

## Effective Performance Tuning Oracle Applications

- Target
- Company profile Invantive
- Why?
- General hints
- Case
- Pointers and Tools

June 2002



## Target

- Introduction into performance tuning Oracle Applications.
- Interactive session:
  - Feel free to ask questions.
  - Presentation is just a guideline. Feel free to deviate.

June 2002

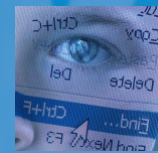


## Company Profile Invantive

Invantive BV offers financial reporting, analysis and expertise to financial services providers.

We help our customers with:

- Better proces control.
- Cost reductions and margin improvements.
- Insight in their primary processes.
- Reduce risk image damage.



June 2002



## General Services

- Datawarehousing: data integration and consolidation based upon uniform definitions, leading to efficiency and risk control.
- Regulatory reporting (IFRS, Basel I, Basel II, Sarbanes-Oxley, WTK, DRA, Dutch GAAP).
- Architecture: designs easy to implement and with a long life-time, even in changing environments.



June 2002



## Technical Services

- Invantive Care: administration and monitoring of complex administrative environment such as ERP, financials and CRM.
- Performance tuning: enabling existing environments to handle more transactions in the same time through analysis and changes.



June 2002

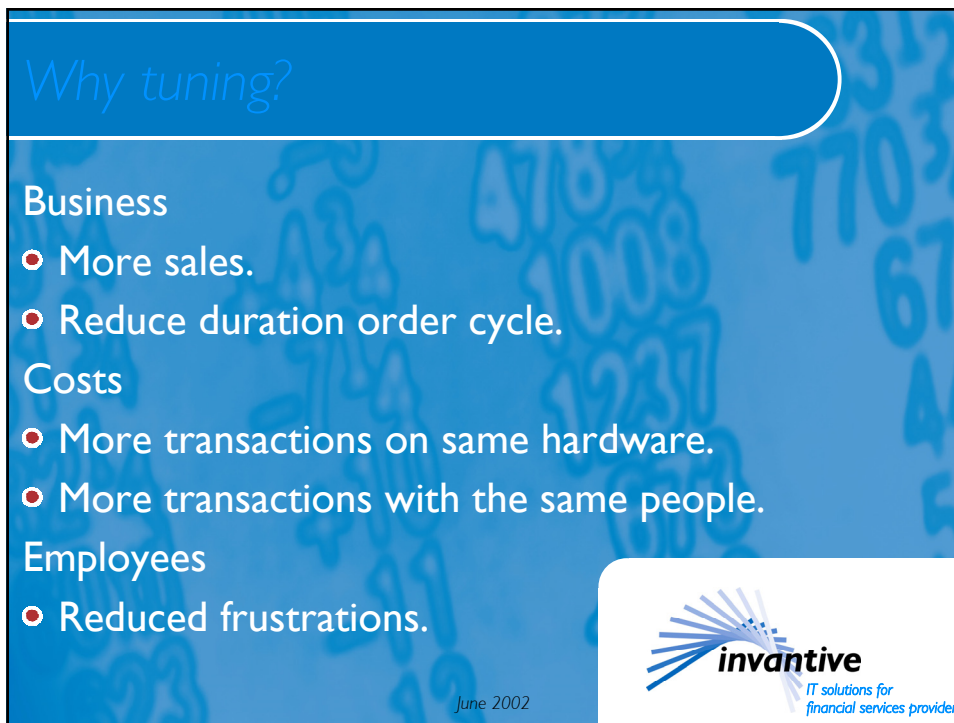
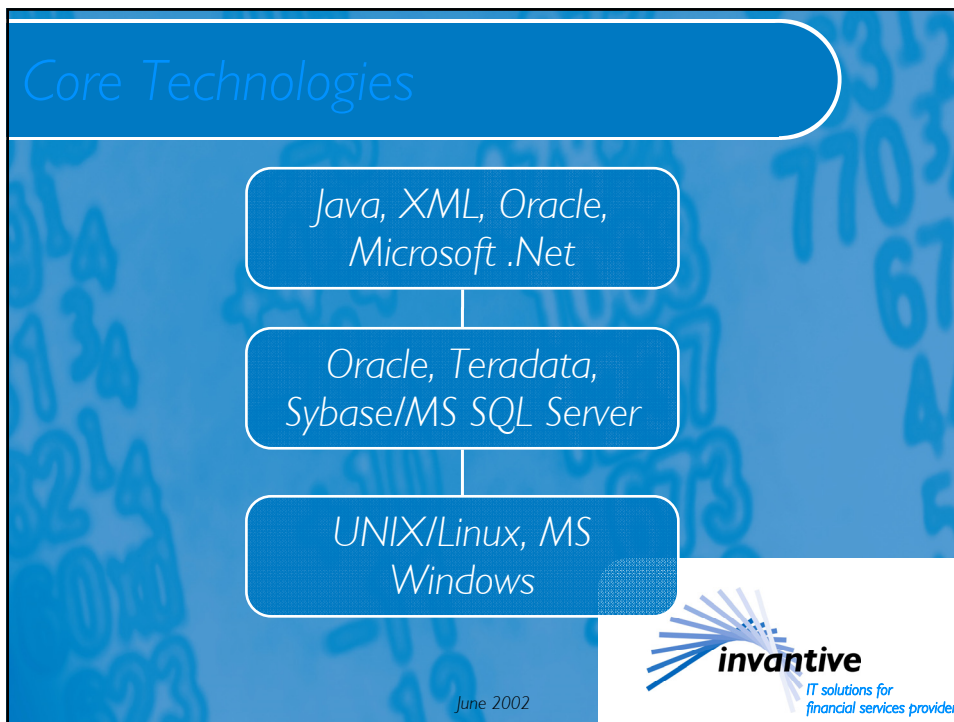


