Oracle数据库优化经验- ADDM DBA

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- **Presents for advanced Oracle topics: RAC, DataGuard, Performance Tuning and Oracle Internal.**

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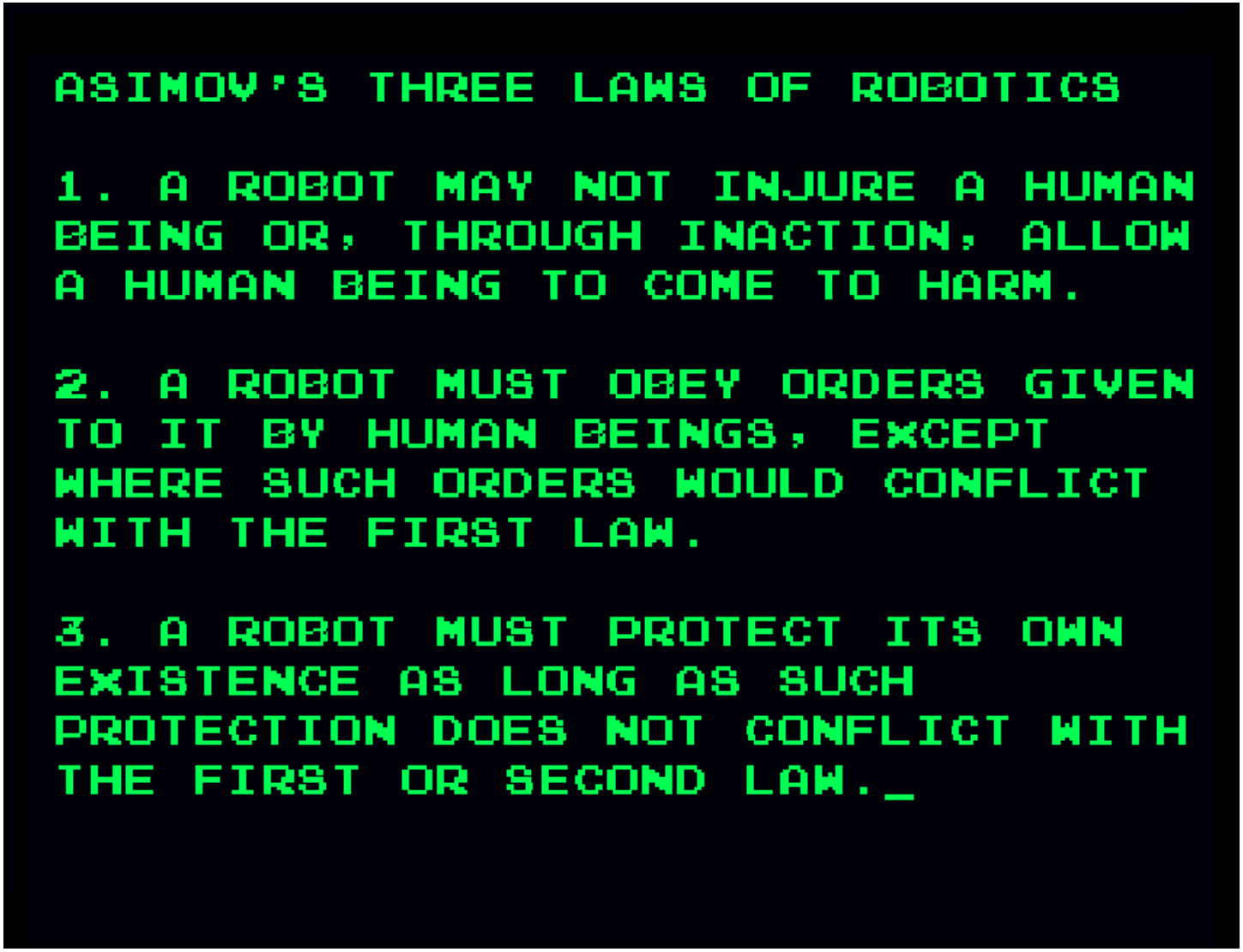
How to Find SHOUG?

