

A Day of Real-World Performance

Andrew Holdsworth, Tom Kyte, Graham Wood





#### Introductions Andrew Holdsworth

- 26 Years at Oracle
- Vice President Real World Performance
  - Good performance is rarely an accident
  - Most people get the systems they deserve
  - Good enough rarely is, aspire for excellence not good enough.







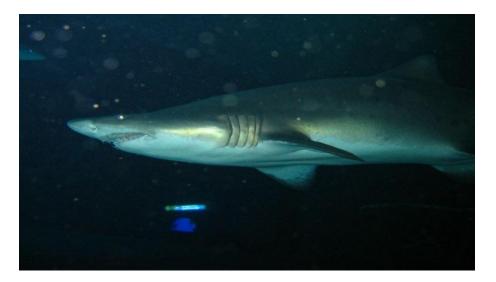




### Graham Wood Architect Server Technologies





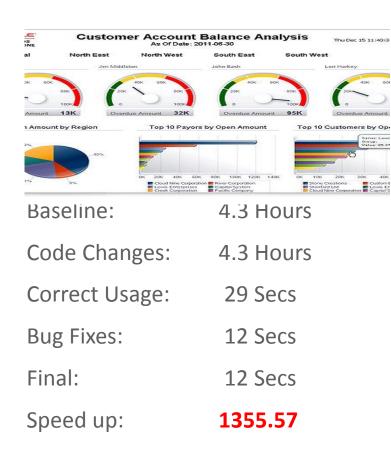








### Recent Results 1000X Project





Speed up:	768
Final:	4.5 Mins
Bug Fixes:	4.5 Mins
Correct Usage:	7.5 Mins
Code Changes:	27 Mins
Baseline:	2.4 Days



Speed up:	9000
Final:	0.90 Secs
Bug Fixes:	0.90 Secs
Correct Usage:	4 Secs
Code Changes:	2.5 Hours
Baseline:	2.5 Hours



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## How Does Your Organization Do Performance ?

Conventional

- Focus is on "Good Enough" or "What the Business Needs"
- Process Orientated/Part of QA
- Spends most the time on Platform Tuning Issues
- Only changes things within limited scope
- Bottom up tuning approach
- Looking for incremental gains

#### Real-World

- Focus on excellence and what the HW and SW can do
- Innovate excellent performance and add intellectual property to your code
- Everything is within scope
- Holistic top down approach
- Focus on orders of magnitude gains





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# Real-World Performance O





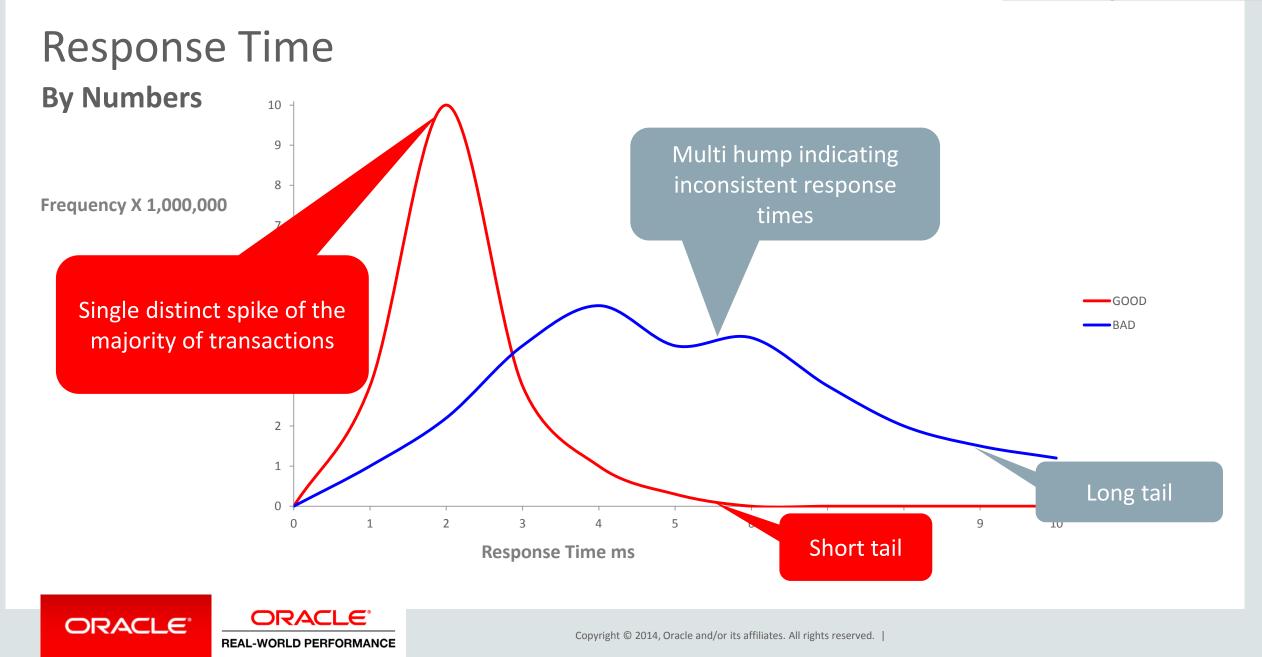


### Response Time What it means

- Response time defines your users (customers) experience
- Response time is a measure of performance quality
- Consistency of response time is an equally important measure of performance quality
- If response time is not consistent, bad things happen !









#### Response Time - Demo Observations

- Users experiencing poor response time
- Low overall system throughput
- Wait events observed in the database
- Culture of blame:
  - Blame the database for all performance issues
  - Development blames the DBA
  - The DBA blames the SW/HW or system administrators



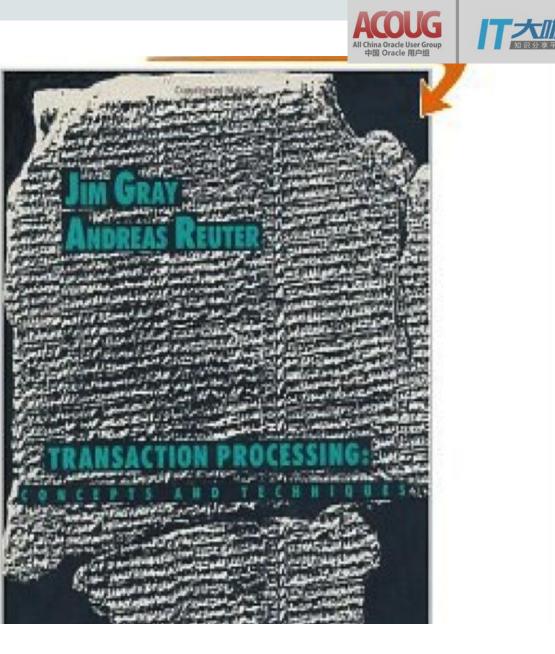




#### Response Time Application Server Bottleneck

- Data analysis shows:
  - Small proportion of the actual response time is in the database
  - Majority of response time spent in application logic
  - CPU is overloaded on the application servers
  - Potential root cause:
    - Capacity planning mistake ?
    - Application code change last week ?





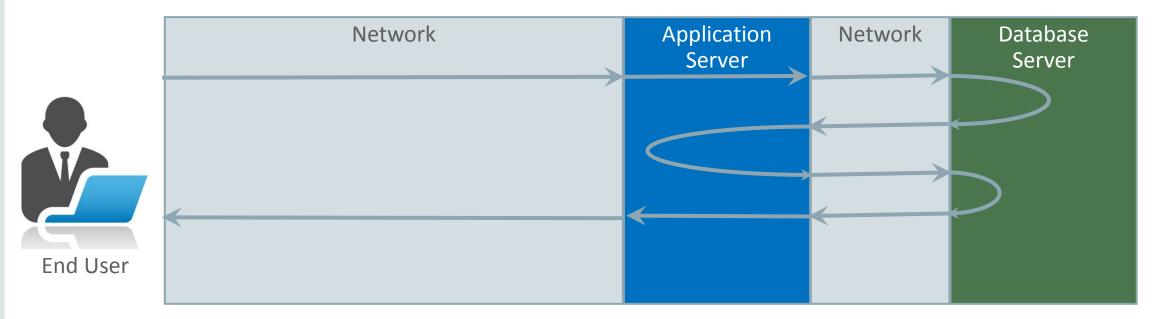
## Some Computer Science Basics

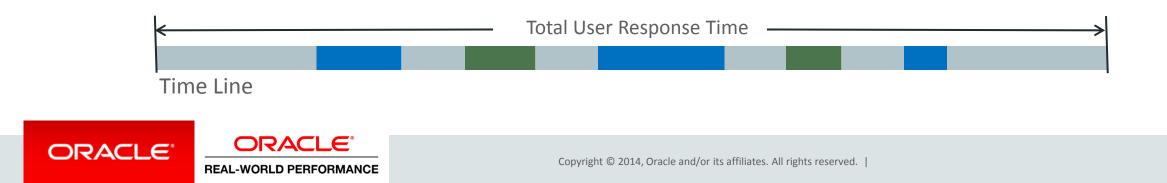






### Response Time v DB Time v Latency

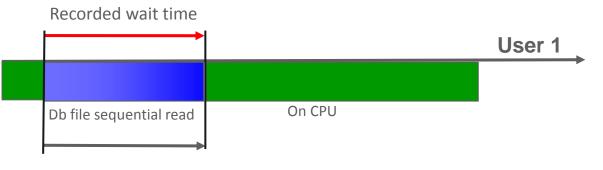






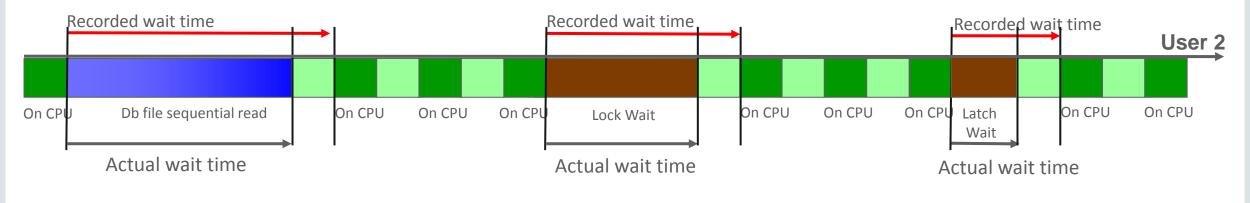
### Database Time – Total time spent in database

#### ON IDLE SYSTEM



Actual wait time

#### ON DEGRADED SYSTEM







#### Latency - Some Important Numbers **Best Block Access Speeds**

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Block Location	Access Time
L2 CPU cache	~ 1 nano sec ( 10 <sup>-9</sup> )
Virtual Memory	~ 1 micro sec ( 10 <sup>-6</sup> )
NUMA Far Memory	~ 10 micro sec ( 10 <sup>-6</sup> )
Flash Memory (PCI)	~ 0.01 milli sec ( 10 <sup>-3</sup> )
Flash Memory (Networked)	~ 0.1 milli sec ( 10 <sup>-3</sup> )
Disk I/O	~ 1-10 milli sec ( 10 <sup>-3</sup> )



### Database Performance Core Principles

- The Oracle database is a process based architecture and to perform efficiently each process requires:
  - To be efficiently scheduled by the O/S until the process completes the SQL statement, or blocks on an operation required to complete the SQL statement e.g. Disk I/O
  - If the process has to fight to get scheduled, or needs to be scheduled for an over extended period of time due to SQL inefficiencies, or any blocking operation takes a long time, then database performance will be poor
- Database performance engineers spend most of their time looking for CPUconsuming processes and eliminating blocking events







### Database Performance Core Principles

- To determine acceptable CPU utilization take a probabilistic approach to the subject.
  - If a CPU is 50% busy the chance of getting scheduled is 1 in 2
  - If a CPU is 66% busy the chance of getting scheduled is 1 in 3
  - If a CPU is 80% busy the chance of getting scheduled is 1 in 5
  - If a CPU is 90% busy the chance of getting scheduled is 1 in10
- If the probabilities are used as indicator of the predictability of user response time, then the variance in user response time becomes noticeable at about 60-65%
- This has been observed in production and laboratory conditions for many years.