## Products

- Invantive Estate: financial reporting and control solution for real estate projects.
- Invantive Melba: administration and monitoring for UNIX and Oracle platforms.
- Invantive Producer: CASE tool for generation of quality reporting solutions.

June 2002





## General Recommendations

- Optimisation must improve bottom-line.
- Establish clear targets in advance.
- Performance problems are always only located in the application.
- A well-designed Oracle application is never I/O-bound but CPU-bound.

June 2002

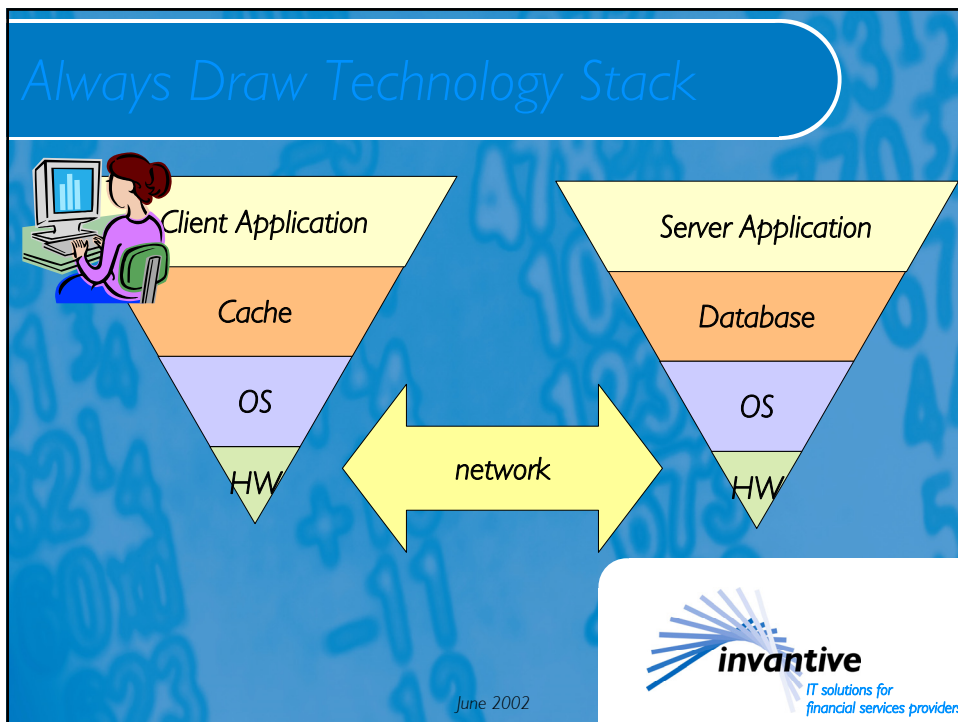


## General Recommendations

- Do you think 100 people can do it faster than your server? Congratulations! You have a candidate for tuning.
- 10% faster is nice, but start of with a 100-fold performance increase as goal.
- Suboptimisation is no optimisation at all.
- Ensure you have a representative test environment.