ADDM DBA – Self Tuning 自动调优修复

机器人仍愚蠢，但可以帮人类省脑细胞

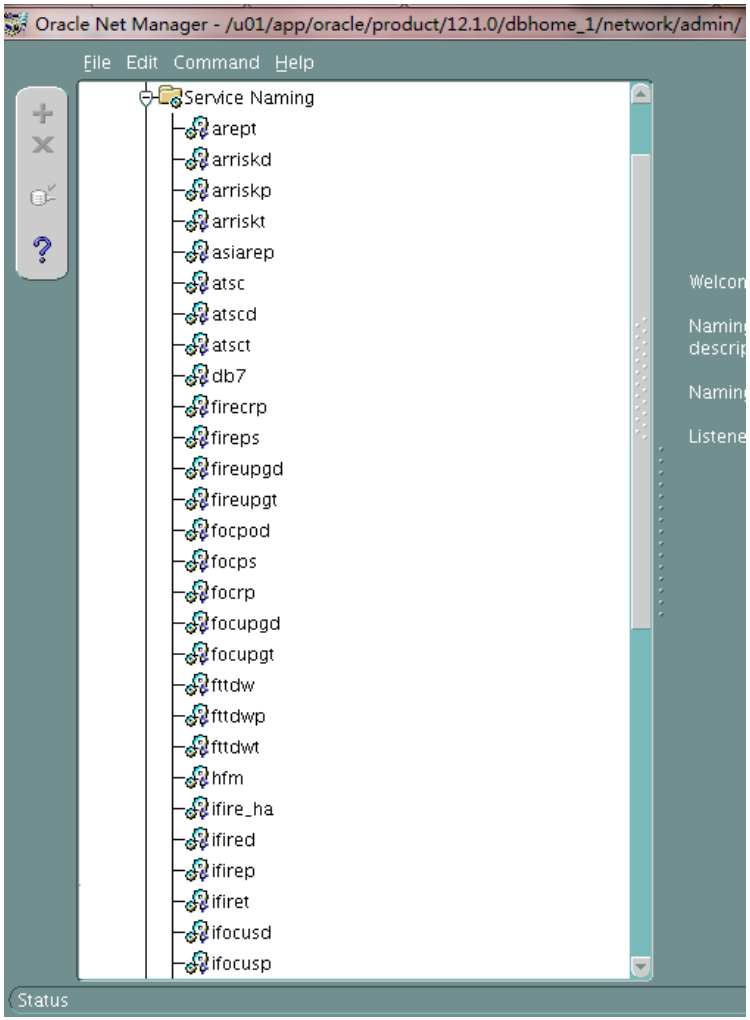


机器调优目前仍无法替代人工调优，有时甚至表现得很愚蠢

```
Finding 1: Virtual Memory Paging
Impact is 26.56 active sessions, 100% of total activity.
-----------------------------------------------------------
Significant virtual memory paging was detected on the host operating system.

   Recommendation 1: Host Configuration
   Estimated benefit is 26.56 active sessions, 100% of total activity.
   ------------------------------------------------------------------
   Action
      Host operating system was experiencing significant paging but no
      particular root cause could be detected. Investigate processes that do
      not belong to this instance running on the host that are consuming
      significant amount of virtual memory. Also consider adding more physical
      memory to the host.

   Recommendation 2: Database Configuration
   Estimated benefit is 26.56 active sessions, 100% of total activity.
   ------------------------------------------------------------------
   Action
      Consider enabling Automatic Shared Memory Management by setting the
      parameter "sga_target" to control the amount of SGA consumed by this
      instance.
```

```
Finding 1: Undersized SGA
Impact is .07 active sessions, 77.78% of total activity.
-----------------------------------------------------------
The SGA was inadequately sized, causing additional I/O or hard parses.
The value of parameter "sga_target" was "24576 M" during the analysis period

   Recommendation 1: Database Configuration
   Estimated benefit is .07 active sessions, 77.78% of total activity.
   ------------------------------------------------------------------
   Action
      Increase the size of the SGA by setting the parameter "sga_target" to
      33792 M.

   Symptoms That Led to the Finding:
   ---------------------------------
      Wait class "User I/O" was consuming significant database time.
      Impact is .03 active sessions, 30.23% of total activity.
```

但当有几十套数据库，上千条问题SQL
需要调优时，纯人工调优真心头痛




```
select count(*) from problem_sql;

  COUNT(*)
----------
      3699
```

啥是ADDM?

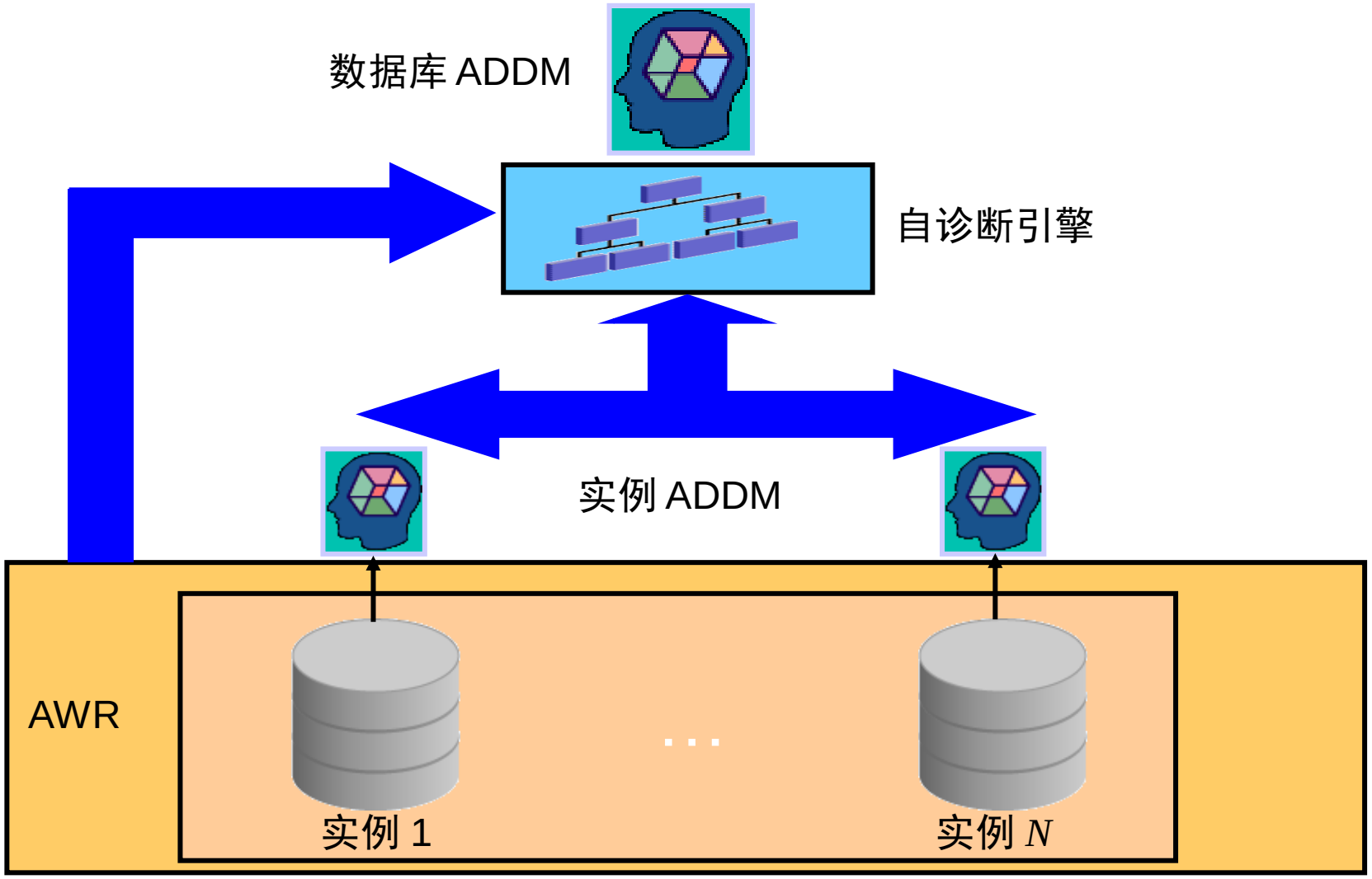
ADDM= Automatic Database Diagnostic Monitor

- 默认每60分钟生成一份自动性能诊断报告
- 基于Oracle过去20年的调优经验的性能问题诊断
- 基于10g以后时间模型的性能影响评估和建议收益估计
- 直击问题根源而非症状
- AWR的数据过于全面详细，ADDM帮你抽丝剥茧这些数据(有dba调优不用AWR/Statspack的吗？ ADDM呢？)
- 12c EM real time ADDM 实时ADDM， 12c RDBMS new feature Compare Period ADDM， 一个今后持续发展的调优框架

ADDM的历史

- ADDM是大约2002年开始的项目，已经有了11年的历史
- 属于KEH模块 Kernel Ease-of-Management Holistic diagnostic monitor
- 最早在10gR1中公开提出了ADDM的概念
- 在10gR2 、 11g 、 12c中持续增强ADDM 的能力
- ADDM无法取代DBA的人工调优， ADDM是调优DBA和开发人员在性能方面的好朋友
- ADDM走在行业领先位置

Oracle Database 11g：
RAC 的自动数据库诊断监视器



ADDM怎么用？

- 最简单的：@?/rdbms/admin/addmrpt
- Enterprise Manager 图形接口
- PL/SQL:

