQL w/exec>1: 83.23      80.89
  
```

2.1.4 Top 5 Timed Events

```

Top 5 Timed Events
~~~~~
Event                               Waits      Time (s)      Avg %Total
                                wait      (ms)      wait      Call
                                (ms)      Time
-----
control file parallel write         1,162         60         52         68.1
CPU time                           12          12         14.0
log file parallel write              486           8         17          9.1
db file sequential read              567           3           5          3.1
log file sync                       133           3          20          3.1
  
```

2.2 AWR

2.2.1 Load Profile

Load Profile

	Per Second	Per Transaction
Redo size:	5,753.65	41,443.18
Logical reads:	103.21	743.41
Block changes:	32.14	231.48
Physical reads:	0.51	3.70
Physical writes:	1.15	8.31
User calls:	0.67	4.84
Parses:	9.11	65.60
Hard parses:	0.59	4.28
Sorts:	2.82	20.33
Logons:	0.03	0.19
Executes:	13.60	97.97
Transactions:	0.14	

% Blocks changed per Read:	31.14	Recursive Call %:	99.44
Rollback per transaction %:	0.00	Rows per Sort:	18.30

2.2.2 Instance Efficiency Percentages

Instance Efficiency Percentages (Target 100%)

Buffer Nowait %:	100.00	Redo NoWait %:	100.00
Buffer Hit %:	99.50	In-memory Sort %:	100.00
Library Hit %:	96.87	Soft Parse %:	93.47
Execute to Parse %:	33.04	Latch Hit %:	100.00
Parse CPU to Parse Elapsed %:	93.47	% Non-Parse CPU:	87.80

2.2.3 Top 5 Timed Events

Top 5 Timed Events

Event	Waits	Time(s)	Avg Wait(ms)	% Total Call Time	Wait Class
control file parallel write	2,403	127	53	78.0	System I/O
CPU time		52		31.9	
log file parallel write	3,553	46	13	28.2	System I/O
log file sync	932	15	17	9.5	Commit
enq: TX - row lock contention	5	13	2,652	8.2	Application

2.2.4 SQL Statistics

SQL Statistics

- SQL ordered by Elapsed Time
- SQL ordered by CPU Time
- SQL ordered by Gets
- SQL ordered by Reads
- SQL ordered by Executions
- SQL ordered by Parse Calls
- SQL ordered by Sharable Memory
- SQL ordered by Version Count
- Complete List of SQL Text

不同角度下的SQL统计信息

2.2.5 Segment Statistics

Segment Statistics

- Segments by Logical Reads
- Segments by Physical Reads
- Segments by Row Lock Waits
- Segments by ITL Waits
- Segments by Buffer Busy Waits

不同角度下段统计信息

2.3 ASH

2.3.1 Top SQL

Top SQL

- Top SQL Statements
- Top SQL using literals
- Complete List of SQL Text

不同纬度下TOP SQL

2.3.2 Top Events

Top Events

- Top User Events
- Top Background Events
- Top Event P1/P2/P3 Values

不同纬度下事件

2.4 ADDM

2.4.1 查找结果和建议案

查找结果和建议案

查找结果 1: 行锁等待数
受影响的是 .52 个活动会话, 占总活动的 97.76\%。
发现 SQL 语句正处于行锁定等待。

建议案 1: 应用程序分析
估计的收益为 .39 个活动会话, 占总活动的 72.36\%。

操作

在 INDEX "LJB.GENDER_IDX" (对象 ID 为 110057) 中检测到了严重的行争用。使用指定的阻塞 SQL

2.5 ADRDD

2.5.1 不同时期的参数比较

Report Details

- Wait Events
- Time Model Statistics
- Operating system Statistics
- Service Statistics
- SQL Statistics
- Instance Activity Statistics
- IO Stats
- Advisory Statistics
- Wait Stats
- Latch Statistics
- Segment Statistics
- Dictionary Cache Statistics
- Library Cache Statistics
- SGA Statistics
- init.ora Parameters

不同时期的等待事件、TOP SQL等比较

2.6 AWRSQRPT

2.6.1 执行计划及相同统计信息

Plan 1(PHV: 3825363728)

- Plan Statistics
- Execution Plan

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Plan Statistics

- % Total DB Time is the Elapsed Time of the SQL statement divided into the Total Database Time

Stat Name	Statement Total	Per Execution	% Snap Total
Elapsed Time (ms)	24	23.56	0.92
CPU Time (ms)	24	23.54	1.50
Executions	1		
Buffer Gets	189	189.00	1.30
Disk Reads	111	111.00	13.49
Parse Calls	1	1.00	0.27
Rows	1	1.00	
User I/O Wait Time (ms)	3		
Cluster Wait Time (ms)	0		
Application Wait Time (ms)	0		
Concurrency Wait Time (ms)	0		
Invalidations	0		
Version Count	1		
Sharable Mem(KB)	12		

3.从案例和前面的知识介绍中说说自己的心得，内容字数不限

ORACLE 作为一款优秀的商业数据库，除了提供强大的数据查询、数据保护等基本的数据功能外，还为使用者提供了种类繁多的故障诊断工具。这些工具从不同的角度、不同的层面来采集数据库运行信息，为数据库系统正常运转提供了有力的保障，总的来说有以下几点：

- ✧ **Statspace** 重点收集了各种影响性能的系统参数的值的情况
- ✧ **Awr** 重点收集了各种统计信息、等待事件的情况
- ✧ **Ash** 弥补了 **awr** 的一些缺点，收集实效信息
- ✧ **Addm** 是 ORACLE 系统各种建议的基础，系统自动调整的基础
- ✧ **Adrdd** 通过对不同阶段的报表比较从而发现系统异常
- ✧ **Awrsqrpt** 通过对具体 SQL 进行诊断，收集具体 SQL 的计划情况