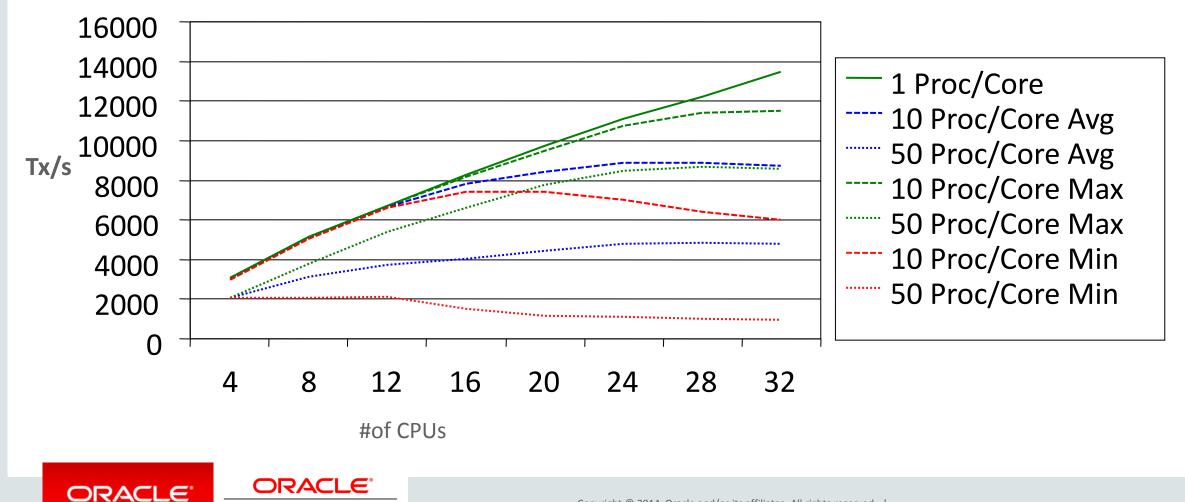




## Database Core Principles

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**Impact of Too Many Processes** 







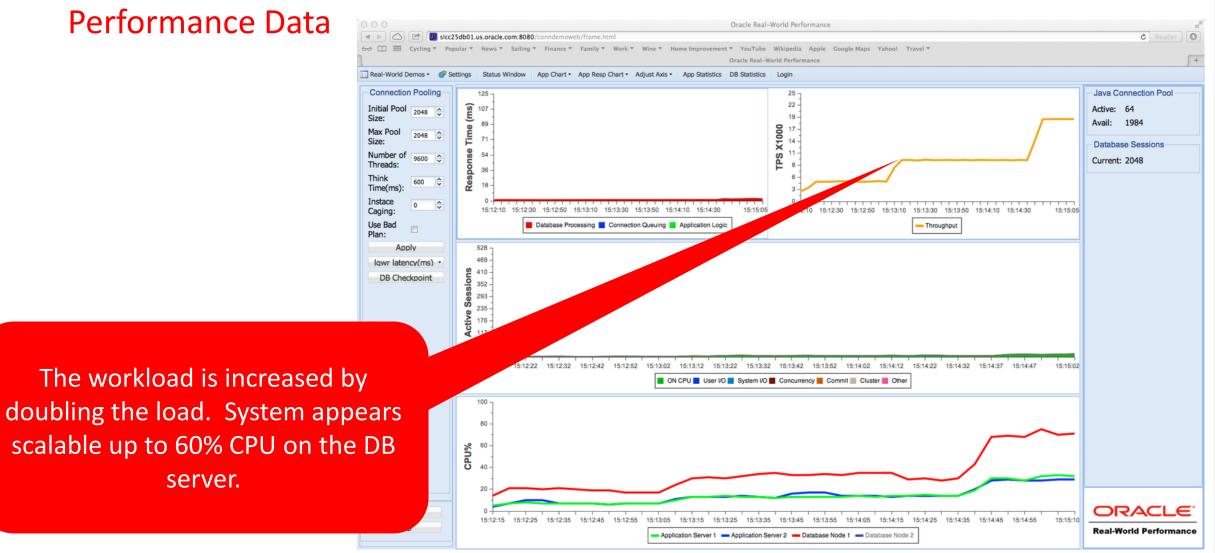
## **Connection Pooling**







#### **Connection Pools**







#### **Connection Pools**







### **Connection Pools**



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Oracle Real-World Performance

A slight increase to the workload results in a disproportionate CPU increase and response time degrades. System monitoring tools become unreliable







15:19:59

15:20:25

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**Real-World Performance** 

#### **Connection Pools**





📕 ON CPU 📕 User I/O 📕 System I/O 📕 Concurrency 📕 Commit 📗 Cluster 📕 Other

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Reducing the connection pool by 50% results in more application server queuing and less DB processes in a wait state. No observable improvement in response time or transaction rate (value or consistency)

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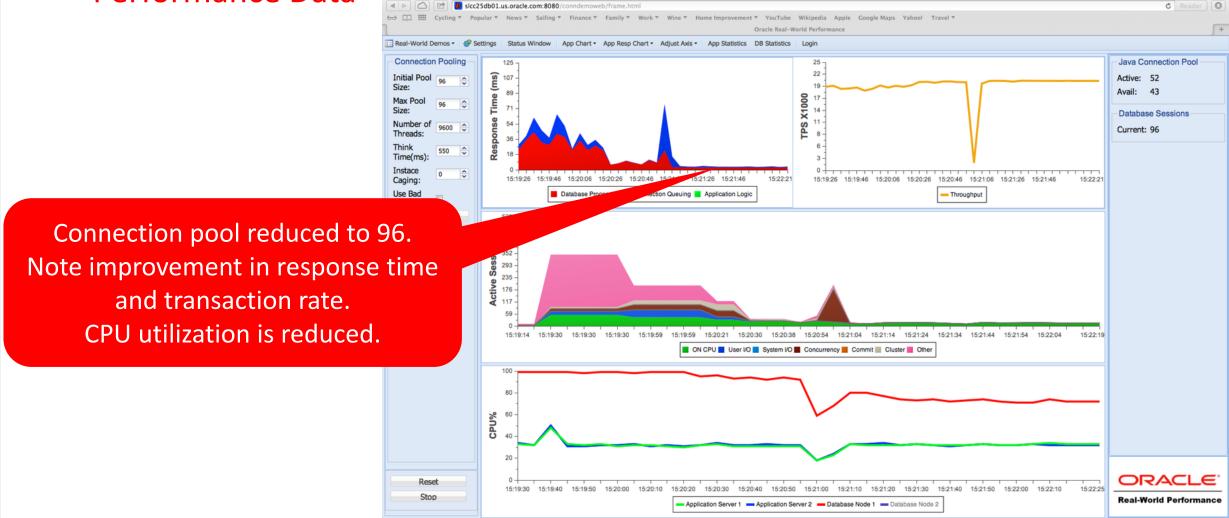




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#### **Connection Pools**

#### **Performance Data**





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Oracle Real-World Performance



#### **Resource Management**

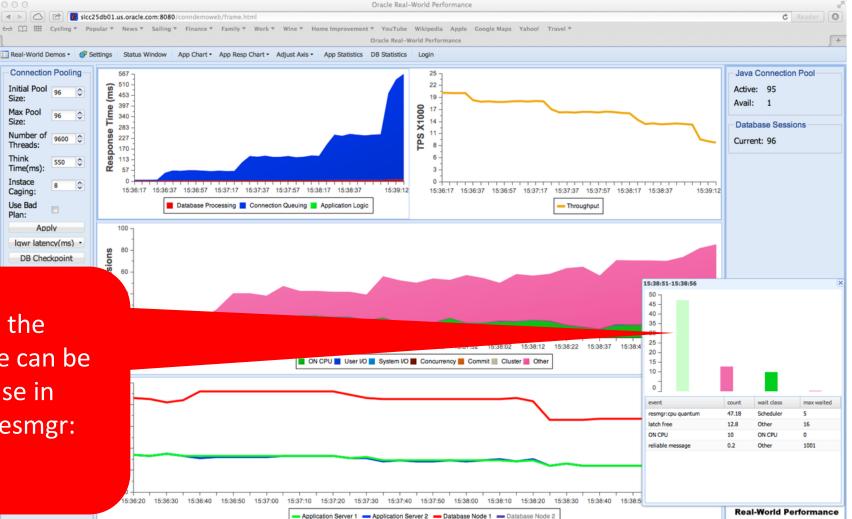
Size:

Size

Think

Plan:

#### **Performance Data**



By reducing the CPU\_COUNT in the resource manager, the database can be throttled back. Note the increase in response time and wait event resmgr: cpu quantum







### Bad Performance Observations

- A problematic application has never met performance objectives
- Response time and throughput are poor
- Everybody blames the database
  - DBA sees no real issues
  - DBA suggests adding more connections to drive up workload
- The system must be able to execute a minimum of 35,000 transactions per second to survive Thanksgiving and Black Friday







