Let's Tune Oracle8 for NT

ECO

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Agenda

➢ **Scope**

➢ **A Look at the Windows NT system**

➢ **About Oracle Services**

➢ **The NT Registry**

➢ **About CPUs, Memory, and Disks**

➢ **Configuring NT as a Backend Server**

➢ **Tuning the Database**

Scope and Assumptions

➢**I am assuming that the listener:**

☛ **Knows NT basics**

☛ **Understands Nomenclature like start->| settings->|control panel**

☛ **Has Basic Oracle DBA and tuning knowledge**

☛ **Knows how to verify and tune basic database structures like caches, etc.**

Oracle on Windows NT

➢ **Windows NT is:**

- ☞ **32-bit OS that supports RISC and CISC architecture**

- ☞ **Uses TCP/IP communications protocol**

- ☞ **Has two modes:**

  - ➡ **Kernel mode (high privilege)**

  - ➡ **User mode (application execution)**

Oracle on NT Cont

➢ **Processes versus Threads**

☞ **Unix and OpenVMS use several detached processes**

➔ **ps -ef |grep ora|grep -v LOCAL|grep -v grep**

☞ **NT built-in, multi-threading**

➔ **A single executable can perform many different tasks at the same time**

Oracle on NT Cont

➢ **In Oracle on NT**

- ☞ **Each detached process = 1 concurrent running thread**

- ☞ **Executable in 8i = Oracle.exe; in 8.0 = Oracle80.exe**

- ☞ **Threads all share the same code, memory space, etc. (reduced resource requirements)**

- ☞ **Use Task Manager to view processes**

Oracle on NT Cont

➢ **As of 8.0.4, multiple ORACLE_HOME**

➢ **Can't easily tell which threads go with what executable**

- ☞ **Must use Services or DOS commands to start and stop each database**

- ☞ **Can use multiple listeners - recommended is to use the highest version one**

Oracle on NT Cont

➢ **To see Oracle Threads:**

☞ **Access the Performance Monitor of the Task Manager**

Thread Name	Thread #
PMON	2
DBW0	3
LGWR	4
CKPT	5
SMON	6
RECO	7

Table 1: Basic Oracle Thread Assignments

Oracle on NT Cont

- ☞ If arch enabled, it will be thread 4
- ☞ In 8i, heterogeneous service agents are multithreaded and will use dispatchers so can support more users
- ☞ Can find thread assignments in the alert log
- ☞ Can use SQL query to see them (as follows)

Oracle on NT Cont

select b.Name bkpr, s.Username
   spid, p.Pid

from V$BGPROCESS b, V$SESSION
   s, V$PROCESS p

where p.Addr = b.Paddr(+)
   and p.Addr = s.Paddr
   /

Oracle on NT Cont

```
BKPR    SPID                    PID

-----   -----------------   -----

PMON                            2

DBW0                            3

LGWR                            4

CKPT                            5

SMON                            6

RECO                            7

        DBSNMP                 12

        SYS                    13
```

About Oracle Services

➢ **Service = An executable program**

➢ **Can be a background or foreground process**

➢ **Will remain running even when no one is logged on to the machine**

➢ **Access using:**

 ➡ **Start->|Settings->|Control Panel->|Services**

Oracle Services Cont

➢ **In 8.0, two separate services for Oracle**

➢ **In 8i, only one service**

➢ **To create a new service, use ORADIM (8i) or ORADIM80 (8.0). Issue the command without any parameters to see the syntax**

The NT Registry

➢ **Registry = a central place to track installed hardware and software**

➢ **Important root keys:**

☞ **HKEY_LOCAL_MACHINE (HKLM)**

☞ **HKEY_USER (HKU)**

☞ **HKEY_CURRENT_CONFIG (HKCC)**

☞ **HKEY_CLASSESROOT (HKCR)**

☞ **HKEY_CURRENT_USER (HKCU/SID)**

The NT Registry Cont

➢ **View registry by using either:**

- ☛ **regedit or regedit32**
- ☛ **Use Start->|Run**

➢ **Under HKEY_LOCAL_MACHINE\Software**

- ☛ **Allows you to see number of and placement of ORACLE_HOMEs**

➢ **Under HKEY_LOCAL_MACHINES\System**

- ☛ **You can see services**

About CPUs

➢ **Watch for CPU usage at 100% ("pegged")**

☞ **If brief, don't worry**

☞ **If constant, add more and/or faster CPUs**

➢ **Remember: Replacing 4 - 200Mhz w/ 4 - 400Mhz will improve MORE than adding 4 more 200Mhz machines!**

Memory Terms

➢ **Virtual Memory = Paging file on disk**

➢ **Page = equal sized pieces of memory**

➢ **Page frame = 4k section of memory**

➢ **Page fault = Occurs when a process requests a page not in memory**

➢ **Paging = Loading data back into memory**

➢ **Swapping = Moving an entire process in or out of memory (NT doesn't do this!)**