创建和执行数据库 ADDM 任务

```
SQL> var tname varchar2(60);
SQL> BEGIN
SQL>   :tname := 'my database ADDM task';
SQL>   dbms_addm.analyze_db(:tname, 1, 2);          //参数 1、2：启动和结束快照
SQL> END;
```

用于查看结果的 GET_REPORT 过程：

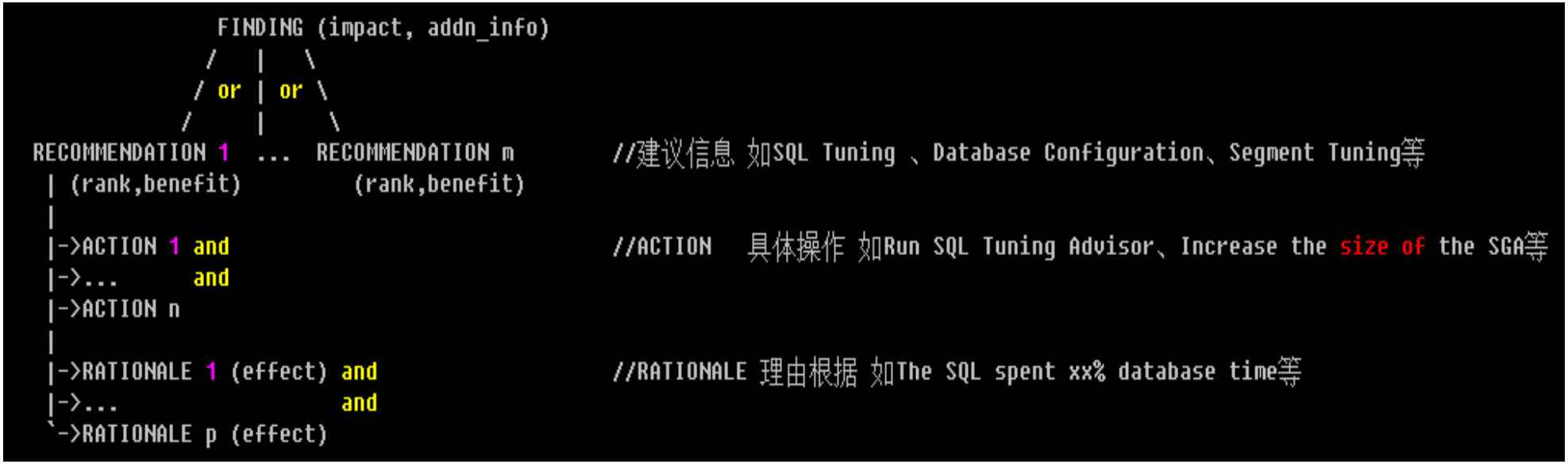
```
SQL> SELECT dbms_addm.get_report(:tname) FROM DUAL;
```

ADDM的教条作用

确定整个 RAC 集群数据库的最重要的性能问题

- 在生成 AWR 快照时自动运行（默认设置）
- 在数据库范围内对以下项进行分析：
  - 全局资源（例如，I/O 和全局锁）
  - 高负载 SQL 和热块
  - 全局高速缓存互联通信量
  - 网络等待时间问题
  - 实例响应时间的偏差
  - DBA 用来分析集群性能

ADDM报告的结构


FINDING (impact, addn_info)
/ | \
/ or | or \
/ | \
RECOMMENDATION 1 ... RECOMMENDATION m //建议信息 如SQL Tuning 、Database Configuration、Segment Tuning等
| (rank,benefit) (rank,benefit)
|
|->ACTION 1 and //ACTION 具体操作 如Run SQL Tuning Advisor、Increase the size of the SGA等
|->... and
|->ACTION n
|
|->RATIONALE 1 (effect) and //RATIONALE 理由根据 如The SQL spent xx% database time等
|->... and
`->RATIONALE p (effect)

耳听为虚，眼见为实

某用户OLTP环境切换存储后INSERT语句出现大量gc buffer busy等待事件，一般看到该等待事件优先想到的是集群间的热块争用：

Top 5 Timed Events

Event	Waits	Time(s)	Avg Wait(ms)	% Total Call Time	Wait Class
db file sequential read	110,200,528	1,449,354	13	34.3	User I/O
gc buffer busy	17,707,094	654,851	37	15.5	Cluster
log file sync	9,779,853	454,794	47	10.8	Commit
CPU time		295,852		7.0	
gc cr grant 2-way	45,631,464	225,901	5	5.3	Cluster