## Parsing Demo





#### Parsing Demo Bad Performance with Logons

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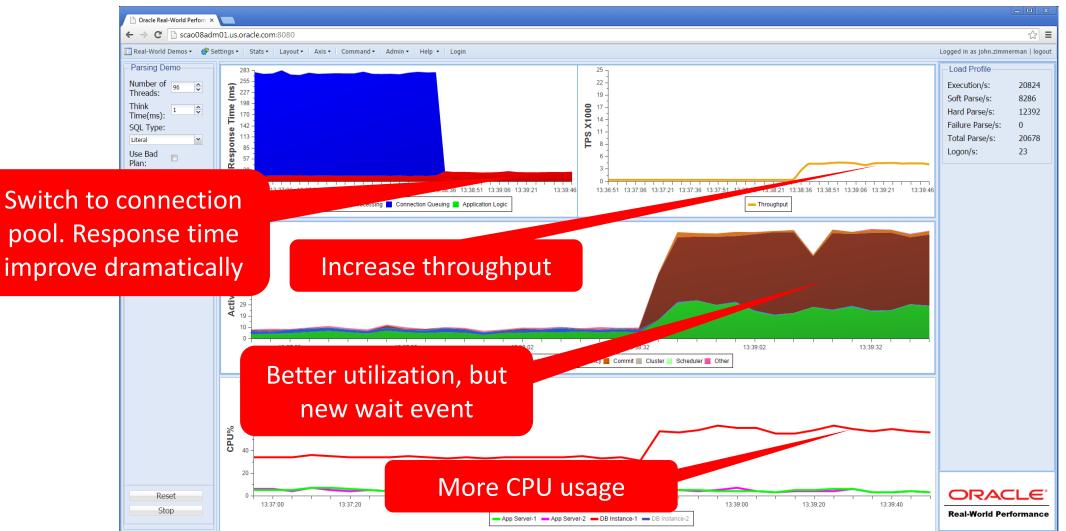




#### Parsing Demo Connection Pools and Hard Parse







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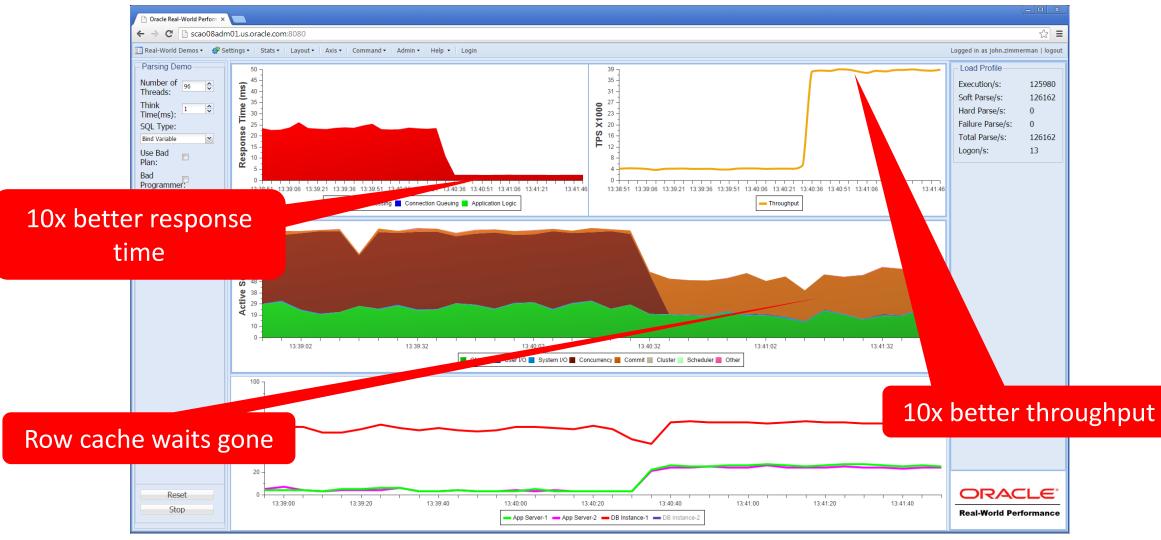
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#### Parsing Demo Bind Variables and Soft Parse

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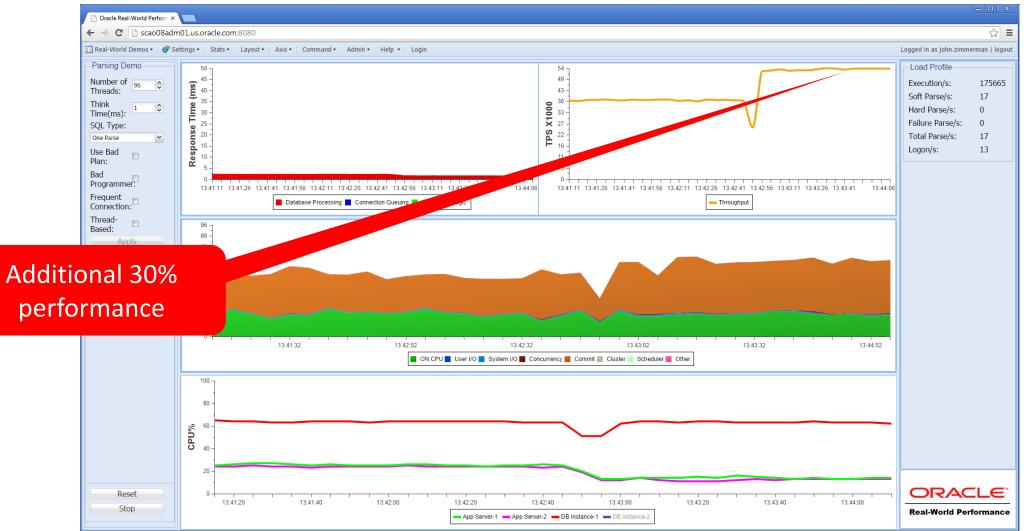


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#### Parsing Demo Shared Cursors and One Parse







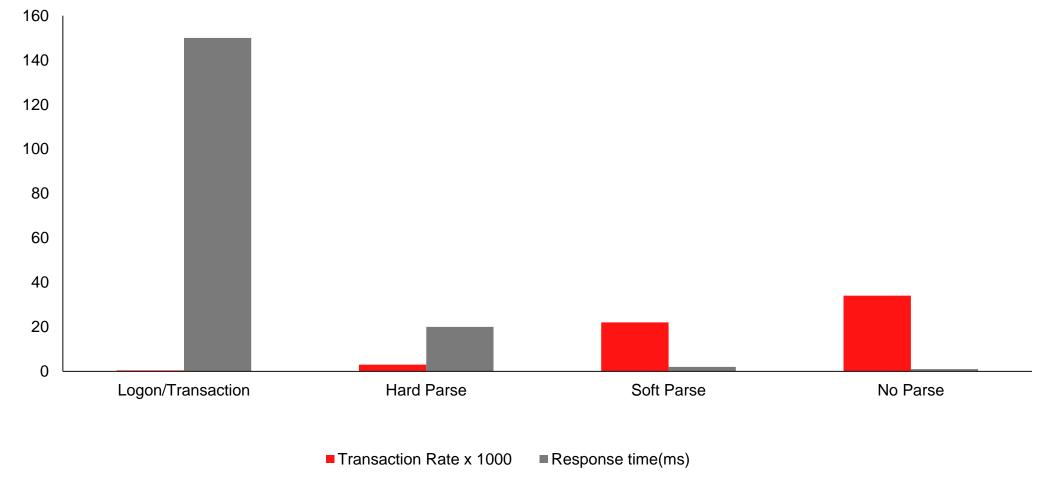
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### Parsing Demo

#### **Incorrect Use of Sessions and Cursors**







### Parsing Demo Observations

- Both the development and DBA teams are confused.
  - Performance in the development and test systems is as anticipated
  - Performance in production is nowhere near level of test system
  - DBAs see shared pool contention but developers have coded diligently to ensure no parsing
  - Development has confirmed the same code is running in both test and production



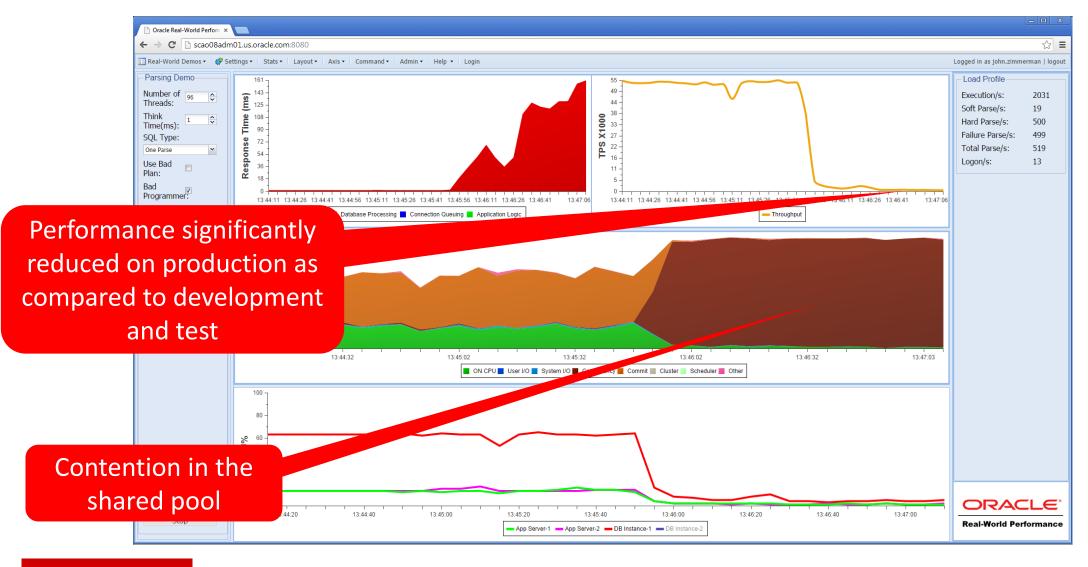


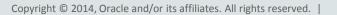
#### Invalid SQL Performance Data

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### Invalid SQL

- A page refresh trigger attempts to set a session-level initialization parameter to enable a diagnostic patch that is not installed in production

   This results in a failed parse
- All users are frequently attempting to parse the same SQL, sessions serialize within the shared pool
- How to find invalid SQL:
  - Look for parse count failures from v\$sysstat
  - Check session traces for error messages
  - Look for SQL\*Net Break/Reset















#### Leaking Observations

- Intermittent error: "ORA-01000: Maximum number of cursors exceeded". Application server fails and must be restarted
- The DBA has suggested that the init.ora parameter open\_cursors be reset to 30,000 to make the problem "go away for a while".
- Symptoms of cursor leaking

