A Day of Real-World Performance

Andrew Holdsworth, Tom Kyte, Graham Wood

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Program Agenda

- Introductions
- OLTP
- Coffee

- Analyzing SQL
- Lunch

- Data Warehousing
- Coffee

- Star Schemas

- Breaks at
  - 10:30-11:00
  - 12:30-13:30
  - 15:00-15:30

Introductions

Introductions

Andrew Holdsworth

- 25 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.

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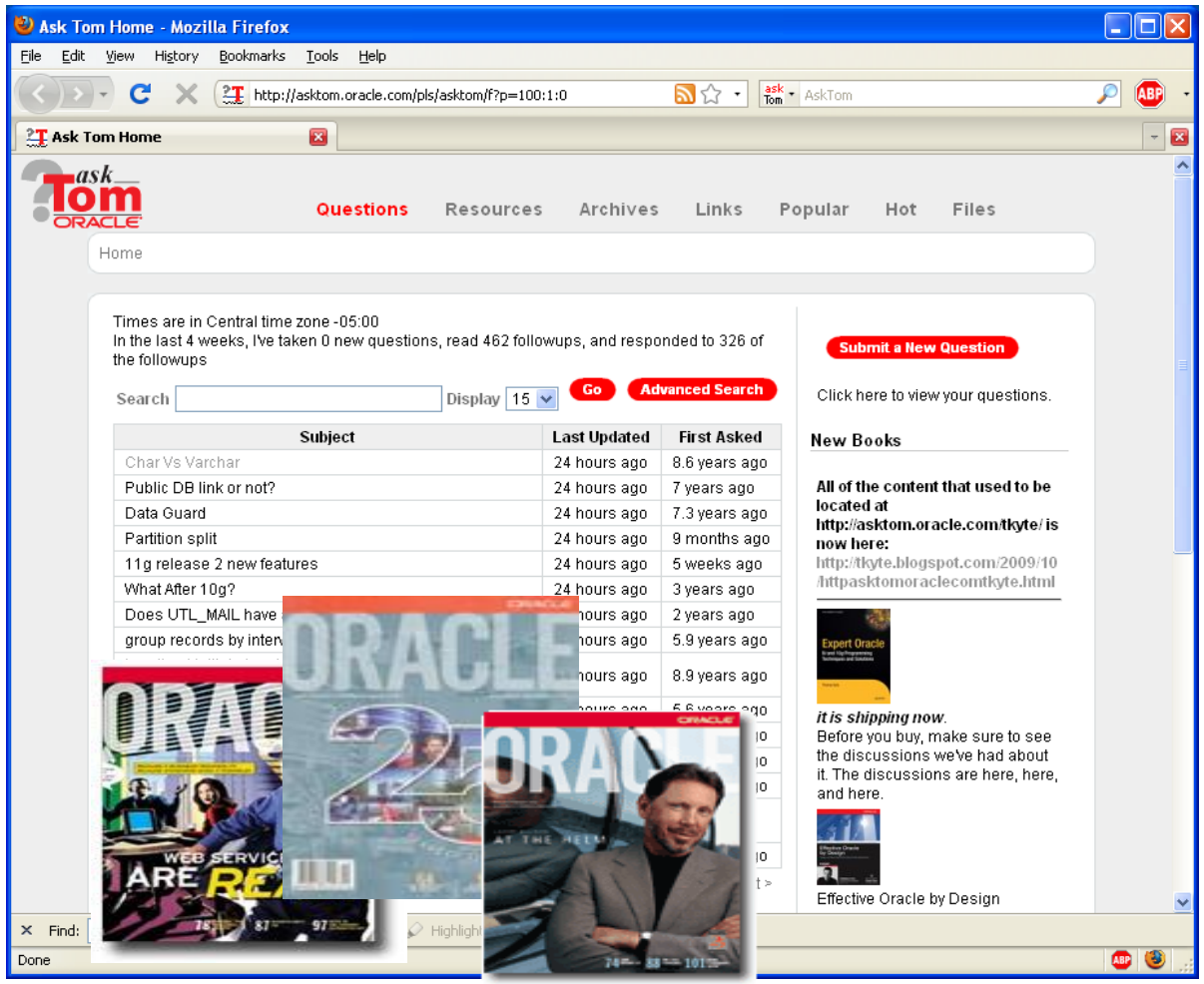
Tom Kyte



- Been with Oracle since 1993
- User of Oracle since 1987
- The “Tom” behind AskTom in Oracle Magazine

  www.oracle.com/oramag
- Expert Oracle Database Architecture
- Effective Oracle by Design
- Expert One on One Oracle
- Beginning Oracle

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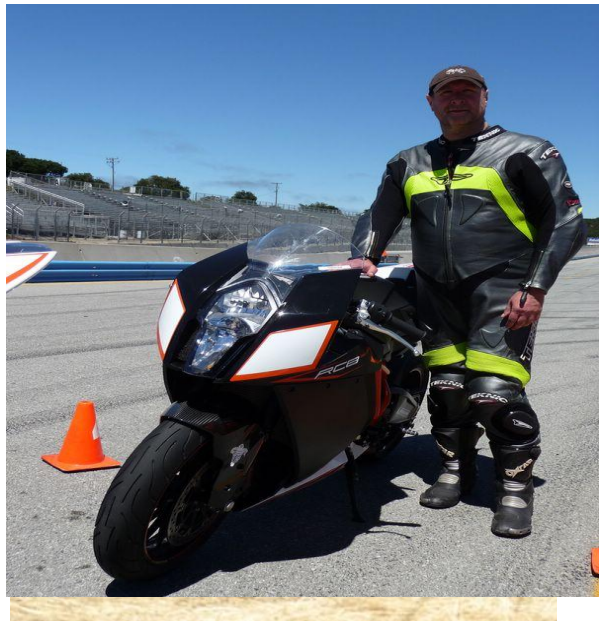
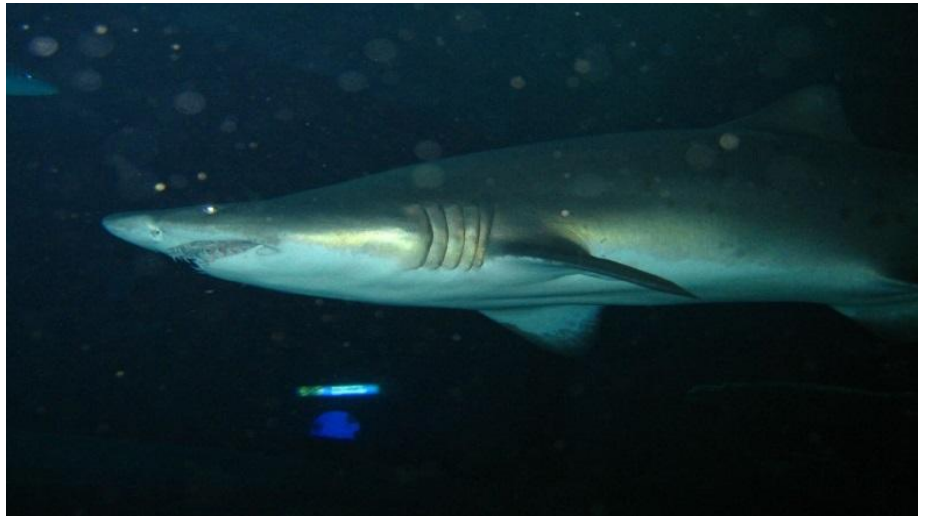
Graham Wood
Architect
Server Technologies





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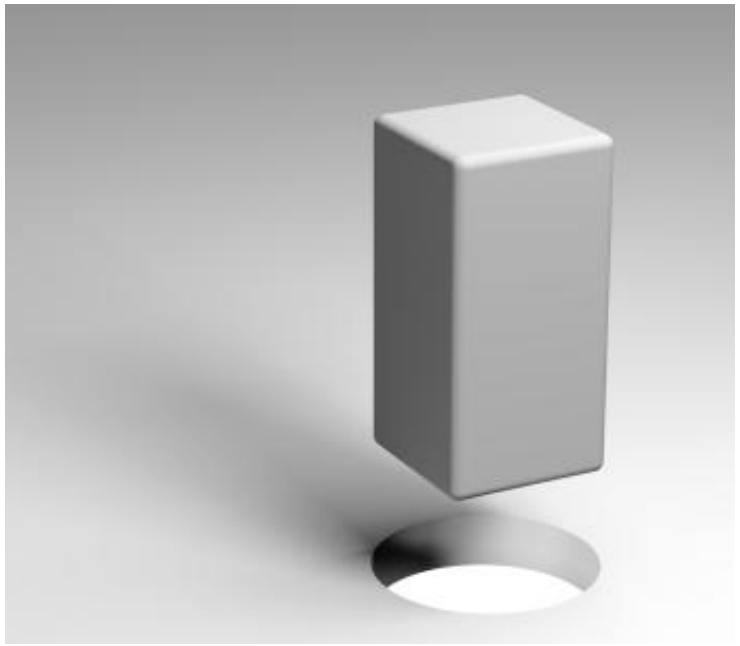
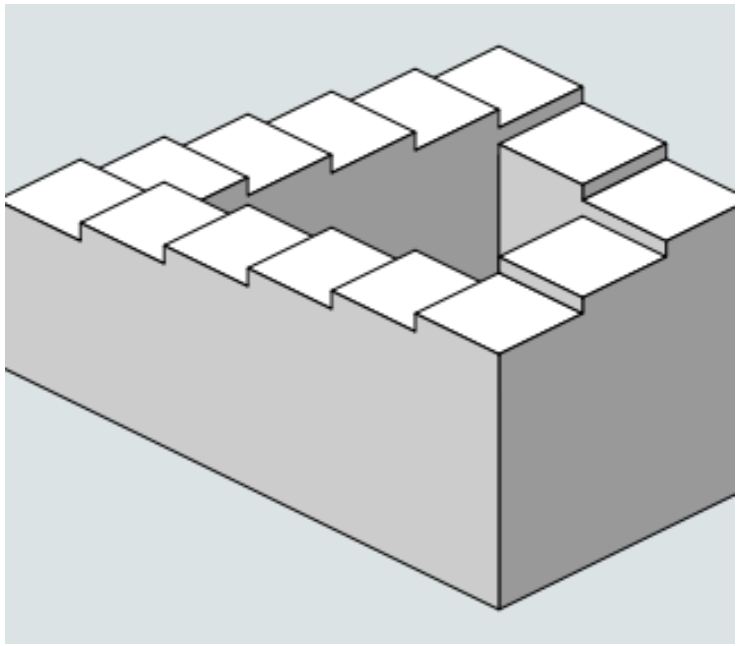
Real-World Performance Root Causes



The database is not being used as it was designed to be used



The application architecture/code design is sub-optimal

There is a sub optimal algorithm in the database

To Fix Root Causes Requires **CHANGE**

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Are you willing to be an agent of **CHANGE ?**

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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

Real-World Performance OLTP

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Agenda

1. Computer Science Basics
2. Schema Types and Database Design
3. Database Interface
4. DB Deployment and Access Options
5. Application Algorithms
6. Resource Management

Agenda

1. Computer Science Basics
2. Schema Types and Database Design
3. Database Interface
4. DB Deployment and Access Options
5. Application Algorithms
6. Resource Management

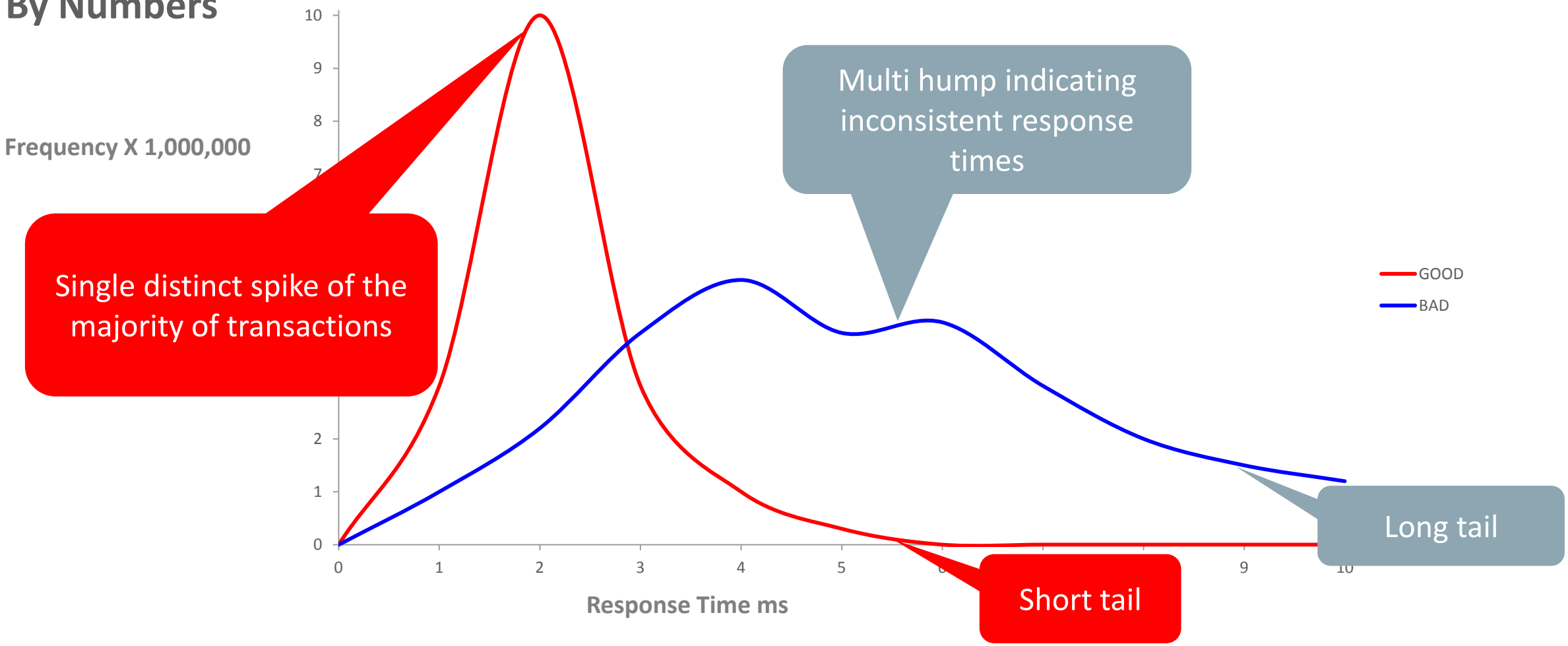
Response Time

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

By Numbers



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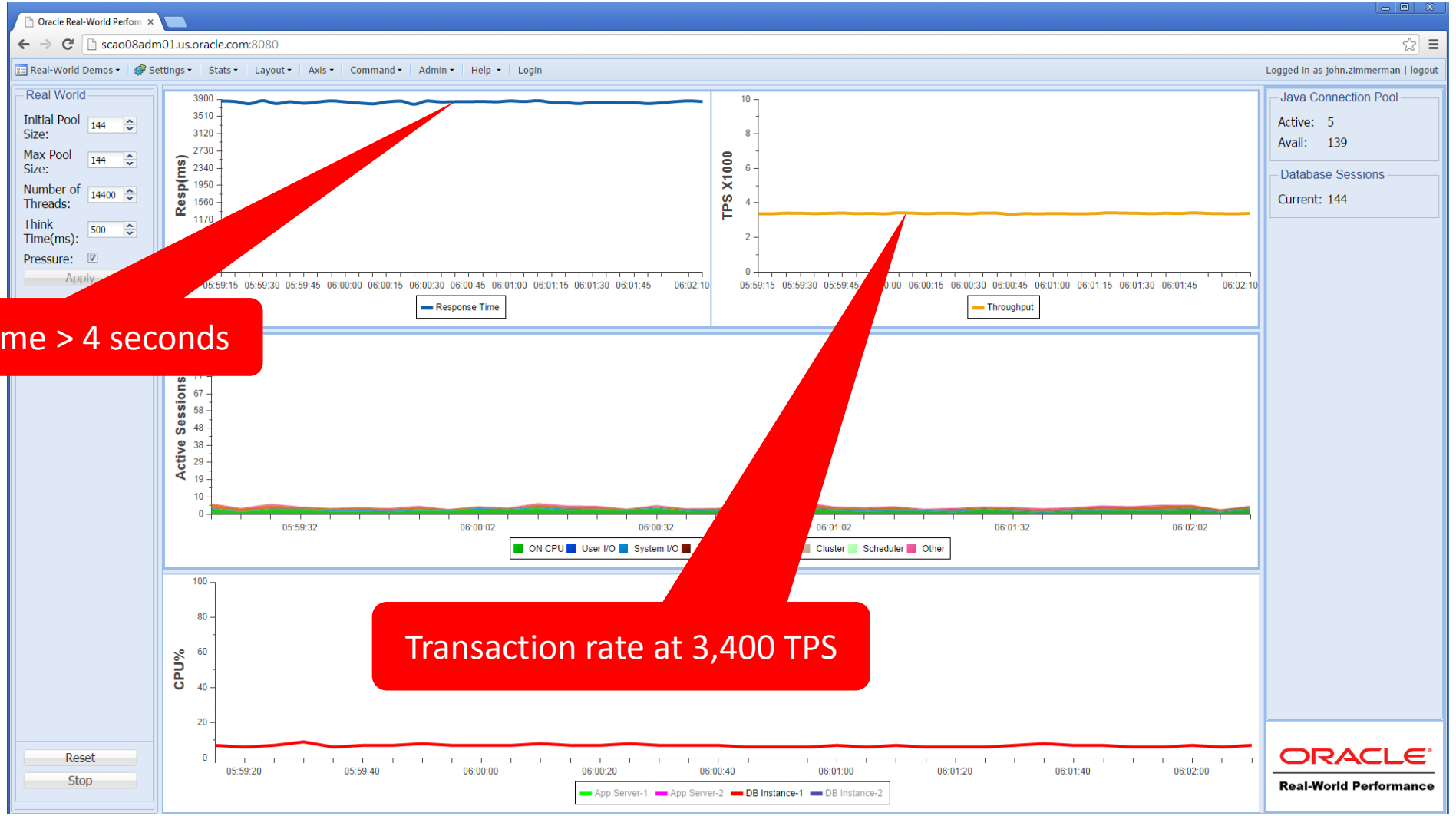
Response Time - Demo