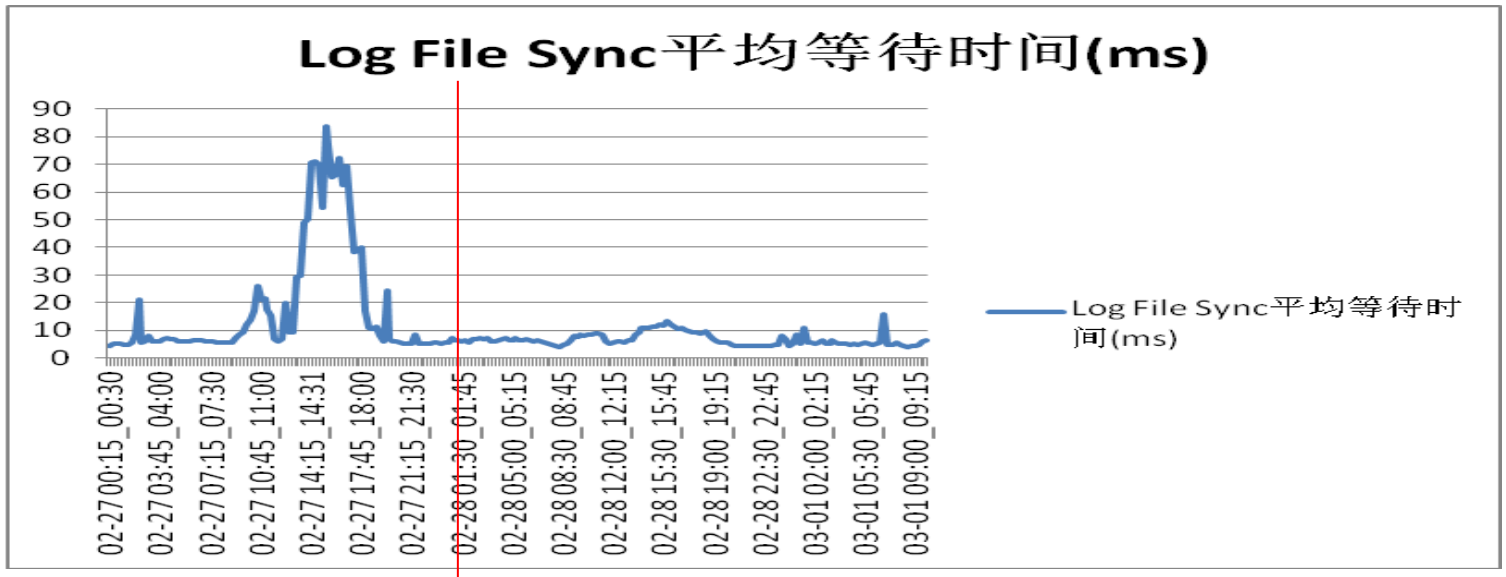
SQL ordered by Cluster Wait Time

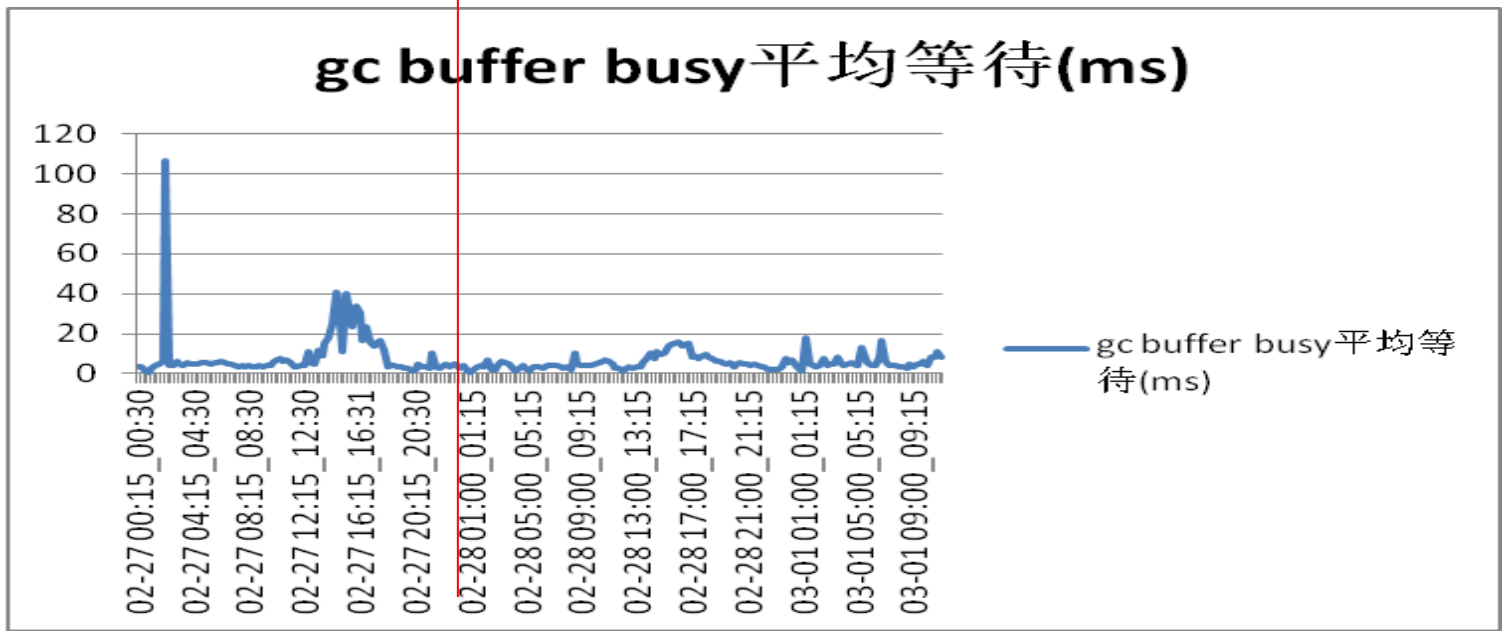
Cluster Wait Time (s)	CWT % of Elapsd Time	Elapsed Time(s)	CPU Time(s)	Executions	SQL Id
60,391.02	81.13	74,435.74	512.84	221,141	8x2q75mbgcjpk
21,688.10	81.27	26,687.21	337.51	228,828	1vdnvfught5pf
21,159.59	34.30	61,694.40	4,948.82	179,959	86dfz577rdgxp

ADDM直击root cause

```
FINDING 3: 12% impact (507182 seconds)
-------------------------------------
Waits on event "log file sync" while performing COMMIT and ROLLBACK operations
were consuming significant database time.

   RECOMMENDATION 1: Application Analysis, 12% benefit (507182 seconds)
      ACTION: Investigate application logic for possible reduction in the
         number of COMMIT operations by increasing the size of transactions.
      RATIONALE: The application was performing 43582 transactions per minute
         with an average redo size of 4261 bytes per transaction.

   RECOMMENDATION 2: Host Configuration, 12% benefit (507182 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
         40 K and the average time per write was 10 milliseconds.

   ADDITIONAL INFORMATION:
      Waits on event "log file sync" were the cause of significant database
      wait on "gc buffer busy" when releasing a data block.  Waits on event
      "log file sync" in this instance can cause global cache contention on
      remote instances.
~
```

存储链路调整前后


Log File Sync平均等待时间(ms)
90
80
70
60
50
40
30
20
10
0
02-27 00:15_00:30
02-27 03:45_04:00
02-27 07:15_07:30
02-27 10:45_11:00
02-27 14:15_14:31
02-27 17:45_18:00
02-27 21:15_21:30
02-28 01:30_01:45
02-28 05:00_05:15
02-28 08:30_08:45
02-28 12:00_12:15
02-28 15:30_15:45
02-28 19:00_19:15
02-28 22:30_22:45
03-01 02:00_02:15
03-01 05:30_05:45
03-01 09:00_09:15
Log File Sync平均等待时间(ms)


gc buffer busy平均等待(ms)
120
100
80
60
40
20
0
02-27 00:15_00:30
02-27 04:15_04:30
02-27 08:15_08:30
02-27 12:15_12:30
02-27 16:15_16:31
02-27 20:15_20:30
02-28 01:00_01:15
02-28 05:00_05:15
02-28 09:00_09:15
02-28 13:00_13:15
02-28 17:00_17:15
02-28 21:00_21:15
03-01 01:00_01:15
03-01 05:00_05:15
03-01 09:00_09:15
gc buffer busy平均等待(ms)