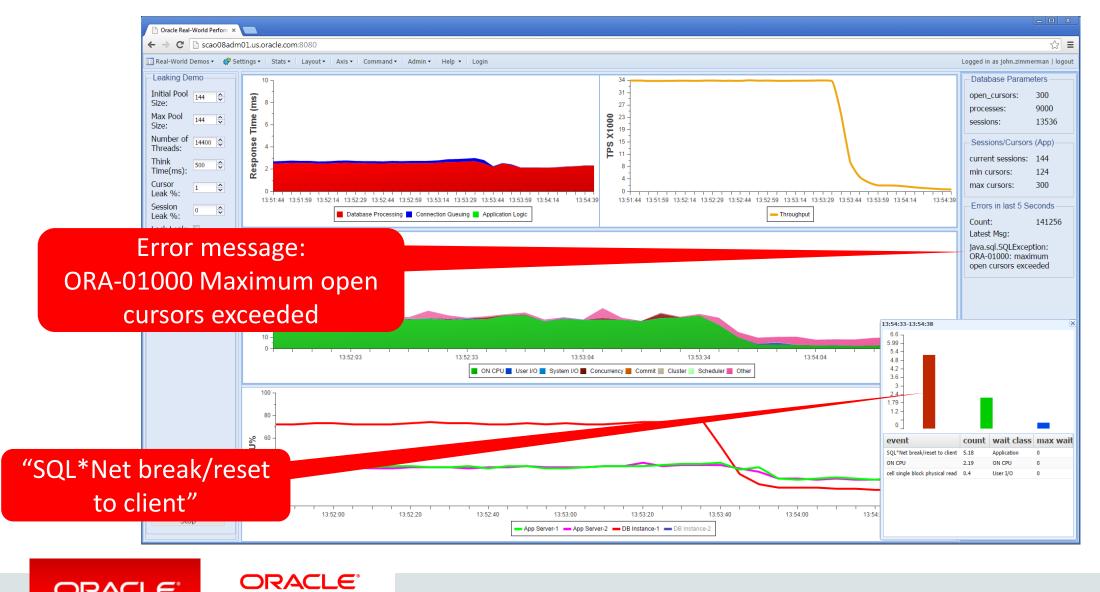




#### Leaking **Performance Data**

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#### ACOUG All China Oracle User Group 中國 Oracle 用户组

