

IN THE CLOUD, PERFORMANCE IS INSTRUMENTED AS COST



David Kurtz
AIOUG 2024

/*+Go-Faster*/ Consultancy

WHO AM I

Go-Faster Consultancy

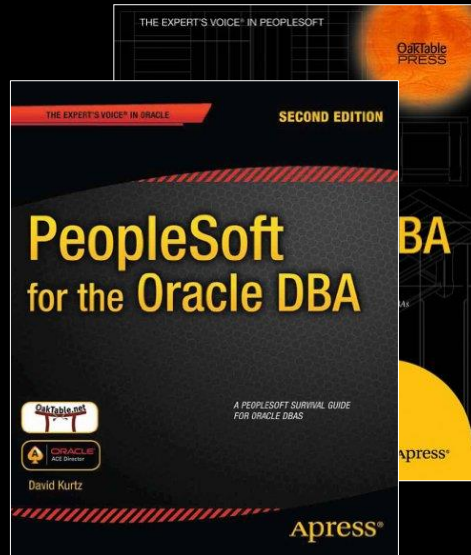
- Performance tuning
 - Oracle RDBMS
 - PeopleSoft ERP
- www.go-faster.co.uk
- blog.go-faster.co.uk
- blog.psftdba.com



Oak Table



ORACLE
ACE Director



IN THE GOOD OLD/BAD OLD DAYS OF 'ON PREMISES'

Sizing Estimate

- Estimate hardware for application
- Estimate growth over life of hardware

Similarly Oracle licence

- Choose Standard –v- Enterprise
- Choose Features: RAC, Diagnostics, Tuning, Partitioning, Compression

Get best possible performance

- Inevitably slow down over time

Depreciate of 5 years (or so)

- Then start again



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"YOU ARE GONNA NEED A BIGGER BOAT"

Usual response was:

"We spent all our money on this boat, and we don't have any more.

You will have to do the best you can with what you have."



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IN THE CLOUD

Capital Expenditure

- Buy & commission hardware
- Licence and install Oracle

Depreciate over time

Operational Expenditure

- Different 'rental' models
 - Bring Your Own Licence (BYOL)
 - Or included in cloud subscription
- Architectural decisions have cost consequences
 - Number of CPUs / Shape
 - Storage Volume
 - Storage Performance Level
- Cloud Estimator Tool
 - <https://www.oracle.com/cloud/costestimator.html>

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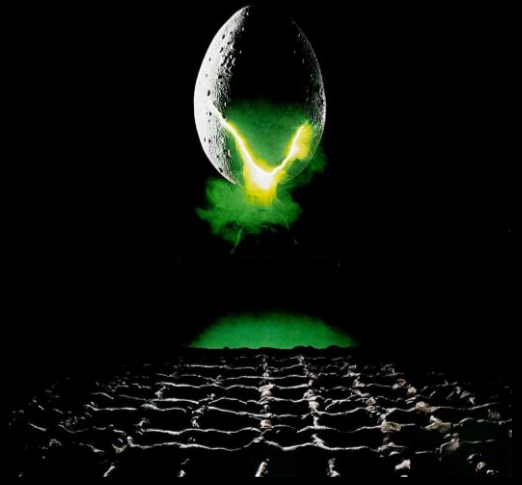
ORACLE CLOUD ESTIMATOR TOOL

The screenshot displays the Oracle Cloud Estimator Tool interface. At the top, there is a navigation bar with 'OCI' and links for 'About', 'Services', 'Solutions', 'Pricing', 'Partners', and 'Resources'. A search icon, a flag icon, and a 'Sign In to Oracle Cloud' button are also present. Below the navigation bar, the main content area is titled 'My Estimate' and shows a configuration for a 'Base Database Service - Virtual Machine' with an estimated monthly cost of \$24,057.85. The configuration includes a 'Database - Base Database Service - Virtual Machine' section with a utilization of 1 instance x 744 hrs/month and an estimated monthly cost of \$24,000.25. The configuration details for the database service are: 'Oracle Base Database Service - Extreme Pe', 'Processor: intel', 'Shape: VM.Standard2.24', 'OCPU: 24', and 'CPU Memory (GB): 520'. Below this, there is a 'Storage - Block Volumes' section with a utilization of 1 instance x 744 hrs/month and an estimated monthly cost of \$57.60. The configuration details for the storage are: 'Storage capacity (GB): 928', 'Performance level: High performance', 'VPU: 20', 'Max IOPS: 50000', and 'Max Throughput (MBps): 680'. There is also a checkbox for 'Apply 200GB Free Tier Discount' and a 'Talk to sales' button.

