

A Brief History of DB Time Performance Analysis from 2 to 10

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Agenda

- Versions of Oracle
- Changes in instrumentation
- Changing tuning techniques

Oracle V2.3: The first Oracle

- Digital PDP-11 Macro-11
 - Two task architecture as 16 bit system allowed only 32K process size
 - Rule Based Optimizer
 - Table order
 - Equality or partially qualified keys for indexes
 - Tools
 - Ufi (user friendly interface)
 - Rpt/rpf report writer
 - lag/iap for fast screen application generation
 - 3GL interfaces, Fortran, COBOL, Pascal

Oracle V2.3: The first Oracle

- Digital PDP-11 Macro-11
 - Tuning
 - Add debug code to identify problem statement
 - Cut and Paste into UFI
 - Change table order or modify indexing
 - (or modify design!)

Oracle V3: Portability

- VAX C
 - Complete rewrite
 - Used VAX/VMS shared memory capabilities for secure single task architecture
 - Supported transactions
 - Got the bad release out of the way early

Oracle V4: Portability

- V4
 - Cube
 - MS-DOS in 640K
 - Read consistency
 - BI files, copies of 'before image' of block
 - views, subqueries
 - lag/iap became Fastforms
 - Tuning very similar to V2.3



Oracle V5: Distributed

- SQL*Net
 - Client/server
 - Distributed (v5.1)
- SQL*Plus replaced UFI, and AUFI
- SQL*Forms replaced Fastforms
- Stable!
 - And needed to be as Ingres, Sybase, Informix were all competing
- First Parallel System

Oracle V5: Distributed

- Tuning
 - ODS
 - Database monitor for locks, file IO
 - Trace
 - Details of what SQL was running and access paths
 - Use ODS to identify problem session and then trace to identify problem SQL then tune as in Oracle V2.3

Oracle V6: Scalability

- New architecture
 - DBWR for database file writes
 - LGWR for log writes
 - Rollback segments for undo and CR
 - Row level locking
 - Hot backup
 - PL/SQL anonymous blocks
 - Tablespaces
 - OPS

Select * From EMP

Oracle V6: Scalability

- New 'Dynamic Performance Tables' v\$
 - v\$sysstat
 - v\$lock
 - v\$waitstat
 - timed_statistics parameter, off by default
- SQL*DBA Monitor replaced ODS
- SQLtrace and tkprof
- Explain plan

Oracle V6: Scalability

- Bstat/estat used for tuning benchmarks
 - Created (and dropped) copies of V\$ tables
- Performance Tuning Guide
 - Introduced a 'Tuning Method'
 - Tune Application and SQL
 - Memory
 - IO
 - Contention
 - Ratios
 - Cache hit ratio

Oracle V6: Scalability

- Stats package first written
 - Capture 'snapshots' of V\$tables in tables in database
 - Report across any two snapshots
 - Report organized so that most important information at top.
 - Details there for drilldowns
 - Distributed internally within Oracle and to some customers

Oracle7: Programmable

- Procedure, triggers (stored PL/SQL)
- Constraints
- Cost Based Optimizer
- Shared pool
 - addresses parsing/memory issues
- 2PC
- Parallel Query (7.1)
- MPP OPS

Oracle7: Programmable

- V\$SQL to see what is in shared pool
 - which SQL was doing most buffer gets, disk reads
- Wait Events
- Tkprof processes wait events in 7.1
- Tkprof stops processing wait events in 7.3
- Enterprise Manager

Oracle 8 & 8i: Objects & Java

- Partitioning
- First 'cache fusion' features
- 8i STATSPACK as part of product
 - High level summary
 - Wait times prominent
 - Drilldowns
 - Time based method of analysis

Oracle 9i: Unbreakable

- RAC
- Statistics changes
 - Times in microsecond
 - V\$SQL_PLAN
 - Times in V\$SQL
 - no longer need proxies of buffer gets, disk reads
 - Segment statistics
 - Object ids in waiting sessions

Oracle 9i: Unbreakable

- Statistics changes
 - Statistics_level parameter
 - Timed_statistics defaults to true
 - Advisories
 - buffer cache,
 - shared pool
 - PGA
- Tkprof processes wait events once again

Oracle 9i: Unbreakable

- Statspack changes
 - CPU time into 'Top Wait Events'
 - SQL rep
 - Report usage of SQL between two snaps including all plans that had been used
- More timing data => better diagnosis

Oracle 10g: Managability

- Autotuning of SGA
 - buffer cache
 - shared pool
 - large pool
 - java pool
- AWR
 - Statspack++
 - Installs as part of database
 - Built into database so more efficient

Oracle 10g: Managability

- ADDM
 - Time as common currency
 - Time based tuning recommendations
- Tuning Advisor
 - Makes tuning recommendations for tuning an individual statement

Oracle 10g: Managability

- New Data sources
 - ASH
 - sampled activity data with many dimensions
 - Still need sql trace?
 - Time model
 - DB time!
 - Allows breakdown of time spent in database.
 - Includes Java time, PLSQL time, connection time, parse time breakdown

Future

- What's new in Oracle 10gR2?
 - Periodic updates of statistics in V\$SQL
 - Blockers identified in ASH
 - AWR diff diff report (compare two periods)
 - More ADDM rules

Conclusion

- With time Oracle has become
 - More scalable
 - More instrumented
 - More diagnosable
 - More complicated (but also more automated)
- But we still see the same problems
 - Poor connection management
 - Poor cursor management
 - Database design?

Conclusion

- Is DB time tuning the Holy Grail of Oracle Tuning?

A large, stylized graphic of the letters 'Q' and 'A' in a dark grey, serif font. A large, bright red ampersand is positioned between the 'Q' and 'A', partially overlapping them. The text 'QUESTIONS' and 'ANSWERS' is written in white, bold, sans-serif capital letters across the middle of the graphic.

QUESTIONS ANSWERS