某用户Exadata X3上的ERP应用上线

- 大量未经充分测试的涌入系统 耗尽IO吞吐量，其中一条SQL运行一次耗费7~8g IO;
- 物理读吞吐峰值达到每秒10~14G
- SQL性能虽烂，但体现Exadata强劲IO 一览无余

```
rent Time: Sat Jun  1 09:57:05 CST 2013
         <---------------Disks----------------><--------------Flash----------------><--------CPU---------><-----------Memory------->
          MBRead Reads RSize MBWrit Writes WSize  MBRead Reads RSize MBWrit Writes WSize  User Sys Wait Irq Run  FreeMB SwapMB SwIn SwOut
1cel01      1060  1101   986      2     77    23       5   234    22      1     21    31     9   4    3   0   3   35883      0    0     0
1cel02      1039  1080   985      2     40    57       4   218    21      1     13    47     5   1    3   0   6   35937      0    0     0
1cel03      1061  1100   988      0     21    12       5   274    20      0      7     5     5   1    3   0   3   35964      0    0     0
1cel04      1061  1087  1000      3     38    79       6   299    20      1     19    57     6   1    3   0   2   36216      0    0     0
1cel05      1084  1113   997      2     48    53       2   130    19      1     21    44     6   2    3   0   2   36236      0    0     0
1cel06      1039  1067   997      1     32    26       1    75    19      1     21    29     5   1    3   0   3   37030      0    0     0
1cel07      1017  1045   996      1     34    17       5   267    21      0     30    12     6   1    3   0   4   36018      0    0     0
allIO: 7405 MB/s;   DiskRead: 7361 MB/s;  DiskWrite: 11 MB/s;   FlashRead: 28 MB/s;  FlashWrite: 5 MB/s;  Average CPU: 8%;
         <--------CPU---------><---------------Disks----------------><-----------Memory------->
          User Sys Wait Irq Run  MBRead Reads RSize MBWrit Writes WSize  FreeMB SwapMB SwIn SwOut
1db01        2   1    0   0   2       0     0     0      0      5     9  125039    235    0     0
1db02        7   1    0   0   6       0     0     0      0      8    10  111713      0    0     0
1db03        0   0    0   0   2       0     0     0      0      8    26  116176    172    0     0
1db04        1   0    0   0   5       0     0     0      0      9    17  164580      0    0     0
rage CPU: 3%;
```

某用户Exadata X3上的ERP应用上线

几百行的SQL语句，您能一眼看到缺哪个索引吗？

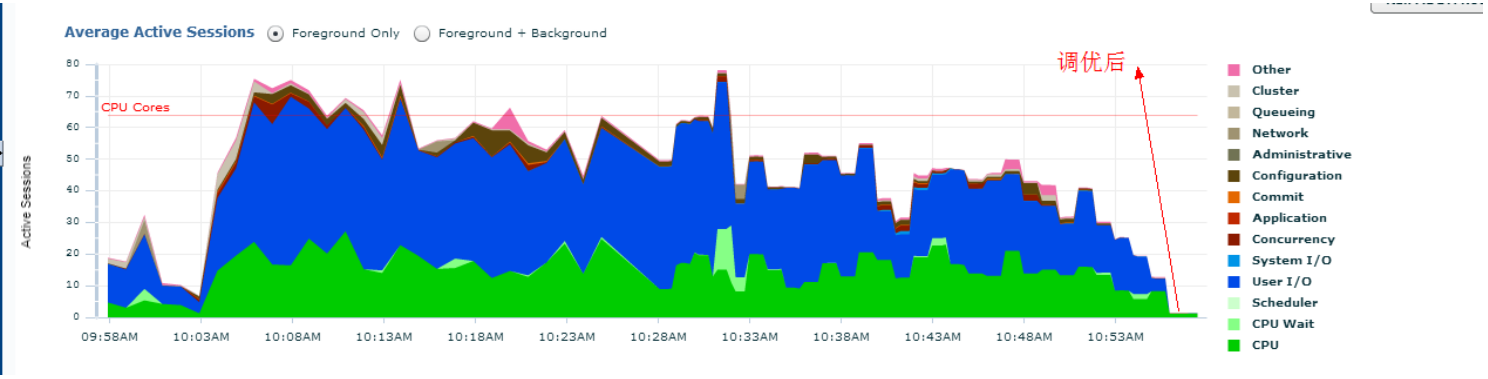
ADDM+sqltrpt 可以帮您做到

```
SQL> select sum(PHYSICAL_READ_BYTES/1024/1024/1024),sum(executions) from gv$SQL WHERE SQL_ID='4z5d0mhnbb9vv';

SUM(PHYSICAL_READ_BYTES/1024/1024/1024) SUM(EXECUTIONS)
--------------------------------------- ---------------
                                6454.52             730
@sqltrpt
Tuning Task Name   : TASK_12242
Tuning Task Owner  : SYS
Workload Type      : Single SQL Statement
Scope              : COMPREHENSIVE
Time Limit(seconds): 1800
Completion Status  : COMPLETED
Started at         : 06/01/2013 15:45:36
Completed at       : 06/01/2013 15:55:40
2- Index Finding (see explain plans section below)
--------------------------------------------------
  The execution plan of this statement can be improved by creating one or more
  indices.
  Recommendation (estimated benefit: 99.99%)
  ------------------------------------------
  - Consider running the Access Advisor to improve the physical schema design
    or creating the recommended index.
    create index IDX$$_3FD20001 on MACLEAN("CUSTID" );
```