June 2002





## Use

Fact: a function never used never gives performance problems.

Try to workaround the problem:

- Use different reports.
- Use a different way of data entry.
- Abandon use of function.

June 2002

**invantive**  
IT solutions for  
financial services providers

## Candidates in Application

- Overall: use TOAD to determine heavy queries from SGA. Best sorting is total disk I/O and total concurrent gets (CPU).
- Concurrent requests: use `fnl_concurrent_requests` to determine which requests take longer than 5 minutes.

Use tracing with tkprof:

- Forms: Trace On.
- Requests: Profile option `%trace` definition.

June 2002



## TOAD Gives you Insight

SQL	Disk Reads	Buffer Gets	Sort	Executions	Parse Calls	Module
<code>select trunc(sum(buffer_gets)) from v\$sqlarea</code>	146	228	4	2	2	T.O.A.D
<code>select owner, table_name, trigger_name from dba_triggers where 1=1 and</code>	119	21778	0	1	1	1 02@ /u01/opt/meba/sql/m
<code>select /*+ RULE 7 */ est.owner, est.segment_name</code>	110	24279	10	1	1	1 02@ /u01/opt/meba/sql/m
<code>select vs.sql_text,vs.shareable_mem,vs.persistent_mem,vs.runtime_mem,vs.sorts,</code>	89	12	2	1	1	T.O.A.D
<code>select owner, table_name, constraint_name from dba_constraints where</code>	72	163	0	1	1	1 02@ /u01/opt/meba/sql/m
<code>select username, l.privilege, l.table_name from dba_users u,</code>	70	6350	5	1	1	1 02@ /u01/opt/meba/sql/m
<code>select cst.owner, cst.name, cst.lbe_num_rows, cst.lbe_avg_row_len,</code>	66	352	2	1	1	1 02@ /u01/opt/meba/sql/m
<code>SELECT TST_ID, TST_PPE_ID, TST_WORKING_DATE, TST_DURATION,</code>	65	917	1	1	1	
<code>begin declare -- Retrieve invalid objects. -- cursor c_obj is</code>	52	8486	0	1	1	1 01@ /u01/opt/meba/sql/cc
<code>SELECT ISS_ID AS ISS_ID, ISS_DESCRIPTION AS ISS_DESCRIPTION,</code>	46	1167	3	3	3	
<code>BEGIN DBMS_OUTPUT.DISABLE; END;</code>	39	198	0	55	55	
<code>SELECT CAL_ID AS CAL_ID, CAL_DESCRIPTION AS CAL_DESCRIPTION,</code>	28	1217	2	2	2	
<code>select ITF_PEOPLE.ID "ID", ITF_PEOPLE.CODE "CODE";</code>	28	319	0	2	2	
<code>insert into tact.ITC_ISSUES_INI ID, CREATION_DATE, LAST_UPDATE_DATE,</code>	27	313	0	1	1	

SQL | Execution Stats | Explain Plan

```

1 /* Formatted on 30-05-2002 15:42 (Revised)Net Formatter v4.4.0) Invantive*/
2 select trunc (sum (buffer_gets))
3 from v$sqlarea
4


```

SYSTEM9001.LX01.INTRANET.INVANTIVE.COM | Disk Reads | Commit is OFF

June 2002

IT solutions for  
financial services providers

## Metalink to Rescue



Is the problem already solved?  
 Example: shipment report (OEXOESHR) slow  
 when given date range.  
 Query: search for patches with OEXOESHR.

**Patch Download**

To view a list of available patches, select a product and platform combination from the drop-down lists.

Patch Number:

Product Family:

Product:

Release:

Platform:

Note: If you run a 32 bit Oracle product on a 64 bit OS, choose the 32 bit platform.