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IN THE CLOUD...

**YOU CAN HAVE AS MUCH
PERFORMANCE
AS YOU ARE WILLING TO
PAY FOR**



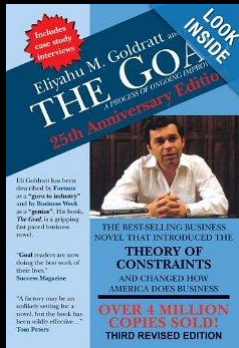
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WHAT DO YOU MEAN BY 'PERFORMANCE'?

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THE GOAL ELI GOLDRATT

“Time lost at a bottleneck is lost across the system.”



“Time saved at a non-bottleneck is worthless.”

1. IDENTIFY the system's constraint(s).
2. Decide how to EXPLOIT the system's constraint(s).
3. SUBORDINATE everything else to the above decision.
4. ELEVATE the system's constraint(s).
5. WARNING!!!! If in the previous steps, a constraint has been broken, go back to step 1, but do not allow INERTIA to cause a system's constraint.“

<https://blog.go-faster.co.uk/2023/06/the-goal.html>

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WHAT IS THE GOAL?

In the factory in “The Goal”,

The goal is

- to increase throughput
- while simultaneously reducing inventory and operating expense.

In the cloud,

The goal is

- to increase system throughput
- while simultaneously reducing response time and the cost of resources.

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HOW MUCH PERFORMANCE DO YOU NEED?

Real live example

- PeopleSoft Financials system
 - Insurance Company
 - Heavy GL reporting batch
- Moved to Exadata Cloud@Customer
 - Not BYOL
 - US\$1.3441 / OCPU / instance / hr
 - ~US\$1000 / OCPU / instance / month
- Sizing Exercise
 - Day 6: OCPUs / instance
 - Night: 10 OCPUs / instance

The most significant things this user did was to provide:

- a quantitative definition of acceptable performance

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PERFORMANCE S.L.A.

Simple Definition

- *"The reports need to be available to users by the start of the working day in continental Europe, at 8am CET (2am EST)"*
- *"Without making system unavailable to Asia/Pac users"*
- *"At night (in the US), other reports can wait, but need to be available at the start of the US working day (6am EST)."*
- No business benefit to finishing earlier than target.
- How many OCPUs do you need to consistently hit the 2am EST target?

Recent change:

- We developed a way to prioritise long running processes on the process scheduler so the long tail of processing finished earlier.

Business said:

- Prioritise international/global reports over North America only reports.

New SLA:

- *"International/Global reports have to finish by 2am EST / 8am CET / 4pm SGT"*
- *"North America reports only have to finish by 6am EST."*

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INITIAL STEPS

Application Configuration

- ExaCC has fewer but much faster CPUs than Supercluster
- Reduce concurrency of report processing, and found we needed fewer CPUs.

Other Tuning

- SQL Profiles
- Disable parallelism
- Reverted to duplicated In-Memory
- Application Tuning
- Resource Manager
- Today: 5 OCPU / instance

In-Memory

- Already using 'free' base-level in-memory on Supercluster
- 16Gb in-memory store / instance
- Improved configuration on ExaCC
 - Faster 200Gbit ROCE interconnect
- Reduced CPU consumption
 - 10 → 7 OCPU / instance
- Licenced for everything on ExaCC
- 96Gb in-memory store / instance
- 6 OCPU / instance

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MOST OF THE COST IN THE CLOUD IS CPU

