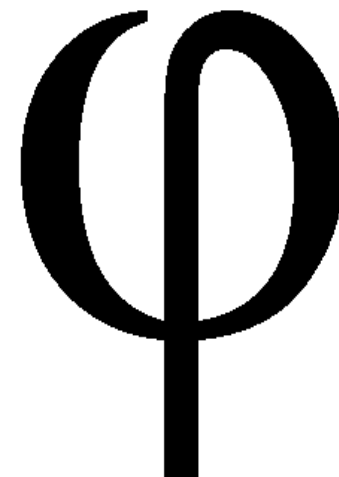


Capacity Planning – without tooling

(Please keep IT simple)

Piet de Visser

The Simple Oracle DBA



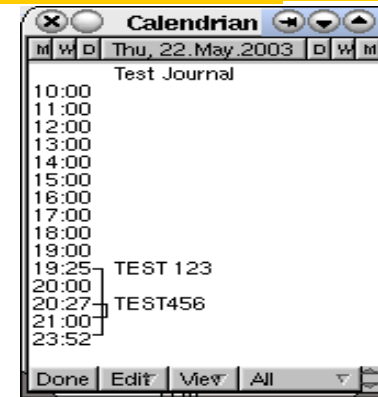
Commit Your **ORACLE** Knowledge

Capacity Planning

(= Everything)

Anecdotes

(I'm sure you have them too)



The quick fix-trick

(Q & D)

More elaborated tricks

(method, better ...?)

Discussion

(Do Challenge!)

- **Capacity = Performance** (= hot, right?)
 - Is system “snappy” ?
 - Do batches run inside window ?
 - Can we patch/upgrade inside 30min ?
- **Capacity is Management-level guff.**
 - Do we have enough kit ? (SLAs, targets, requirements..)
 - Can we add more plants / trucks / customers ?
 - Will it still work in 6 – 12 – 18 – 24 months ?
- **Capacity is rarely right - just live with that**
 - %usr, %idle, %steal : at least one will be too high...



- You want 17 or 1800 tx/sec ?
 - Java... (nuf said)
- Looking at 1TB (through a toilet window)
 - Processing 1M lines/hr...
- “our system is getting full”..
 - Heavy SQL in OLTP (we got lucky - fixable)
- KIWI – but not for (very)dynamic sql
- KIWI – but not for single-threaded processes.
- Check Jonathan’s ppt about EXA, “The Answer”
- ...There will always be “capacity” problems.



Commit Your **ORA**

Thank You !



· ORACLE Knowledge

- **Capacity : Demand - What do you need done**
 - **Get the Business numbers – Future Projections!**
 - **Nr Customers (and activity)**
 - **Nr orders / nr movements / amount of history...**
- **Capacity : supply - What kit do you have.**
 - **Software: Which system/software will be used ?**
 - **Hardware : CPU / Memory / Storage (Exa??)**
- **Capacity: can supply match demand ?**
 - **or your job is in danger,**
 - **Or... you can make a fortune touting Exa..**