Language:

Limit Search to:

Includes File:


Order by:

June 2002



IT solutions for  
financial services providers

## Metalink to Rescue




Result:

**List of selected patches**

ID:565911 Patch:1658672 OEXOESHR - PATCH 1040055 NAG RUN TIME PROBLEM Product:Order Entry Platform:Sun Solaris OS (SPARC) Language:American English Translations Required	Version:Applications 10.7.0 Last updated:27-MAR-2001 Includes:OEXOESHR.rdf 40.18 Size:97K (99475 bytes)
ID:473023 Patchset:1588061 Patch 10.7.OEJ Product:Order Entry Platform:Sun Solaris OS (SPARC) Language:American English Translations Required	Version:Applications 10.7.0 Last updated:27-JUN-2001 Includes:OEXOESHR.rdf 40.17 Size:11M (12407233 bytes)
ID:255789 Patch:1040055 SHIPMENT REPORT NOT PRINTING ORDERS WHERE SHIP DATE HAS NON-ZERO TIME STAMP Product:Order Entry Platform:Sun Solaris OS (SPARC) Language:American English Translations Required	Version:Applications 10.7.0 Last updated:22-NOV-1999 Includes:OEXOESHR.rdf 40.17 Size:96K (99203 bytes)

June 2002



IT solutions for  
financial services providers



## Oracle Optimizer (not GL optimizer)

25% of problematic queries give excellent results with the other optimizer:

- 10.7 en 11.0 reports: try /\*+ all\_rows \*/.
- 10.7 en 11.0 forms: try /\*+ first\_rows \*/.
- 11i: try /\*+ rule \*/.

Example, from 16 minuten to 15 seconds hint:

```
select /*+ rule */ distinct wsh.delivery_id delivery_id
from   wsh_new_deliveries wsh
       wsh_deliverables_v wd
where  l=1
and    wsh.delivery_id      = wd.delivery_id
and    wsh.status_code     = 'OP'
and    wsh.asn_date_sent   is null
and    wd.released_status_name = 'Staged'
```

June 2002



## Concurrent Managers

Check setup:

- Reduce number of normal managers to at most twice the number of processors.
- Reduce number to 95-percentile of concurrent running requests.
- Every concurrent manager less saves 20 Mb.
- Tune all concurrent programs running longer than 5 minutes and a run-frequency of at least weekly.
- Finally and not earlier: make a distinction between long running request and concurrent managers.

June 2002



## SQL Tuning

- Check whether candidates can be assisted by an extra index.
- Check whether the correct index is used.
- Keep future growth in mind, an index on a date column might last longer.
- Try to reduce frequency of execution when reaching optimal level of query performance.

A case...

June 2002



## The Wieber



Filter:  
Name-range

Filter:  
Date-range

Start!

1% used for results

June 2002



## Change 1

Customers (K rows)      Shipping details (M rows)      Deliveries (K rows)

Filter: Name-range      Filter: Date-range

Advantages:

- Doubled performance.
- Less sensitive for increased datavolume.

June 2002

**invantive**  
IT solutions for financial services providers

## Change 2

Still not within target of 5 minutes. Further analysis showed that multiple similar queries are used:

- Full list.
- Group by location.
- Group by customer.

Solution:  
Fill temporary table with full list and use group by-s.

Result:

June 2002

**invantive**  
IT solutions for financial services providers

## Database

- Causes solely 10% of performance problems.
- Keep statistics up-to-date including column histograms.
- Use capacity management and purging procedures (e.g. 10.7: so\_exceptions, 11i: po\_wf\_debug)

June 2002



## Operating System

- Causes 5% of performance problems.
- Check OS Cache methods.
- See example in next section for analysis tools.

June 2002



## Hardware

- Causes 5% of performance problems.
- Memory, memory, memory: monitor memory usage with 'top' and 'memptool', monitor paging-out using 'vmstat'.
- CPU: monitor with 'top'.
- Capacity management: discover trends with 'MRTG' or 'sar'.