The cloud

- incentivises you to minimise your CPU

I believe that we will see

- More systems spending more time running at or close to 0% CPU free

In the cloud,

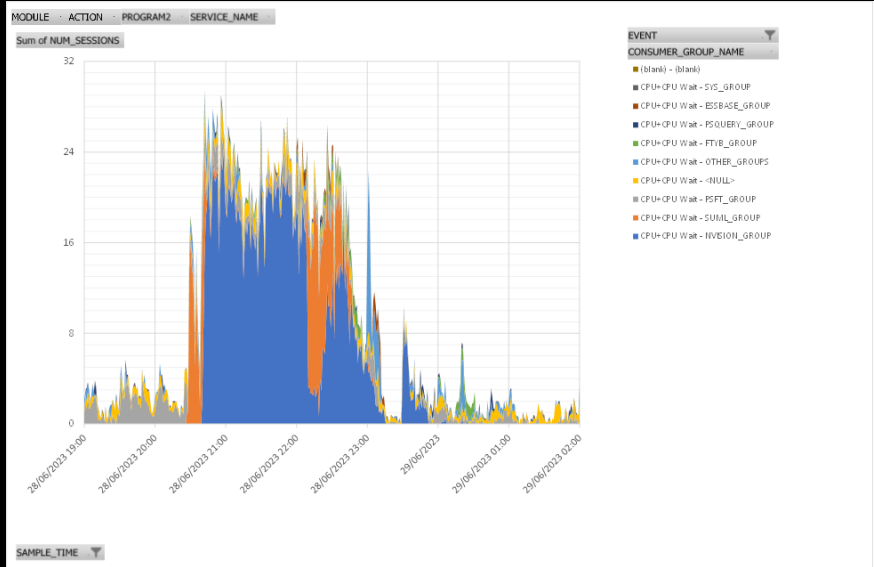
- if your system is not constrained by CPU at least some of the time,
- you are probably spending too much money on renting too many CPUs.

What happens to your database when you run out of CPU?

What do you want to happen to your database when you run out of CPU?

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BATCH ACTIVITY ON 2X60CPU (OR 2X12VCPU)



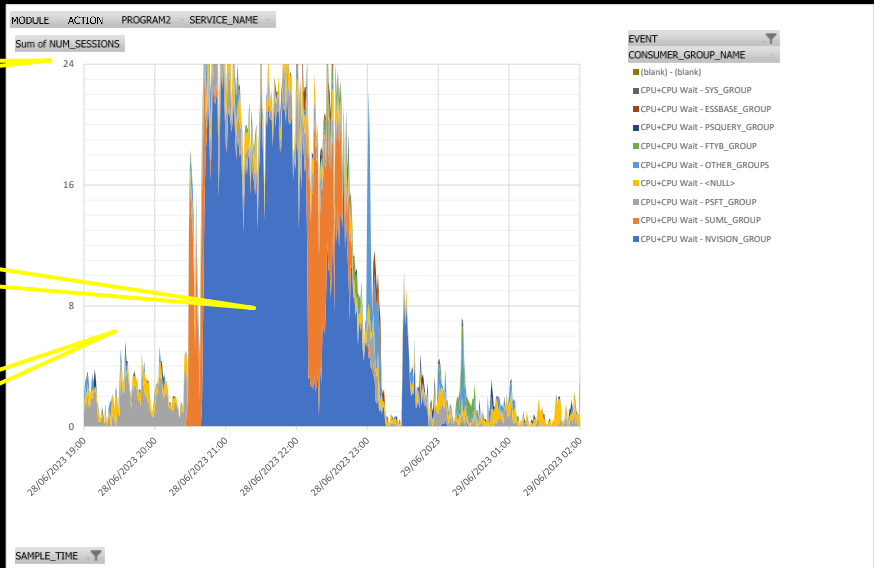
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SCALE Y-AXIS TO 24AAS = 2X60CPU = 24VCPU

