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

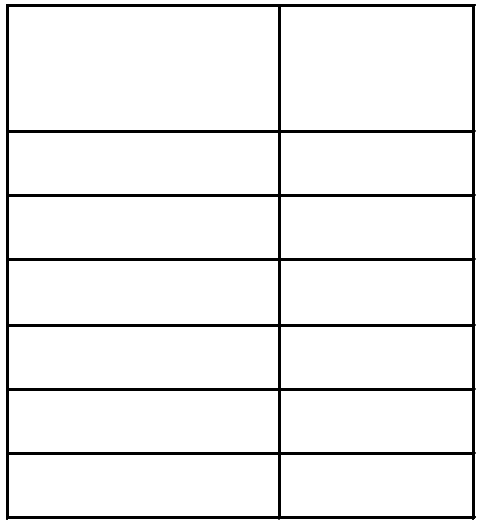
- In Oracle on NT
  - Each detached process = 1 concurrent running thread
  - Executable in 8i = Oracle.exe; in 8.0 = Oracle80.exe
  - Threads all share the same code, memory space, etc. (reduced resource requirements)
  - Use Task Manager to view processes

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



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

* 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

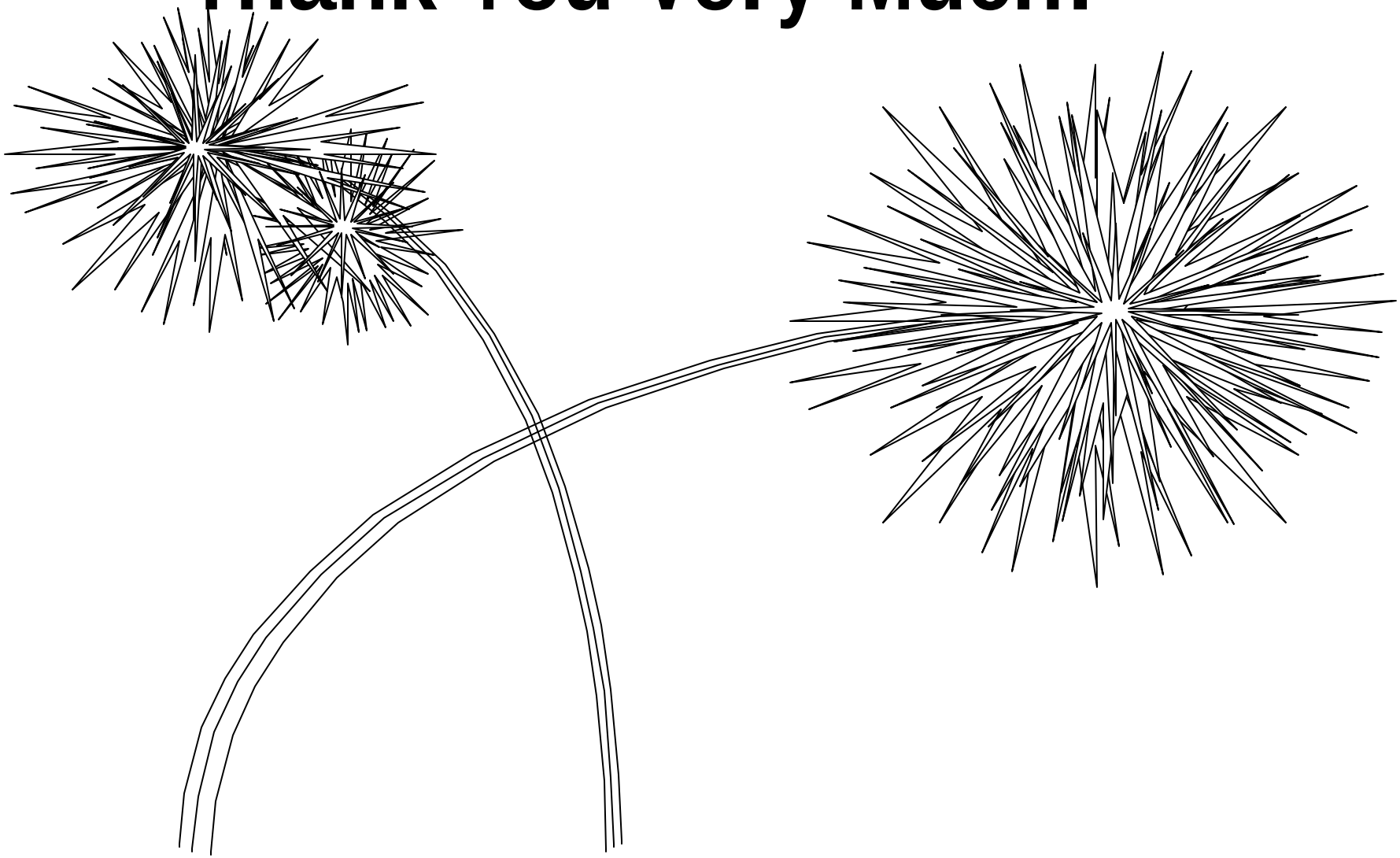
- **Concentrate on:**
  - **The buffer hit ratio - # of times a block is found in RAM**
  - **Redo log space requests - # of times redo log buffer flushed**
  - **DB file read waits - # of times Oracle had to wait for physical I/O**
  - **Buffer busy waits - # of times a transaction had to wait to access 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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