More Memory Terms

➤ **Minimum Working Set Size = Min number of pages in memory for each process**

➤ **Maximum Working Set Size = If enough memory is available, each process can grow to this size**

➤ **Reserved Memory = Memory allocated to a thread**

➤ **Committed Memory = Virtual memory that has space reserved on a disk**

Using Memory

➢ **As a 32-bit OS, max memory addressable is 4 Gb; NT reserves 2Gb for itself; with SP3, 3 GB available for applications**

➢ **To see memory usage for a process, look in Task Manager, Memory tab**

➢ **Monitor page fault rate from pfmon in the Resource Kit**

Memory Cont

➢ **Default page size on NT is 4k; on Compaq is 8k**

➢ **For better performance, create the Oracle database to coincide with the NT page size**

➢ **If working set size is shrinking and growing, part of SGA can get paged out**

➢ **For DSS, try to balance Oracle hit ratio and OS paging**

Check Disk Usage

➢ **Monitor datafile disk usage over time and move files to better balance disk access (script provided in paper)**

➢ **Add physical disks as needed or replace disks or arrays with faster disks and/or array controllers**

➢ **Increase memory to reduce "trips back to disk"**

Maximum Sizes

Database Feature	Maximum Size
Maximum Oracle block size	16KB
Maximum blocks per data file	4 million
Maximum data files per database	2KB – 20,000, 4KB – 40,000, 8KB – 65,535
Largest data file	64GB (assuming 16KB Oracle block size)
Largest database	4PB (Petabytes)

* Max # Users depends on whether MTS is used

Configuring NT as a Server

➢ **Oracle8i is memory intensive!**

➢ **To give Oracle the most memory resource:**

☞ **DON'T use for any other purposes, like:**

➡ **primary domain controller**

➡ **file or print server**

➡ **remote access server**

➡ **router**

➡ **firewall server**

Other Steps to Take

➢ **Reduce priority of interactive foreground processes**

  ☞ **Move Application Performance Boost slider = None (from System->|Control Panel->|Settings menu)**

➢ **Can span virtual memory pages across disks (if more than one physical disk is available)**

➢ **If change virtual memory page file size, reboot**

More Steps Cont

➢ **Reduce NT server file cache (great for machine acting as a file server!) Oracle8i does its own caching via the SGA.**

➢ **Use Control Panel->|Settings->|Network->Services tab->|Properties and click network applications configuration box**

➢ **When done, reboot**

More Steps Cont

➢ **Disable unnecessary services (only if machine is not used for anything else!)**

➢ **Can disable Plug and Play, remote access autodial manager, remote access connection manager, remote access server, telephony server**

➢ **Disable from Settings->|Control Panel->|Services**

More Steps Cont

➢ **Remove unused network protocols and reset bind order then reboot**

➢ **Identify unused protocols and use Settings->|Control Panel->|Network**

➢ **If using more than one protocol, reset bind order with most used protocol first using Bindings tab select "All Services"; select protocol used most and click on "move up"**

More Steps Cont

➢ **Optimize network throughput by changing "Optimize for file sharing" to "optimize for network throughput". Should see 5 - 10% improvement**

➢ **From Network option->|Services tab, choose Server option->|Properties and select "Maximize throughput for network applications" (Then Reboot)**

Other Actions to Take

➤ **Check for the latest service packs from Microsoft (then check Oracle support to ensure they are supported)**

➤ **If NT is your back-end server only, close unnecessary foreground applications from the startup folder (WinNT\Profiles\All Users\Start Menu\Programs\Startup) like FindFast indexing and MS Office toolbar**

➤ **Don't use complex screen savers!**

A Bit about Basic Tuning

➢**Oracle environment includes:**

☛**Physical and logical design levels**

➥**Disk and object layout**

☛**Application level**

➥**Tune the SQL**

☛**Operating system level**

➥**OS resources (memory, disk capacity)**

Basic Tuning Cont

☞ **The network**

➡ **Both bandwidth and latency**

☞ **The database level**

➡ **Memory structures, latches, locks, contention**

➤ **Consider Pareto's Rule… 20% of the work will consume 80% of the time**

Tuning the Database

➢ **A "nice way" to see contention on your system:**

➢ **Use the following V$ views (see script in paper):**

☞ **V$SYSTEM_EVENT (system-wide)**

☞ **V$SESSION_EVENT (session-by-session - - while session active)**

☞ **V$SESSION_WAIT**

Regarding Contention

➢ **Concentrate on:**

- ☛ **The buffer hit ratio - # of times a block is found in RAM**

- ☛ **Redo log space requests - # of times redo log buffer flushed**

- ☛ **DB file read waits - # of times Oracle had to wait for physical I/O**

- ☛ **Buffer busy waits - # of times a transaction had to wait to access a block in memory**
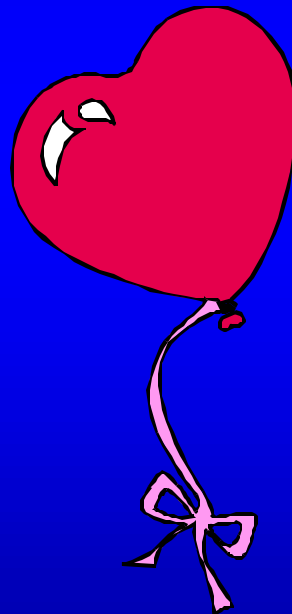
Regarding Contention Cont