Paying for 2x6 OCPU

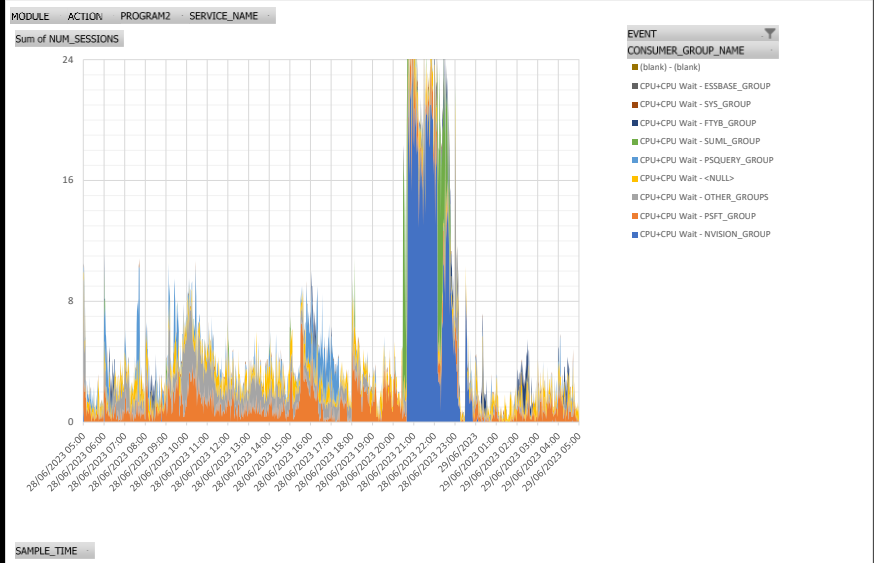
Using coloured areas

Paying for unused white areas



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ACROSS 24 HOURS

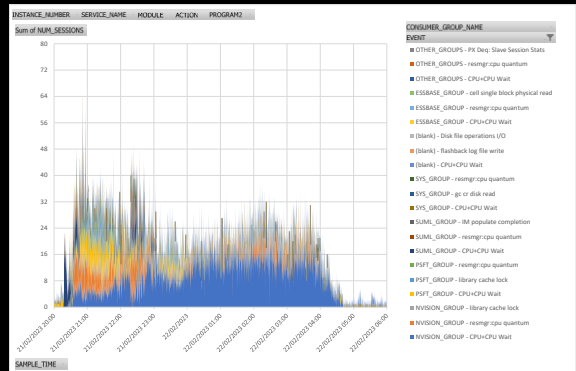
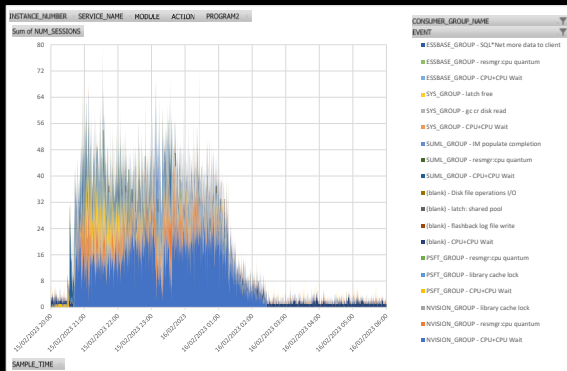


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"WHAT HAPPENS IF WE REDUCE THE NUMBER OF OCPUS FROM 6 TO 4?"

Coloured area = processing time

Processing roughly constant



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RESOURCE MANAGER

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WHAT HAPPENS TO AN ORACLE DATABASE WHEN IT RUNS OUT OF CPU?

Without the Resource Manager

- All processes are created equal
- They have to fight it out on the operating system run queue.
- A process may go to sleep holding a lock or latch.

With the Resource Manager

- Meet Objectives
- While simultaneously using fewer resources
 - Particularly CPU
 - Lower priority processes denied CPU
 - Event: resmgr: CPU Quantum

Available since Oracle 8i.

- Rarely used.

Ask the users

- “Who needs what by when?”
- “What is most important?”
- “What is the next most important?”
- Some things more important or urgent
 - Critical path to deadline
- Others can wait
 - → Hierarchy of priorities
 - Different priorities at different times

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CREATE RESOURCE PLAN TO REFLECT HIERARCHY OF PROCESSING

If the business is waiting for the output of a process then

- that is a high priority process
- that needs to be guaranteed a high proportion of available CPU.