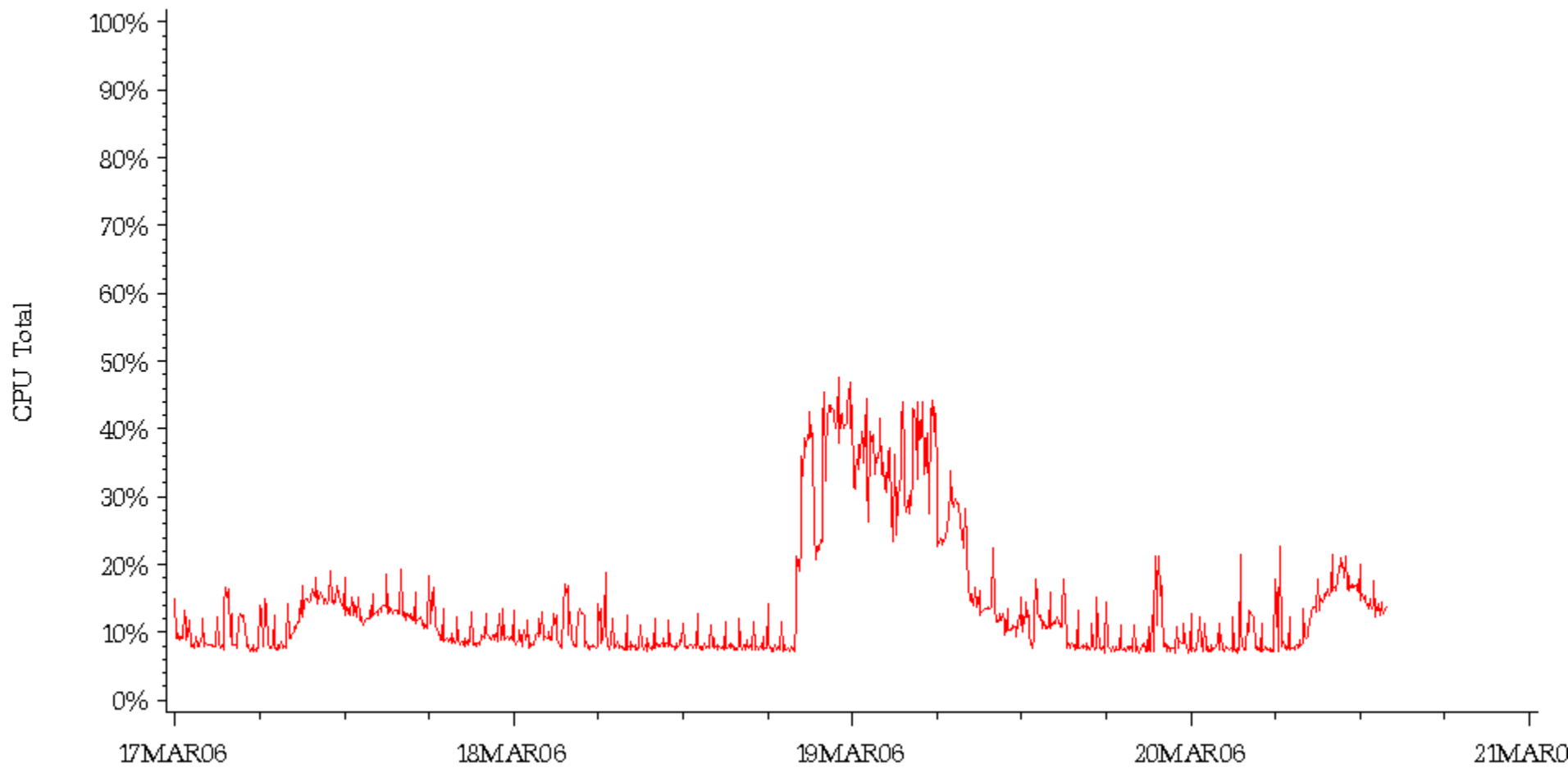


Commit Your **ORACLE** Knowledge

- **Business says: 1 order per minute...**
 - Verify in the system...
- **Measurement + Testing is key ...**
 - (I know: sometimes, the measurement just isnt..)
 - (I know: sometimes you cannot test)
- **Short: Measure!**
 - How much work in 1 unit (1 order, 1 day, 1 report).
 - Use only available tools (don't fall for fancy stuff)
 - SQL / Statspack / AWR
 - vmstat / sar : how much is used...