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

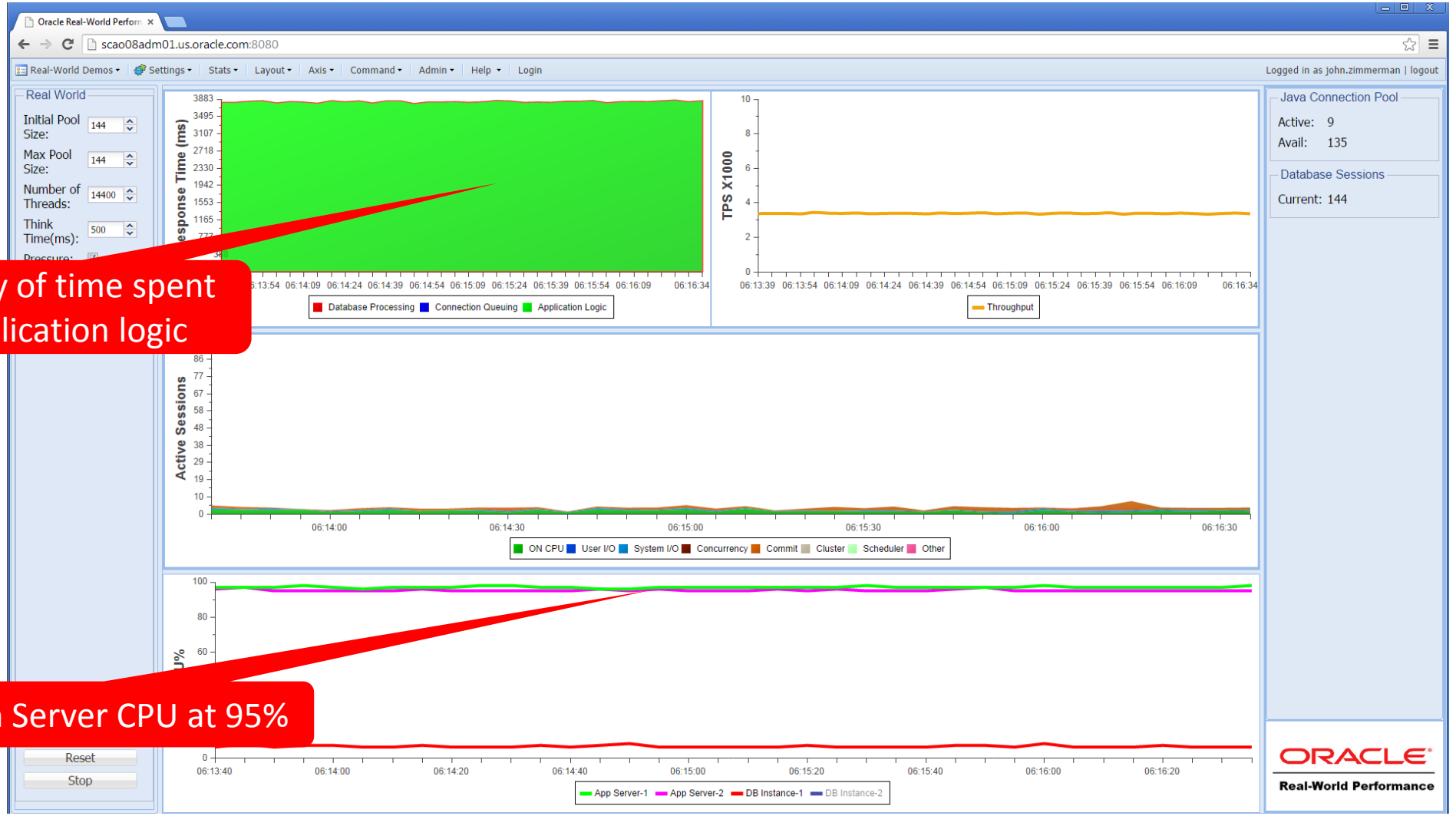
Response Time
Performance Data



Response Time > 4 seconds

Transaction rate at 3,400 TPS

Response Time
Application Server Performance Data



Majority of time spent in application logic

Application Server CPU at 95%

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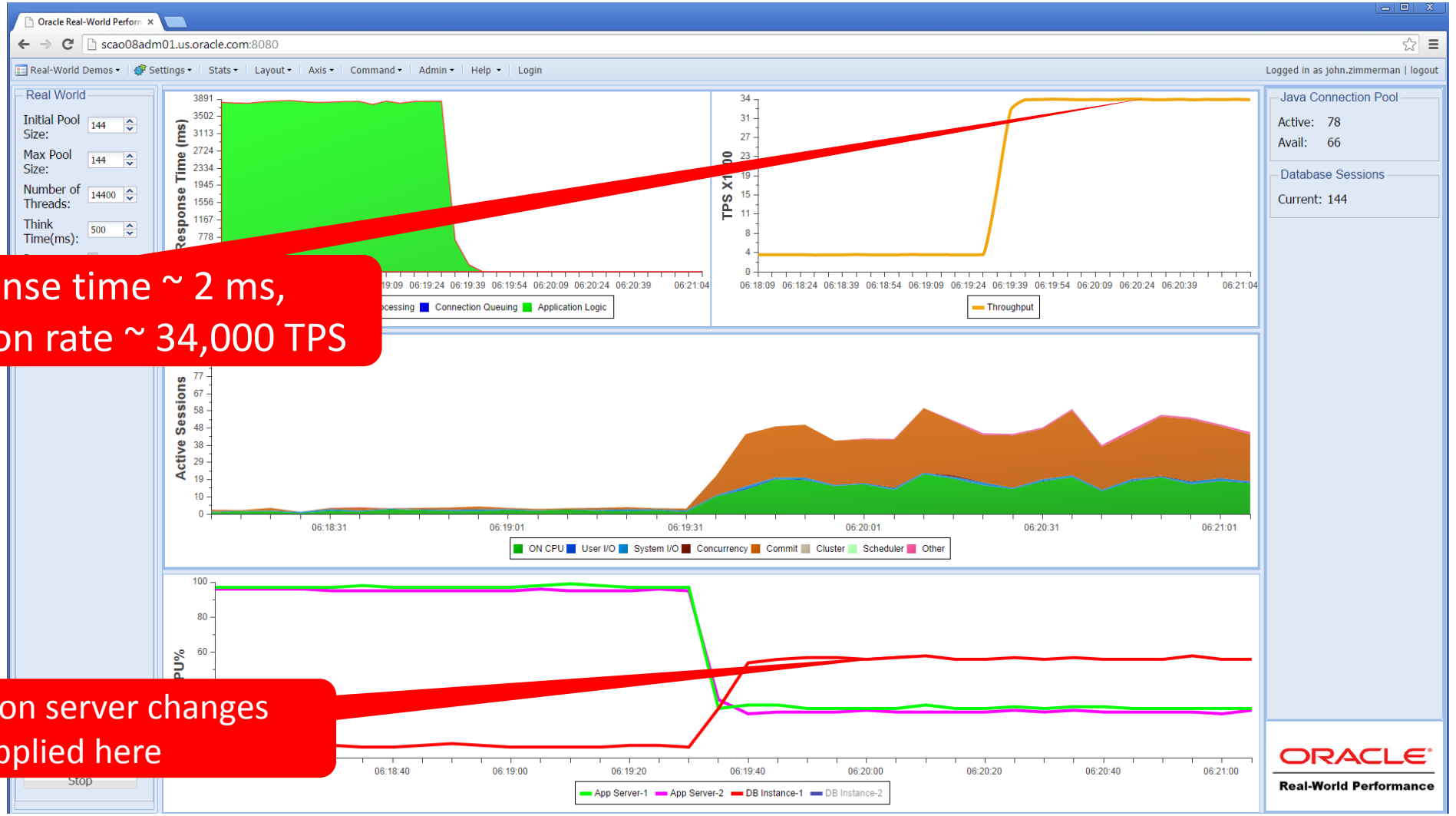
Response Time
Resolution



Response time ~ 2 ms,
Transaction rate ~ 34,000 TPS

Application server changes applied here

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Response Time

Application Server Bottleneck

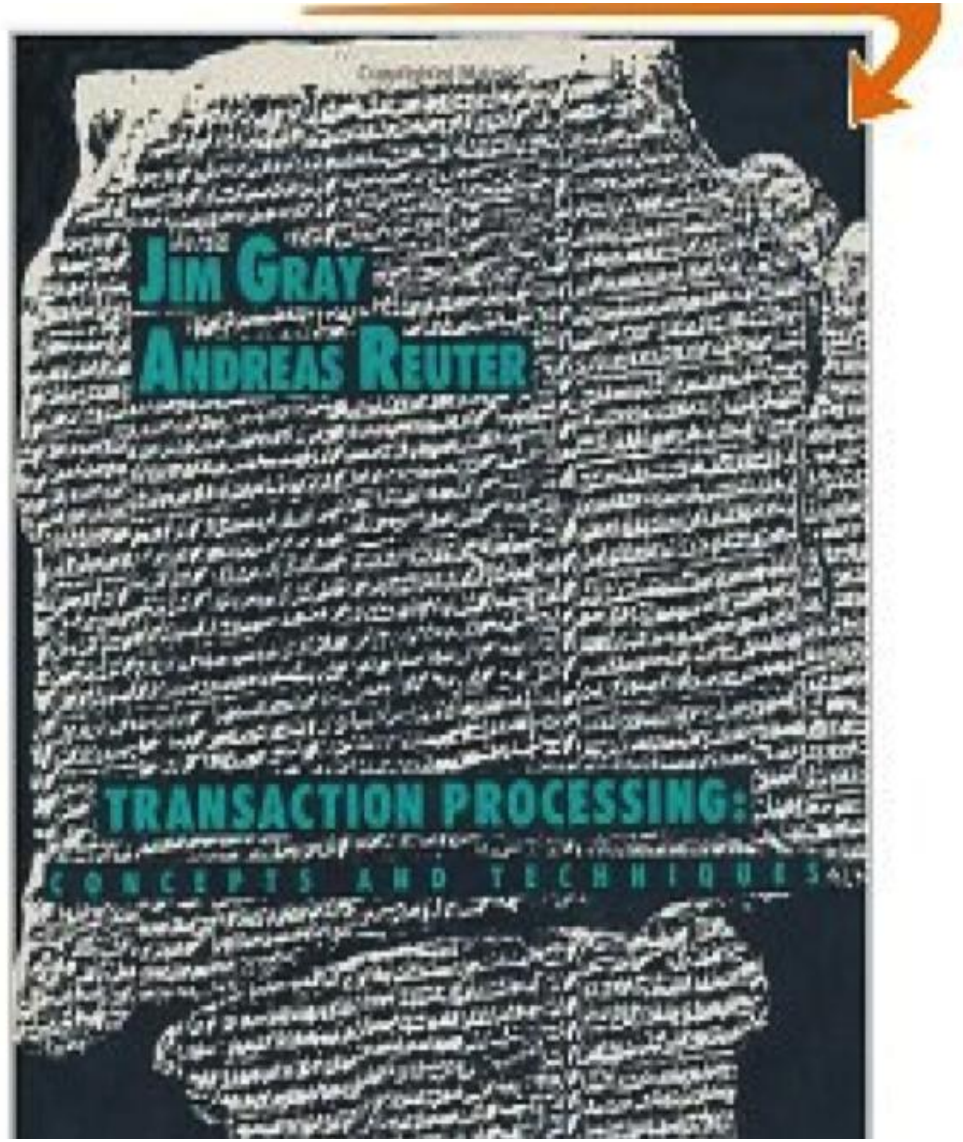
- Data analysis shows:
  - Small proportion of the actual response time is in the database
  - Majority of response time spent in application logic
  - CPU is overloaded on the application servers
  - Potential root cause:
    - Capacity planning mistake ?
    - Application code change last week ?

High Performance Applications

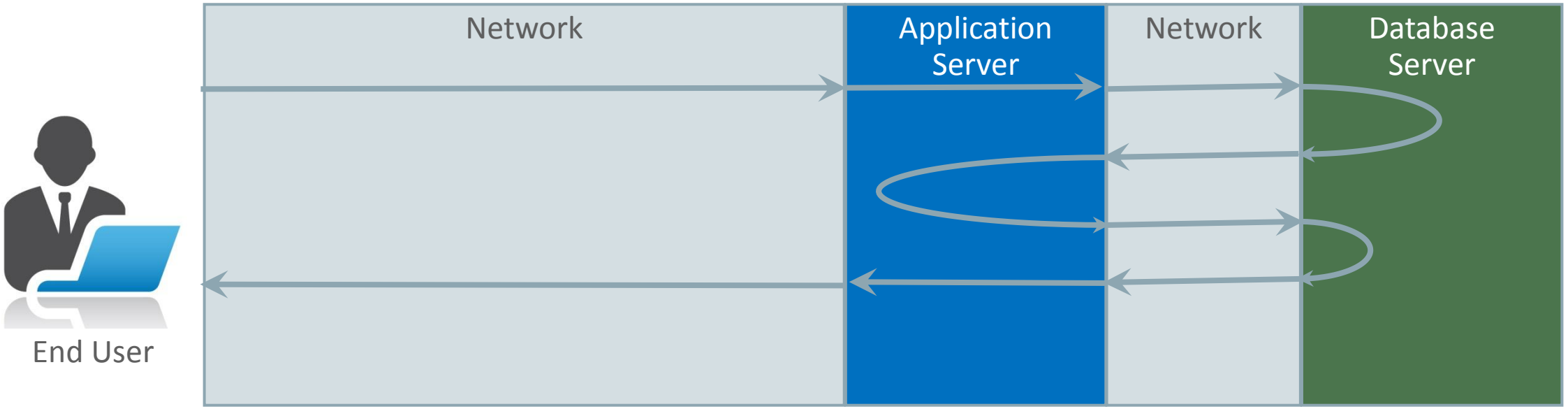
The Challenge

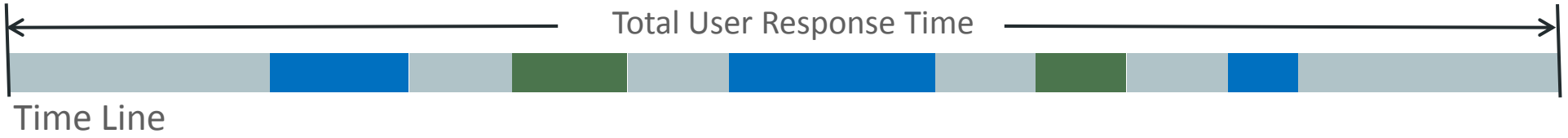
- The impact of how application code impacts system performance should never be underestimated
  - This fact has been known for a long time
  - It has been ignored for almost as long
- Education of developers on the correct way to write code is a continuous, repeating activity
  - New developers graduate every year!
- Poor coding techniques combined with classic programmer bugs can render investments in the system worthless

Some Computer Science Basics



Response Time v DB Time v Latency





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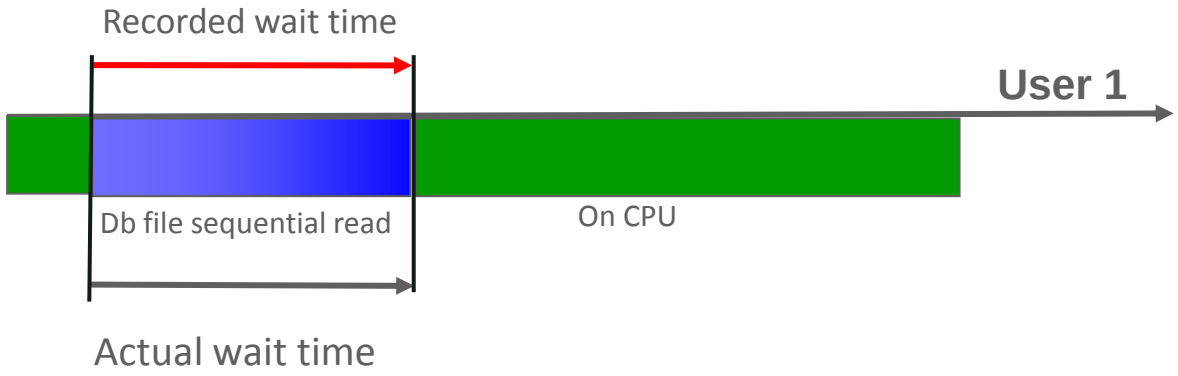
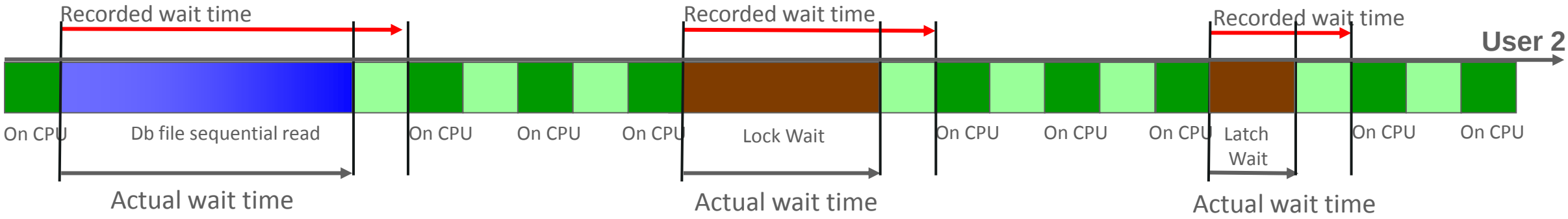
Database Time – Total time spent in database

ON IDLE SYSTEM



ON DEGRADED SYSTEM



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Latency - Some Important Numbers

Best Block Access Speeds

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

Database Performance Core Principles

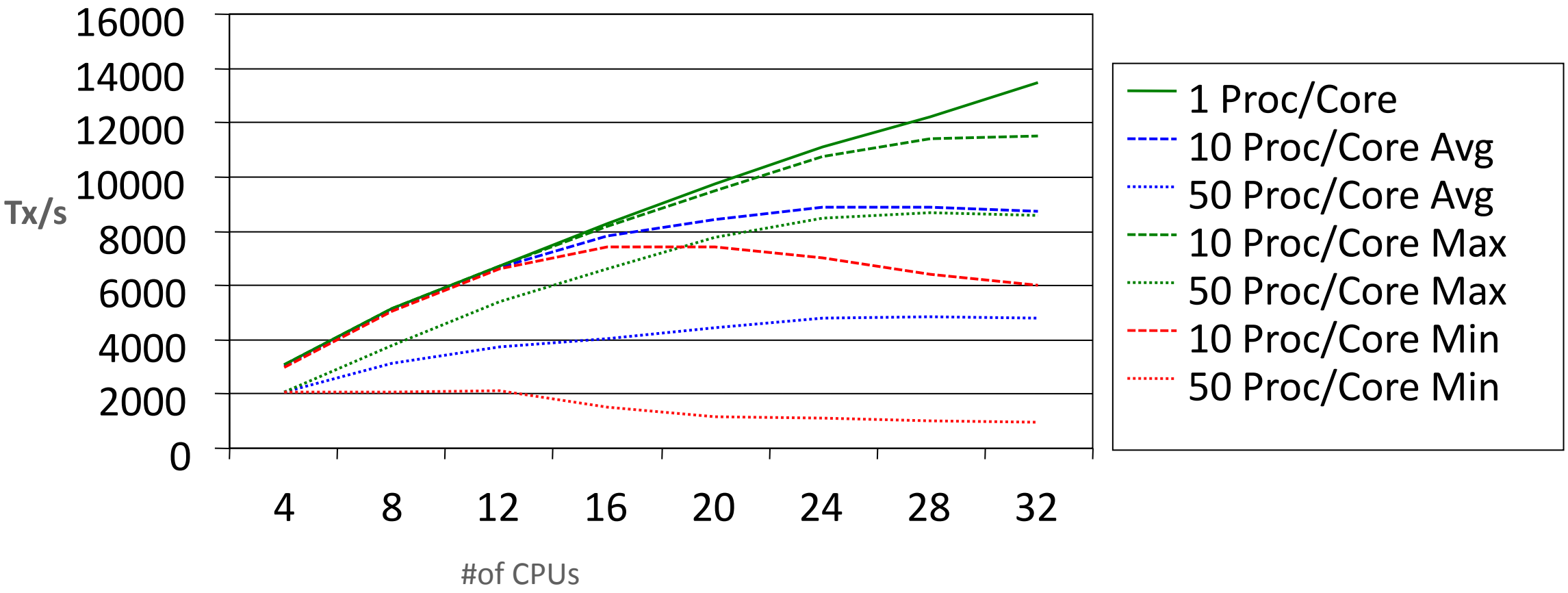
- The Oracle database is a process based architecture and to perform efficiently each process requires:
  - To be efficiently scheduled by the O/S until the process completes the SQL statement, or blocks on an operation required to complete the SQL statement e.g. Disk I/O
  - If the process has to fight 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 CPU-consuming 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

Impact of Too Many Processes



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Connection Pooling

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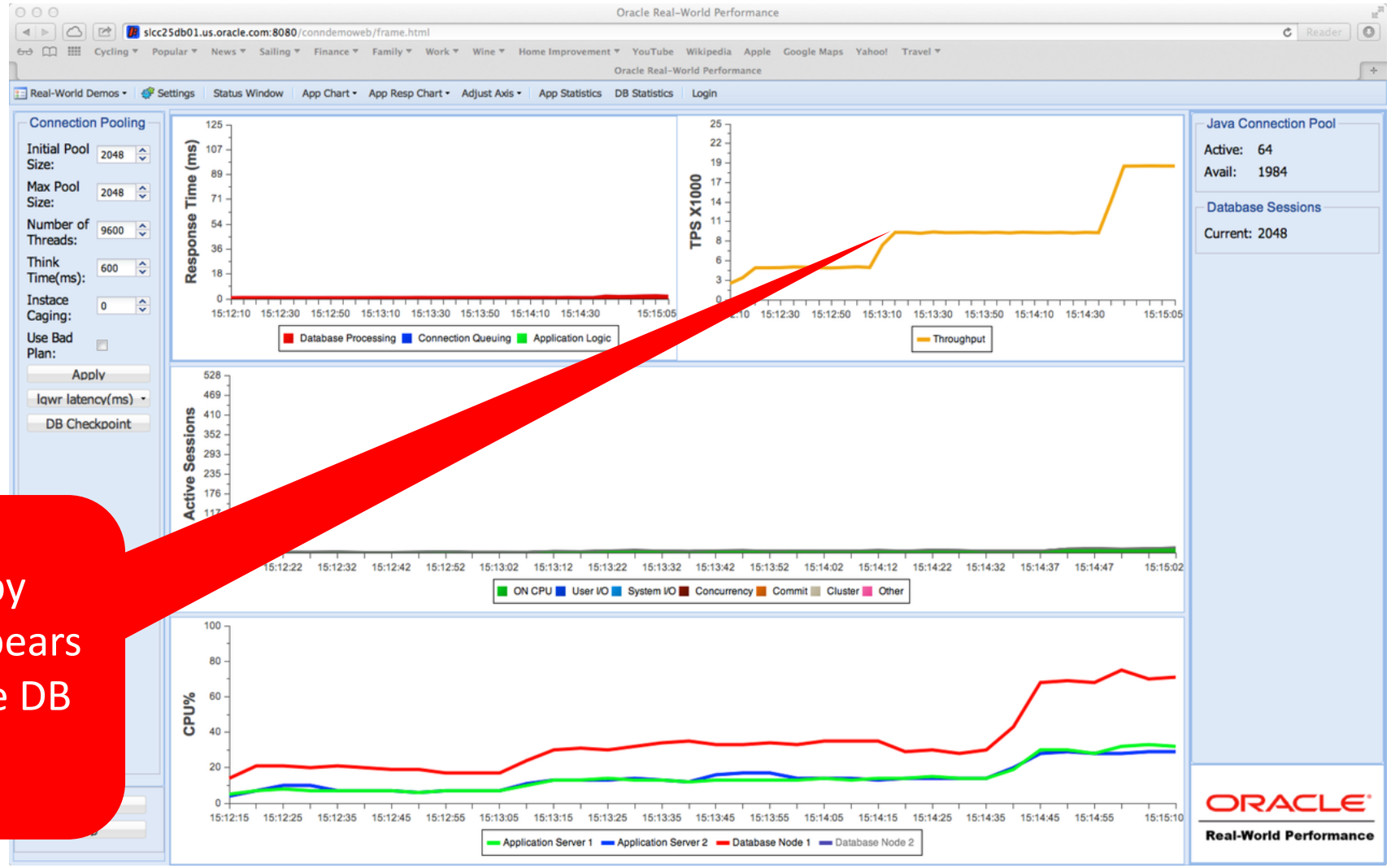
RWP Video