### Leaking Session Details

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2fmg925gmk09       JMSERT INTO Lgame_XYDC VALUES(1, r2, r2, 123, 12345/781         dx:rXt299/A       SELET DBNOEDDC,ARDID,BALANCE PHIZETA(MEXDAX,ISCLEMTR         Swkrig/ryg/In       select Triveloge, Ibandin (volptions, 0), 00 if om syrawth         7Xbjty/rob86       UPDATE Lgame_XYDC (deall set BOUUSPRIZE = 12345/78 WHERE s         B65gmc/dyg/A       select /* connect Jb_riftering */ privilege, bitand(vop         B65gmc/dyg/A       UPDATE T_SESSION SET PRIZENTAX = SS321, SCIENTRECEIVED         B65gmc/dyg/A       select SYS_CONTEXT(VSEREW, SERVER, 4005T), SYS_CONTEXT(V         B65gmc/dyg/A       select SYS_CONTEXT(VSEREW, SERVER, 4005T), SYS_CONTEXT(V         B70db/ghyMvB       select SYS_CONTEXT(VSEREW, SERVER, 4005T), SYS_CONTEXT(VD         B71	2mbg7gMu69       NERT NTO Lgame_YOFC VUEKE(1, 2, 1, 2, 12, 12, 12, 12, 12, 12, 12,	Importantial       INSET TO Degree_YOF CAURCIA, 1, 2, 2, 24, 244, 2345678         Importantial       Sector Deprecision Counce David-Reprecision Cause David Reprecision Ca			
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Swikp?spi2?hselect privlege#, bitand(mi/logions, 0), 0) form systahls72hpty?db65gUPDATE t_gameXYDC_detali tet 80NUSPRIZE = 12345678 WHERE sbitspipfm%vnselect /* connect_by_filter wies# sel855squic/dygikkselect spares from usef where use#= i:0zs820bmk4rvUPDATE t_game_XYDC_detali VALUESCE.UED0zs820bmk4rvUPDATE t_game_XYDC yetali VALUESCE.UED327z8c4669sINSERT INTO LybERUM', SERVERUMET, SI', SI', JihllD',6111select synce from usef where use#= i:700kd05ujtmcUPDATE t_game_XYDC SET FinishBonus = 2 WHERE seniald=: i an701kd05ujtmcUPDATE t_game_XYDC SET FinishBonus = 2 WHERE seniald=: i an701kd05ujtmcUPDATE t_game_XYDC WHERE seniald=: i an701kd05ujtmcUPDATE t_game_XYDC WHERE seniald=: i an701kd05ujtmcUPDATE t_game_XYDC WHERE seniald=: i an701kd5vgafvarvAselect types faloxis, extents, minesty, maxets, extizge extpud701kd5vgafvarvAselect Bonusconnut.inccost FROM Lybe extild=701kd5vgafvarvAselect Bonusconnut.inccost FROM Lybe seniald=701kd5vgafvarvAselect Bonusconnut.inccost	Similar Torong Toron	Similar Singles     Setted privileges, bland/wit/options, 0, 0, 0 from systeld       The background of the set of the			
73bgh?qb86g       UPDATE Lgame_XYDC_detal set BONUSFRIZE = 12345678 WHERE s         bkgpjc/mr9vn       seled /* connect_bv_filtering */ privleges, bland(m/(op         855gwoc/pglkk       upDATE T_gest_SION SET PRIZENOTAX = 654321, ISCLIENTRECEIVED         327zblchd69s       INSERT INTO Lgame_XYDC_detal VALUES(1, 1, 2, 3, 'hallD',         (bhspramhjul 1       seled SYS_CONTEXT(USERENV, 'SERVER_HOT, USENEXVLUE         70bld6ujgmc       UPDATE Lgame_XYDC SET FinitBouts = 2 WHERE seladi=:1 an         70bld6ujgmc       UPDATE Lgame_XYDC SET FinitBouts = 2 WHERE seladi=:1 an         70bld6ujgmc       UPDATE LgesSION SET WFDC MURE seladi=:1 an         71gyfqbyftrugg       seled types_block_sentent, intext, maxets, extize, estild=         71gyfqbyftrugg       seled types_block_sentent, intext, maxets, extilde_vettup         71gyfqbyftrugg       UPDATE T_gESSION SET WFDC MURE seladi=         71gyfqbyftrugg       UPDATE T_gESSION SET WFDESTLIND = UPRIZENOTAX = 100,LST         71gyfqbyftrugg       Select Oper(falover_method), NLL, or (a 1: FOR UPO         71gyfqbyftrugg       Select Set Share find for do_normal.set Mut wis (a 1: FOR UPO         71gyfqbyftrugg </td <td>Windprived       UPART [_same_VYC]_detail as EX0US/PEZE = 123:6578 WHERE s       Interview         Mindprived       Select /* connet by // filtering ' / prolege*, bian (n/kg)       Interview         BidSupport/oplik       Select aper filtering ' / prolege*, bian (n/kg)       Interview         BidSupport/oplik       Select aper filtering ' / prolege*, bian (n/kg)       Interview         Dis2Description       UPART TSESSION SET WEEXPLOY / SeVER (N/S), N/S_CONTEXT(U       Interview         Dis2Description       UPART TSESSION SET WEEXPLOY / SeVER (N/S), N/S_CONTEXT(U       Interview         Number of the interview       UPART TSESSION SET WEEXPLOY / SeVER (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT</td> <td>Windprived     UPDATE (same_VTC_data as EXMUSPEZ = 1224575 WHERE s     Interview       Mindprived     sett /** conted.by_filtering ' providee*, biad(m/kg)     Interview       Bistyme/colgolk     sett as end from update with set sett =: 1     Interview       Dizzbalenderin     UPDATE (same_VTC) Edit (size), Size(RF) (Size(RF))     Interview       Dizzbalenderin     UPDATE (same_VTC) Edit (size), Size(RF) (Size(RF))     Interview       Dizzbalenderin     UPDATE (same_VTC) Edit (size), Size(RF) (Size(RF))     Interview       Number (Size(Size(RF)))     UPDATE (same_VTC) Edit (size(Size(RF)))     Interview       Number (Size(Size(RF)))     UPDATE (same_VTC) Edit (size(Size(RF)))     Interview       Number (Size(Size(Size(RF))))     UPDATE (same_VTC) Edit (size(Size(Size(Size(Size(Size(Size(Size(S</td> <td></td> <td></td> <td></td>	Windprived       UPART [_same_VYC]_detail as EX0US/PEZE = 123:6578 WHERE s       Interview         Mindprived       Select /* connet by // filtering ' / prolege*, bian (n/kg)       Interview         BidSupport/oplik       Select aper filtering ' / prolege*, bian (n/kg)       Interview         BidSupport/oplik       Select aper filtering ' / prolege*, bian (n/kg)       Interview         Dis2Description       UPART TSESSION SET WEEXPLOY / SeVER (N/S), N/S_CONTEXT(U       Interview         Dis2Description       UPART TSESSION SET WEEXPLOY / SeVER (N/S), N/S_CONTEXT(U       Interview         Number of the interview       UPART TSESSION SET WEEXPLOY / SeVER (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT(U       Interview         Number of the interview       Select for board (N/S), Several (N/S), N/S_CONTEXT	Windprived     UPDATE (same_VTC_data as EXMUSPEZ = 1224575 WHERE s     Interview       Mindprived     sett /** conted.by_filtering ' providee*, biad(m/kg)     Interview       Bistyme/colgolk     sett as end from update with set sett =: 1     Interview       Dizzbalenderin     UPDATE (same_VTC) Edit (size), Size(RF) (Size(RF))     Interview       Dizzbalenderin     UPDATE (same_VTC) Edit (size), Size(RF) (Size(RF))     Interview       Dizzbalenderin     UPDATE (same_VTC) Edit (size), Size(RF) (Size(RF))     Interview       Number (Size(Size(RF)))     UPDATE (same_VTC) Edit (size(Size(RF)))     Interview       Number (Size(Size(RF)))     UPDATE (same_VTC) Edit (size(Size(RF)))     Interview       Number (Size(Size(Size(RF))))     UPDATE (same_VTC) Edit (size(Size(Size(Size(Size(Size(Size(Size(S			
bkqbpjcfm9vn       select /* connect_by_filtering */ privilege#, bitand(nv(op         B65qwpcdygbk       select spares from users where user#=:1         B65qwpcdygbk       uPDATESESSION SET PRIZENOTAX = 64321, ISCLIENTRECEIVED         Ds82bbmkHrv       UPDATE [_game_XYDC_detail VALUES(: 1; 2; 3; HallD',         S2czonce/c409s       NISERT INTO (_game_XYDC_detail VALUES(: 1; 2; 3; HallD',         YORK00       UPDATE [_game_XYDC_SET FinishBons = 2 UHERE senalld =:1 an         S9g1gbg/mv8       select bys_cONTEXT(USERENV, SERVER_HOST), SYS_CONTEXT(U         YORK00       UPDATE [_game_XYDC_WHERE senalld =:1 an         S9g1gbg/mv8       select bys_cBonsCount,LimeCost FRON t_game_XYDC WHERE senalld =         tury       SELECT BonsCount,LimeCost FRON t_game_XYDC WHERE senalld =         tury       SELECT BonsCount,LimeCost FRON t_game_XYDC WHERE senalld =         br/ckyaShytx       select decode(upper/finitor= method), 0; MSGT; 1,         a4d55gbsf1z73       SELECT BonsCount,LimeCost FRON t_game_XYDC MILES (: 1, intermost, antert,	https://minimage/interning/filering	https://storm       setcl./*connet_by_filtering */ privileges, bland(m/gp       index         bicgingchtgibk       setcl./*connet_by_filtering */ privileges, bland(m/gp       index         bicgingchtgibk       setcl./*connet_by_filtering */ privileges, bland(m/gp       index         bicgingchtgibk       ubbacktift       index       index         bicgingchtgibk       ubbacktift       index       index         bicgingchtgibk       ubbacktift       index       index         bicgingchtgible       ubbacktift       index       index         bicgingchtgible       ubbacktift       index       index         bicgingchtgible       ubbacktift       index       index         bicgible       ubbacktift       index       index       index         bicgible       ubbacktift       ubbacktift       index       index       index         bicktift       ubbacktift       ubbacktift       index       index       index       index         bicktift       ubbacktift       ubbacktift       index       index       index       index       index         bicktift       ubbacktift       ubbacktift       index       index       index       index         bicktift       ubbacktift			
865qwpcdygkk     select spare6 from users where user#=1     0       0zs820bmktrv     UPDATE T_SESION SET PRIZENOTAX =54251, ISCLENTRECEIVED     0       3257z8c4669s     INSERT ITO L game_XYDC detail X5LES(1), 2, 3, YallID',     0       700kd06ujtzmc     UPDATE L game_XYDC SET Finisheonus = 2 WHERE seriald=:1 an     0       9tgl9g0y4rwy8     select Vy=z,bicks,ettales,ettale_utale     0       9tgl9g0y4rwy8     select Vy=z,bicks,ettales,ettale_utale     0       9tsly8p0y4rwy8     select Vy=z,bicks,ettales,ettale_utale     0       9tsly8p1zh3     SELECT Bonucastize,extpl_u     0       9tsly8p1zh3     SELECT Bonucastize,ettale     0       1apy6ht1cbj8     UPDATE T_SESSION SET WFDETALLD = 1,PRIZENOTAX = 100,LAST     0       bvcksyx3fvqx     select decode(upperfaillover_method), NULL 0, ' ASIC; 1, add558jbj1z/3     1       9tsl9g0y4m4spu     update user8 set spare6 DECODE(to character and set spare6 DECODE(to	KSopyochygkk	KS-spychydyk			
Dzs220bmkHrv       UPDATE T_SESSION SET PRIZENOTAX =65421, ISCLIENTRECEIVED         3257zm8c4d69s       INSERT INTO Lgame_XVDC_detail VALUES(1, 1, 2, 1, 3, 1, HallD),         fbh5pzmhju11       select Sys_CONTEXT(USERIV/, SERVER_NDT, SYS_CONTEXT(U         70xdd80jimc       UPDATE Ljassi, AVDC_SET Enishedsous = 2 WHERE seriald=11 an         9tg14g9,4twy8       select Sys_contExt(Useria, minets, maxext, setzie, extpt, u         1ayofk1tcbj8       UPDATE L_SESSION SET INFOEMLID = 1, PROM_KST, Stry_ContExt, extpt, u         1ayofk1tcbj8       UPDATE L_SESSION SET WHEETALLD = 1, AND AST         bkkkyys5hyqk       select dedeupser(fallover=modul, SAST, L, select BenusContL, ULL, 0, 'SASTC, 1, select BenusContL, BenusContL	uss2sbmikiny       UPDATE T_SESSION SET PRIZEWOXA <	uss2sbankiny       UPORTE T_SESSION SET PROZENOTAX + 649421, ISCLEMPRECENDED       In control (1, 1, 2, 3, 1, MID)         Star 2, 206-K4695       INISERT INTO (1, 2, m, X)OC, GUTTETUTUSERINY, SSC, CONTEXTU       In control (1, 2, 2, 3, 1, MID)         PM0456gingunc       UPDATE T_game_XYOC, STF Initiabout = 2, VIERE setal/s1 an       In control (1, 2, 2, 3, 1, MID)         PM0456gingunc       UPDATE T_game_XYOC, STF Initiabout = 2, VIERE setal/s1 an       In control (1, 2, 2, 3, 1, MID)         Numphilition       setatory Structure, setatory S			
3257x8cHd69s       INSERT INTO Lgame_XYDC_detail VALUES(: 1, 2, :3, HalID',         f0h5prpmlju11       selet 595_CONTEXT(USERENV, 'SERVER_HONTEXT(U         70hd06ujjzmc       UPDATE Lgame_XYDC SET FinishBonus = 2 WHERE seriald=: 1 an         70hd06ujjzmc       UPDATE Lgame_XYDC WHERE seriald=: 1 an         94ghg9hvm08       selet tope_Ibneko,sentent, minets, extore, extor, u         4kujvn21quxn7       SELECT BonusCount, LineCost FROM Lgame_XYDC WHERE seriald=         1apr/6h1czbj8       UPDATE T_SESSION SET WFDETALLD = 1, PRLZ NOTAX = 100, LAST         bvkdsyns5hyqx       selet doed(upper(failour=nthod), set i 1 FOR UPD         e4d56g5b1z73       SELECT BonusCount, LineCost FRO WDE Gene         94dsdg5b1z73       SELECT set set spare6-DECODE(to_theTIC) = 1, PRLZ NOTAX = 100, LAST         94dsd5v3s2uy       INSERT INTO Lgame_XYDC bonus_detail VALUES(: 1 - 500)         94dsd5v3s2uy       INSERT INTO Lgame_XYDC bonus_detail VALUES(: 1 - 500)         94dsd5v3s2uy       UpDATE T_SESSION SET LATO	32572x8/c4699       INSERT INTO Lgame_VYOC_detail VALUES (1; 1; 2; 3; HallD',         Inhspumhul 1       select Sys_Control       interference         Youtsgipse       UPDATE T_SESSION set Verse Automation and Automat	32572x8C46499       INSERT INTO Lgame_VYDC_detail VALUES (1; 1; 2; 3; MallD),			
f0hSrpzmhju11       select SYS_CONTEXT(USEREIN/, SERVER_HOST), SYS_CONTEXT(U         70kd06jijzmc       UPCATE L_game_XYDC SET FinishBonus = ZVHERE seriald=1 an         9kjdg0kHvv8       select byse_blockont, LineCost FROM L_game_XYDC WHERE seriald=1         1apy6h1tcbj8       UPCATE T_SESSION SET WHEET seriald=1         bycksyaShyck       select doubger_finite/move_method, NULL, or NHERE seriald=1         addSegBig1z33       SELECT Bonus, aextextextextextextextextextextextextexte	MhSrpamhjul1       select SYS_CONTEXT(USERENV, SERVER_HOST), SYS_CONTEXT(U         VPOATE Lgame_XND SET Finishoours = 2. WHERE senaled = in	MhSrpamhjul1       select SVS_CONTEXT(USERENV, SERVER_HOST), SVS_CONTEXT(U         VDXAddsUgime       UVPATE L_same_XNDC SET Finishoat, maxet, mixet, m			
700kd06ujjznc       UPDATE L game_XYDC SET FinishBonus = 2 WHERE serialid=:1 an         9kgj4g04rvvg0       select type#,blocks,extents,minests,maxexts,extsize,extpct,u         4kujvn2luvvn7       SELECT BonusCount,LineCost ROM L_game_Y/DC WHERE serialid=         1ayp6htLcbj8       UPDATE T_SESSION SET WFDETALLID= 1,PRIZENOTAX = 100,LAST         brokksyk3byqx       select decd(upper(fallover_method), NULL, 0, 'BASIC, 1,         a4d56g8hg1z73       SELECT seatName from do_normal.seat where id = :1 FOR UPD         4kduf2xv3s2uy       INSERT INTO L game_XYDCbonus_detail VLUES(:1, -)         9zg9d9bm4spu       update usef se spare6=DECODE(to_cbonus_detail VLUES(:1, -)         09Sydz7Snu7q       UPDATE T_SESION SET VFINIS	20kd8sigjimc       UPDATE t_game_XYDC SET FinishBonus = 2 WHERE seniald=1 an         9 updp9/hvvg       select type=/index.secture.maxexts.extsc.ex	20kd8dsijjimc       UPQATE t_game_VYDC SET FinikBonus = 2 WHERE seniald=: 1 an         9 kjdp6yhviv8       islekt type5/kokk_extenti, mixetxi, extige_extud_u         4 kujn2kjpf3ymv8       islekt type5/kokk_extenti, mixetxi, mixetxi, extudu_extudu_u         1 ap/6h1cdp8       UPQATE T_SESSION SET WF0ETAILD = 1, PRIZENOTAX = 100, LAST         1 ap/6h1cdp8       UPQATE T_SESSION SET WF0ETAILD = 1, PRIZENOTAX = 100, LAST         1 ad/65k6/jbt73       SEECT setName from (Lagme_V/DC SUBE setaild=)         1 ad/65k6/jbt73       SEECT setName from (Lagme_V/DC SUBE setaild=)         1 dd/2xv3zuy       INSERT INTO L_game_V/DC SUBE setaild=)         1 dd/2xv3zuy       UPQATE T_SESSION SET PEPINS			
9tg/49v/rw/8       select type#_blocks,extents,minexts,maxexts,extsize,extpct,u         4xu/ro21qwwn7       SELECT BonusCount,LineCost FROM t_gameXYDC WHERE serialId=         1avp6ht1cbj8       UPOATE T_SESSION SET WFDETALLID = 1,PERZENOTAK = 100,LAST         bvckxysRivqX       select deced(upperfallover=metod), NULL,0, 'BASIC, 1,         a4d56g8hj1z73       SELECT seatName from do_normal.seat where id = 1 FOR UPD         4kduf2vv3s2uv       INSERT INTO t_game_XYDCbonus_detail VALUES(:1, -sectormation of the sectormation of	9g/4g/9/mv/8       select type#,blocks, extents, minexts, maxexts, extpdt, u	9g/4g/9/mv/8       select type=/blocks.extents,minexts,maxexts,extsize,extpt_u       Intervents,minexts,maxexts,extsize,extpt_u       Intervents,minexts,maxexts,extsize,extpt_u         1aye/filtibilitibi tentemete tentemeter entemeter entemeter entemeter ent			
lapy6h1tcbj8     UPDATE T_SESSION SET WFDETALLID = 1,PRIZENOTAX = 100,LAST       bxkbypaShyqx     select decode(upper(faluore_method), NLLL, 0; fastic; 1,       a4d56glshg1z73     SELECT seathame from do_normal, NLLL by PD       4kdsf2xv32uy     INSERT INTO t_game_XTDCbonus_detail VALUES(1, 2)       9zg9d9bm4spu     update users set spare6=DECODE(to_characteria of the stepFINIS)       095ydz73nu7q     UPDATE T_SESSION SET INTO type=FINIS	lapy6ht1cdbj8       UPDATE T_SESSION SET WFDETAILID = 1,PRIZEHOTAX = 100,LAST       Import 1, PRIZEHOTAX = 100,LAST         brkdstyssStycx       select decode(upperfailowr_method), NULL, 0, MASIC, 1,       Import 1, PRIZEHOTAX = 100,LAST       Import 1, PRIZEHOTAX = 100,LAST         a+d56gdbg1273       SELECT seathame fon do_normal.seat where id = 1 FOR UPD       Import 1, PRIZEHOTAX = 100,LAST       Import 1, PRIZEHOTAX = 100,LAST         a+d56gdbg1273       SELECT seathame fon do_normal.seat where id = 1 FOR UPD       Import 1, PRIZEHOTAX = 100,LAST       Import 1, PRIZEHOTAX = 100,LAST         a+d56gdbg1273       SELECT seathame fon do_normal.seat where id = 1 FOR UPD       Import 1, PRIZEHOTAX = 100,LAST       Import 1, PRIZEHOTAX = 100,LAST         a+d56gdbg1273       SELECT seathame fon do_normal.seat where id = 1 FOR UPD       Import 2, PRIZEHOTAX = 100,LAST       Import 2, PRIZEHOTAX = 100,LAST         ysgbqdbm4spu       update user's set spare6=DECODE(to_chartic	lapy6ht1cdpl8       UPDATE T_SESSION SET WFDETAILID = 1,PRIZENOTAX = 100,LAST       Import 1, PRIZENOTAX = 100,LAST         bxdxhyxs5kycx       select decode(upperfailower_method), NULL (), response of the interval of			
bvkkyyaShyqx     select decode(upper(failover_method), NULL, 0, 'BASIC', 1,       a4d56g8hg1z73     SELECT seatName from do_normal.seat where id =: 1 FOR UPD       4kduf2vv3s2uy     INSERT INTO t_game_XYDCbonus_detail VALUES(1, 1)       9zg9qd9bm4spu     update user\$ set spare6=DECODE(to_cborner_method), NULL, 0, 'BESTEPFINIS       09Sydz7c3nu7q     UPDATE T_SESSION SET INTO SET IN	bvkckyyshygk       selet decode(upper(failover_method), NULL 0, 'BASIC', 1,         a+d456g8hg1z73       SELECT seaName from cly Dobuss, detail VALUES(1, 1, 2)         hcd/dzvy32uy       NISERT INTO t_game_XPOLObous_detail VALUES(1, 1, 2)         3rg9q9d9m4pu       update use's set spare6=DECODE(to_christian of the constraint)         9rg9qrdprintpu       update use's set spare6=DECODE(to_christian of the constraint)         9rg9qrdprintpu       update use's set spare6=DECODE(to_christian of the constraint)         0psydz7c3nu7q       UPDATE T_SESSION SET IF the constraint)         xith Count > 1       resolver State of the constraint)	bvkckyyshygk       select decode(upper(failover_method), NULL, 0, 'BASIC', 1,         a+d456g8hg1z73       SELECT seaName from dy DCDbonus_detail VALUES(1, 1)         hcd/dzvv32uy       NISERT INTO t_game_XPCObonus_detail VALUES(1, 1)         3rg9eg9hm4pu       update users sparse-DECODE(to_shc=1, root)         9rg9eg9hm4pu       update users sparse-DECODE(to_shc=1, root)         09Syd27C3nu7q       UPDATE T_SESSION SST_1***********************************			
a4d56gdbg1z73     SELECT seatName from do_normal.seat where id =: 1 FOR UPD       4kdu2xv3s2uy     INSERT INTO t_game_XYDCbonus_detail VALUES(1	a4d56gbg1z73       SELECT seatName from do_normal.seat where id =: 1 FOR UPD       Image: 1 FOR UPD         4kdu?zw32uy       INSERT INTO t_game_XYOODonus_detail VALUES(:1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +	a4d56gbg1z73       SELECT seatName from do_normal.seat where id =: 1 FOR UPD         4kdr2xv3s2uy       INSERT INTO t_game_XYOCboux_detail VALUES(:1, where id =: 1 FOR UPD         9zg9dd9bm4spu       update user\$ set spare6=DECODE(to_cbot means to normal.seat where id =: 1 FOR UPD         095ydz7c3nu7q       UPDATE T_SESSION SET IF         vith Count > 1	1apy6ht1czbj8	UPDATE T_SESSION SET WFDETAILID = 1,PRIZENOTAX = 100,LAST	
4kduf2xv3s2uy     INSERT INTO t_game_XYDCbonus_detail VALUES(s)_s       9zg9qd9bm4spu     update users set spare6=DECODE(to_charman and the set spare6=DECODE(to_charman and the set spare6=DECODE(to_charman and the set set spare6=DECODE(to_charman and the set set set set set set set set set se	#kduf2vv3s2uy     INSERT INTO t_game_XYDCbonus_detail VALUES(:10)       9zg9qd9bim4spu     update users set spare6=DECODE(to_chilling to user)       095ydz7c3nu7q     UPDATE T_SESSION SET for the statistic to user)   Kill Session Enable	#kduf2v/3s2uy     INSERT INTO L_game_XYDCbonus_detail VALUES(st_st_st_st_st_st_st_st_st_st_st_st_st_s	bvkckyya5hyqx	select decode(upper(failover_method), NULL, 0 , 'BASIC', 1,	
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	vith Count > 1	vith Count > 1	9zg9qd9bm4spu	update user\$ set spare6=DECODE(to_characteristic)	
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	with Count > 1	with Count > 1			Kill Session Enable 5
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## Leaking Observations