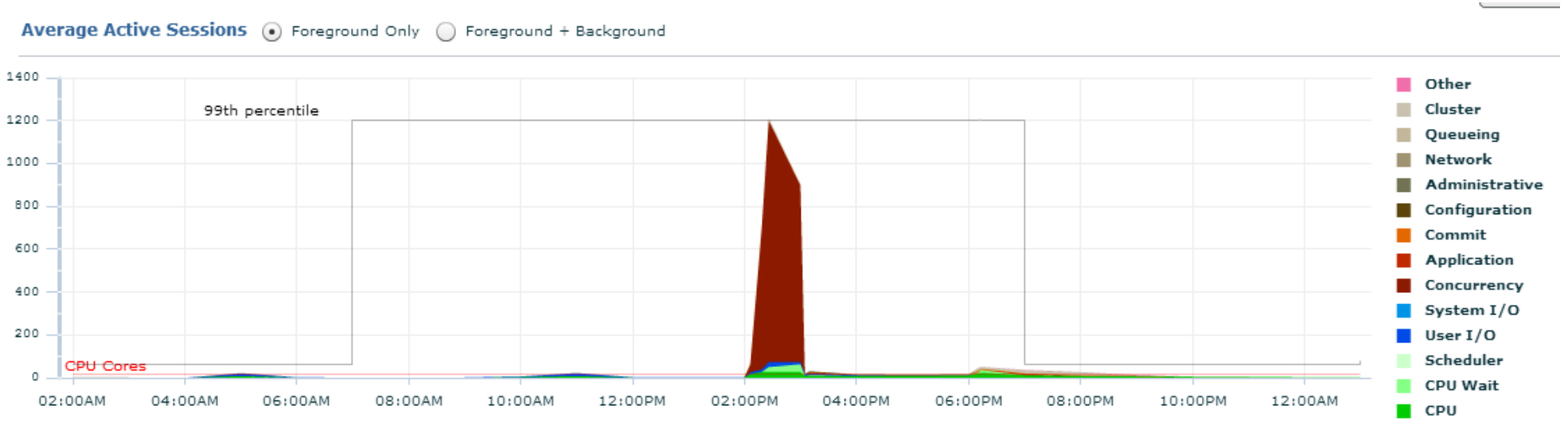
某用户Exadata X3上的ERP应用上线

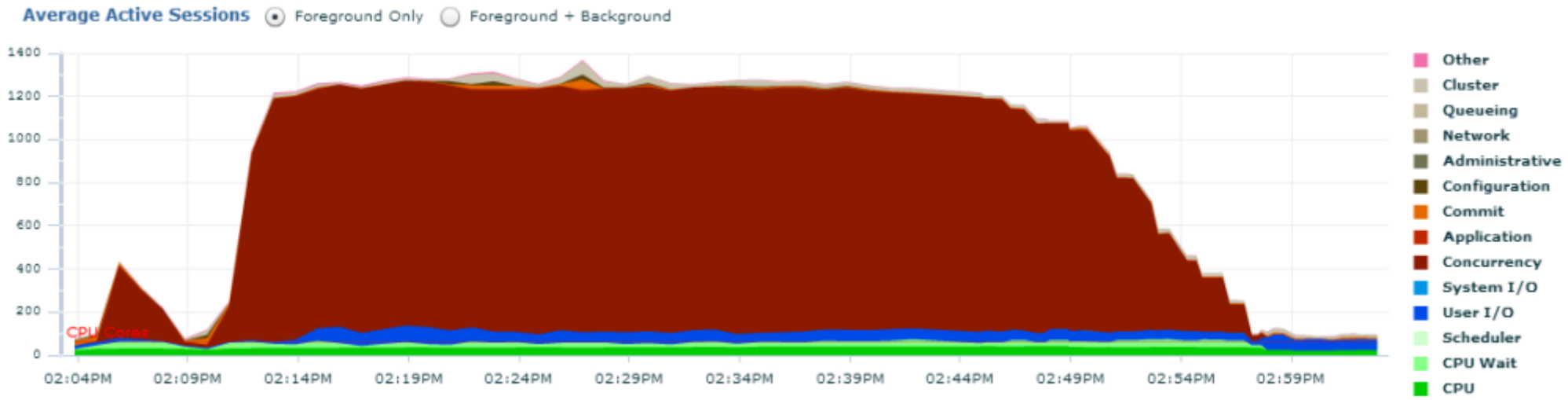
- 使用ADDM配合sqltrpt 在上线当天解决了影响上线能否顺利的大多数性能问题
- DBA对于陌生环境的熟悉以时间为代价，addm的存在可以降低学习成本
- 80%的性能问题是由于10%的Top SQL语句引起的 - Performance Hog:

“ 我把服务器资源当早饭吃！CPU、Memory、IO都美味！”



系统中的性能鱼刺


Average Active Sessions
Foreground Only
Foreground + Background
1400
1200
1000
800
600
400
200
0
99th percentile
CPU Cores
02:00AM
04:00AM
06:00AM
08:00AM
10:00AM
12:00PM
02:00PM
04:00PM
06:00PM
08:00PM
10:00PM
12:00AM
Other
Cluster
Queueing
Network
Administrative
Configuration
Commit
Application
Concurrency
System I/O
User I/O
Scheduler
CPU Wait
CPU


Average Active Sessions
Foreground Only
Foreground + Background
1400
1200
1000
800
600
400
200
0
CPU Cores
02:04PM
02:09PM
02:14PM
02:19PM
02:24PM
02:29PM
02:34PM
02:39PM
02:44PM
02:49PM
02:54PM
02:59PM
Other
Cluster
Queueing
Network
Administrative
Configuration
Commit
Application
Concurrency
System I/O
User I/O
Scheduler
CPU Wait
CPU

使用ADDM从容定位

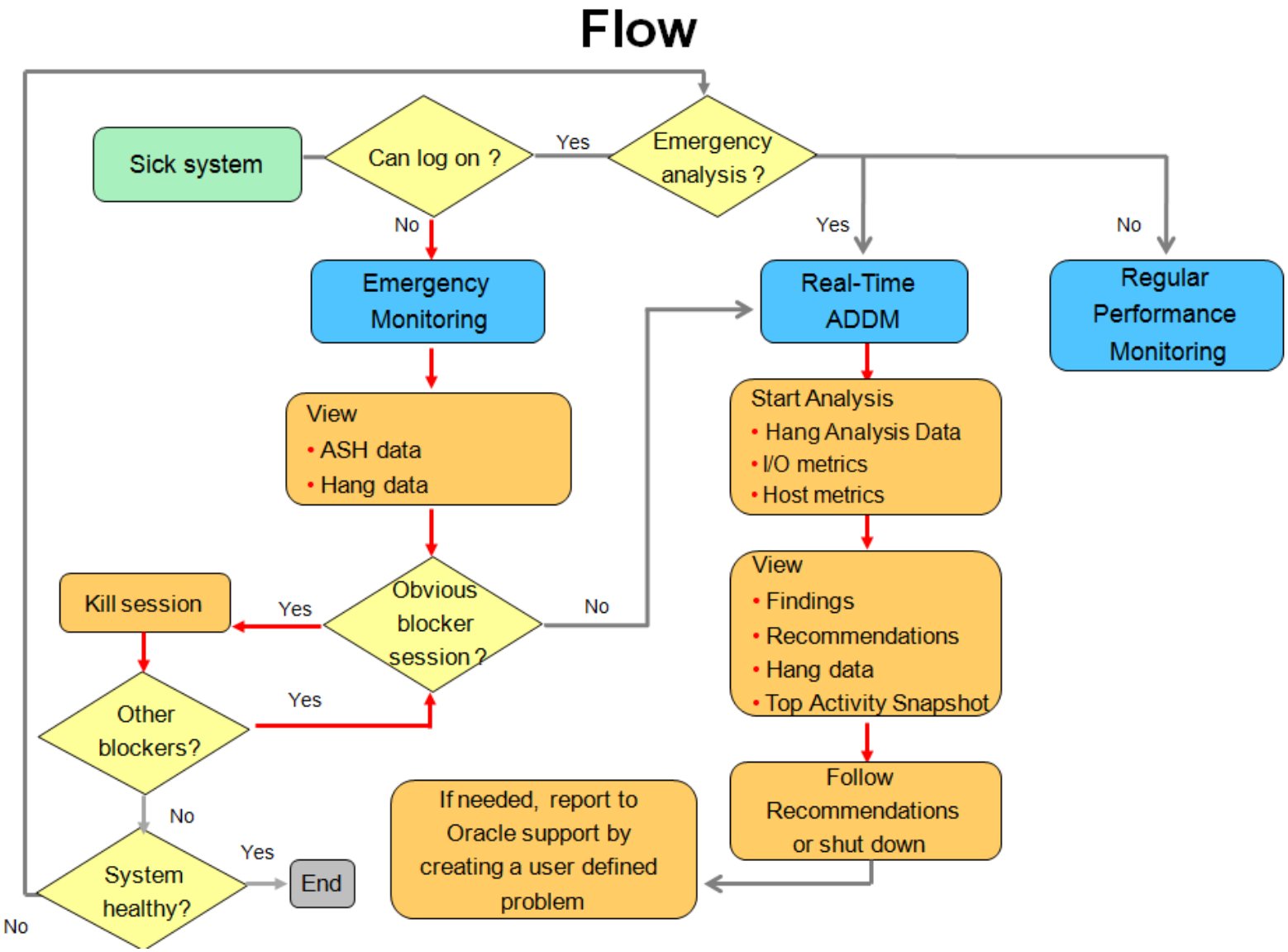
```
Summary of Findings
-------------------
   Description           Active Sessions      Recommendations
                         Percent of Activity
   --------------------  -------------------  ---------------
1  Buffer Cache Latches  448.13 | 83.39       1
2  Top SQL Statements    210.89 | 39.24       5
3  CPU Usage             15.03 | 2.8          1

SQL statements consuming significant database time were found. These
statements offer a good opportunity for performance improvement.

   Recommendation 1: SQL Tuning
   Estimated benefit is 44.42 active sessions, 8.27% of total activity.
   ------------------------------------------------------------------
   Action
      Investigate the SELECT statement with SQL_ID "9fjgw136wb2d9" for
      possible performance improvements. You can supplement the information
      given here with an ASH report for this SQL_ID.
      Related Object
         SQL statement with SQL_ID 9fjgw136wb2d9.
         select * from ( select row_.*, rownum rownum_ from ( SELECT
```