Connection Pools

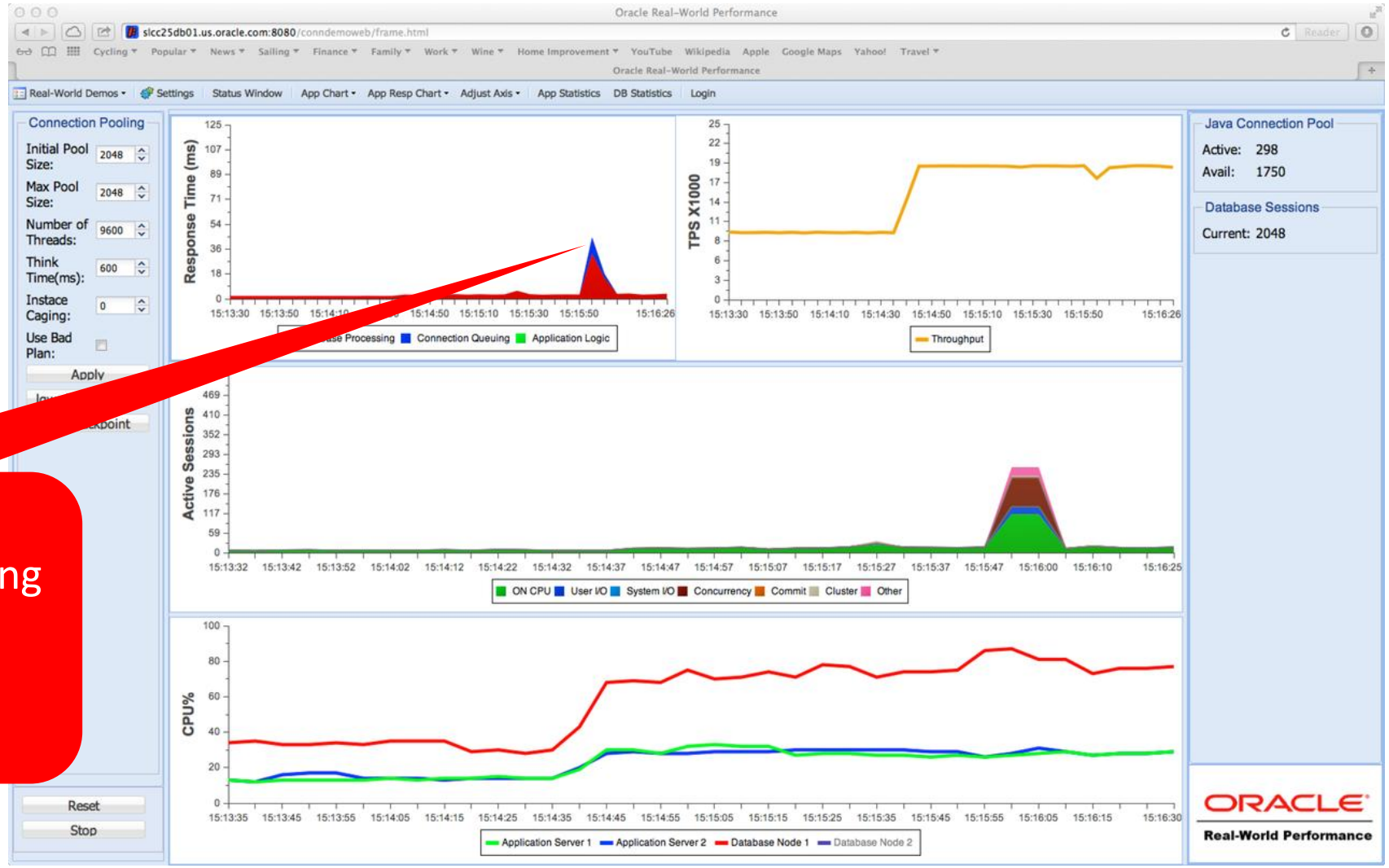
Performance Data



The workload is increased by doubling the load. System appears scalable up to 60% CPU on the DB server.

Connection Pools

Performance Data



A checkpoint is initiated, creating a CPU spike that results in unpredictable response time

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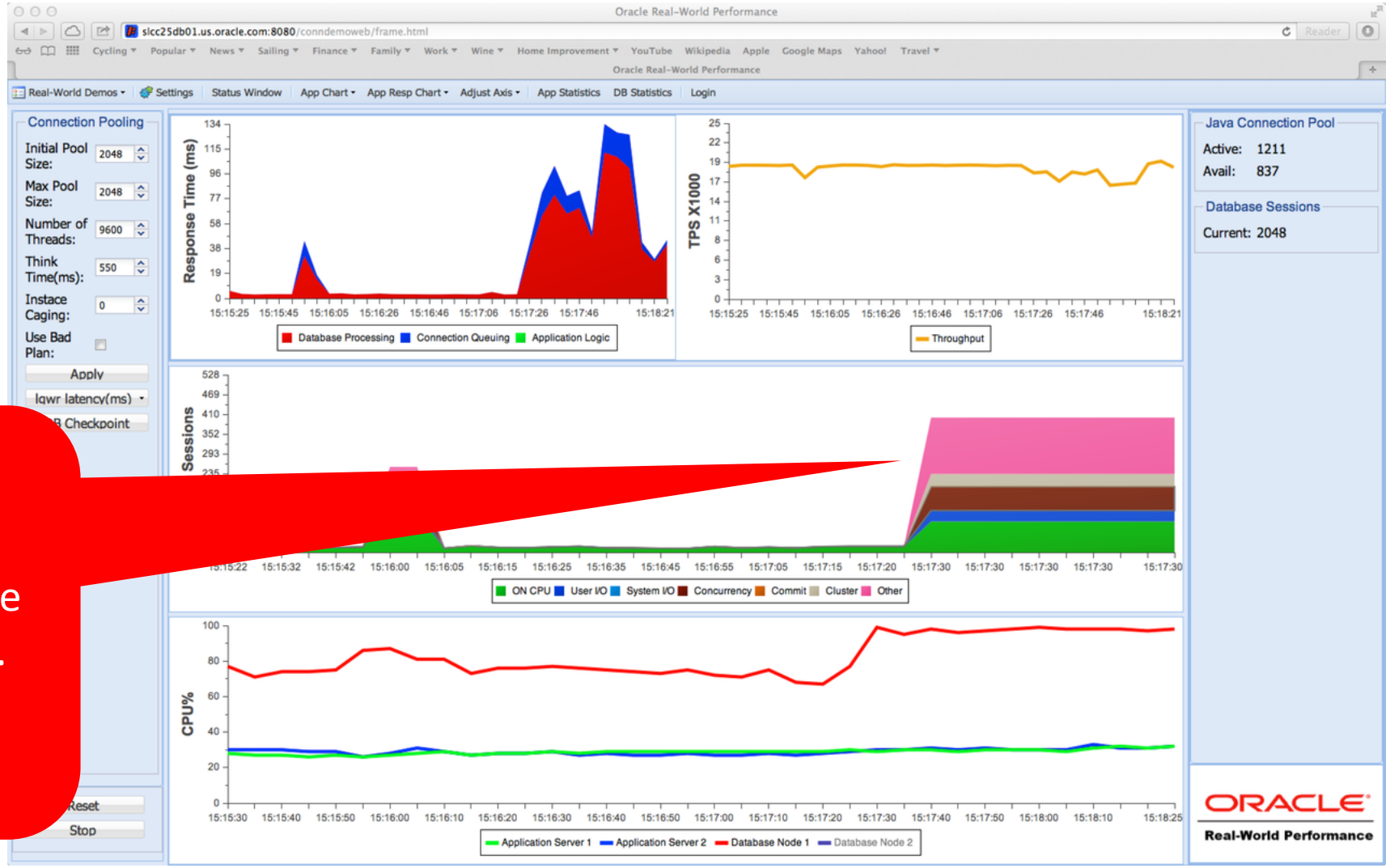
Connection Pools

Performance Data



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

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Connection Pools

Performance Data

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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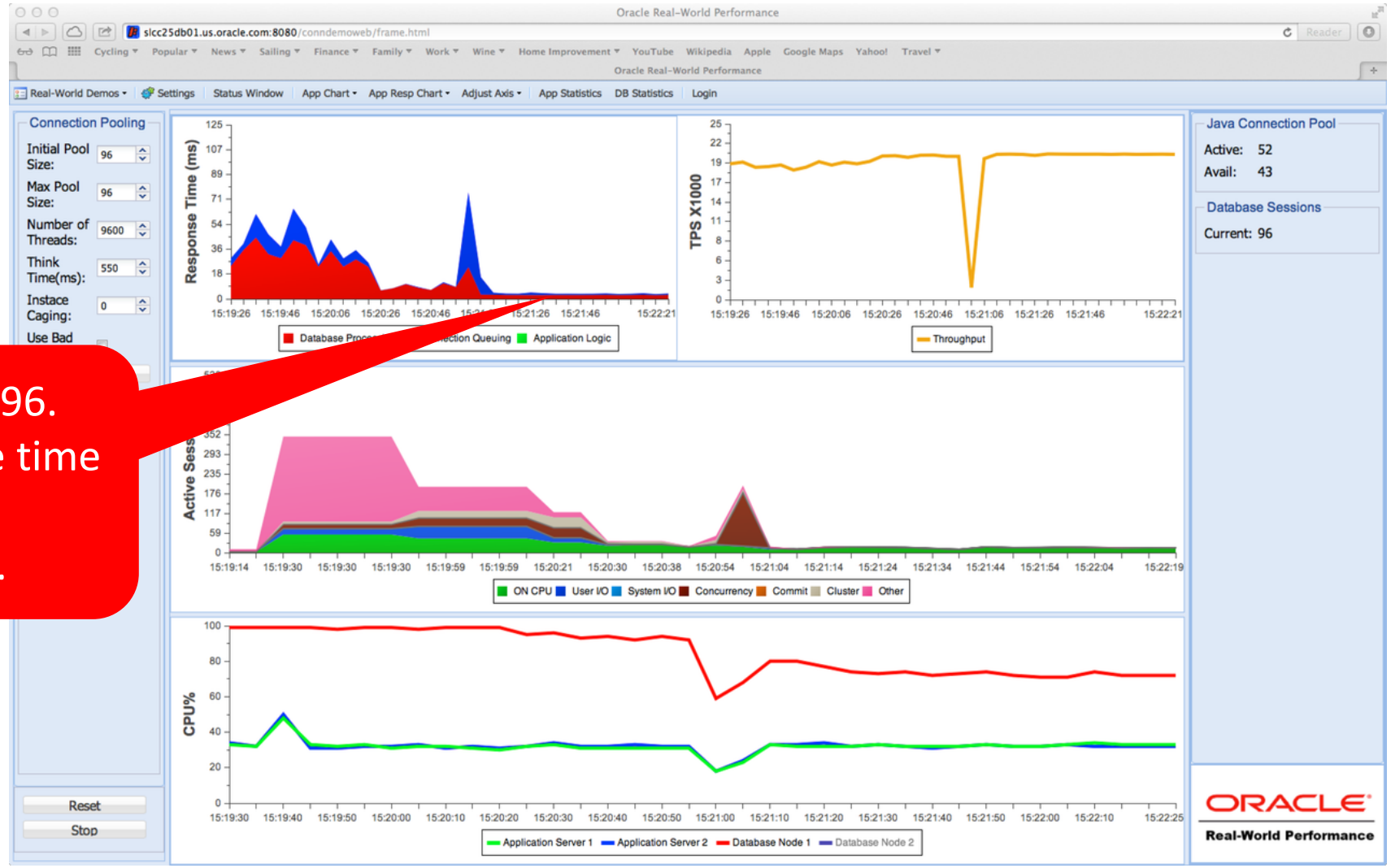
Connection Pools

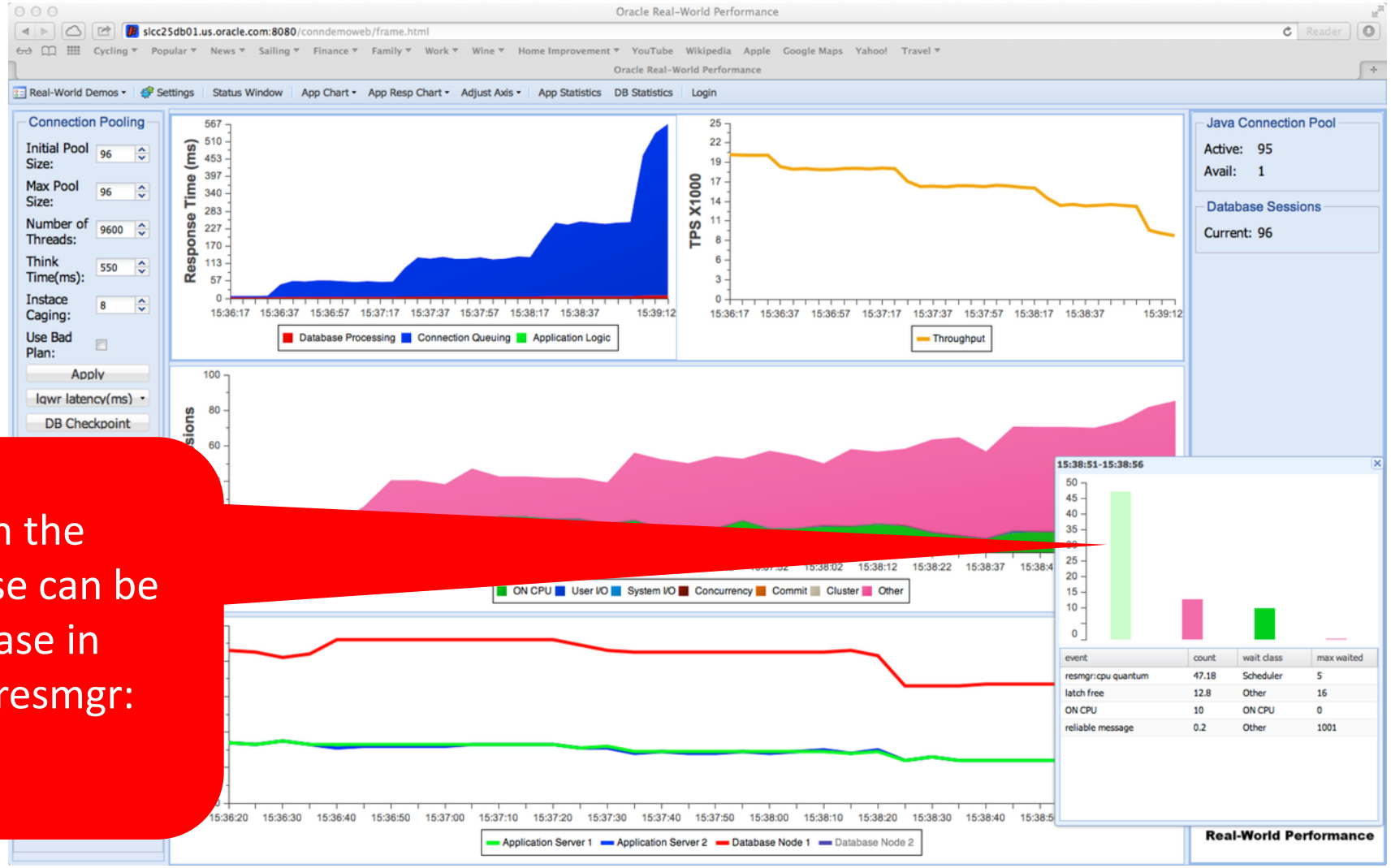
Performance Data



Connection pool reduced to 96.
Note improvement in response time and transaction rate.
CPU utilization is reduced.

Resource Management

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

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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

Cursors and Connections

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Parsing Demo

Bad Performance with Logons

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Poor response time

Low transaction rate

Cannot make the system busy

Parsing Demo

Connection Pools and Hard Parse

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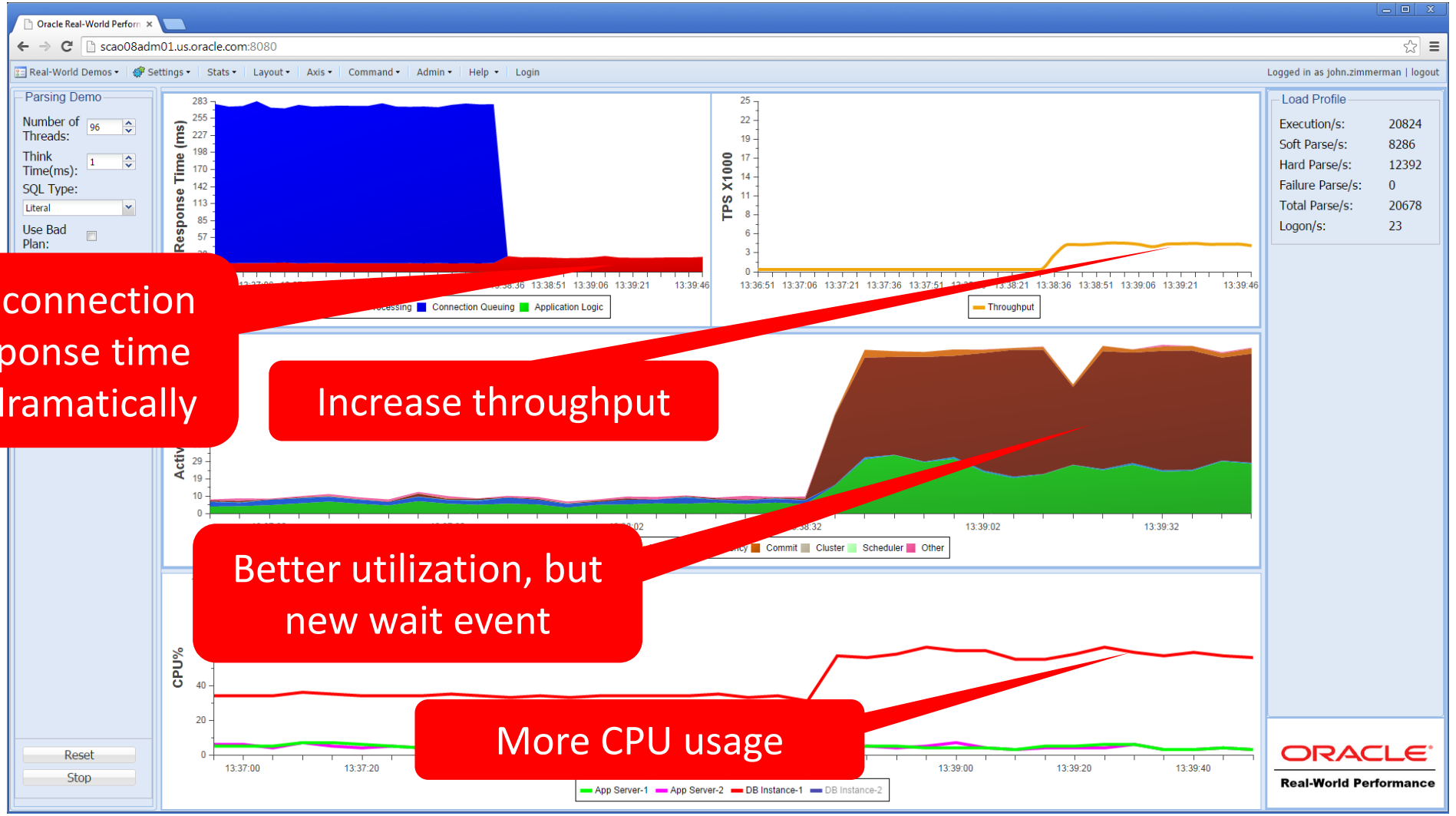