- After a period of time, the system performance begins to decline and then degrades rapidly
- After rapid degradation, the application servers time out and the system is unavailable
- The DBA claims the database is not the problem and simply needs more connections
  - The init.ora parameter processes is increased to 20,000





### Leaking Performance Data











# Leaking Session Leaking

- Due to coding errors on exception handling, the application leaks connections in the connection pool making them programmatically impossible to use
- This reduces the effective size of the connection pool
- The remaining connection are unable to keep up with the incoming workload
- The rate of connection leakage is accelerated until there are no useable connections left in the pool





# Leaking Session Leaking

- Potential indicators of session leaking:
  - Frequent application server resets
  - init.ora parameters process and sessions set very high
  - Configuration of large and dynamic connection pools
  - Large number of idle connections connected to the database
  - Free memory on database server continually reduced
  - Presence of idle connection kill scripts or middleware configured to kill idle sessions





## Leaking Observations

- Without warning, the database appears to hang and the application servers time out simultaneously
- The DBA sees that all connections are waiting on a single lock held by a process that has not been active for a while.
- Each time the problem occurs, the DBA responds by running a script to kill sessions held by long time lock holders and allowing the system to restart.



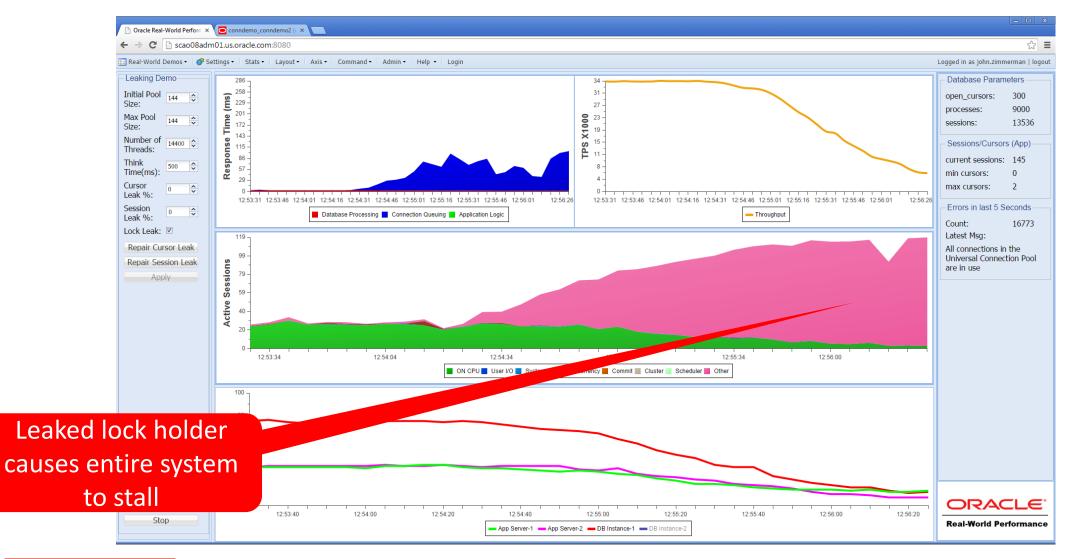
#### Leaking Performance Data

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**REAL-WORLD PERFORMANCE** 









### Leaking **Blocking Tree**

🗅 Oracle Real-World Perform 🗙 🖸 Instance Locks: conndem 🗴 🚺

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### Leaking Performance Data