CPU Utilisation



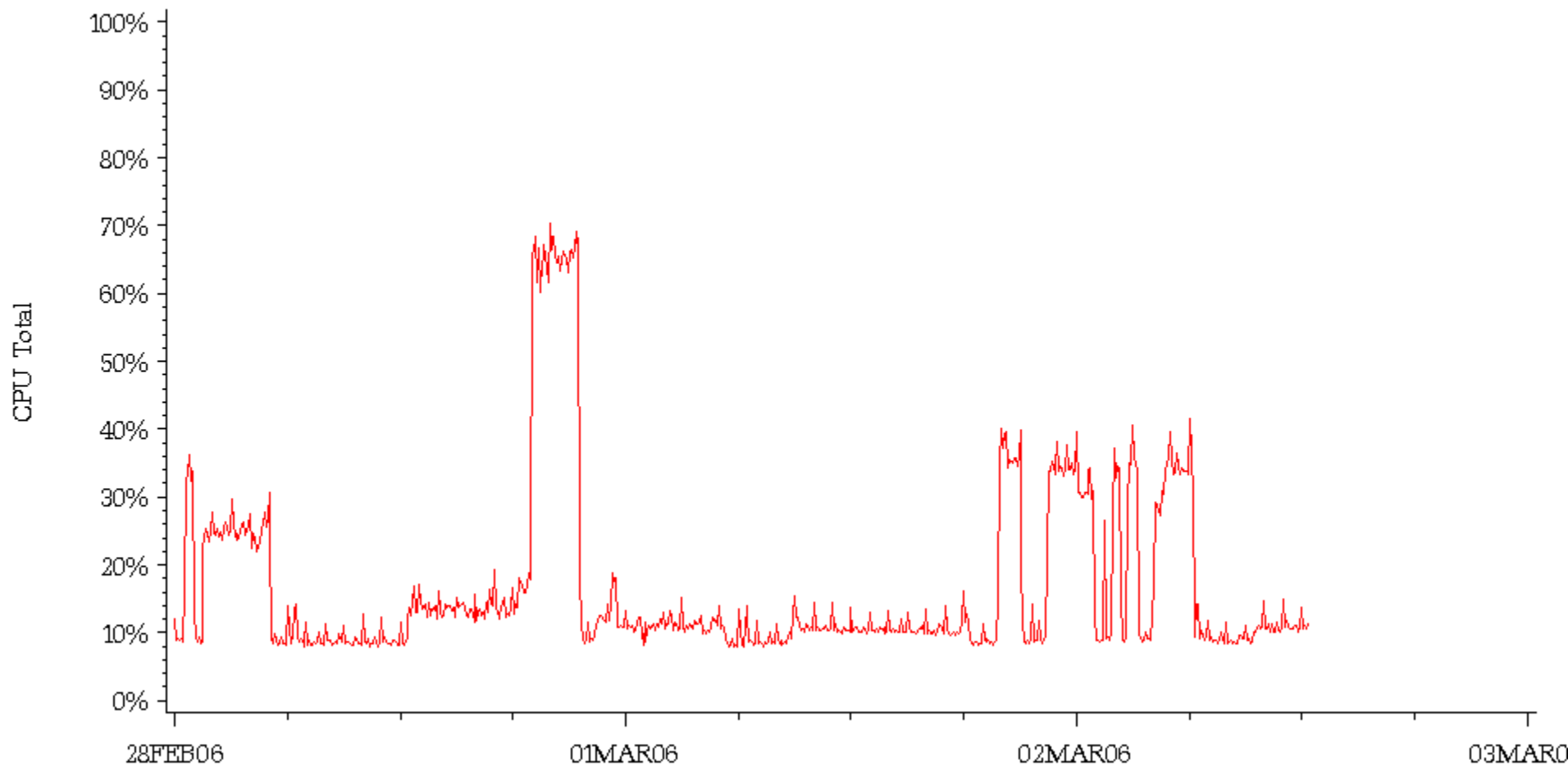
BT/UCPS CP00100

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17MAR06 — 20MAR06

Commit Your **ORACLE** Knowledge

CPU Utilisation



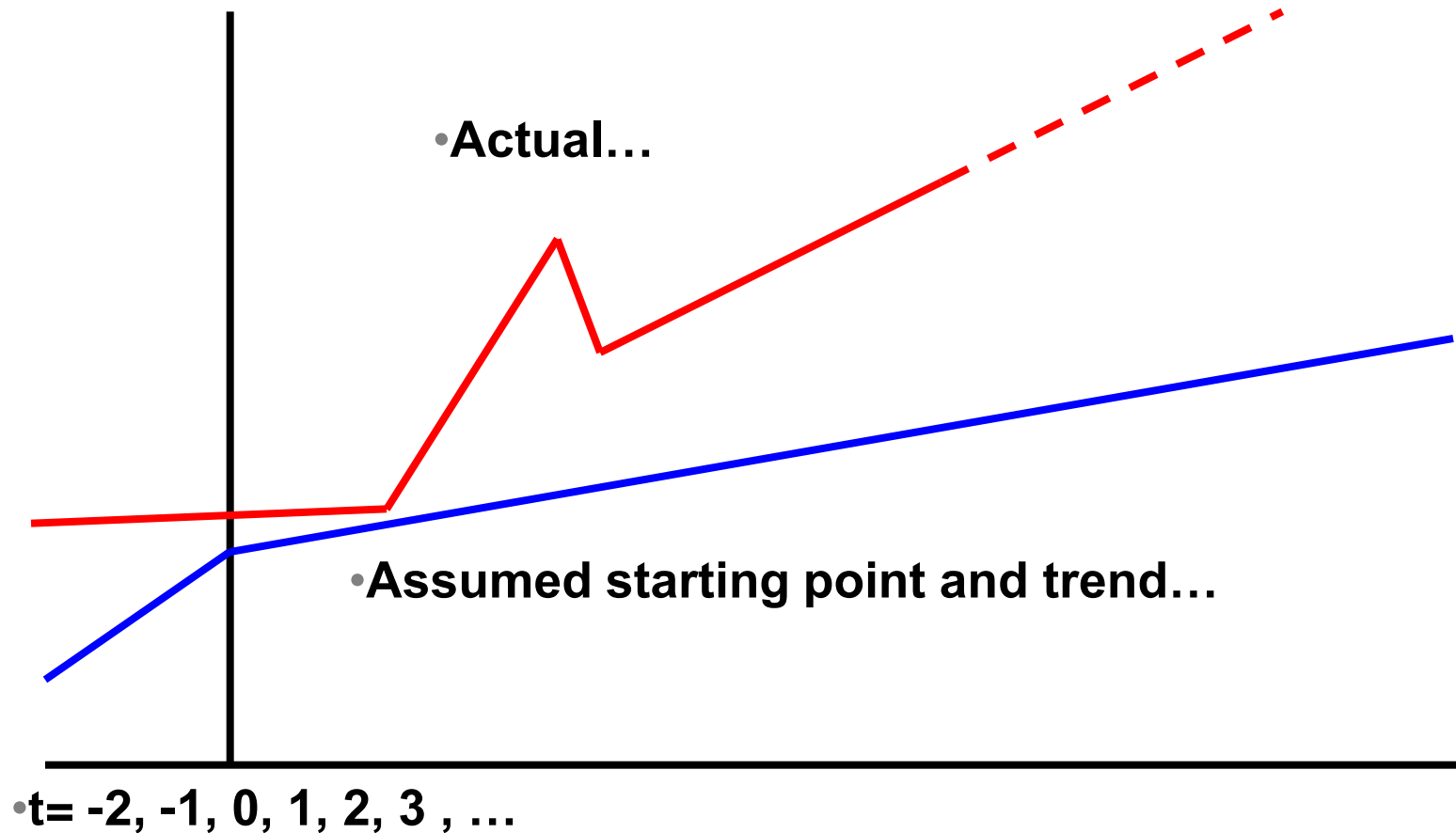
BT/UCPS CP00100

PNBU180DM3—UKSR

28FEB06 — 02MAR06

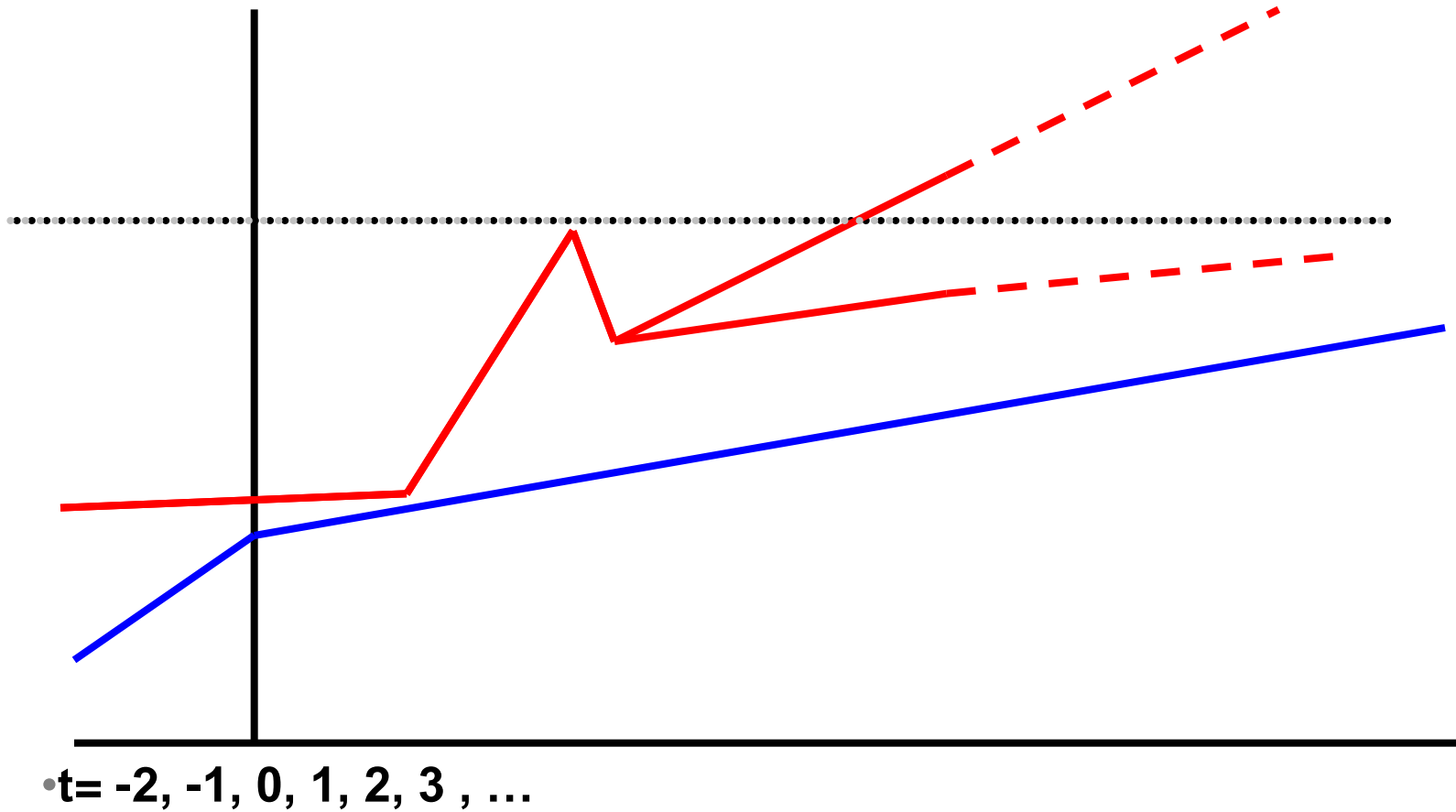
- **Measure, Trust + verify**
 - Go verify with SQL*plus, sar and .. xls
- **Activity per Day / Week / Month**
 - 100K movements = 1 per second... (average!)
- **MB growth per day / week / month**
 - 20M /day in SJO, or 1G/day in SGP..
- **System usage (SAR or OEM)**
 - And XLS (make some simple plots)
 - Beware of %Steal