If a process is finishing before the business needs it then

- it is lower priority.

For example,

- a set of processes was building reporting tables that were not needed until the start of the US working day,
- so their start time was pushed back,
- they were put in a low priority consumer group that also restricted their degree of parallelism.

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FLOW OF PROCESSING IN FINANCIALS

GL Processing Flow

- Transactions
- → Post to Ledger
- → Summary Ledgers
- → MVs
- → nVision Reports

Other processes

- Essbase extract
- Ad-hoc user query
- Ad-hoc user nVision reporting
- Processing only consumed in US
- Later deadline

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
|---------------------|---------------------|---------------|--------------------------|
| | OCPUs / node | | 5 |
| | vCPUs / node | | 10 |
| SYS_GROUP | 1 | 100% | No parallel degree limit |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
|---------------------|---------------------|---------------|--------------------------|
| | OCPUs / node | | 5 |
| | vCPUs / node | | 10 |
| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
|--------------------|---------------------|---------------|--------------------------|
| | OCPUs / node | | 5 |
| | vCPUs / node | | 10 |
| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| | | | |
| SUML_GROUP | 3 | 100% | 8 |
| | | | |
| NVISION_GROUP | 4 | 1% | 4 |
| | | | |
| | | | |
| | | | |
| | | | |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
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| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| | | | |
| SUML_GROUP | 3 | 100% | 8 |
| | | | |
| NVISION_GROUP | 4 | 1% | 4 |
| | | | |
| PSQUERY_GROUP | 6 | 1% | 4 |
| | | | |
| | | | |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
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| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| | | | |
| SUML_GROUP | 3 | 100% | 8 |
| | | | |
| NVISION_GROUP | 4 | 1% | 4 |
| | | | |
| PSQUERY_GROUP | 6 | 1% | 4 |
| | | | |
| ESSBASE_GROUP | 7 | 1% | 0 |
| | | | |
| | | | |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
|--------------------|---------------------|---------------|--------------------------|
| | OCPUs / node | | 5 |
| | vCPUs / node | | 10 |
| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| HIGH_GROUP | 2 | 1% | 20 |
| SUML_GROUP | 3 | 100% | 8 |
| | | | |
| NVISION_GROUP | 4 | 1% | 4 |
| | | | |
| PSQUERY_GROUP | 6 | 1% | 4 |
| | | | |
| ESSBASE_GROUP | 7 | 1% | 0 |
| LOW_GROUP | 8 | 1% | No parallel degree limit |
| | | | |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
|--------------------|---------------------|---------------|--------------------------|
| | OCPUs / node | | 5 |
| | vCPUs / node | | 10 |
| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| HIGH_GROUP | 2 | 1% | 20 |
| SUML_GROUP | 3 | 100% | 8 |
| | | | |
| NVISION_GROUP | 4 | 1% | 4 |
| FTYB_GROUP | 5 | 1% | 0 |
| PSQUERY_GROUP | 6 | 1% | 4 |
| | | | |
| ESSBASE_GROUP | 7 | 1% | 0 |
| LOW_GROUP | 8 | 1% | No parallel degree limit |
| | | | |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
|--------------------|---------------------|---------------|--------------------------|
| | OCPUs / node | | 5 |
| | vCPUs / node | | 10 |
| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| HIGH_GROUP | 2 | 1% | 20 |
| SUML_GROUP | 3 | 100% | 8 |
| | | | |
| NVISION_GROUP | 4 | 1% | 4 |
| FTYB_GROUP | 5 | 1% | 0 |
| PSQUERY_GROUP | 6 | 1% | 4 |
| | | | |
| ESSBASE_GROUP | 7 | 1% | 0 |
| LOW_GROUP | 8 | 1% | No parallel degree limit |
| LOW_LIMITED_GROUP | 8 | 1% | 2 |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
|--------------------|---------------------|---------------|--------------------------|
| | OCPUs / node | | 5 |
| | vCPUs / node | | 10 |
| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| HIGH_GROUP | 2 | 1% | 20 |
| SUML_GROUP | 3 | 100% | 8 |
| NVISION_HIGH_GROUP | 4 | 99% | 4 |
| NVISION_GROUP | 4 | 1% | 4 |
| FTYB_GROUP | 5 | 1% | 0 |
| PSQUERY_GROUP | 6 | 1% | 4 |
| | | | |
| ESSBASE_GROUP | 7 | 1% | 0 |
| LOW_GROUP | 8 | 1% | No parallel degree limit |
| LOW_LIMITED_GROUP | 8 | 1% | 2 |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU10 |
|--------------------|---------------------|---------------|--------------------------|
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| | vCPUs / node | | 10 |
| SYS_GROUP | 1 | 100% | No parallel degree limit |
| PSFT_GROUP | 2 | 100% | 5 |
| HIGH_GROUP | 2 | 1% | 20 |
| SUML_GROUP | 3 | 100% | 8 |
| NVISION_HIGH_GROUP | 4 | 99% | 4 |
| NVISION_GROUP | 4 | 1% | 4 |
| FTYB_GROUP | 5 | 1% | 0 |
| PSQUERY_GROUP | 6 | 1% | 4 |
| NVSRUN_GROUP | 6 | 1% | 4 |
| ESSBASE_GROUP | 7 | 1% | 0 |
| LOW_GROUP | 8 | 1% | No parallel degree limit |
| LOW_LIMITED_GROUP | 8 | 1% | 2 |
| OTHER_GROUPS | 8 | 100% | 2 |