🕒 Oracle Real-World Perform 🗙 🔁 Session Details: 2273 (CLO 🗴 💼

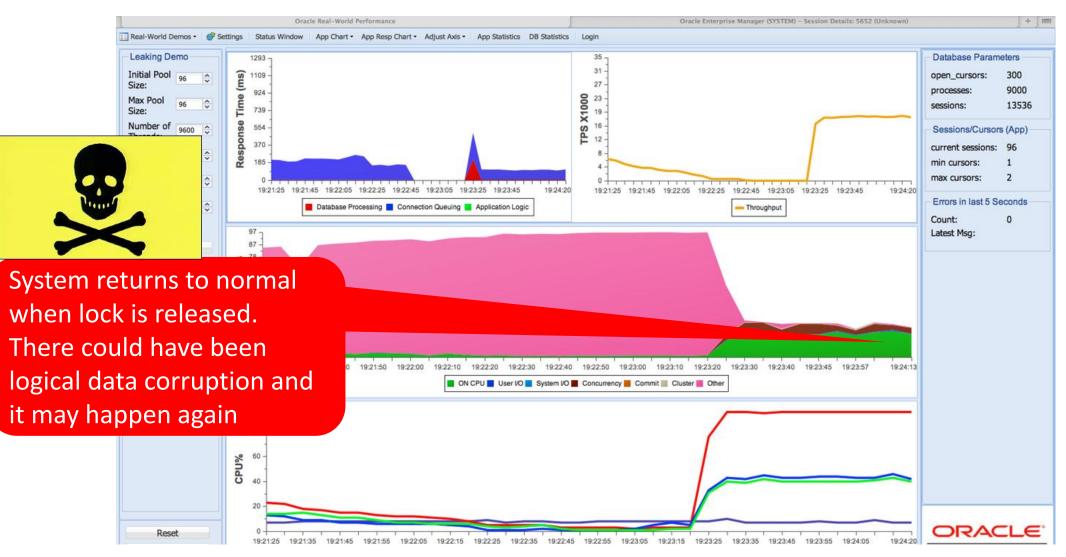
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1.40 <u>suu</u> n21uvvn7         SELECT <u>397105211</u> java@sca08adm03.us.orade.com (TNS V1-V3)           1.40 <u>3257zu8c4d69s</u> INSERT <u>0</u> java@sca08adm03.us.orade.com (TNS V1-V3)	1.7	20		UNKNOWN	0										
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.40         cb2rs7/0299yt         SELECT         15345561159         java@scao08adm03.us.orade.com (TNS VI-V3)				INSERT		java@scao08adm03.us.oracle.com	n (TN5 V1-V3)								
	.40	10	cb2rs7t0z99yt	SELECT	1534564159	java@scao08adm03.us.oracle.com	n (TNS V1-V3)								
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#### Leaking Performance Data







# Leaking Lock Leaking

- Lock leaking is usually a side effect of session leaking and the exception handling code failing to execute a commit or rollback in the exception handling process.
- A leaked session may be programmatically lost to the connection while holding locks and uncommitted changes to the database.





# Leaking Lock Leaking

- Programming error impact:
  - Potential system hangs: all connections queue up for the held lock
  - Potential database logical corruptions: end users may have thought transactions were committed when in fact they have not been
  - If sessions return to the connection pool but still have uncommitted changes, it is not deterministic, if and/or when the changes are committed or rolled back. This is a serious data integrity issue.





# Leaking

#### How to Develop High Performance Applications

- Developer Bugs
  - Incorrect/untested exception handling
    - Cursor, session and lock leaking
      - High values for init.ora ( open\_cursors, processes, sessions )
      - Idle process and lock holder kill scripts
      - Oversized connection pools of largely idle processes





### AWR Architecture Analysis More than just wait events and top SQL

- Large amount of data in the AWR report
- Tells us about the way that the system has been architected and designed as well as about how it is performing
- Often see common mistakes





# AWR from online system

**Ready for Black Friday?** 



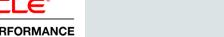




# AWR from Online system

- Testing system for Black Friday readiness
- Cannot generate load expected on test system
- Do you see any problems with this system scaling up from this test?
- Will we survive Black Friday ?







# AWR Header

#### WORKLOAD REPOSITORY report for

DB Name	DB Id	Instance	Inst num	Startup Time	Release	RAC
SHOPPING	1722515684	SHOPPING02	2	07-Oct-13 16:10	11.2.0.2.0	YES

Host Name	Platform	CPUs	Cores	Sockets	Memory (GB)
hlq11db.na.bigretail.com	Linux x86 64-bit	64	32	4	504.03

	Snap Id	Snap Time	Sessions	Cursors/Session
Begin Snap:	3037	15-Oct-13 02:45:11	3351	8.2
End Snap:	3044	15-Oct-13 04:30:00	4635	26.2
Elapsed:		104.82 (mins)		
DB Time:		27,641.09 (mins)		

#### **Report Summary**

#### Cache Sizes

	Begin	End		
Buffer Cache:	30,720M	30,720M	Std Block Size:	16K
Shared Pool Size:	16,384M	16,384M	Log Buffer:	14,772K

#### Load Profile

	Per Second	Per Transaction	Per Exec	Per Call
DB Time(s):	263.7	0.2	0.00	0.00
DB CPU(s):	39.0	0.0	0.00	0.00
Redo size:	9,829,605.5	7,222.2		
Logical reads:	802,177.1	589.4		

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- 32 Cores available
- Over processed



- Sessions is 100x cores
- Session count growing
  - Session leak
  - Dynamic connection pools
- Cursors per session growing



- Cursor leakage



# Load Profile

#### Load Profile

	Per Second	Per Transaction	Per Exec	Per Call
DB Time(s):	263.7	0.2	0.00	0.00
DB CPU(s):	39.0	0.0	0.00	0.00
Redo size:	9,829,605.5	7,222.2		
Logical reads:	802,177.1	589.4		
Block changes:	44,854.5	33.0		
Physical reads:	10,749.2	7.9		
Physical writes:	2,085.7	1.5		
User calls:	104,774.4	77.0		
Parses:	39,775.4	29.2		
Hard parses:	0.1	0.0		
W/A MB processed:	96.0	0.1		
Logons:	10.5	0.0		
Executes:	59,560.7	43.8		
Rollbacks:	878.3	0.7		
Transactions:	1,361.0			

- ~260 sessions active on average
- ~40 on CPU
  - Only have 32 cores
  - System CPU limited
- 10 logons per second
  - In a stable system?
    - Session leaks
    - Dynamic connection pools
- 40% of user txns are rollbacks
   Coding for failure







### Init.ora

#### init.ora Parameters

Parameter Name	Begin value	End value (if different)
_bloom_filter_enabled	FALSE	
_disable_image_check	TRUE	
_fix_control	6239971:off	
_kghdsidx_count	1	
_kgl_debug	hash='69cd9f156d9ccd9b245ebaccce65c558' debug=33554432	
_kgl_hot_object_copies	16	
_memory_imm_mode_without_autosga	FALSE	
_shared_pool_reserved_min_alloc	6000	
aq_tm_processes	4	
audit_file_dest	/u01/app/oracle/admin/SHOPPING02/adump	
audit_sys_operations	TRUE	
audit_trail	DB	
cluster_database	TRUE	
cluster_database_instances	2	
compatible	11.2.0.2.0	
control_file_record_keep_time	35	
control_files	+SHOPPING_DATA01/SHOPPING/controlfile/current.762.823865529, +SHOPPING_REC001/SHOPPING/controlfile/current.375.823865531	
core_dump_dest	/u01/app/oracle/admin/SHOPPING02/cdump	
cursor_sharing	FORCE	
db_block_size	16384	
db_cache_size	32212254720	
db_create_file_dest	+SHOPPING_DATA01	
db_domain	world	
db_file_multiblock_read_count	32	
db_files	4096	
db_name	SHOPPING	
db_recovery_file_dest	+SHOPPING_RECO01	

- Underscore parameters
- Db\_block\_size=16384
- Cursor\_sharing=FORCE
- Db\_file\_multiblock\_read\_count=32







### Init.ora

db_file_multiblock_read_count	32
db_files	4096
db_name	SHOPPING
db_recovery_file_dest	+SHOPPING_RECO01
db_recovery_file_dest_size	64424509440
db_recycle_cache_size	4429185024
db_writer_processes	12
diagnostic_dest	/u01/app/oracle
disk_asynch_io	TRUE
fal_client	SHOPPING
fal_server	op99eodb01_linux
fast_start_mttr_target	3600
instance_name	SHOPPING02
instance_number	2
java_pool_size	134217728
job_queue_processes	20
large_pool_size	2147483648
local_listener	SHOPPING02_local
log_archive_config	dg_config=(SHOPPING, op99eodb)
log_archive_dest_1	location=+SHOPPING_REC001
log_archive_dest_2	
log_archive_dest_state_2	DEFER
log_archive_max_processes	10
log_archive_min_succeed_dest	1
log_buffer	3407872
nls_date_format	DD-MON-RR
open_cursors	2000
open_links	255
optimizer_capture_sql_plan_baselines	TRUE
optimizer_dynamic_sampling	1
optimizer_index_cost_adj	50
optimizer_mode	ALL_ROWS
optimizer_secure_view_merging	FALSE

- Db\_writer\_processes=12
  - On a system that supports asynchlO?
- Open\_cursors=2000
  - Per session limit
  - Implies <u>cursor leaking</u>



ORACLE'





### Init.ora

open_cursors	2000
open_links	255
optimizer_capture_sql_plan_baselines	TRUE
optimizer_dynamic_sampling	1
optimizer_index_cost_adj	<mark>50</mark>
optimizer_mode	ALL_ROWS
optimizer_secure_view_merging	FALSE
os_authent_prefix	
parallel_adaptive_multi_user	FALSE
parallel_max_servers	180
parallel_min_servers	8
pga_aggregate_target	16106127360
processes	5500
recovery_parallelism	90
remote_listener	qlocdb17:50000
remote_login_passwordfile	EXCLUSIVE
resource_manager_plan	
sec_case_sensitive_logon	FALSE
service_names	SHOPPINGsvc, SHOPPING02svc
session_cached_cursors	200
session_max_open_files	20
sessions	8320
sga_max_size	56505663488
shared_pool_reserved_size	262144000
shared_pool_size	17179869184
spfile	+SHOPPING_DATA01/SHOPPING/spfile
sql_trace	FALSE
star_transformation_enabled	false
streams_pool_size	134217728
thread	2
timed_statistics	TRUE
trace_enabled	TRUE
undo_management	AUTO
undo_retention	18000
undo_tablespace	undo02
workarea_size_policy	AUTO

- Optimizer\_index\_cost\_adj=50
  - Classic hack parameter
- Processes=5500
- Sessions=8320







# Top events

### Where is the time going?

#### **Top 5 Timed Foreground Events**

Event	Waits	Time(s)	Avg wait (ms)	% DB time	Wait Class
library cache: mutex X	51,206,131	377,179	7	22.74	Concurrency
enq: TX - row lock contention	259,719	298,891	1151	18.02	Application
db file sequential read	40,457,009	282,531	7	17.04	User VO
latch: row cache objects	141,091	247,016	1751	14.89	Concurrency
DB CPU		245,536		14.81	

#### • Concurrency waits > 35% of time

- Library cache: mutex X
- Latch:row cache objects
- Typical of high CPU load
- A symptom, not the problem
- Row lock contention 18% of time
- IO with 7ms avg read time
- CPU only 15% of DB Time
- Log file sync?