June 2002



## Network

- Causes 5% of performance problems.
- Monitor round trip times using 'ping' and 'traceroute'.
- Analyse #round-trips for one transaction.
- Capacity management (MRTG)
- Monitor using 'ethereal', 'Isof' and 'trace'.
- Example network monitoring of 'from dual':

June 2002



## Use Ethereal to Analyse Activity

The screenshot shows the Ethereal interface with a list of captured packets. The selected packet (No. 1) is a TCP Reset (RST) from dbcp101.intranet.livant.com to dbcp101.intranet.livant.com. The detailed view shows the Transmission Control Protocol (TCP) segment with the following fields:

- Src Port: 2970 (2970)
- Dst Port: 1521 (1521)
- Seq: 59568575
- Ack: 409440784

The hex dump below shows the raw data of the packet, with the TCP header and payload highlighted in red.

June 2002

**invantive**
IT solutions for  
financial services providers

## Use Lsof to Determine File Numbers

The terminal output shows the output of the command `lsof -p 22641`. The output lists various files and devices opened by the process with PID 22641, including Oracle database files, shared libraries, and system files.

```

# lsof -p 22641
COMMAND PID USER FD TYPE DEVICE SIZE NODE NAME
oracle 22641 oracle cwd DIR 9,2 4096 930744 /u00/app/oracle/product/8.1.7/dbs
oracle 22641 oracle cwd DIR 9,1 4096
oracle 22641 oracle txt REG 9,2 25582933 1158733 /u00/app/oracle/product/8.1.7/bin/oracle
oracle 22641 oracle mem REG 9,1 494288 460189 /lib/ld-2.2.4.so
oracle 22641 oracle mem REG 9,2 4192428 66131 /u00/app/oracle/product/8.1.7/lib/libjov8.so
oracle 22641 oracle mem REG 9,2 33269 66174 /u00/app/oracle/product/8.1.7/lib/libdsbtsh8.so
oracle 22641 oracle mem REG 9,1 65997 462553 /lib/libld1-2.2.4.so
oracle 22641 oracle mem REG 9,1 624962 317555 /lib/ld38/libm-2.2.4.so
oracle 22641 oracle mem REG 9,1 531205 317556 /lib/ld38/libpthread-0.9.so
oracle 22641 oracle mem REG 9,1 5780408 313575 /lib/ld38/libc-2.2.4.so
oracle 22641 oracle mem REG 9,1 262272 465145 /lib/libnss_files-2.2.4.so
oracle 22641 oracle 0r FIFO 0,6 31397431 pipe
oracle 22641 oracle 1w REG 9,1 1979 432752 /var/tmp/out.28104 (deleted)
oracle 22641 oracle 2w REG 9,1 1979 432752 /var/tmp/out.28104 (deleted)
oracle 22641 oracle 3r CHR 1,3 231499 /dev/null
oracle 22641 oracle 4r CHR 1,3 231499 /dev/null
oracle 22641 oracle 5r CHR 1,3 231499 /dev/null
oracle 22641 oracle 6r CHR 1,3 231499 /dev/null
oracle 22641 oracle 7r REG 9,2 352912 794413 /u00/app/oracle/product/8.1.7/nbws/mesz/oraus.msb
oracle 22641 oracle 15u IPv4 33702750 TCP 15u01:1521->dbcp101.intranet.livant.liv.com:2970 (ESTABLIS
HED)
oracle 22641 oracle 409u REG 9,3 471863296 179879 /u01/app/oracle/oradata/d01/system01.dbf
  
```

June 2002

**invantive**
IT solutions for  
financial services providers



## Tools

- Tkprof: `$ORACLE_HOME`
- TOAD: [www.toadsoft.com](http://www.toadsoft.com)
- Top: <http://www.groupsys.com/top/>
- Memtool (Solaris): <http://playground.sun.com/pub/memtool/>
- Lsof: <ftp://ftp.cerias.purdue.edu/pub/tools/unix/sysutils/lsof/>
- Trace/truss/strace: OS vendor
- MRTG: [www.mrtg.org](http://www.mrtg.org)
- Ethereal: [www.ethereal.com](http://www.ethereal.com) (UNIX en Windows)
- Tcpdump: [www.tcpdump.org](http://www.tcpdump.org)
- Invantive Melba: [guido.leenders@invantive.com](mailto:guido.leenders@invantive.com)

June 2002