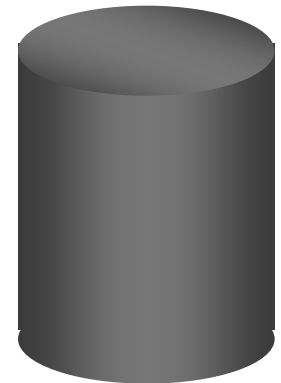
Commit Your **ORACLE** Knowledge

The Ceiling – Iron or Brains ?



Commit Your **ORACLE** Knowledge

- **How big is your system**
 - (very often, nowadays just big...)
 - Cat /proc/cpuinfo, meminfo
 - Statspack (will tell you !)
 - Surprise: you use 2G out of a 24G server
 - Surprise: your db does 10min of work in 60min...
- **Pitfalls:**
 - Virtual...
 - Slowness in storage
 - Peak-loads (10am and 10pm)



AWR has most of the data you need....

PDV BV

THAT MATTER

	Per Second	
Redo size:	629,039.51	663.37
Logical reads:	120,998	1,474.09
Block changes:		43.47

Event	Waits	Time	Call Time	Wait Class
CPU time			58.9	
db file sequential read	3		18.7	User I/O
log file sync	6		18.7	Commit
log file parallel	3		17.3	System I/O
db file	12		5.8	System I/O

Tran	82.08	
------	-------	--

And ... it tells you CPU_COUNT, system-memory and usage....

Commit Your **ORACLE** Knowledge

- **After Quick + Dirty measurements (guesstimates)**
 - You know “demand”
 - You know “supply”
- **Does it match ?**
 - Only you can answer (and the users!)
- **If not...**
 - Performance-tweaking.. (op-tuh-my-sation)
 - KIWI...
 - Mostly a combination.
 - (example: eliminating the report-DB Totally fixed it all...)



SOLUTIONS THAT MATTER

- **Individual actions**; must be efficient
 - **C reate / Insert** (1x)
 - **R ead / Queries** (Nx, which fields, why?)
 - **U pdate** (Nx, which fields ?)
 - **D elete** (1x, bulk/del old data?)
 - **Efficient ? ... SQL and Indexes !**

- **Concurrent actions**; must remain efficient
 - **Limit locks** (no blocking of others)
 - **No unusable indexes** (exchange part..!)
 - **No hot-blocks** (buffer busy waits).