# Top SQL

### Where is the time going?

#### SQL ordered by Elapsed Time

- Resources reported for PL/SQL code includes the resources used by all SQL statements called by the code.
- % Total DB Time is the Elapsed Time of the SQL statement divided into the Total Database Time multiplied by 100
- %Total Elapsed Time as a percentage of Total DB time
- %CPU CPU Time as a percentage of Elapsed Time
- %IO User I/O Time as a percentage of Elapsed Time
- Captured SQL account for 43.8% of Total DB Time (s): 1,658,465
   Captured PL/SQL account for 13.9% of Total DB Time (s): 1,658,465

Elapsed Time (s)	Executions	Elapsed Time per Exec (s)	%Total	%CPU	%10	SQL Id	SQL Module	SQL Text
204,008.97	1,967,640	0.10	12.30	0.59	2.83	ccfrfn4vuhtt0	ScheduleReturn	SELECT /*SHOP*/ YFS_ORDER_HE
116,892.49	26,600,256	0.00	7.05	6.12	0.00	4xrbd7rw15at7	INT&CAP_AgentServer	BEGIN DBMS_APPLICATION_INFO.SE
110,919.39	28,684,565	0.00	6.69	6.30	0.00	<u>bmx990q2tsqjb</u>	JDBC Thin Client	BEGIN DBMS_APPLICATION_INFO.SE
79,569.63	13,172,207	0.01	4.80	8.40	0.00	<u>8pvr9fks6m1r9</u>	ADJUSTEOMSINV	SELECT /*SHOP*/ TO_CHAR(sysd
57,474.41	108,429	0.53	3.47	0.17	0.05	1f72kz03ydy4x	Sourcing	SELECT /*SHOP*/ YFS_ORDER_HE
20,853.07	53,990	0.39	1.26	0.17	0.00	f110q31ahqbb5	CONFIRMFPSHIPMENT	SELECT /*SHOP*/ YFS_ORDER_HE
19,865.13	1,580,843	0.01	1.20	6.48	0.00	<u>2tq3dknsjum6d</u>	JDBC Thin Client	SELECT :"SYS_B_0" FROM DUAL
19,820.14	93,037	0.21	1.20	0.16	0.01	<u>4htst3fakwa0m</u>	CONSOLIDATE_ADDNL_INV	SELECT /*SHOP*/ YFS_INVENTOR
19,064.37	19	1,003.39	1.15	4.03	97.93	d7ufw6t6n4qrn	JDBC Thin Client	SELECT /*SHOP*/ count(:"SYS
16,954.77	2,418,713	0.01	1.02	8.52	91.24	<u>fqq27u174x4t1</u>	RETEK_ORDER_CREATE	SELECT /*SHOP*/ YFS_ORDER_LI

#### • Top statement

SELECT /\*SHOP\*/ YFS\_ORDER\_HEADER.\*
FROM YFS\_ORDER\_HEADER
WHERE (ORDER\_HEADER\_KEY = :1 )
FOR UPDATE

- -12% of load
- 2 million executions
- Average execution 0.1 sec







# Top SQL

#### Segments by Row Lock Waits

% of Capture shows % of row lock waits for each top segment compared

with total row lock waits for all segments captured by the Snapshot

Owner	Tablespace Name	Object Name	Subobject Name	Obj. Type	Row Lock Waits	% of Capture
SHOP	SHOPDATA	YFS_ORDER_HEADER		TABLE	250,888	38.42
SHOP	SHOPDATA	YFS_INVENTORY_ITEM		TABLE	83,732	12.82
SHOP	SHOPINDEX2	YFS_ORDER_HEADER_I9		INDEX	63,183	9.68
SHOP	SHOPINDEX1	YFS_STATISTICS_DETAIL_PK		INDEX	30,675	4.70
SHOP	SHOPINDEX1	YFS_ORDER_RELEASE_STATUS_PK		INDEX	25,905	3.97

#### • Top statement

SELECT /\*SHOP\*/ YFS\_ORDER\_HEADER.\*
FROM YFS\_ORDER\_HEADER
WHERE (ORDER\_HEADER\_KEY = :1 )
FOR UPDATE

-40% of RLWs are on that object







# Top SQL

#### SQL ordered by Elapsed Time

- Resources reported for PL/SQL code includes the resources used by all SQL statements called by the code.
- % Total DB Time is the Elapsed Time of the SQL statement divided into the Total Database Time multiplied by 100
- %Total Elapsed Time as a percentage of Total DB time
- %CPU CPU Time as a percentage of Elapsed Time
- %IO User I/O Time as a percentage of Elapsed Time
- Captured SQL account for 43.8% of Total DB Time (s): 1,658,465
   Captured SQL account for 43.8% of Total DB Time (s): 1,658,465
- Captured PL/SQL account for 13.9% of Total DB Time (s): 1,658,465

Elapsed Time (s)	Executions	Elapsed Time per Exec (s)	%Total	%CPU	%10	SQL Id	SQL Module	SQL Text
204,008.97	1,967,640	0.10	12.30	0.59	2.83	ccfrfn4vuhtt0	ScheduleReturn	SELECT /*SHOP*/ YFS_ORDER_HE
116,892.49	26,600,256	0.00	7.05	6.12	0.00	4xrbd7rw15at7	INT&CAP_AgentServer	BEGIN DBMS_APPLICATION_INFO.SE
110,919.39	28,684,565	0.00	6.69	6.30	0.00	<u>bmx990q2tsqjb</u>	JDBC Thin Client	BEGIN DBMS_APPLICATION_INFO.SE
79,569.63	13,172,207	0.01	4.80	8.40	0.00	<u>8pvr9fks6m1r9</u>	ADJUSTEOMSINV	SELECT /*SHOP*/ TO_CHAR(sysd
57,474.41	108,429	0.53	3.47	0.17	0.05	<u>1f72kz03ydy4x</u>	Sourcing	SELECT /*SHOP*/ YFS_ORDER_HE
20,853.07	53,990	0.39	1.26	0.17	0.00	f110q31ahqbb5	CONFIRMEPSHIPMENT	SELECT /*SHOP*/ YFS_ORDER_HE
19,865.13	1,580,843	0.01	1.20	6.48	0.00	<u>2tq3dknsjum6d</u>	JDBC Thin Client	SELECT :"SYS_B_0" FROM DUAL
19,820.14	93,037	0.21	1.20	0.16	0.01	<u>4htst3fakwa0m</u>	CONSOLIDATE_ADDNL_INV	SELECT /*SHOP*/ YFS_INVENTOR
19,064.37	19	1,003.39	1.15	4.03	97.93	<u>d7ufw6t6n4qrn</u>	JDBC Thin Client	SELECT /*SHOP*/ count(:"SYS
16,954.77	2,418,713	0.01	1.02	8.52	91.24	<u>fqq27u174x4t1</u>	RETEK_ORDER_CREATE	SELECT /*SHOP*/ YFS_ORDER_LI

#### • Next two statements

- Call of DBMS\_APPLICATION\_INFO
  - Application instrumentation
- -14% of load
- 26M executions each
- Instrumentation is a good thing BUT
- Not needed since Oracle 10g
- Use parameters to OCI or Java instead







# Other SQL

98sp81sbwt4vc	select /* SHOP */: "SYS_B_0" as ENTITY, sum(quantity) QUANTITY, DEMAND_TYPE, B.shipnode_key from yfs_inventory_demand B where B.inventory_item_key = (select inventory_item_key from yfs_inventory_item A where A.item_id = :1
	and A product_class = (2 and A UOM = (3 and A organization_code = (4) and B demand_ship_date >= (5 and B shipnode_key in ((7, 18, 9); 10, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 113, 114, 115, 116, 117, 118, 119, 110, 118, 118, 118, 118, 118, 118, 118
	23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1
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	115,116,117,118,119,120,121,1122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,144,145,149,150,151,152,145,145,145,145,145,145,145,145,145,145
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	723 724 725 726 727 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 759 760
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	:989 , :990 , :991 , :992 , :993 , :994 , :995 , :996 , :997 , :998 , :999 , :1000 , :1001 , :1002 , :1003 , :1004 , :1005 , :1006 )group by B.demand_type, B.shipnode_key union select /* SHOP */ :"SYS_B_1" as ENTITY, sum(quantity) QUANTITY,
	DEMAND_TYPE, B.shipnode_key from yfs_inventory_demand_addnl B where B.inventory_item_key = (select inventory_item_key from yfs_inventory_item_A where A.item_id = :1007 and A.product_class = :1008 and A.UOM = :1009 and
	A.organization_code = :1010 ) and B.demand_ship_date >= :1011 and B.demand_ship_date <= :1012 and B.shipnode_key in ( :1013 , :1014 , :1015 , :1016 , :1017 , :1018 , :1012 , :1020 , :1021 , :1022 , :1023 , :1024 , :1025 , :1026 , :1027 ,
	:1028 ; :1029 ; :1030 ; :1031 ; :1032 ; :1033 ; :1034 ; :1035 ; :1036 ; :1 037 ; :1038 ; :1039 ; :1041 ; :1042 ; :1043 ; :1044 ; :1045 ; :1046 ; :1047 ; :1048 ; :1049 ; :1050 ; :1051 ; :1052 ; :1054 ; :1055 ; :1056 ; :1057 ; :1058 ; :1059
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	1,1190,.1191,.1192,.1193,.1194,.1195,.1196,.1197,.1188,.1199,.1200,.1201,.1202,.1203,.1204,.1205,.1206,.1207,.1208,.1209,.1211,.1212,.1213,.1214,.1215,.1216,.1217,.1218,.1219,.1220,.1221,100,
	1222 ;123 ;1224 ;1225 ;1226 ;1227 ;1228 ;1229 ;1230 ;1231 ;1232 ;1235 ;1236 ;1237 ;1238 ;1239 ;1241 ;1242 ;1241 ;1242 ;1244 ;1245 ;1244 ;1247 ;1248 ;1249 ;1250 ;1251 ;1252 ;1253 ;1256 ;1257 ;1257 ;1256 ;1257 ;1257 ;1256 ;1257 ;1257 ;1256 ;1257 ;1257 ;1256 ;1257 ;1256 ;12
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# **Online Summary**

Not looking good for Black Friday

- System is CPU bound at test load levels
- System seems to be leaking both cursors and sessions (and maybe locks)
- System is running far too many processes
- High overhead application instrumentation