Switch to connection pool. Response time improve dramatically

Increase throughput

Better utilization, but new wait event

More CPU usage

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Parsing Demo

Bind Variables and Soft Parse

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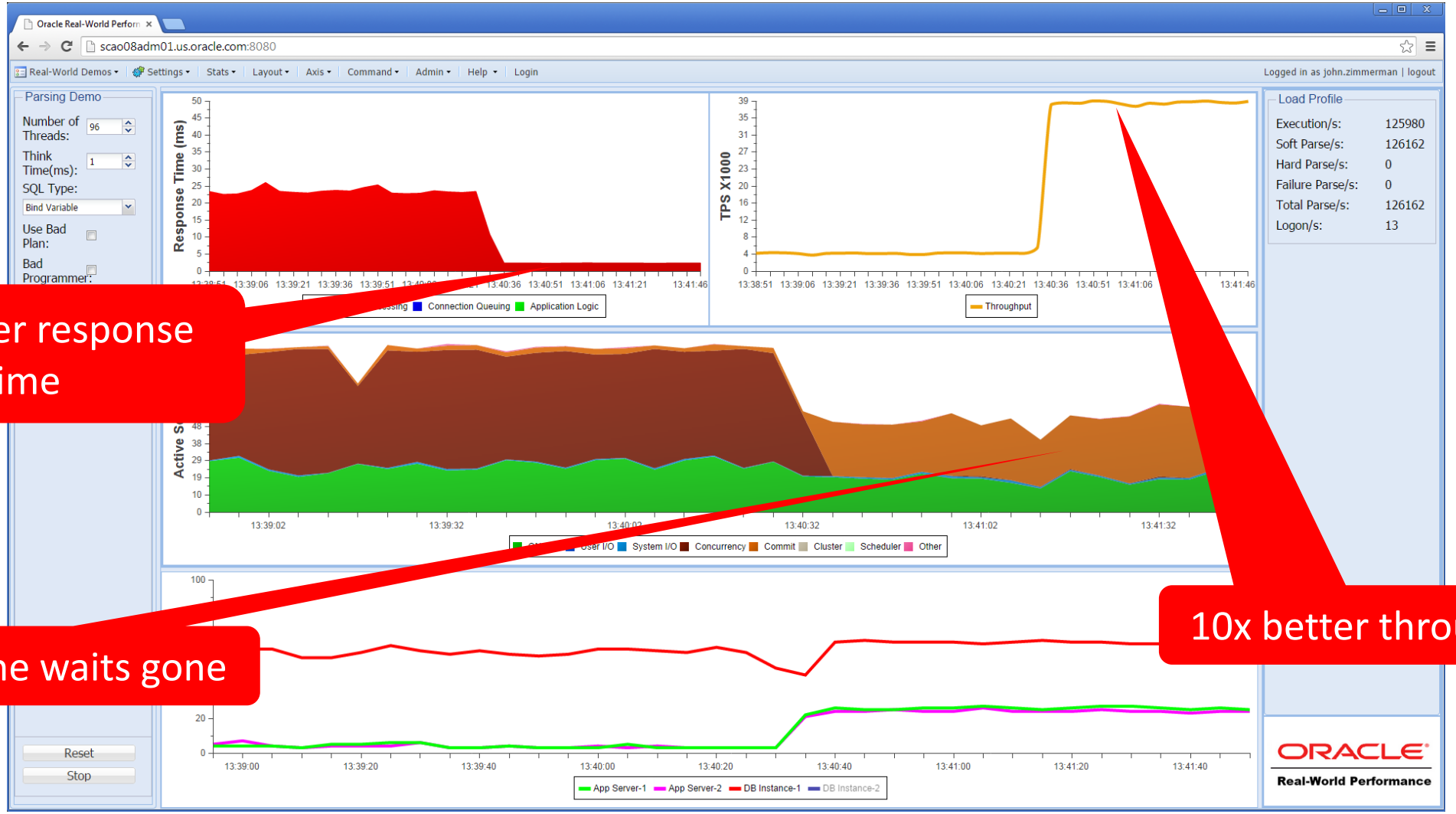

10x better response time

Row cache waits gone

10x better throughput

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Parsing Demo

Shared Cursors and One Parse

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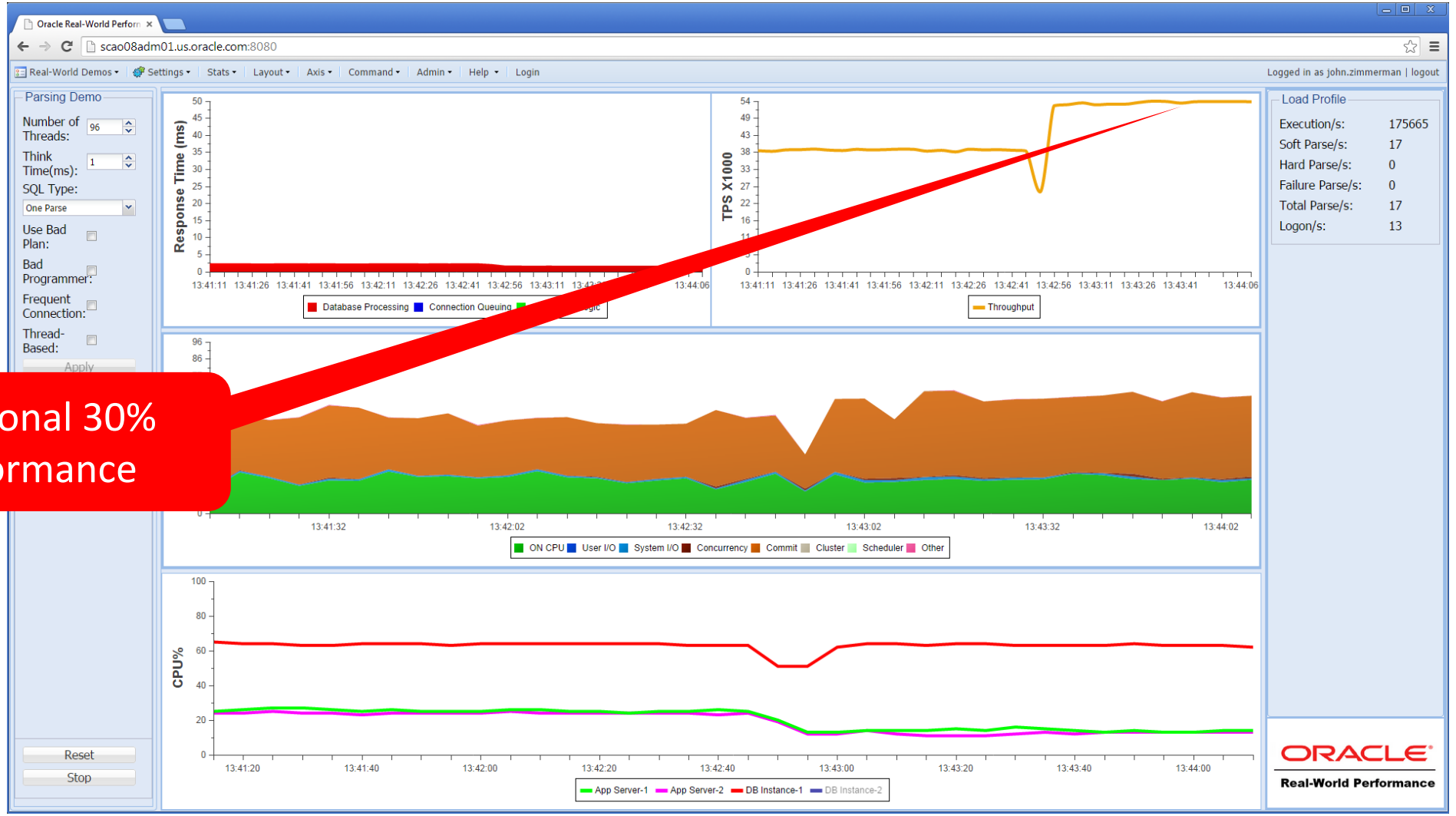
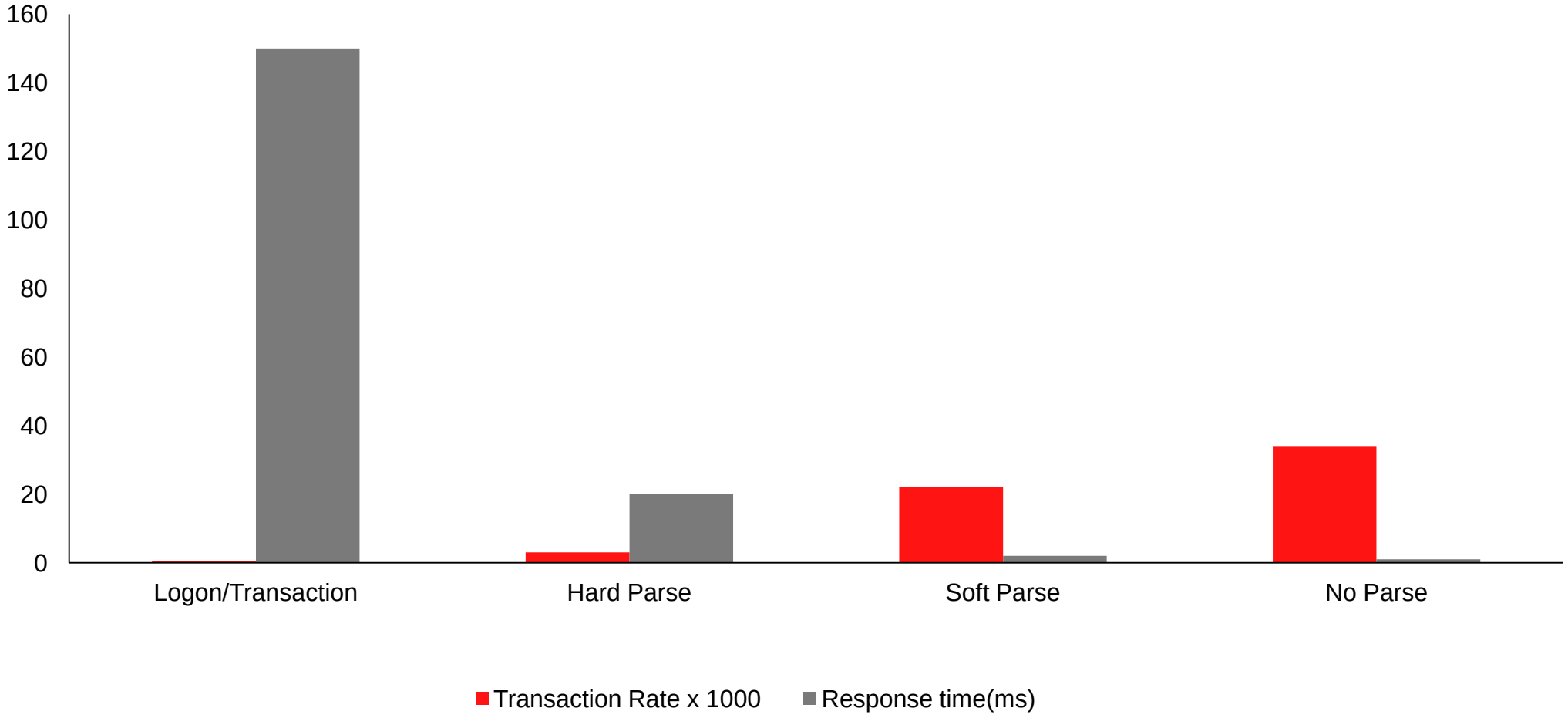


Additional 30% performance

Parsing Demo

Incorrect Use of Sessions and Cursors



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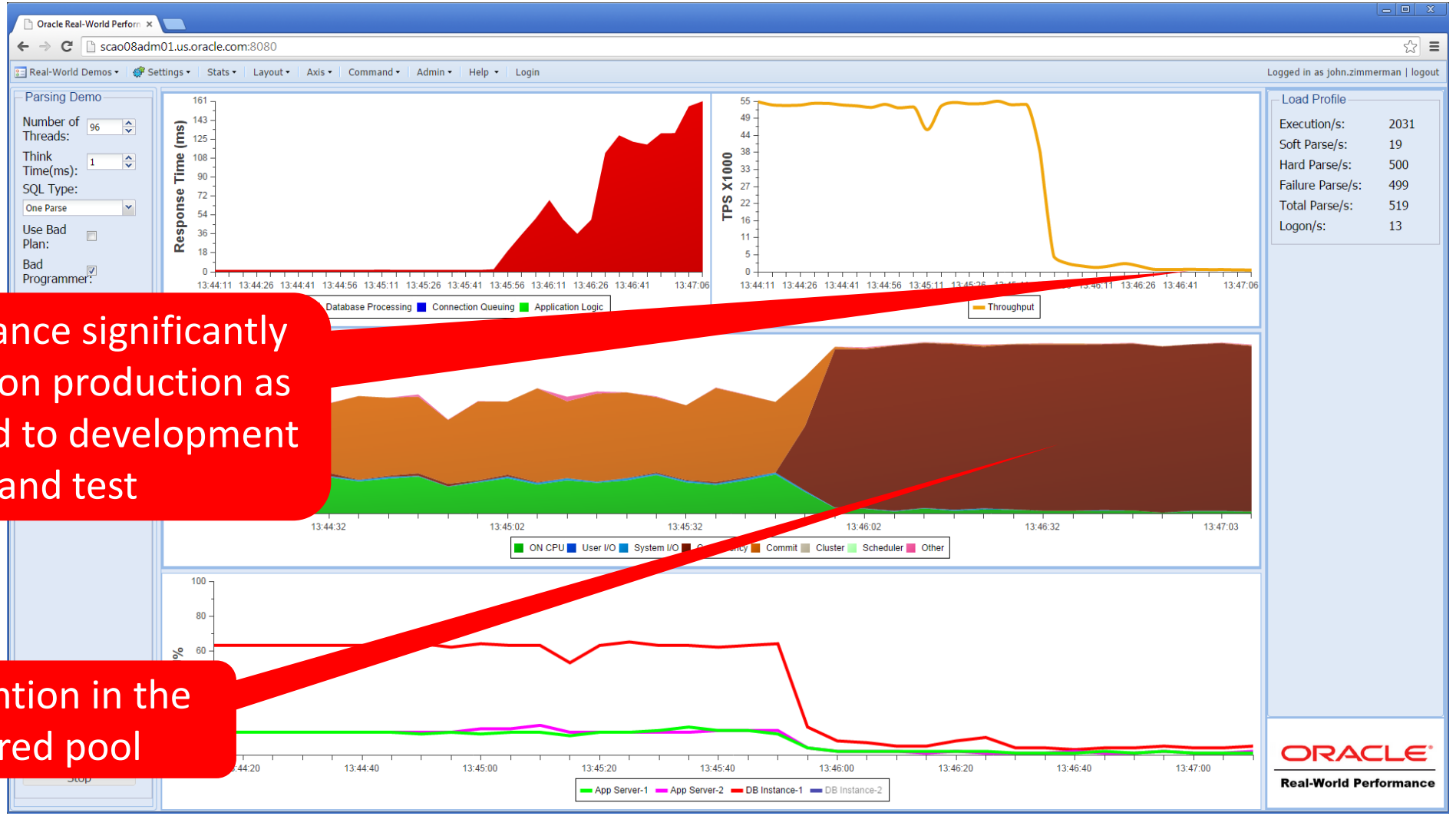
Parsing Demo

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



Performance significantly reduced on production as compared to development and test

Contention in the shared pool

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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

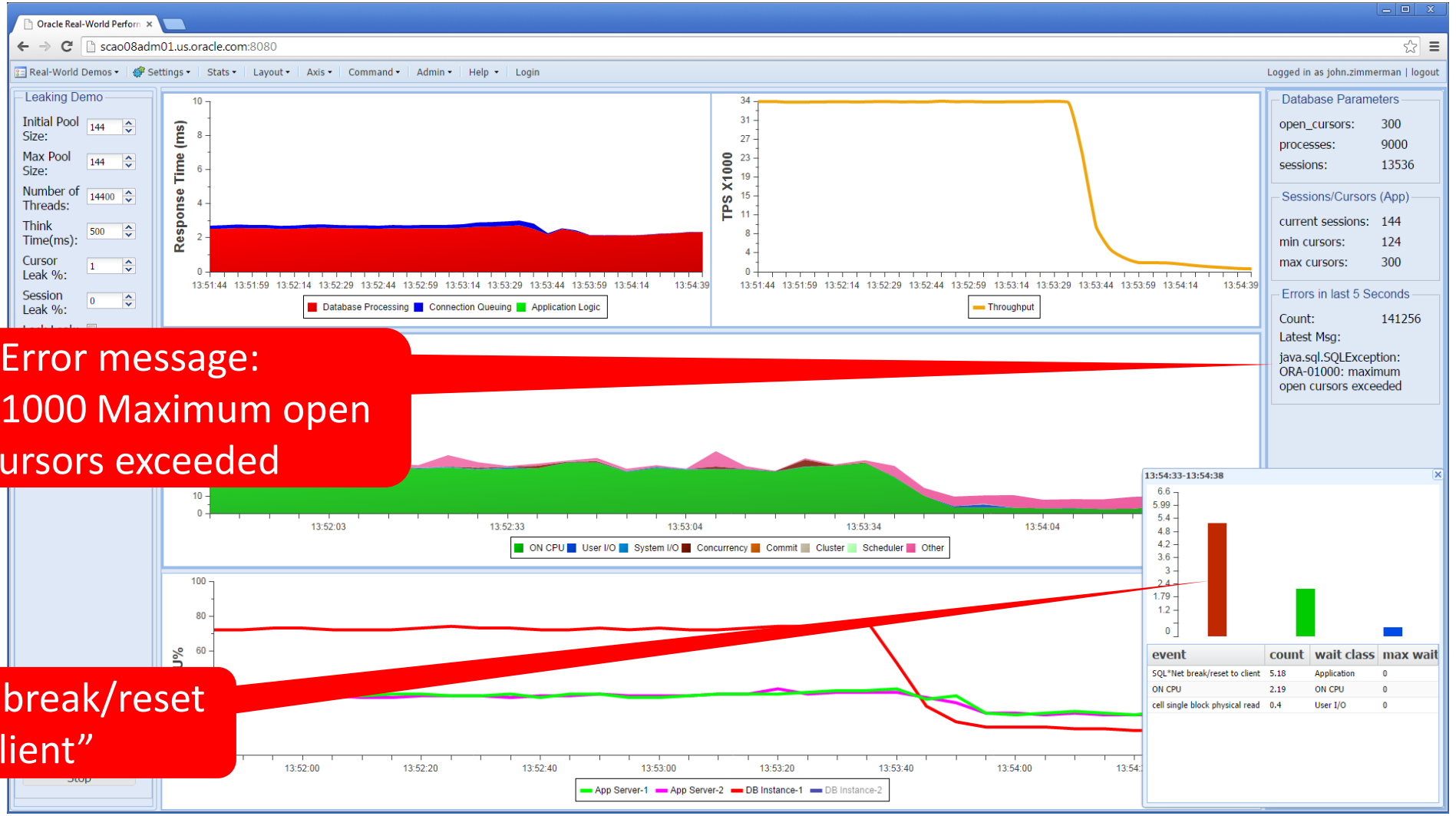
ORACLE RWP Video

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



Error message:
ORA-01000 Maximum open cursors exceeded

"SQL*Net break/reset to client"

