湖南省安全生产监督管理局
OA 数据库性能初步分析

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目前数据库服务器 CPU 达到 100%,主要问题就是 SQL 语句存在性能问题,我们拿本次抓到的 AWR 来做一个简单说明：

DB Name	DB Id	Instance	Inst num	Startup Time	Release	RAC
ORCL	1440394291	orcl	1	21-6月 -16 12:06	11.2.0.1.0	NO

Host Name	Platform	CPUs	Cores	Sockets	Memory (GB)
WIN-LL7LEJS6NSV	Microsoft Windows x86 64-bit	24	12	2	63.88

	Snap Id	Snap Time	Sessions	Cursors/Session
Begin Snap:	696	22-6月 -16 10:01:00	170	5.9
End Snap:	697	22-6月 -16 10:32:43	176	5.6
Elapsed:		31.72 (mins)		
DB Time:		1,897.16 (mins)		

Report Summary

说明：AAS=61 ，系统本身只有 24 个 CPU，如果不对 sql 语句进行调优，那么根据当前的情况，需要 61 个 CPU 才能满足当前业务对 CPU 的要求。

Load Profile

	Per Second	Per Transaction	Per Exec	Per Call
DB Time(s):	59.8	92.1	0.15	0.01
DB CPU(s):	23.0	35.5	0.06	0.00
Redo size:	177,934.8	273,958.6		
Logical reads:	2,710,091.4	4,172,611.1		
Block changes:	1,352.5	2,082.3		
Physical reads:	9.4	14.5		
Physical writes:	46.8	72.0		
User calls:	5,529.6	8,513.6		
Parses:	100.2	154.3		
Hard parses:	0.5	0.7		
W/A MB processed:	55.8	85.9		
Logons:	0.1	0.1		
Executes:	398.9	614.1		
Rollbacks:	0.4	0.5		
Transactions:	0.7			

说明：在 31 分钟的抓取时间中，总逻辑读为：20G/秒,初步推断逻辑读很高

Instance Efficiency Percentages (Target 100%)

Buffer Nowait %:	100.00	Redo NoWait %:	99.94
Buffer Hit %:	100.00	In-memory Sort %:	100.00
Library Hit %:	99.64	Soft Parse %:	99.54
Execute to Parse %:	74.87	Latch Hit %:	92.62
Parse CPU to Parse Elapsd %:	49.41	% Non-Parse CPU:	99.98

Shared Pool Statistics

说明:Latch hit 值严重偏低,当这个值在 98%时系统就已经变慢,现在这个值到了 92%显然系统已经 hang 住了.

Top 5 Timed Foreground Events

Event	Waits	Time(s)	Avg wait (ms)	% DB time	Wait Class
latch: cache buffers chains	1,388,776	63,855	46	56.10	Concurrency
DB CPU		43,821		38.50	
log file switch (checkpoint incomplete)	80	133	1666	0.12	Configuration
SQL*Net more data to client	7,971,134	82	0	0.07	Network
latch free	101	50	499	0.04	Other

Host CPU (CPUs: 24 Cores: 12 Sockets: 2)

说明: top5 事件中出现 latch: cache buffers chains, ,当前数据库中存在严重的 latch 争用,latch 争用一般跟 sql 语句有关,有时候也可能是 bug 导致。

SQL ordered by Gets

- Resources reported for PL/SQL code includes the resources used by all SQL statements called by the code.
- %Total - Buffer Gets as a percentage of Total Buffer Gets
- %CPU - CPU Time as a percentage of Elapsed Time
- %IO - User I/O Time as a percentage of Elapsed Time
- Total Buffer Gets: 5,157,347,252
- Captured SQL account for 65.6% of Total