利用sqltrpt快速调优

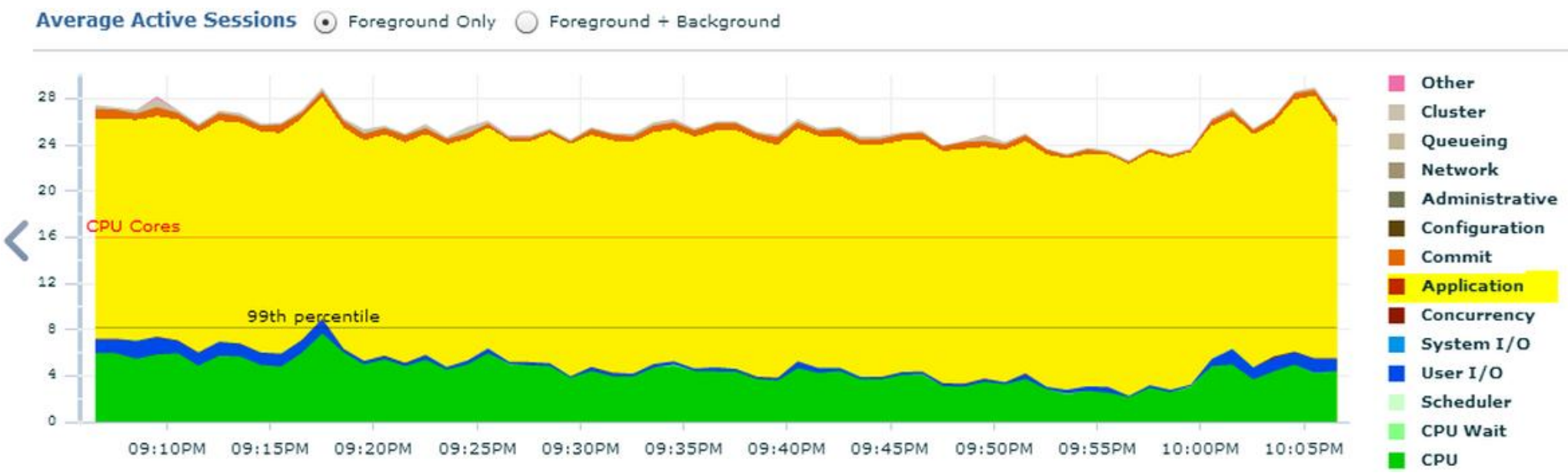
```
------------------------------------------------------------------------------
Tuning Task Name   : TASK_12234
Tuning Task Owner  : SYS
Workload Type      : Single SQL Statement
Scope              : COMPREHENSIVE
Time Limit(seconds): 1800
Completion Status  : COMPLETED
SQL ID     : 9fjgw136wb2d9
Plan Finding
---------------------------
  Some alternative execution plans for this statement were found by searching
  the system's real-time and historical performance data.
  The following table lists these plans ranked by their average elapsed time.
  See section "ALTERNATIVE PLANS SECTION" for detailed information on each
  plan.
  id plan hash  last seen            elapsed (s)  origin          note
  -- ---------- ------------------- ------------ --------------- --------------
   1 1975836852  2013-06-01/13:00:02        0.032 AWR
   2 1948551218  2013-06-01/14:05:54       15.917 Cursor Cache    original plan


  Recommendation
  --------------
  - Consider creating a SQL plan baseline for the plan with the best average
    elapsed time.
    execute dbms_sqltune.create_sql_plan_baseline(task_name => 'TASK_12234',
            owner_name => 'SYS', plan_hash_value => 1975836852);
```