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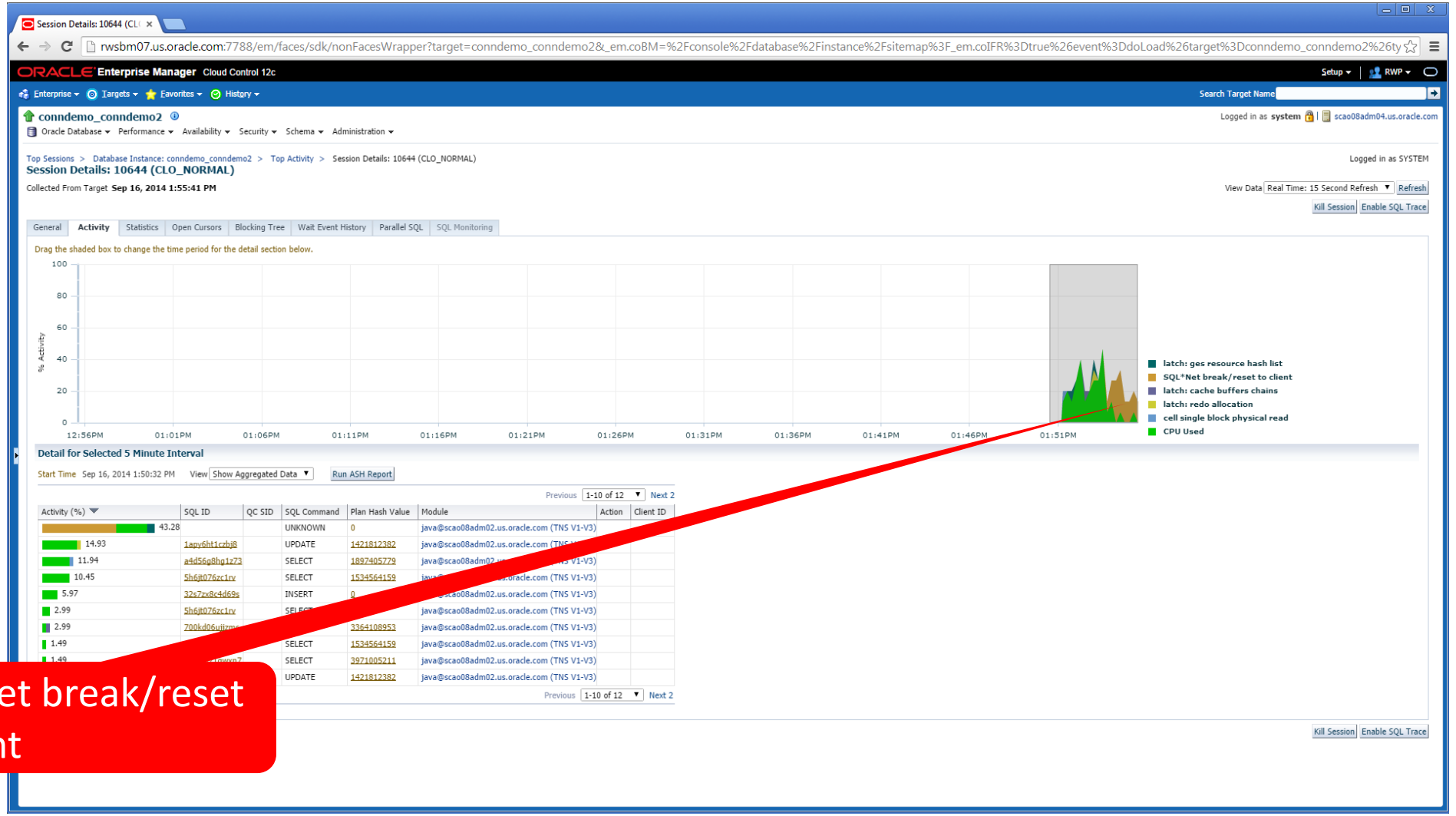
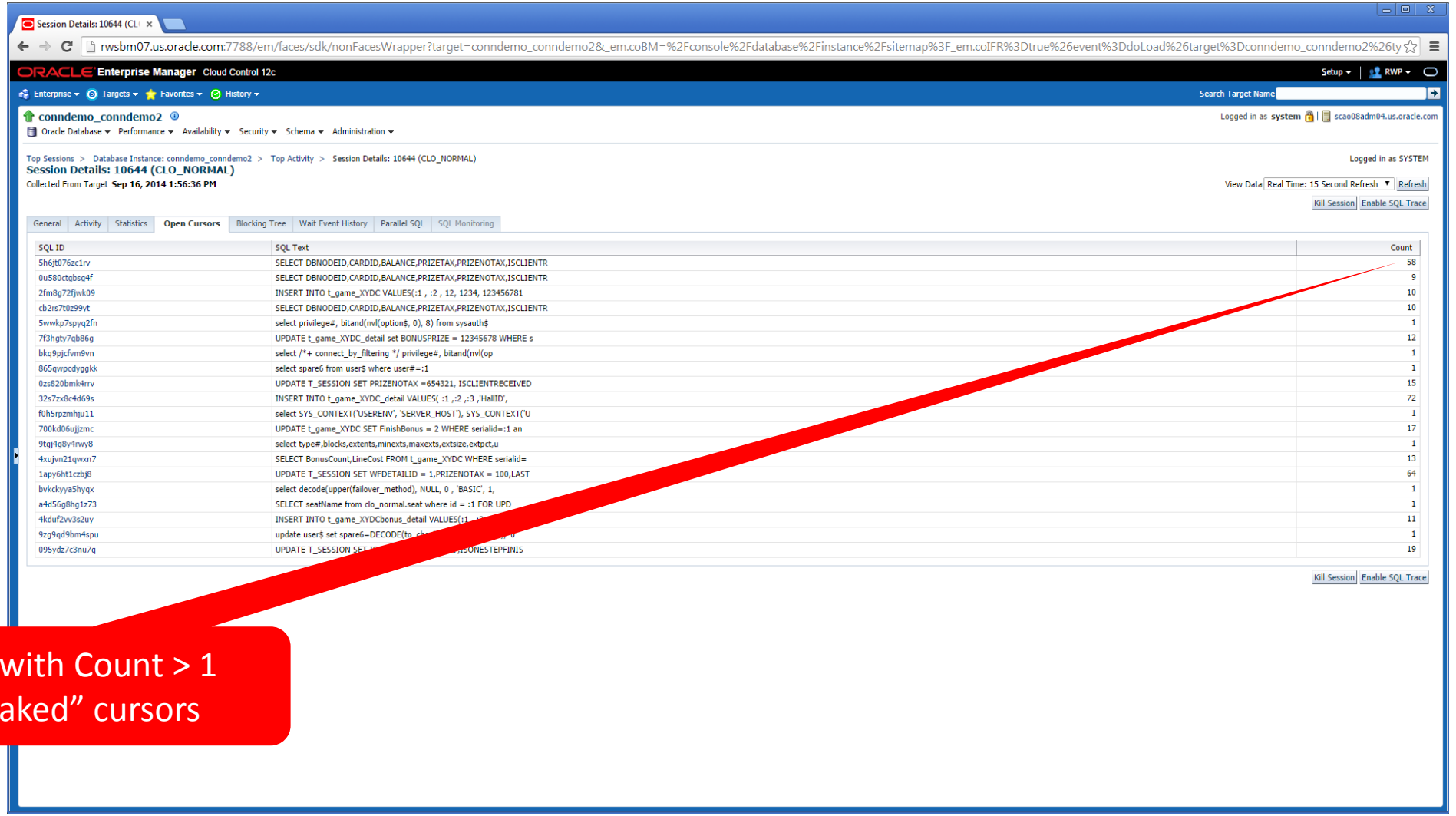
Leaking
Session Details



SQL*Net break/reset to client

Leaking
Cursor Data



Cursor list with Count > 1 implies “leaked” cursors

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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

Load diminishes to zero

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

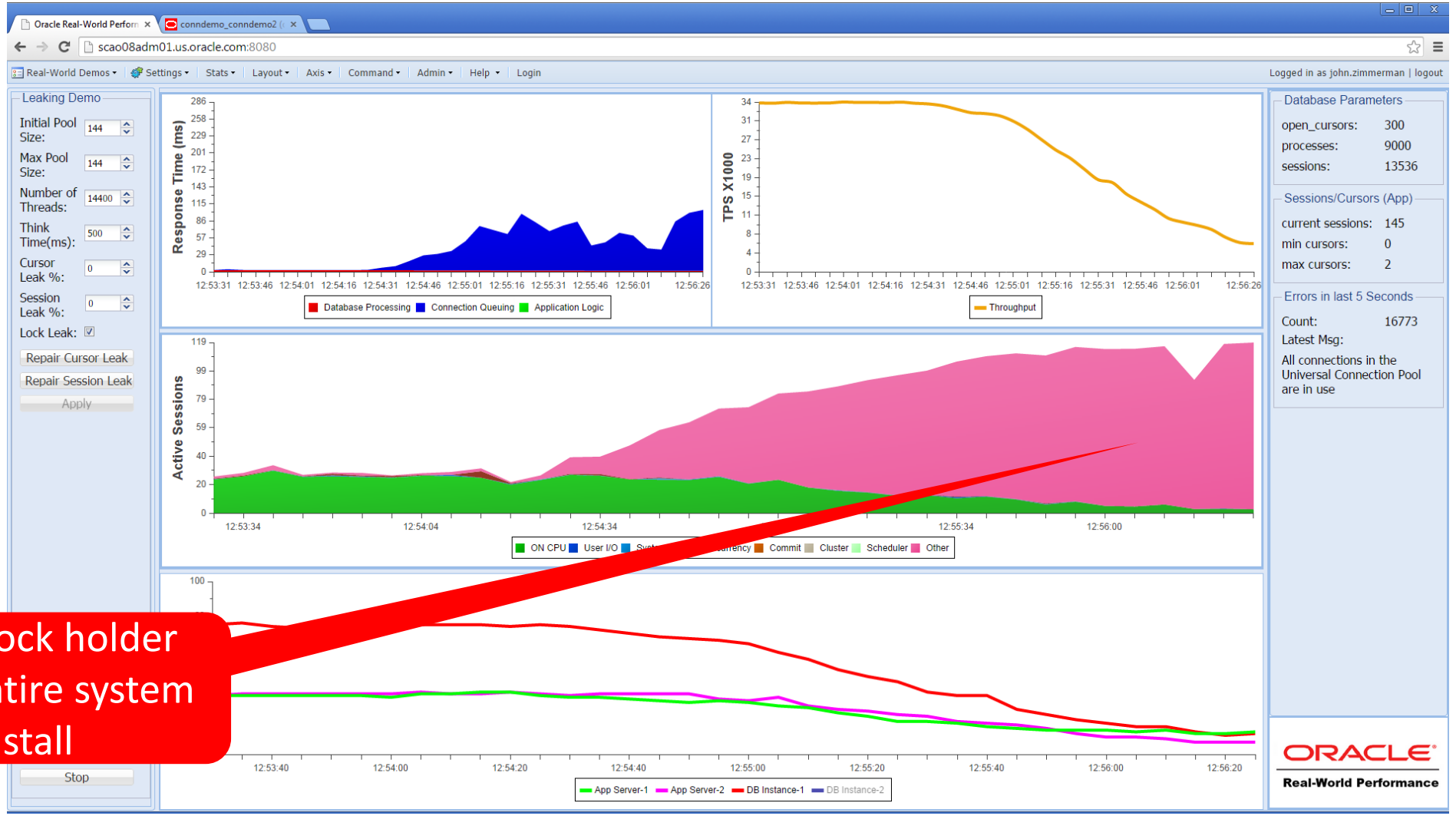
- Potential indicators of session leaking:
  - Frequent application server resets
  - init.ora parameters process and sessions set very high
  - Configuration of large and dynamic connection pools
  - Large number of idle connections connected to the database
  - Free memory on database server continually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



Leaked lock holder causes entire system to stall

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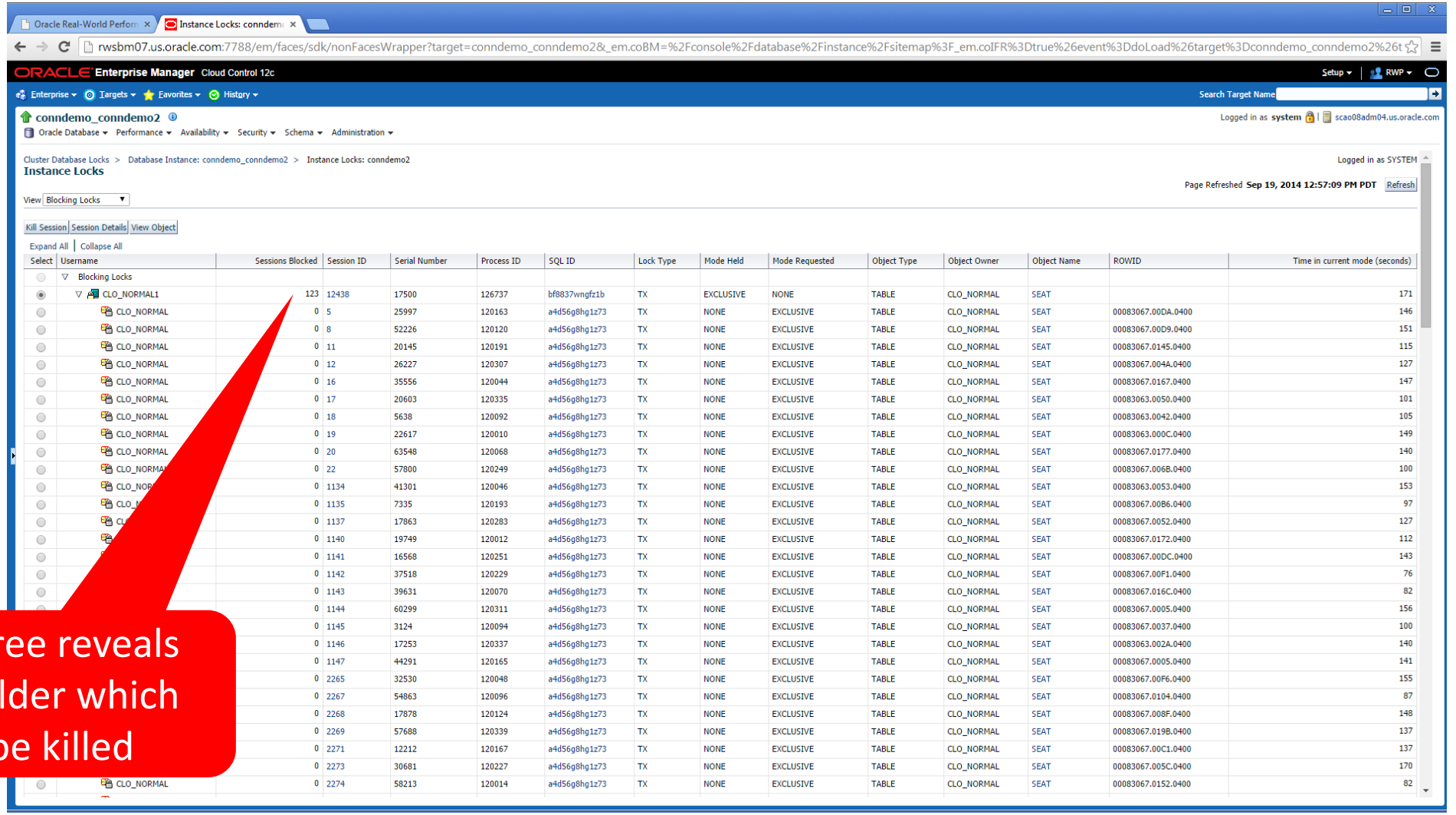
Leaking
Blocking Tree



Block tree reveals lock holder which can be killed

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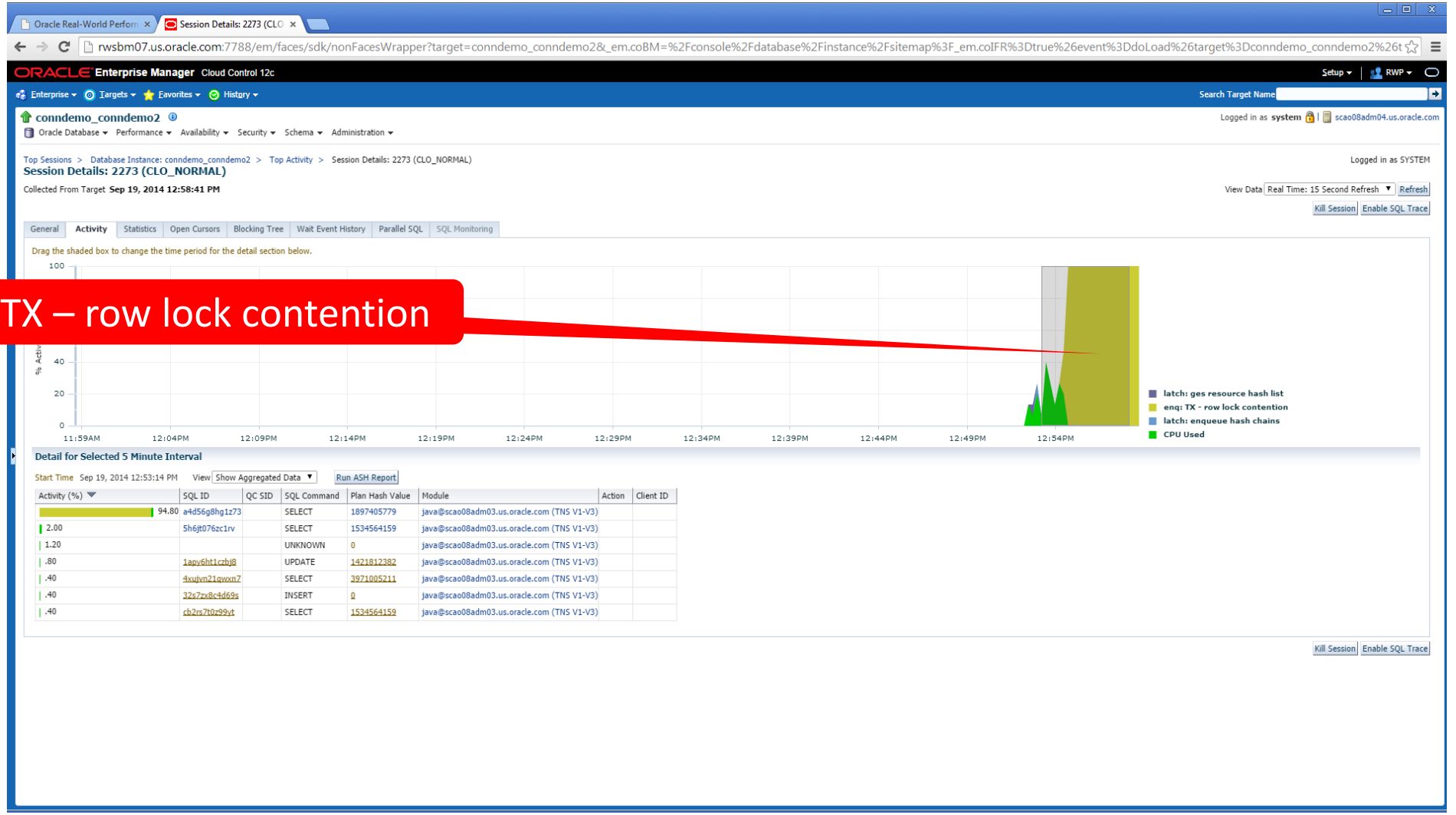
Leaking
Performance Data



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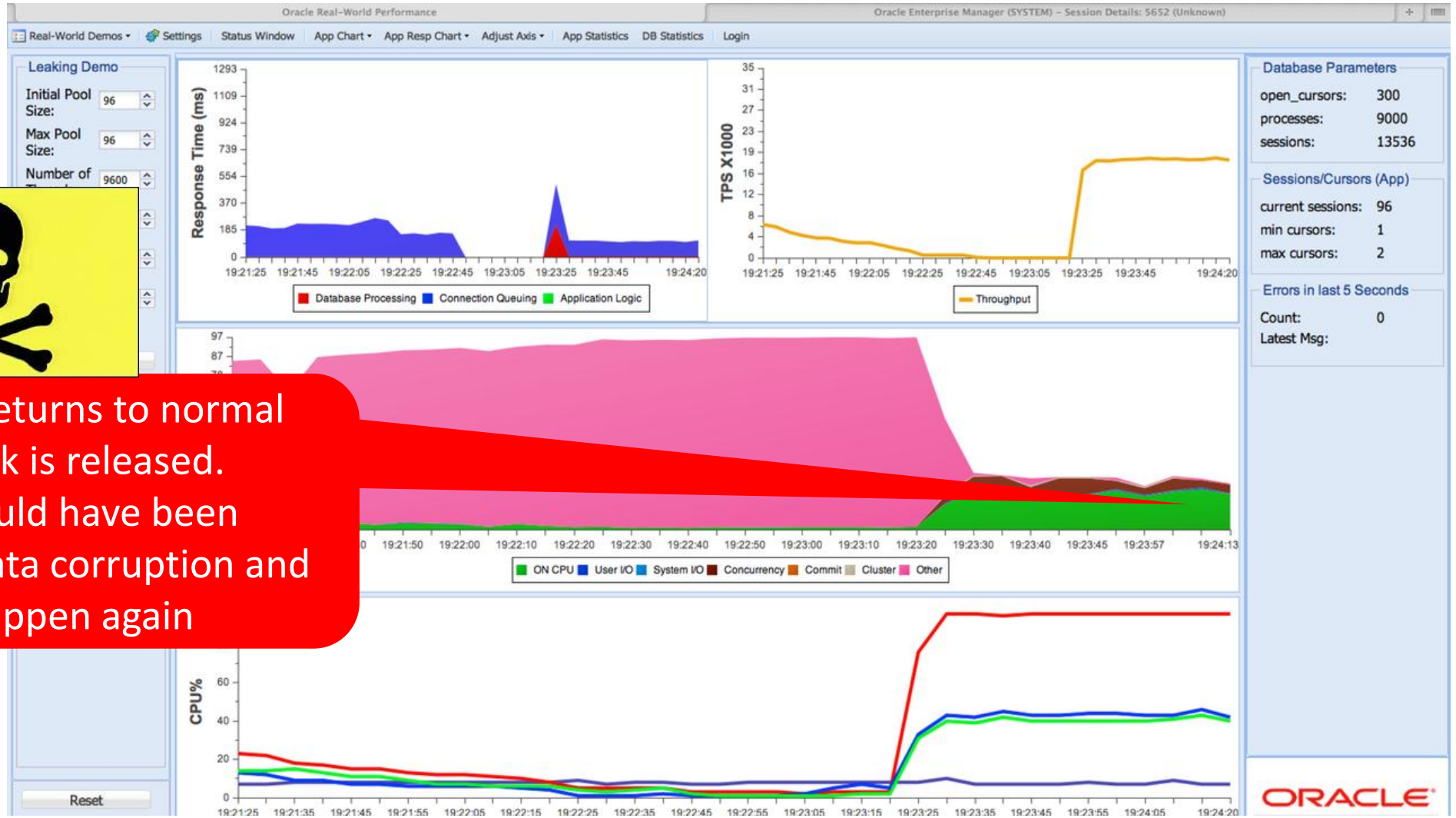
Leaking
Performance Data