☛ **Table fetch continued row - # of times a row was fragmented into more than one block**

☛ **Disk sorts - # of times sort was performed to disk**

☛ **Library cache hit ratio - # of times shared code was found in memory**

➢ **OLTP versus DDS mix**

➢ **Tuning is an on-going process!**

Thank You Very Much!
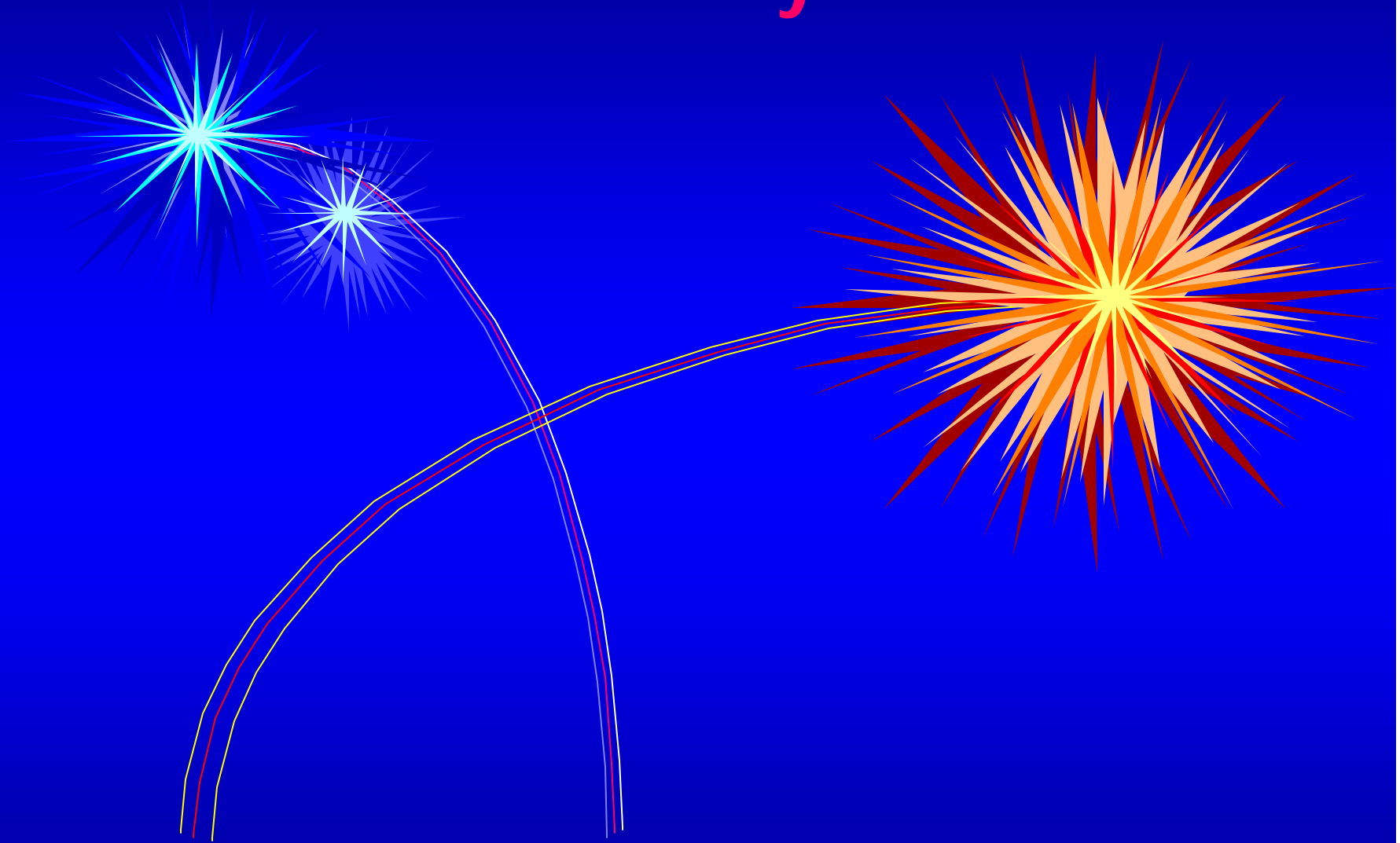
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