Buffer Gets	Executions	Gets per Exec	%Total	Elapsed Time (s)	%CPU	%IO	SQL Id	SQL Module	SQL Text
181,860,699	2,766	65,748.63	3.53	4,794.28	39.46	0.00	7wgt3q2u0645f		select t.bianhao as bus_id, bi...
169,559,151	2,462	68,870.49	3.29	3,428.68	28.63	0.00	dyy8cjqdhpku7		select t.bianhao as bus_id, bi...
124,660,194	1,808	68,949.22	2.42	2,535.27	27.31	0.00	7tszbhmaq202w		select t.bianhao as bus_id, bi...
108,179,391	2,439	44,353.99	2.10	792.61	73.25	0.00	gbf8bb2bp9103		select t.bianhao as bus_id, bi...
95,825,991	1,390	68,939.56	1.86	1,563.61	35.35	0.00	fssjk1w3gqp5d		select t.bianhao as bus_id, bi...
90,506,264	1,315	68,826.06	1.75	1,766.87	28.07	0.00	6zbrsuararm7y		select t.bianhao as bus_id, bi...
86,525,840	1,256	68,890.00	1.68	2,335.91	38.89	0.00	4t83dp7hfxstr		select t.bianhao as bus_id, bi...
85,285,823	1,239	68,834.40	1.65	1,648.38	27.94	0.00	a6p12j7b7kf20		select t.bianhao as bus_id, bi...
85,216,931	1,235	69,001.56	1.65	2,210.07	40.31	0.00	3bx82axkt20js		select t.bianhao as bus_id, bi...
85,148,042	1,236	68,890.00	1.65	1,795.61	27.10	0.00	205zmj4vunjda		select t.bianhao as bus_id, bi...
85,086,161	1,236	68,839.94	1.65	1,704.14	27.11	0.00	gkhf6jvr162fb		select t.bianhao as bus_id, bi...
85,014,426	1,235	68,837.59	1.65	2,327.79	38.49	0.00	b1r032qwzv1k5		select t.bianhao as bus_id, bi...
84,972,041	1,233	68,914.88	1.65	1,784.35	27.32	0.00	b2a4usbva7m60		select t.bianhao as bus_id, bi...
84,941,372	1,232	68,945.92	1.65	2,403.50	37.01	0.00	3zuh9gcx87fag		select t.bianhao as bus_id, bi...
84,941,371	1,231	69,001.93	1.65	1,739.73	26.47	0.00	cszb34xgws3fd		select t.bianhao as bus_id, bi...
84,941,370	1,233	68,890.00	1.65	1,698.27	29.37	0.00	g1xjskwr6kd7f		select t.bianhao as bus_id, bi...
84,921,231	1,231	68,985.57	1.65	1,735.55	26.24	0.00	98vgabg3k6brd		select t.bianhao as bus_id, bi...
84,872,482	1,232	68,890.00	1.65	1,744.72	26.46	0.00	74rf1psawzqw5		select t.bianhao as bus_id, bi...
84,703,387	1,230	68,864.54	1.64	1,705.25	28.28	0.00	bfxb7mj8pmusb		select t.bianhao as bus_id, bi...
84,675,566	1,230	68,841.92	1.64	2,237.87	39.63	0.00	9977pgbm09bf3		select t.bianhao as bus_id, bi...
84,665,812	1,228	68,946.10	1.64	1,640.07	29.29	0.00	dh3ufsqr6r6vb		select t.bianhao as bus_id, bi...
84,665,811	1,230	68,833.99	1.64	1,742.35	28.18	0.00	5tdhnp644g6tb		select t.bianhao as bus_id, bi...
84,528,034	1,226	68,946.19	1.64	1,740.89	28.10	0.00	f8fy88qj7f7yd		select t.bianhao as bus_id, bi...
84,488,623	1,226	68,914.05	1.64	2,374.30	37.20	0.00	5h3ms7mduh3us		select t.bianhao as bus_id, bi...
84,390,251	1,225	68,890.00	1.64	1,705.65	28.66	0.00	50pptpnv0wddr		select t.bianhao as bus_id, bi...

说明：Buffer Gets 很高，Buffer Gets 的数量跟 CPU 成正比，上图标出了消耗量超过 100,000,000 的 sql 语句。

Segments by Logical Reads

- Total Logical Reads: 5,157,347,252
- Captured Segments account for 99.1% of Total

Owner	Tablespace Name	Object Name	Subobject Name	Obj. Type	Logical Reads	%Total
OA_AJJ	OA_AJJ	AJJ_FRIST_PAGE_LOG		TABLE	4,419,747,296	85.70
OA_AJJ	OA_AJJ	AJJ_XIAOXICHUANDI_XIAOXI		TABLE	287,521,664	5.57
OA_AJJ	OA_AJJ	OA_FLOW_INSWFACTION		TABLE	179,975,696	3.49
OA_AJJ_CS	OA_AJJ_CS	AJJ_FRIST_PAGE_LOG		TABLE	116,865,872	2.27
OA_AJJ_CS	OA_AJJ_CS	OA_FLOW_INSWFACTION		TABLE	53,651,696	1.04

Back to Segment Statistics
Back to Top

Segments by Physical Reads

说明：通过上图我们发现 sql 语句产生的逻辑读对象占据 80%的都消耗在 OA_AJJ.AJJ_FRIST_PAGE_LOG 表上。

建议：

1. 对相关 sql 语句进行优化。
2. 升级数据库软件到 11.2.0.4