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| Resource Plan Name | Management Priority | CPU Guarantee | PSFT_PLAN_CPU8 | PSFT_PLAN_CPU10 | PSFT_PLAN_CPU12 |
|--------------------|---------------------|---------------|--------------------------|-----------------|-----------------|
| | OCPU / node | | 4 | 5 | 6 |
| | vCPU / node | | 8 | 10 | 12 |
| SYS_GROUP | 1 | 100% | No parallel degree limit | | |
| PSFT_GROUP | 2 | 100% | 4 | 5 | 6 |
| HIGH_GROUP | 2 | 1% | 16 | 20 | 24 |
| SUML_GROUP | 3 | 100% | 6 | 8 | 9 |
| NVISION_HIGH_GROUP | 4 | 99% | 3 | 4 | 5 |
| NVISION_GROUP | 4 | 1% | 3 | 4 | 5 |
| FTYB_GROUP | 5 | 1% | 0 | 0 | 0 |
| PSQUERY_GROUP | 6 | 1% | 3 | 4 | 4 |
| NVSRUN_GROUP | 6 | 1% | 3 | 4 | 4 |
| ESSBASE_GROUP | 7 | 1% | 0 | 0 | 0 |
| LOW_GROUP | 8 | 1% | No parallel degree limit | | |
| LOW_LIMITED_GROUP | 8 | 1% | 2 | 2 | 2 |
| OTHER_GROUPS | 8 | 100% | 2 | 2 | 2 |

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WHAT IF WE CHANGE THE NUMBER OF CPU?

To 4 OCPUs / node?

- CPU_COUNT = 8

```
alter system set RESOURCE_MANAGER_PLAN=PSFT_PLAN_CPU8 scope=both sid='*';
alter system set JOB_QUEUE_PROCESSES=8 scope=both sid='*';
alter system set PARALLEL_MAX_SERVERS=40 scope=both sid='*';
alter system set PARALLEL_SERVERS_TARGET=40 scope=both sid='*';
```

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MAP SESSIONS TO CONSUMER GROUPS

- Using session attributes
- How you use these depends on
 - Your requirements
 - Whether your application is instrumented
- Default hierarchy
 - 1 – explicit
 - 2 – service, module, action
 - 3 – service, module
 - 4 – module, action
 - 5 – module
 - 6 – service
 - 7 – oracle user
 - 8 – client program
 - 9 – client, OS user
 - 10 – client, machine
 - 11 – client ID

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APPLICATION INSTRUMENTATION

DBMS_APPLICATION_INFO

- Set session attributes
 - MODULE, ACTION
 - <https://blog.go-faster.co.uk/2016/09/dbmsapplicationinfo.html>