System returns to normal when lock is released. There could have been logical data corruption and it may happen again

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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

Database / Middleware Interaction

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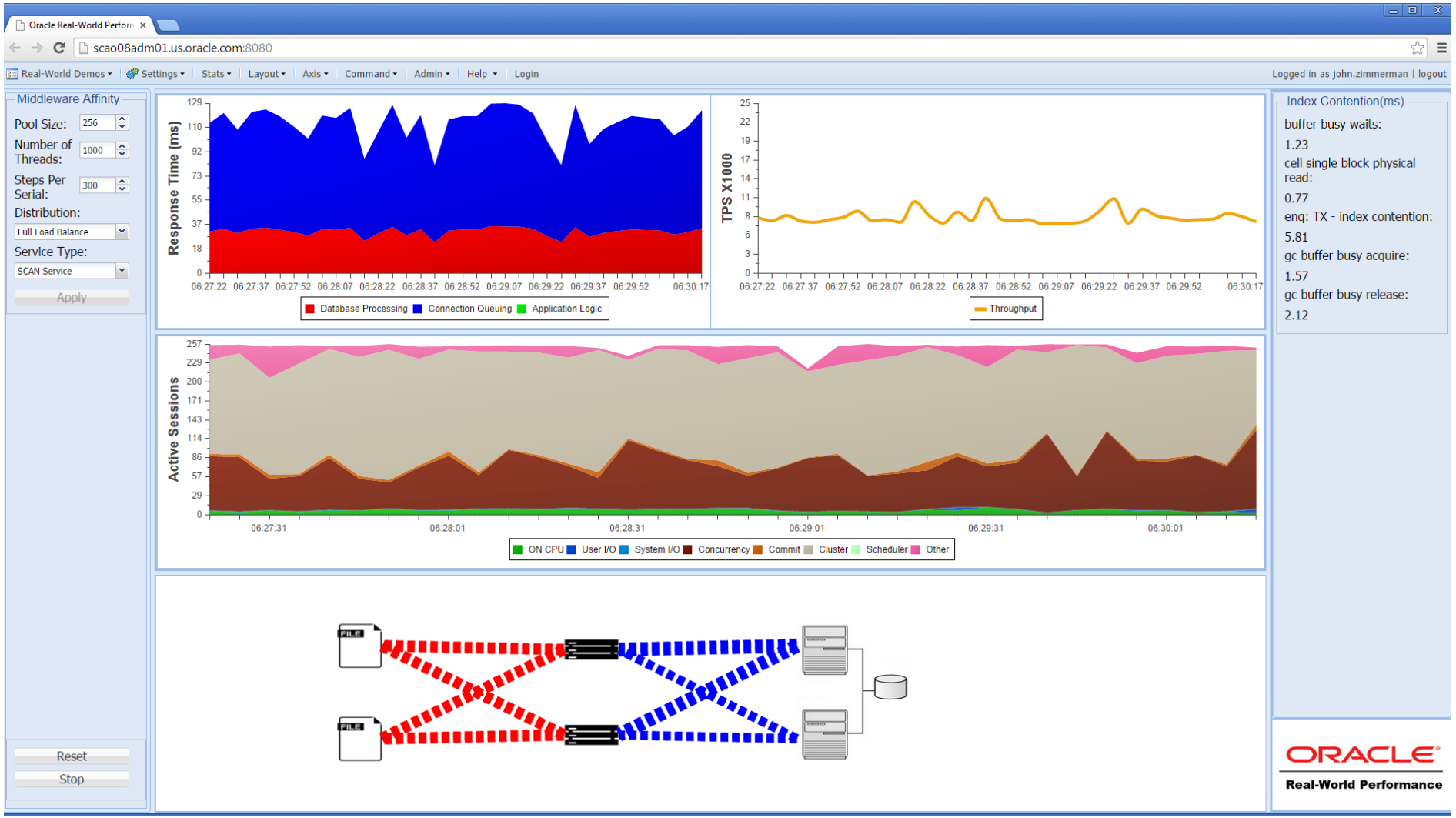
Database / Middleware Interaction

Scenario

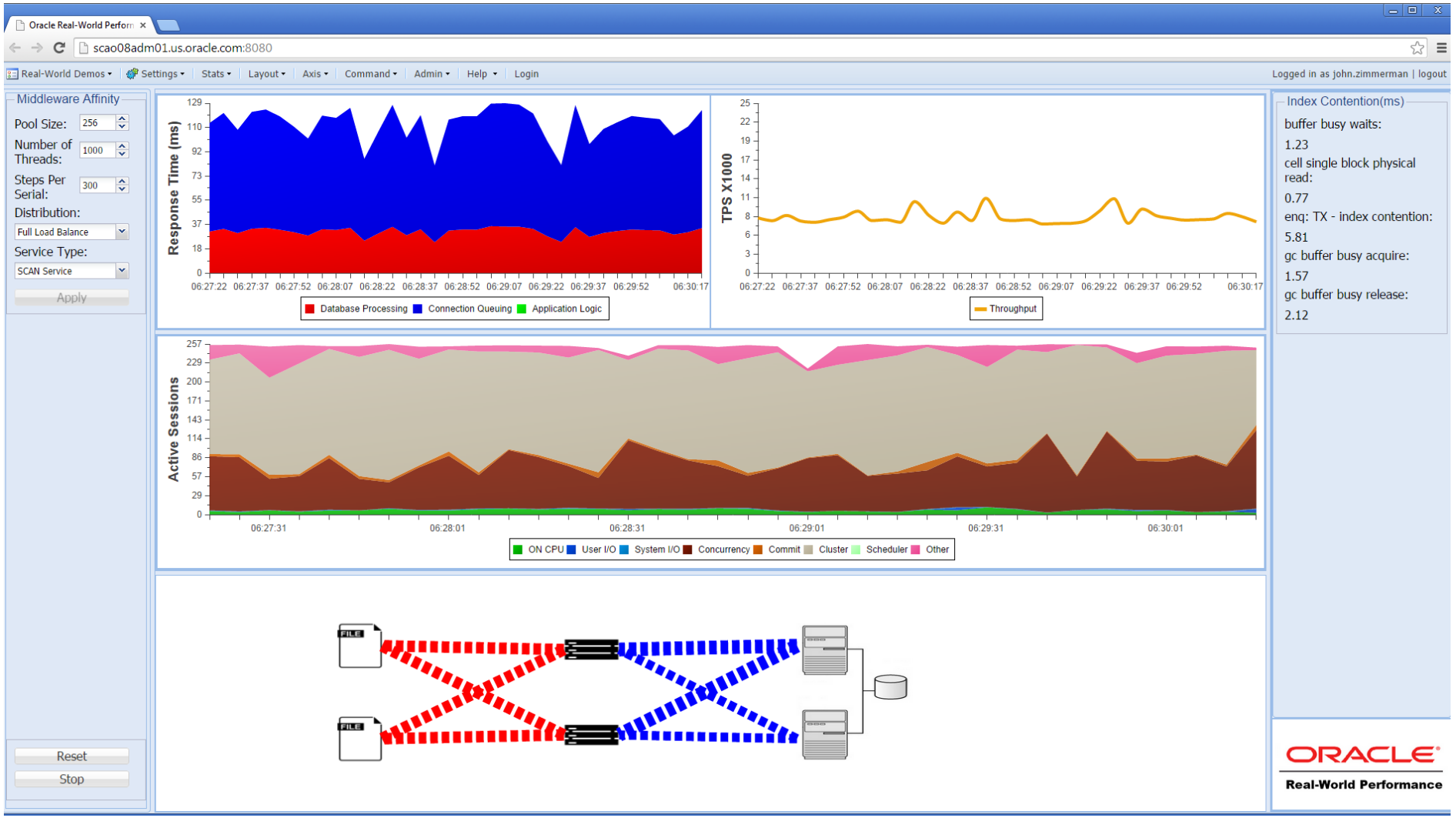
- Devices ship files.
- Files read and processed by multiple application servers
- Each application server uses multiple threads that connect to database through a connection pool which is distributed by a scan listener over two instances.



Database / Middleware Interaction

Problem

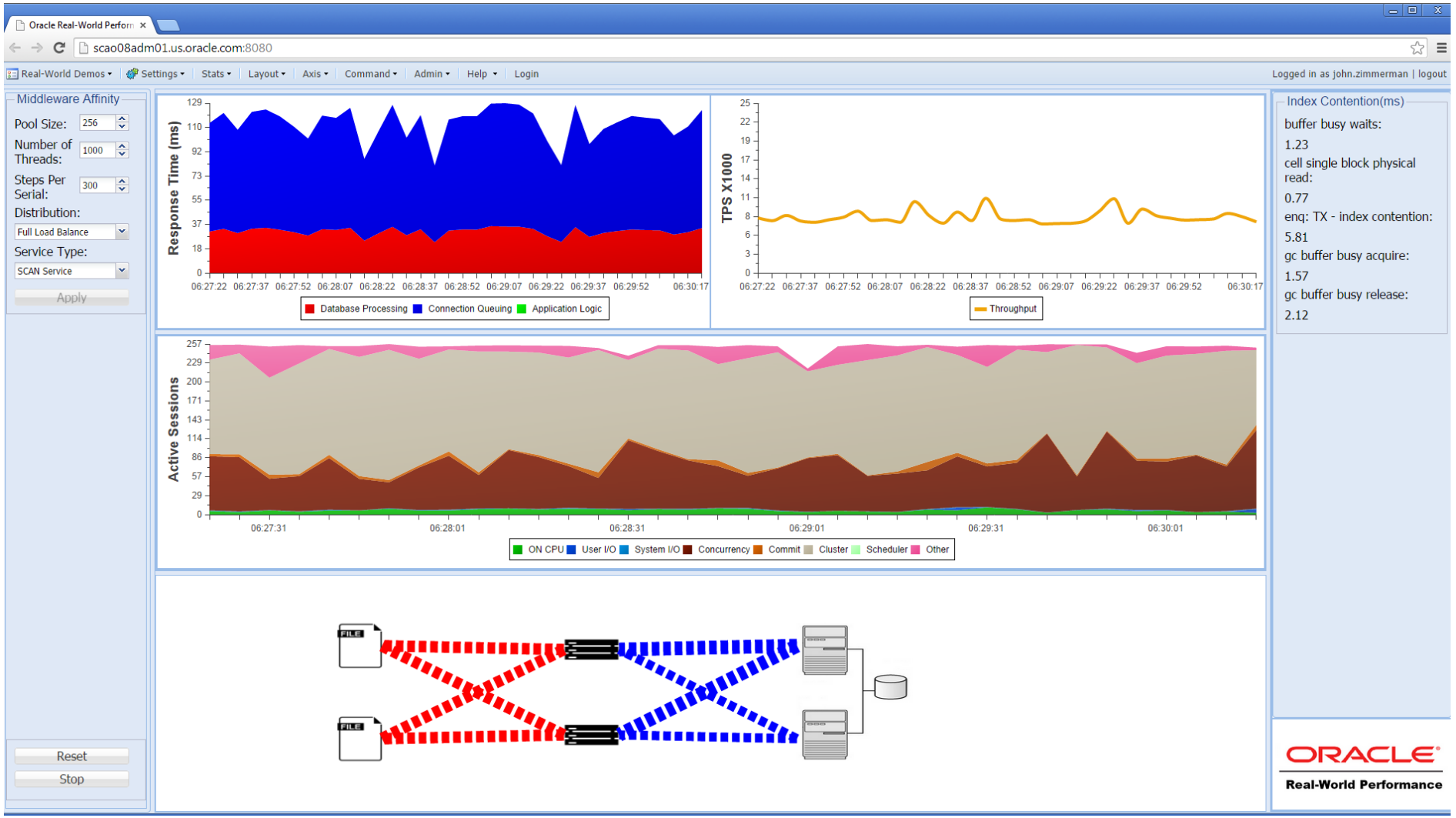
- It's too slow
- It's a problem with the database
  - Look at all those waits
- Need to be able to process an order of magnitude more data
- Obviously need to move to Hadoop



Database / Middleware Interaction

Analysis

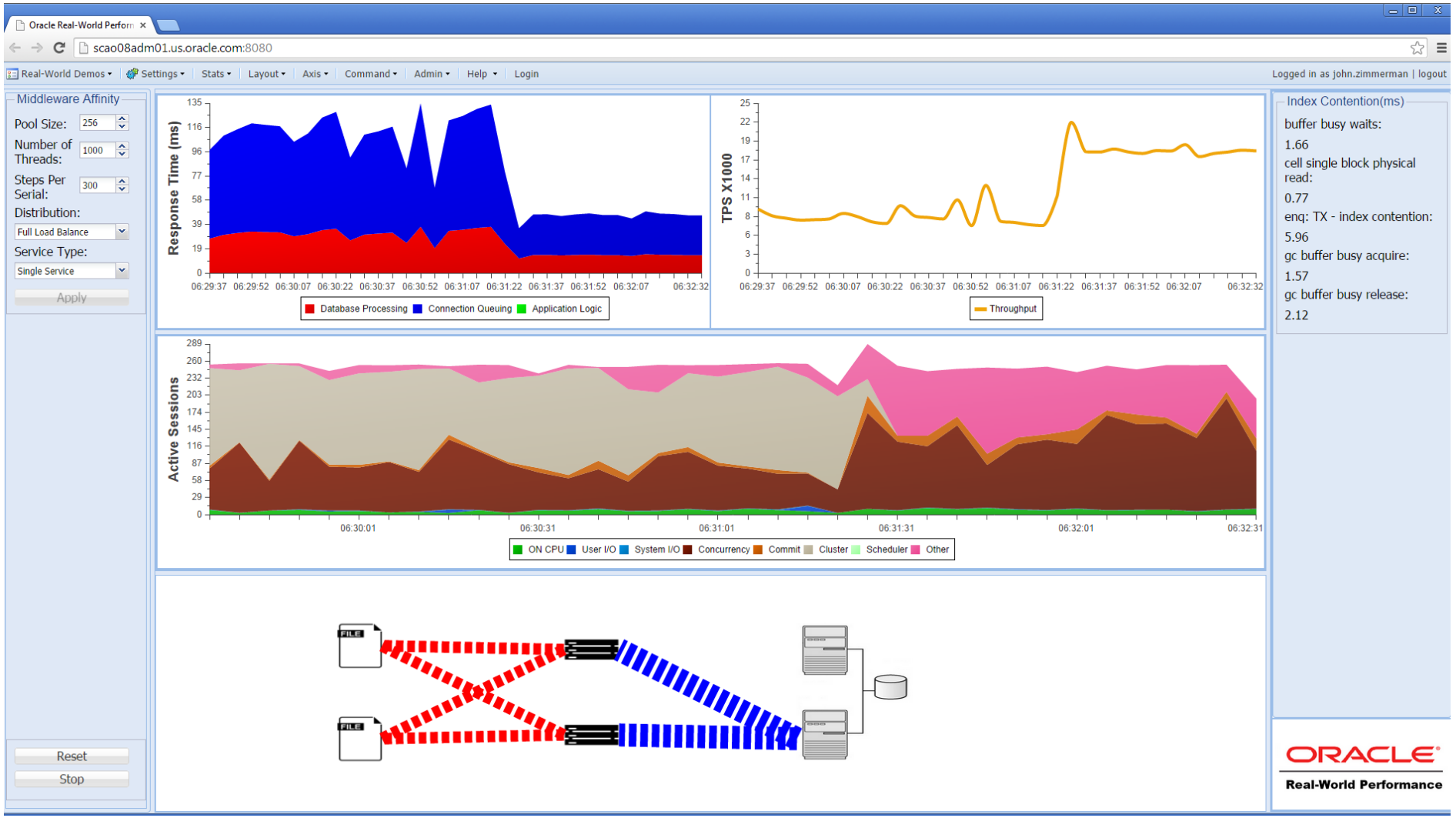
- Only small amount of data being processed.
- Both instances essentially idle with most processes waiting in RAC and concurrency waits.



Database / Middleware Interaction

Solution

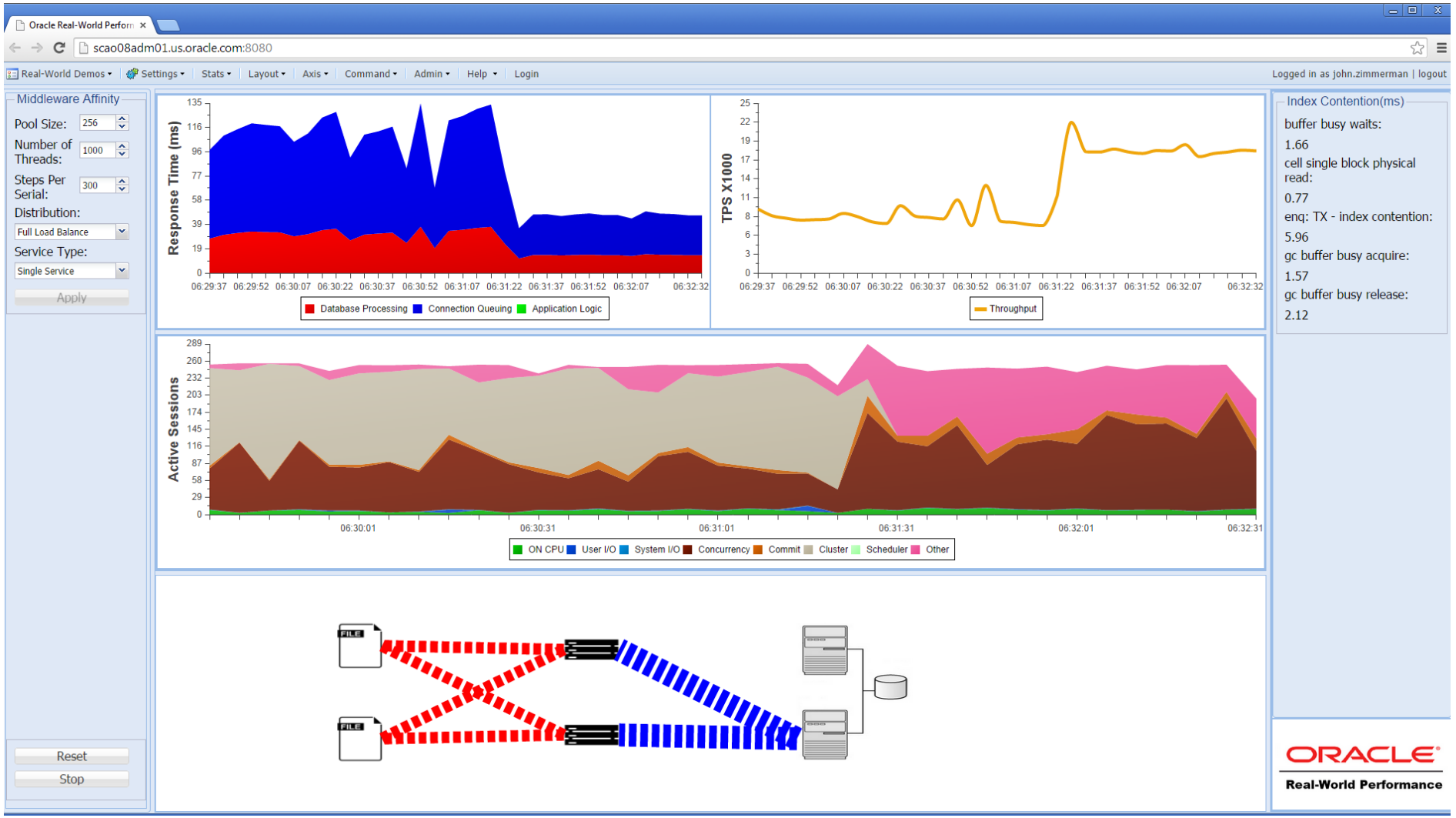
- Remove all of those RAC waits by running against a single database instance.