Real time Addm实时监控建议

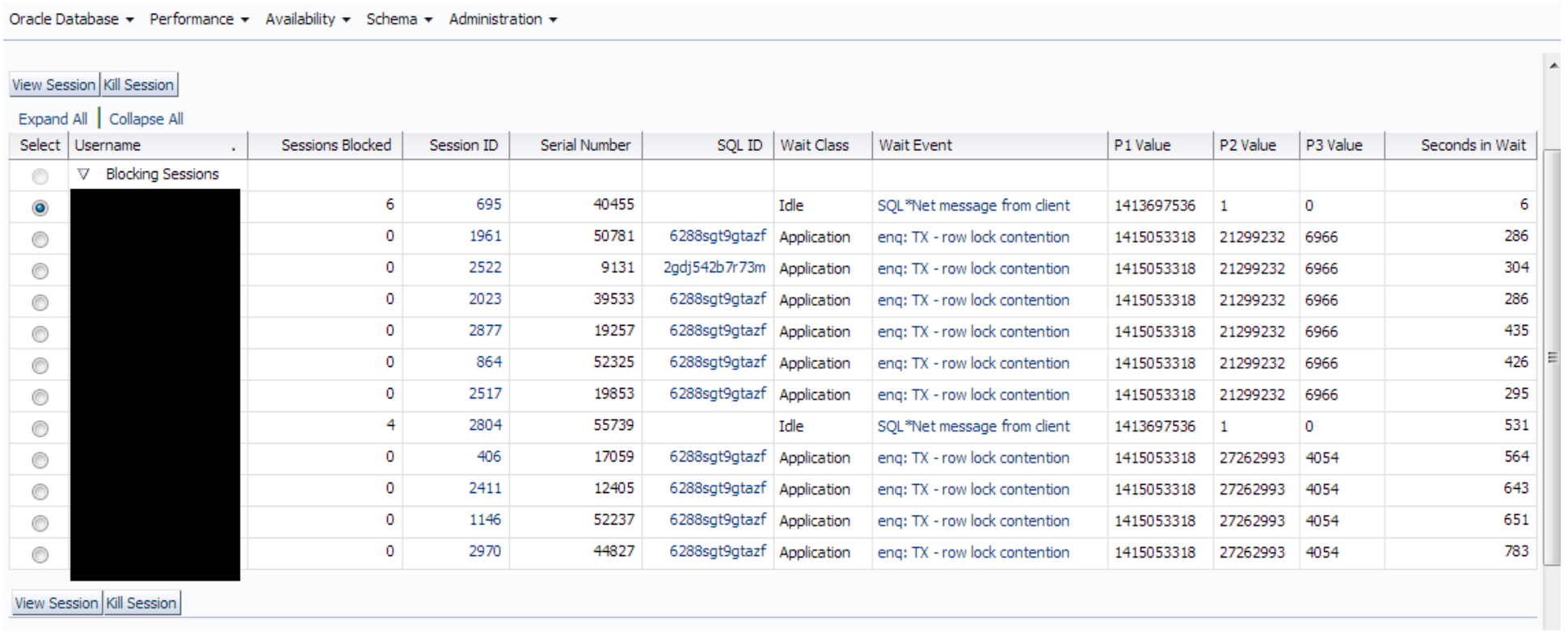
一个典型的企业紧急监控流程，realtime addm是重要的一环



我是一朵云，如何快速定位系统内的锁阻塞问题，找出阻塞源头？



使用real-time addm快速定位回话阻塞：包括lock、library cache lock/pin blocker等等



Oracle Database ▾ Performance ▾ Availability ▾ Schema ▾ Administration ▾

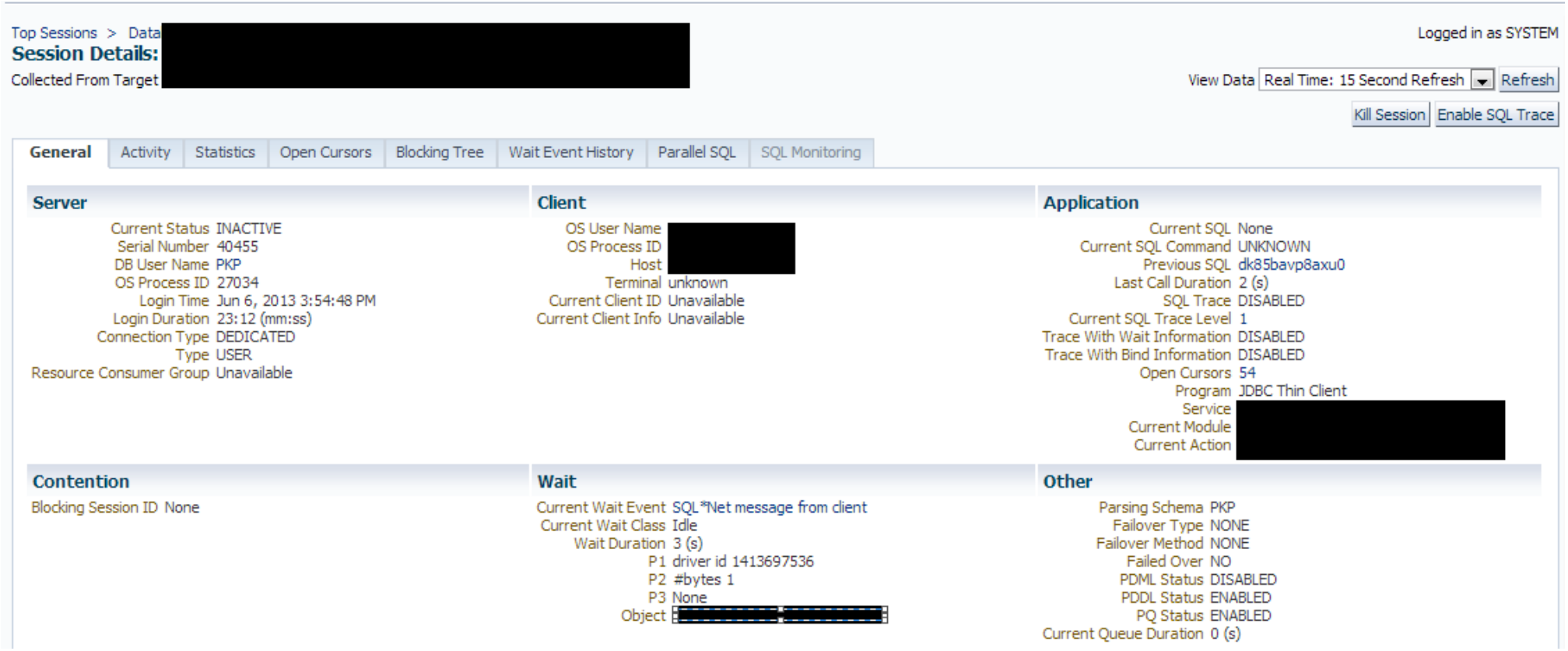
View Session | Kill Session

Expand All | Collapse All

Select	Username	Sessions Blocked	Session ID	Serial Number	SQL ID	Wait Class	Wait Event	P1 Value	P2 Value	P3 Value	Seconds in Wait
	▽ Blocking Sessions										
	[redacted]	6	695	40455		Idle	SQL*Net message from client	1413697536	1	0	6
		0	1961	50781	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	21299232	6966	286
		0	2522	9131	2gdj542b7r73m	Application	enq: TX - row lock contention	1415053318	21299232	6966	304
		0	2023	39533	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	21299232	6966	286
		0	2877	19257	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	21299232	6966	435
		0	864	52325	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	21299232	6966	426
		0	2517	19853	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	21299232	6966	295
		4	2804	55739		Idle	SQL*Net message from client	1413697536	1	0	531
		0	406	17059	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	27262993	4054	564
		0	2411	12405	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	27262993	4054	643
		0	1146	52237	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	27262993	4054	651
		0	2970	44827	6288sgt9gtazf	Application	enq: TX - row lock contention	1415053318	27262993	4054	783

View Session | Kill Session

使用real-time addm快速定位回话阻塞：包括lock、library cache lock/pin blocker等等



才开了个头哦。。。

To Be Continued……

つづく……

http://t.askmaclean.com/thread-2560-1-1.html

更多信息

www.askmaclean.com

or

http://www.askmaclean.com/archives/tag/tuning

Question & Answer

If you have more questions later, feel free to ask