Commit Your **ORACLE** Knowledge

- **What generates my (DB) workload ?**
 - SQL, the statements that tell the DB what to do!
 - Do you recognize the queries in the awrrpt ?
 - (e.g. are you looking at the right report)
- **From Statspack / AWR / V_\$SQL / Traces**
 - What Time (ela, cpu) does a stmt take (aggregated!)
 - How much Work does a stmt do (gets, rows-processed)
 - What job, what Unit of work was done ?
 - Is that Reasonable ... ? (fast? scaleable?)
- **(Expected) Frequency and “workload” for a qry ?**



SQL ordered by Gets

- Resources reported for PL/SQL code included
- Total Buffer Gets: 32,612,884
- Captured SQL account for 91.2% of Total

Buffer Gets	Executions	Gets per Exec	%
32,570,957	1,363	23,896.52	
1,851,387	1,765	1,048.94	
1,828,401	1,765	1,035.92	
1,764,845	1,765	999.91	
1,648,859	1,765	934.20	
1,352,149	1,765	766.09	
1,245,977	1,765	705.94	

SQL ordered by Executions

- Total Executions: 548,950
- Captured SQL account for 54.7% of Total

Executions	Rows Processed	Rows per Exec	Cl
77,294	77,294	1.00	
72,676	0	0.00	
60,498	60,498	1.00	
28,658	28,658	1.00	
10,330	10,330	1.00	
1,765	1,765	1.00	
1,765	1,765	1.00	
1,765	1,765	1.00	
1,765	1,765	1.00	
1,765	1,765	1.00	

```
SQL > Select buffer_gets, executions, rows_processed
From V$SQL where ... order by ... ;
```

Commit Your **ORACLE** Knowledge

- **Gets / Row** <10
 - Realistically, any data is accessed via Index!
- **Gets / Execute :** <100
 - How much work (CPU, IO) will it take.
 - For a million rows, allow some more work...
 - But: be careful if executed at high-frequency.
- **Gets / Transaction** <1000
 - Why? Efficiency! And Limit the time of locking.
 - Problem: more difficult to measure in detail.



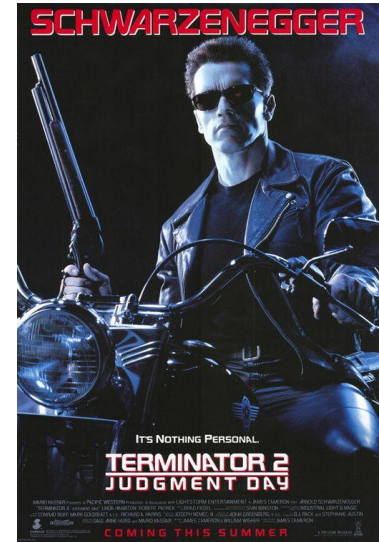
Ratio to find Locking...

SOLUTIONS THAT MATTER

- **Special case: TX-enqueue waits.**
 - Table / Segment can be found from segment-stats
 - Which Stmt ?... use a ratio!
- **CPU-time / Elapsed time (percentage) >50 %**
 - Notably: looking for Concurrency or IO problems
 - Also : if it waits for anything but CPU
 - (buff-busy, log-file-sync, log-file-par-wrt)
- **To fix locks: often means talking to Arch and Dev...**
 - Start transaction at latest possible moment.
 - Avoid running totals and similar constructs if possible.

Commit Your **ORACLE** Knowledge

- **“Elimination”**: don’t run the stmt.
 - Best option!
- **“Optimization”**: make it faster.
 - Realistic option (hopefully)
- **“Containment”** : run the stmt less frequent.
 - (= Worst option; It Will Be Back!
- **Do-Nothing (KIWI)** :
 - If you are confident about workload and hardware....



Commit Your **ORACLE** Knowledge

- **Capacity : Demand - What do you need done**
 - **Get simple numbers**
 - **Project-future**

- **Capacity : supply - What kit do you have.**
 - **Find Simple numbers**
 - **Verify!**

- **Capacity: Match ???**
 - **Tip: Plan simply, and carry some big kit..**



Don't Take my word for it...

Tahiti.oracle.com: start with concept-guides

Technet (but be critical)

Oracle-L : real world stuff

[SimpleOracleDb . Blogspot . com](http://SimpleOracleDb.blogspot.com) (my ramblings)

Do some testing yourself ...

Goethe : Simplicity Shows the Master



Commit Your **ORACLE** Knowledge

- Questions ?
- Reactions ?
- Experiences from the audience ?



Commit Your **ORACLE** Knowledge