Database / Middleware Interaction

Analysis

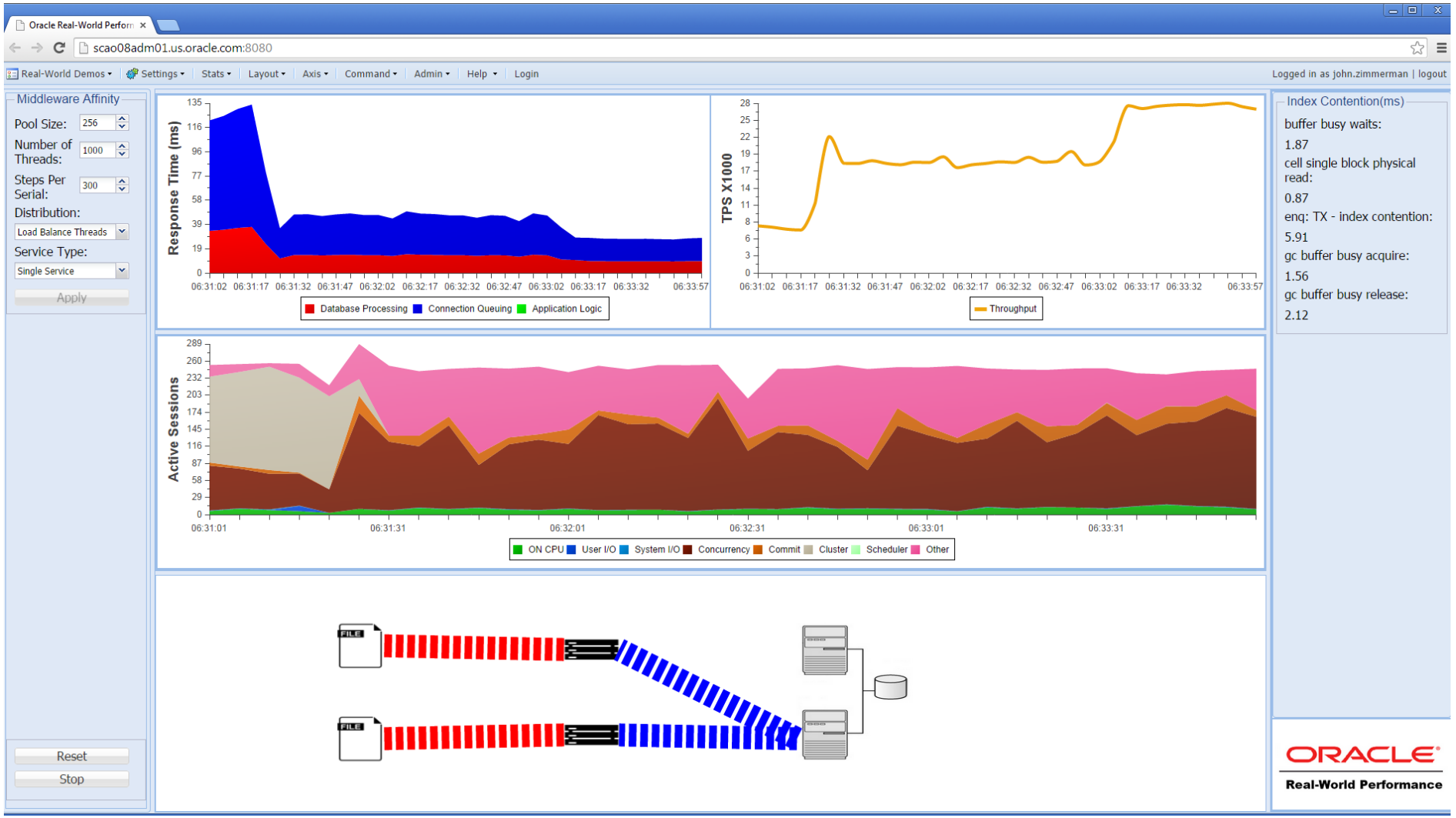
- Throughput up by factor of 10x
- RAC waits gone
- CPU time actually visible
- High concurrency waits
  - Buffer busy
  - Tx index contention



Database / Middleware Interaction

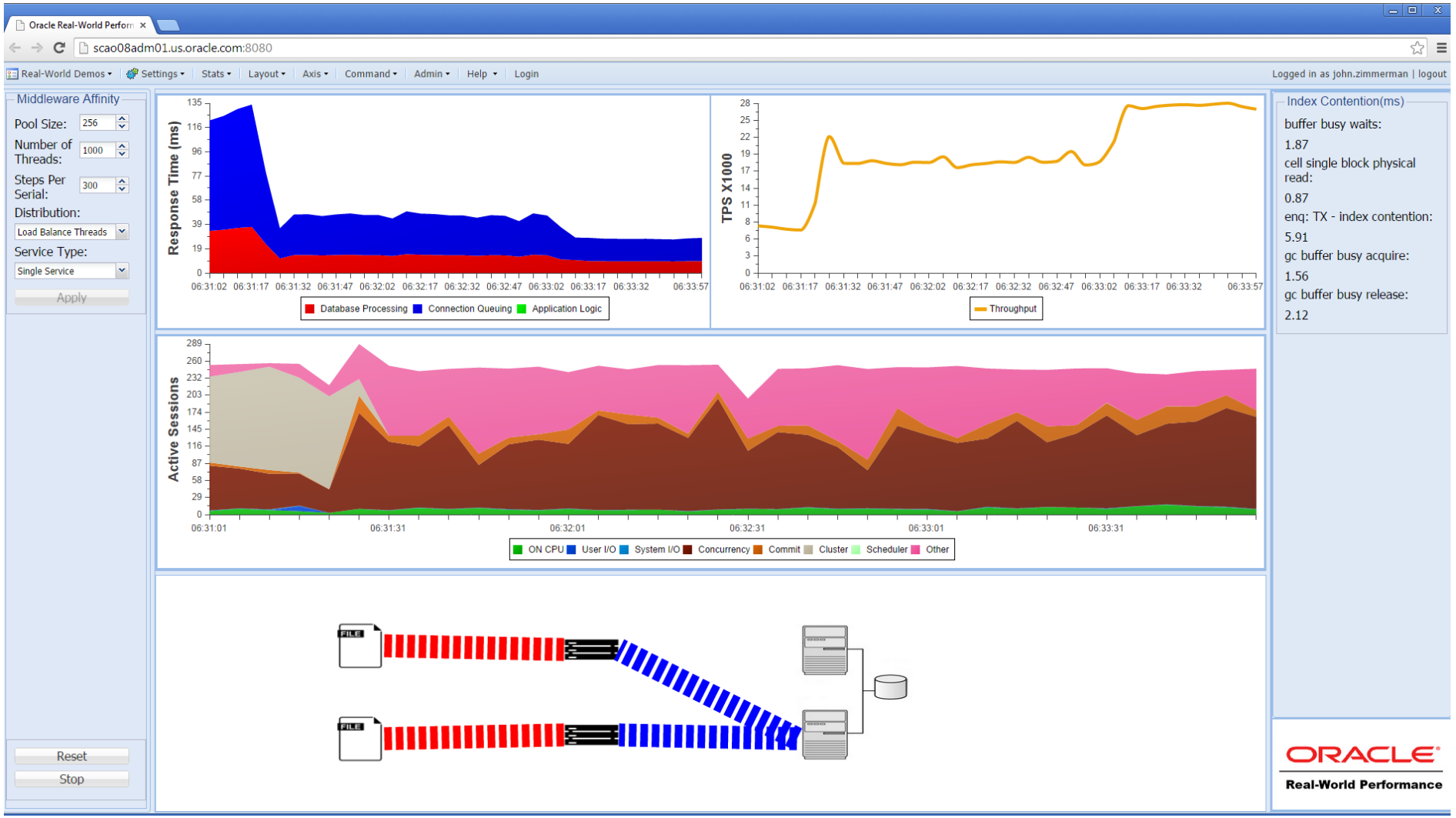
Solution

- Reduce contention waits by processing a file entirely within a single application server



Database / Middleware Interaction
Analysis

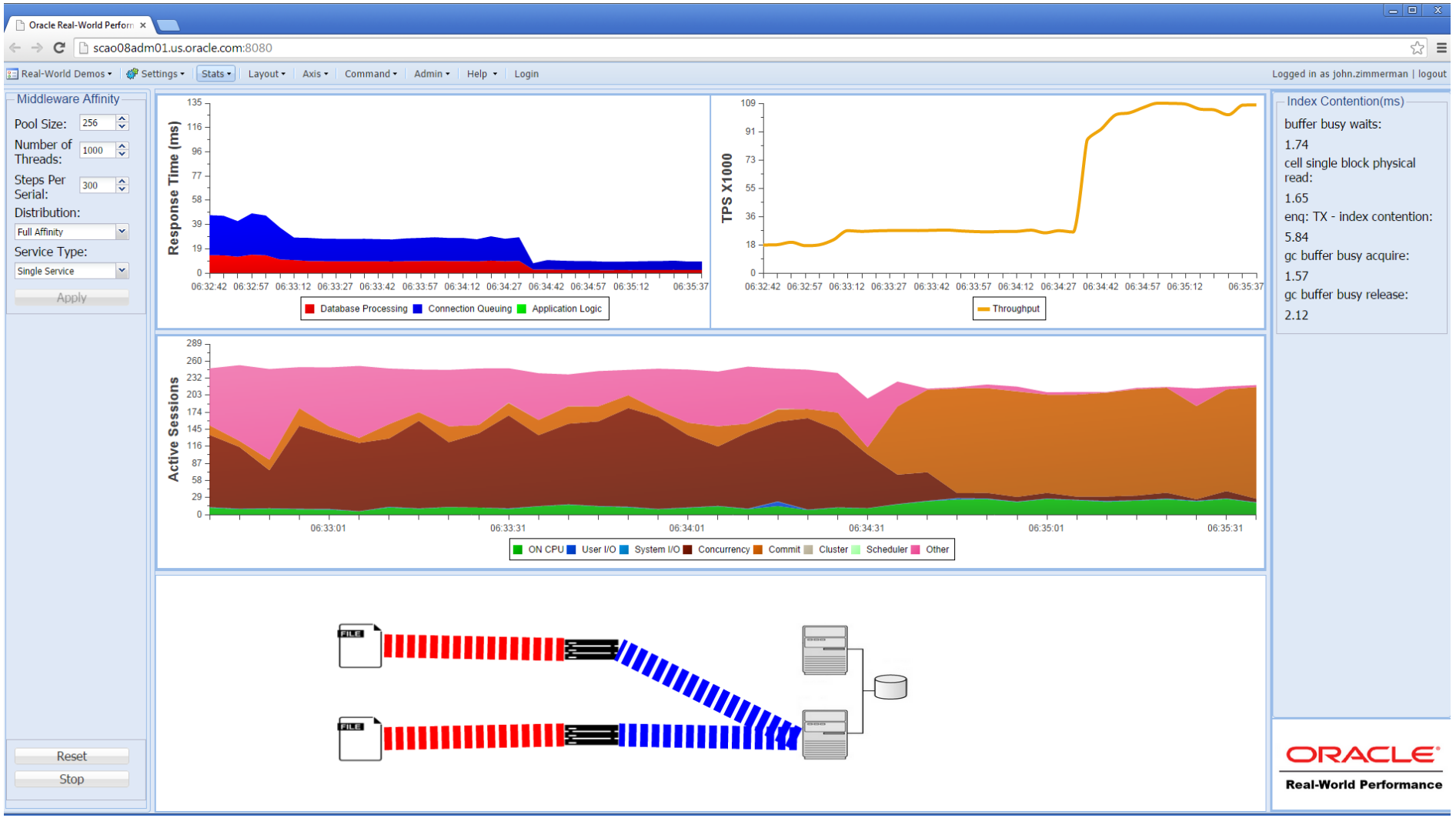
- Throughput improved again
- Concurrency events reduced but still present



Database / Middleware Interaction

Solution

- Introduce affinity for a related set of records to a single thread by hashing
- All records for the same primary key processed by single thread so no contention in index for same primary key vale



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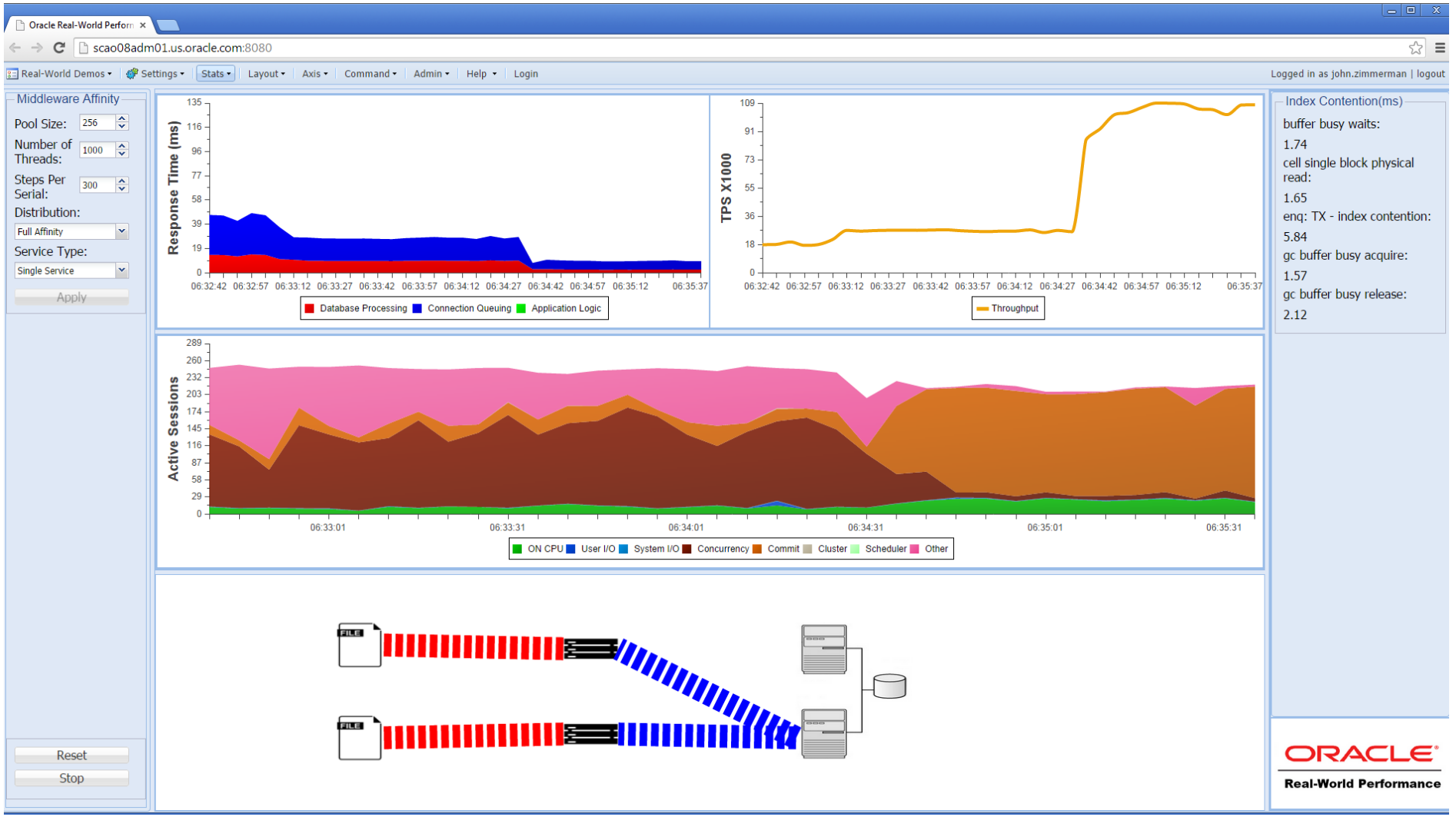
Database / Middleware Interaction
Analysis

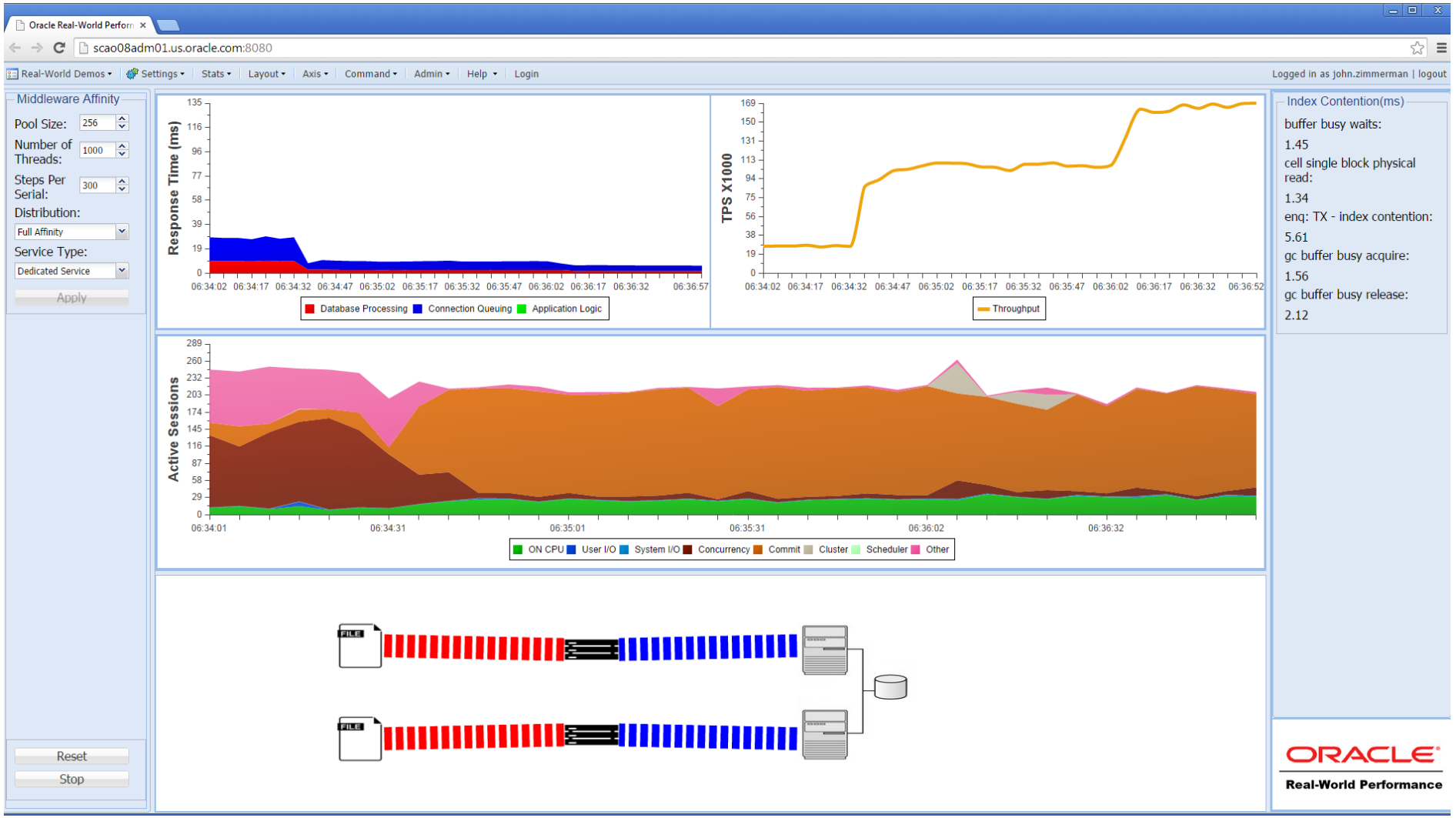
- More throughput
- Log file sync predominant event
- CPU usage close to core count



Database / Middleware Interaction

Solution

- Reintroduce RAC to add more CPU resource
- Implement separate service for each instance
- Connect application server to one instance



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		

- 32 Cores available
- Over processed ORACLE RWP Video
  - Sessions is 100x cores
  - Session count growing
    - Session leak
    - Dynamic connection pools
- Cursors per session growing ORACLE RWP Video
  - 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_RECO01/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

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REAL-WORLD PERFORMANCE

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_RECO01
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 asynchIO?
- Open_cursors=2000
  - Per session limit
  - Implies cursor leaking ORACLE RWP Video

Init.ora

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
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 I/O
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?

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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	%IO	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	bmx990q2tsqjb	JDBC Thin Client	BEGIN DBMS_APPLICATION_INFO.SE...
79,569.63	13,172,207	0.01	4.80	8.40	0.00	8pvr9fks6m1r9	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	2tq3dknsjum6d	JDBC Thin Client	SELECT :"SYS_B_0" FROM DUAL...
19,820.14	93,037	0.21	1.20	0.16	0.01	4htst3fakwa0m	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	fqq27u174x4t1	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

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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
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110,919.39	28,684,565	0.00	6.69	6.30	0.00	bmx990q2tsqjb	JDBC Thin Client	BEGIN DBMS_APPLICATION_INFO.SE...
79,569.63	13,172,207	0.01	4.80	8.40	0.00	8pvr9fks6m1r9	ADJUSTEOMSINV	SELECT /*SHOP*/ TO_CHAR(sysd...
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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	2tq3dknsjum6d	JDBC Thin Client	SELECT :"SYS_B_0" FROM DUAL...
19,820.14	93,037	0.21	1.20	0.16	0.01	4htst3fakwa0m	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	fqq27u174x4t1	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.demand_ship_date <= :6 and B.shipnode_key in (:7 , :8 , :9 , :10 , :11 , :12 , :13 , :14 , :15 , :16 , :17 , :18 , :19 , :20 , :21 , :22 , :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 , :71 , :72 , :73 , :74 , :75 , :76 , :77 , :78 , :79 , :80 , :81 , :82 , :83 , :84 , :85 , :86 , :87 , :88 , :89 , :90 , :91 , :92 , :93 , :94 , :95 , :96 , :97 , :98 , :99 , :100 , :101 , :102 , :103 , :104 , :105 , :106 , :107 , :108 , :109 , :110 , :111 , :112 , :113 , :114 , :115 , :116 , :117 , :118 , :119 , :120 , :121 , :122 , :123 , :124 , :125 , :126 , :127 , :128 , :129 , :130 , :131 , :132 , :133 , :134 , :135 , :136 , :137 , :138 , :139 , :140 , :141 , :142 , :143 , :144 , :145 , :146 , :147 , :148 , :149 , :150 , :151 , :152 , :153 , :154 , :155 , :1 56 , :157 , :158 , :159 , :160 , :161 , :162 , :163 , :164 , :165 , :166 , :167 , :168 , :169 , :170 , :171 , :172 , :173 , :174 , :175 , :176 , :177 , :178 , :179 , :180 , :181 , :182 , :183 , :184 , :185 , :186 , :187 , :188 , :189 , :190 , :191 , :192 , :193 , :194 , :195 , :196 , :197 , :198 , :199 , :200 , :201 , :202 , :203 , :204 , :205 , :206 , :207 , :208 , :209 , :210 , :211 , :212 , :213 , :214 , :215 , :216 , :217 , :218 , :219 , :220 , :221 , :222 , :223 , :224 , :225 , :226 , :227 , :228 , :229 , :230 , :231 , :232 , :233 , :234 , :235 , :236 , :237 , :238 , :239 , :240 , :241 , :242 , :243 , :244 , :245 , :246 , :247 , :248 , :249 , :250 , :251 , :252 , :253 , :254 , :255 , :256 , :257 , :258 , :259 , :260 , :261 , :262 , :263 , :264 , :265 , :266 , :267 , :268 , :269 , :270 , :271 , :272 , :273 , :274 , :275 , :276 , :277 , :278 , :279 , :280 , :281 , :282 , :283 , :284 , :285 , :286 , :287 , :288 , :289 , :290 , :291 , :292 , :293 , :294 , :295 , :296 , :297 , :298 , :299 , :300 , :301 , :302 , :303 , :304 , :305 , :306 , :307 , :308 , :309 , :310 , :311 , :312 , :313 , :314 , :315 , :316 , :317 , :318 , :319 , :320 , :321 , :322 , :323 , :324 , :325 , :326 , :327 , :328 , :329 , :330 , :331 , :332 , :333 , :334 , :335 , :336 , :337 , :338 , :339 , :340 , :341 , :342 , :343 , :344 , :345 , :346 , :347 , :348 , :349 , :350 , :351 , :352 , :353 , :354 , :355 , :356 , :357 , :358 , :359 , :360 , :361 , :362 , :363 , :364 , :365 , :366 , :367 , :368 , :369 , :370 , :371 , :372 , :373 , :374 , :375 , :376 , :377 , :378 , :379 , :380 , :381 , :382 , :383 , :384 , :385 , :386 , :387 , :388 , :389 , :390 , :391 , :392 , :393 , :394 , :395 , :396 , :397 , :398 , :399 , :400 , :401 , :402 , :403 , :404 , :405 , :406 , :407 , :408 , :409 , :410 , :411 , :412 , :413 , :414 , :415 , :416 , :417 , :418 , :419 , :420 , :421 , :422 , :423 , :424 , :425 , :426 , :427 , :428 , :429 , :430 , :431 , :432 , :433 , :434 , :435 , :436 , :437 , :438 , :439 , :440 , :441 , :442 , :443 , :444 , :445 , :446 , :447 , :448 , :449 , :450 , :451 , :452 , :453 , :454 , :455 , :456 , :457 , :458 , :459 , :460 , :461 , :462 , :463 , :464 , :465 , :466 , :467 , :468 , :469 , :470 , :471 , :472 , :473 , :474 , :475 , :476 , :477 , :478 , :479 , :480 , :481 , :482 , :483 , :484 , :485 , :486 , :487 , :488 , :489 , :490 , :491 , :492 , :493 , :494 , :495 , :496 , :497 , :498 , :499 , :500 , :501 , :502 , :503 , :504 , :505 , :506 , :507 , :508 , :509 , :510 , :511 , :512 , :513 , :514 , :515 , :516 , :517 , :518 , :519 , :520 , :521 , :522 , :523 , :524 , :525 , :526 , :527 , :528 , :529 , :530 , :5 31 , :532 , :533 , :534 , :535 , :536 , :537 , :538 , :539 , :540 , :541 , :542 , :543 , :544 , :545 , :546 , :547 , :548 , :549 , :550 , :551 , :552 , :553 , :554 , :555 , :556 , :557 , :558 , :559 , :560 , :561 , :562 , :563 , :564 , :565 , :566 , :567 , :568 , :569 , :570 , :571 , :572 , :573 , :574 , :575 , :576 , :577 , :578 , :579 , :580 , :581 , :582 , :583 , :584 , :585 , :586 , :587 , :588 , :589 , :590 , :591 , :592 , :593 , :594 , :595 , :596 , :597 , :598 , :599 , :600 , :601 , :602 , :603 , :604 , :605 , :606 , :607 , :608 , :609 , :610 , :611 , :612 , :613 , :614 , :615 , :616 , :617 , :618 , :619 , :620 , :621 , :622 , :623 , :624 , :625 , :626 , :627 , :628 , :629 , :630 , :631 , :632 , :633 , :634 , :635 , :636 , :637 , :638 , :639 , :640 , :641 , :642 , :643 , :644 , :645 , :646 , :647 , :648 , :649 , :650 , :651 , :652 , :653 , :654 , :655 , :656 , :657 , :658 , :659 , :660 , :661 , :662 , :663 , :664 , :665 , :666 , :667 , :668 , :669 , :670 , :671 , :672 , :673 , :674 , :675 , :676 , :677 , :678 , :679 , :680 , :681 , :682 , :683 , :684 , :685 , :686 , :687 , :688 , :689 , :690 , :691 , :692 , :693 , :694 , :695 , :696 , :697 , :698 , :699 , :700 , :701 , :702 , :703 , :704 , :705 , :706 , :707 , :708 , :709 , :710 , :711 , :712 , :713 , :714 , :715 , :716 , :717 , :718 , :719 , :720 , :721 , :722 , :723 , :724 , :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 , :758 , :759 , :760 , :761 , :762 , :763 , :764 , :765 , :766 , :767 , :768 , :769 , :770 , :771 , :772 , :773 , :774 , :775 , :776 , :777 , :778 , :779 , :780 , :781 , :782 , :783 , :784 , :785 , :786 , :787 , :788 , :789 , :790 , :791 , :792 , :793 , :794 , :795 , :796 , :797 , :798 , :799 , :800 , :801 , :802 , :803 , :804 , :805 , :806 , :807 , :808 , :809 , :810 , :811 , :812 , :813 , :814 , :815 , :816 , :817 , :818 , :819 , :820 , :821 , :822 , :823 , :824 , :825 , :826 , :827 , :828 , :829 , :830 , :831 , :832 , :833 , :834 , :835 , :836 , :837 , :838 , :839 , :840 , :841 , :842 , :843 , :844 , :845 , :846 , :847 , :848 , :849 , :850 , :851 , :852 , :853 , :854 , :855 , :856 , :857 , :858 , :859 , :860 , :861 , :862 , :863 , :864 , :865 , :866 , :867 , :868 , :869 , :870 , :871 , :872 , :873 , :874 , :875 , :876 , :877 , :878 , :879 , :880 , :881 , :882 , :883 , :884 , :885 , :886 , :887 , :888 , :889 , :890 , :891 , :892 , :893 , :894 , :895 , :896 , :897 , :898 , :899 , :900 , :901 , :902 , :903 , :904 , :905 , :9 06 , :907 , :908 , :909 , :910 , :911 , :912 , :913 , :914 , :915 , :916 , :917 , :918 , :919 , :920 , :921 , :922 , :923 , :924 , :925 , :926 , :927 , :928 , :929 , :930 , :931 , :932 , :933 , :934 , :935 , :936 , :937 , :938 , :939 , :940 , :941 , :942 , :943 , :944 , :945 , :946 , :947 , :948 , :949 , :950 , :951 , :952 , :953 , :954 , :955 , :956 , :957 , :958 , :959 , :960 , :961 , :962 , :963 , :964 , :965 , :966 , :967 , :968 , :969 , :970 , :971 , :972 , :973 , :974 , :975 , :976 , :977 , :978 , :979 , :980 , :981 , :982 , :983 , :984 , :985 , :986 , :987 , :988 , :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 , :1019 , :1020 , :1021 , :1022 , :1023 , :1024 , :1025 , :1026 , :1027 , :1028 , :1029 , :1030 , :1031 , :1032 , :1033 , :1034 , :1035 , :1036 , :1 037 , :1038 , :1039 , :1040 , :1041 , :1042 , :1043 , :1044 , :1045 , :1046 , :1047 , :1048 , :1049 , :1050 , :1051 , :1052 , :1053 , :1054 , :1055 , :1056 , :1057 , :1058 , :1059 , :1060 , :1061 , :1062 , :1063 , :1064 , :1065 , :1066 , :1067 , :1068 , :1069 , :1070 , :1071 , :1072 , :1073 , :1074 , :1075 , :1076 , :1077 , :1078 , :1079 , :1080 , :1081 , :1082 , :1083 , :1084 , :1085 , :1086 , :1087 , :1088 , :1089 , :1090 , :1091 , :1092 , :1093 , :1094 , :1095 , :1096 , :1097 , :1098 , :1099 , :1100 , :1101 , :1102 , :1103 , :1104 , :1105 , :1106 , :1107 , :1108 , :1109 , :1110 , :1111 , :1112 , :1113 , :1114 , :1115 , :1116 , :1117 , :1118 , :1119 , :1120 , :1121 , :1122 , :1123 , :1124 , :1125 , :1126 , :1127 , :1128 , :1129 , :1130 , :1131 , :1132 , :1133 , :1134 , :1135 , :1136 , :1137 , :1138 , :1139 , :1140 , :1141 , :1142 , :1143 , :1144 , :1145 , :1146 , :1147 , :1148 , :1149 , :1150 , :1151 , :1152 , :1153 , :1154 , :1155 , :1156 , :1157 , :1158 , :1159 , :1160 , :1161 , :1162 , :1163 , :1164 , :1165 , :1166 , :1167 , :1168 , :1169 , :1170 , :1171 , :1172 , :1173 , :1174 , :1175 , :1176 , :1177 , :1178 , :1179 , :1180 , :1181 , :1182 , :1183 , :1184 , :1185 , :1186 , :1187 , :1188 , :1189 , :1190 , :1191 , :1192 , :1193 , :1194 , :1195 , :1196 , :1197 , :1198 , :1199 , :1200 , :1201 , :1202 , :1203 , :1204 , :1205 , :1206 , :1207 , :1208 , :1209 , :1210 , :1211 , :1212 , :1213 , :1214 , :1215 , :1216 , :1217 , :1218 , :1219 , :1220 , :1221 , :1222 , :1223 , :1224 , :1225 , :1226 , :1227 , :1228 , :1229 , :1230 , :1231 , :1232 , :1233 , :1234 , :1235 , :1236 , :1237 , :1238 , :1239 , :1240 , :1241 , :1242 , :1243 , :1244 , :1245 , :1246 , :1247 , :1248 , :1249 , :1250 , :1251 , :1252 , :1253 , :1254 , :1255 , :1256 , :1257 , :1258 , :1259 , :1260 , :1261 , :1262 , :1263 , :1264 , :1265 , :1266 , :1267 , :1268 , :1269 , :1270 , :1271 , :1272 , :1273 , :1274 , :1275 , :1276 , :1277 , :1278 , :1279 , :1280 , :1281 , :1282 , :1283 , :1284 , :1285 , :1286 , :1287 , :1288 , :1289 , :1290 , :1291 , :1292 , :1293 , :1294 , :1295 , :1296 , :1297 , :1298 , :1299 , :1300 , :1301 , :1302 , :1303 , :1304 , :1305 , :1306 , :1307 , :1308 , :1309 , :1310 , :1311 , :1312 , :1313 , :1314 , :1315 , :1316 , :1317 , :1318 , :1319 , :1320 , :1321 , :1322 , :1323 , :1324 , :1325 , :1326 , :1327 , :1328 , :1329 , :1330 , :1331 , :1332 , :1333 , :1334 , :1335 , :1336 , :1337 , :1338 , :1339 , :1340 , :1341 , :1342 , :1343 , :1344 , :1345 , :1346 , :1347 , :1348 , :1349 , :1350 , :1351 , :1352 , :1353 , :1354 , :1355 , :1356 , :1357 , :1358 , :1359 , :1360 , :1361 , :1362 , :1363 , :1364 , :1365 , :1366 , :1367 , :1368 , :1369 , :1370 , :1371 , :1372 , :1373 , :1374 , :1375 , :1376 , :1377 , :1378 , :1379 , :1380 , :1381 , :1382 , :1383 , :1384 , :1385 , :1386 , :1387 , :1388 , :1389 , :1390 , :1391 , :1392 , :1393 , :1394 , :1395 , :1396 , :1397 , :1398 , :1399 , :1400 , :1401 , :1402 , :1403 , :1404 , :1405 , :1406 , :1407 , :1408 , :1409 , :1410 , :1411 , :1412 , :1413 , :1414 , :1415 , :1416 , :1417 , :1418 , :1419 , :1420 , :1421 , :1422 , :1423 , :1424 , :1425 , :1426 , :1427 , :1428 , :1429 , :1430 , :1431 , :1432 , :1433 , :1434 , :1435 , :1436 , :1437 , :1438 , :1439 , :1440 , :1441 , :1442 , :1443 , :1444 , :1445 , :1446 , :1447 , :1448 , :1449 , :1450 , :1451 , :1452 , :1453 , :1454 , :1455 , :1456 , :1457 , :1458 , :1459 , :1460 , :1461 , :1462 , :1463 , :1464 , :1465 , :1466 , :1467 , :1468 , :1469 , :1470 , :1471 , :1472 , :1473 , :1474 , :1475 , :1476 , :1477 , :1478 , :1479 , :1480 , :1481 , :1482 , :1483 , :1484 , :1485 , :1486 , :1487 , :1488 , :1489 , :1490 , :1491 , :1492 , :1493 , :1494 , :1495 , :1496 , :1497 , :1498 , :1499 , :1500 , :1501 , :1502 , :1503 , :1504 , :1505 , :1506 , :1507 , :1508 , :1509 , :1510 , :1511 , :1512 , :1513 , :1514 , :1515 , :1516 , :1517 , :1518 , :1519 , :1520 , :1521 , :1522 , :1523 , :1524 , :1525 , :1526 , :1527 , :1528 , :1529 , :1530 , :1531 , :1532 , :1533 , :1534 , :1535 , :1536 , :1 537 , :1538 , :1539 , :1540 , :1541 , :1542 , :1543 , :1544 , :1545 , :1546 , :1547 , :1548 , :1549 , :1550 , :1551 , :1552 , :1553 , :1554 , :1555 , :1556 , :1557 , :1558 , :1559 , :1560 , :1561 , :1562 , :1563 , :1564 , :1565 , :1566 , :1567 , :1568 , :1569 , :1570 , :1571 , :1572 , :1573 , :1574 , :1575 , :1576 , :1577 , :1578 , :1579 , :1580 , :1581 , :1582 , :1583 , :1584 , :1585 , :1586 , :1587 , :1588 , :1589 , :1590 , :1591 , :1592 , :1593 , :1594 , :1595 , :1596 , :1597 , :1598 , :1599 , :1600 , :1601 , :1602 , :1603 , :1604 , :1605 , :1606 , :1607 , :1608 , :1609 , :1610 , :1611 , :1612 , :1613 , :1614 , :1615 , :1616 , :1617 , :1618 , :1619 , :1620 , :1621 , :1622 , :1623 , :1624 , :1625 , :1626 , :1627 , :1628 , :1629 , :1630 , :1631 , :1632 , :1633 , :1634 , :1635 , :1636 , :1637 , :1638 , :1639 , :1640 , :1641 , :1642 , :1643 , :1644 , :1645 , :1646 , :1647 , :1648 , :1649 , :1650 , :1651 , :1652 , :1653 , :1654 , :1655 , :1656 , :1657 , :1658 , :1659 , :1660 , :1661 , :1662 , :1663 , :1664 , :1665 , :1666 , :1667 , :1668 , :1669 , :1670 , :1671 , :1672 , :1673 , :1674 , :1675 , :1676 , :1677 , :1678 , :1679 , :1680 , :1681 , :1682 , :1683 , :1684 , :1685 , :1686 , :1687 , :1688 , :1689 , :1690 , :1691 , :1692 , :1693 , :1694 , :1695 , :1696 , :1697 , :1698 , :1699 , :1700 , :1701 , :1702 , :1703 , :1704 , :1705 , :1706 , :1707 , :1708 , :1709 , :1710 , :1711 , :1712 , :1713 , :1714 , :1715 , :1716 , :1717 , :1718 , :1719 , :1720 , :1721 , :1722 , :1723 , :1724 , :1725 , :1726 , :1727 , :1728 , :1729 , :1730 , :1731 , :1732 , :1733 , :1734 , :1735 , :1736 , :1737 , :1738 , :1739 , :1740 , :1741 , :1742 , :1743 , :1744 , :1745 , :1746 , :1747 , :1748 , :1749 , :1750 , :1751 , :1752 , :1753 , :1754 , :1755 , :1756 , :1757 , :1758 , :1759 , :1760 , :1761 , :1762 , :1763 , :1764 , :1765 , :1766 , :1767 , :1768 , :1769 , :1770 , :1771 , :1772 , :1773 , :1774 , :1775 , :1776 , :1777 , :1778 , :1779 , :1780 , :1781 , :1782 , :1783 , :1784 , :1785 , :1786 , :1787 , :1788 , :1789 , :1790 , :1791 , :1792 , :1793 , :1794 , :1795 , :1796 , :1797 , :1798 , :1799 , :1800 , :1801 , :1802 , :1803 , :1804 , :1805 , :1806 , :1807 , :1808 , :1809 , :1810 , :1811 , :1812 , :1813 , :1814 , :1815 , :1816 , :1817 , :1818 , :1819 , :1820 , :1821 , :1822 , :1823 , :1824 , :1825 , :1826 , :1827 , :1828 , :1829 , :1830 , :1831 , :1832 , :1833 , :1834 , :1835 , :1836 , :1837 , :1838 , :1839 , :1840 , :1841 , :1842 , :1843 , :1844 , :1845 , :1846 , :1847 , :1848 , :1849 , :1850 , :1851 , :1852 , :1853 , :1854 , :1855 , :1856 , :1857 , :1858 , :1859 , :1860 , :1861 , :1862 , :1863 , :1864 , :1865 , :1866 , :1867 , :1868 , :1869 , :1870 , :1871 , :1872 , :1873 , :1874 , :1875 , :1876 , :1877 , :1878 , :1879 , :1880 , :1881 , :1882 , :1883 , :1884 , :1885 , :1886 , :1887 , :1888 , :1889 , :1890 , :1891 , :1892 , :1893 , :1894 , :1895 , :1896 , :1897 , :1898 , :1899 , :1900 , :1901 , :1902 , :1903 , :1904 , :1905 , :1906 , :1907 , :1908 , :1909 , :1910 , :1911 , :1912 , :1913 , :1914 , :1915 , :1916 , :1917 , :1918 , :1919 , :1920 , :1921 , :1922 , :1923 , :1924 , :1925 , :1926 , :1927 , :1928 , :1929 , :1930 , :1931 , :1932 , :1933 , :1934 , :1935 , :1936 , :1937 , :1938 , :1939 , :1940 , :1941 , :1942 , :1943 , :1944 , :1945 , :1946 , :1947 , :1948 , :1949 , :1950 , :1951 , :1952 , :1953 , :1954 , :1955 , :1956 , :1957 , :1958 , :1959 , :1960 , :1961 , :1962 , :1963 , :1964 , :1965 , :1966 , :1967 , :1968 , :1969 , :1970 , :1971 , :1972 , :1973 , :1974 , :1975 , :1976 , :1977 , :1978 , :1979 , :1980 , :1981 , :1982 , :1983 , :1984 , :1985 , :1986 , :1987 , :1988 , :1989 , :1990 , :1991 , :1992 , :1993 , :1994 , :1995 , :1996 , :1997 , :1998 , :1999 , :2000 , :2001 , :2002 , :2003 , :2004 , :2005 , :2006 , :2007 , :2008 , :2009 , :2010 , :2011 , :2012)group by B.demand_type, B.shipnode_key

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REAL-WORLD PERFORMANCE

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

Why is My SQL Slow ?