Collected AWR and ASH

- Visible in Enterprise Manager
- AWR / ASH reports

Can also be used for

- Consumer group mappings
 - = to values
 - LIKE and REGEXP matching

PeopleSoft

- Enable built in-instrumentation
- Additional trigger and FGA to instrument batch processes and nVision reports

Identify parts of application

- MODULE
 - = Process Name
- ACTION
 - = Application Engine Step Name
 - = nVision report Name

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SET PRIORITIES OF CONSUMER GROUP MAPPINGS

```

BEGIN
  DBMS_RESOURCE_MANAGER.set_consumer_group_mapping_pri (
    explicit           => 1,
    client_program     => 2,
    module_name_action => 3,
    module_name        => 4,
    oracle_user        => 5,
    --this resource plan does not use the following attributes
    service_name       => 6,
    client_os user     => 7,
    client_machine     => 8,
    service_module     => 9,
    service_module_action => 10,
    client_id          => 11);
END;
/

```

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| | Priority | Priority | | | | | |
|----------------|--------------------|-----------------|---------------|---------------------|--------------------|-------------|-----------|
| | | Oracle Function | 1 Explicit | 2 Client Program | 3 Module.Action | 4 Module | 5 User |
| Consumer Group | SYS_GROUP | 1 | | | | | |
| | PSFT_GROUP | 2 | | | | | |
| | HIGH_GROUP | | | | | | |
| | SUML_GROUP | 3 | | | | | |
| | NVISION_HIGH_GROUP | 4 | | | | | |
| | NVISION_GROUP | | | | | | |
| | FTYB_GROUP | 5 | | | | | |
| | NVSRUN_GROUP | 6 | | | | | |
| | PSQUERY_GROUP | | | | | | |
| | ESSBASE_GROUP | 7 | | | | | |
| | LOW_GROUP | 8 | | | | | |
| | LOW_LIMITED_GROUP | | | | | | |

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| | Priority | Priority | | | | | |
|-------------------|--------------------|-----------------|------------|------------------|-----------------|----------|-------------|
| | | Oracle Function | 1 Explicit | 2 Client Program | 3 Module.Action | 4 Module | 5 User |
| Consumer Group | SYS_GROUP | 1 | | | | | |
| | PSFT_GROUP | 2 | | | | | SYSADM |
| | HIGH_GROUP | | | | | | |
| | SUML_GROUP | 3 | | | | | |
| | NVISION_HIGH_GROUP | 4 | | | | | |
| | NVISION_GROUP | | | | | | |
| | FTYB_GROUP | 5 | | | | | |
| | NVSRUN_GROUP | 6 | | | | | |
| | PSQUERY_GROUP | | | | | | |
| | ESSBASE_GROUP | 7 | | | | | ESSBASECUBE |
| LOW_GROUP | 8 | | | | | | |
| LOW_LIMITED_GROUP | | | | | | | |

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|-------------------|--------------------|-----------------|------------|------------------|-----------------|----------|-------------|
| | | Oracle Function | 1 Explicit | 2 Client Program | 3 Module.Action | 4 Module | 5 User |
| Consumer Group | SYS_GROUP | 1 | | | | | |
| | PSFT_GROUP | 2 | | | | | SYSADM |
| | HIGH_GROUP | | | | | | |
| | SUML_GROUP | 3 | INMEMORY | ✓ | | | |
| | NVISION_HIGH_GROUP | 4 | | | | | |
| | NVISION_GROUP | | | | | | |
| | FTYB_GROUP | 5 | | | | | |
| | NVSRUN_GROUP | 6 | | | | | |
| | PSQUERY_GROUP | | | ✓ | | | |
| | ESSBASE_GROUP | 7 | | | | | ESSBASECUBE |
| LOW_GROUP | 8 | | | | | | |
| LOW_LIMITED_GROUP | | | | | | | |

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| | Priority | Priority | | | | | |
|----------------|--------------------|-----------------|------------|------------------|-----------------|-----------------|---------------------|
| | | Oracle Function | 1 Explicit | 2 Client Program | 3 Module.Action | 4 Module | 5 User |
| Consumer Group | SYS_GROUP | 1 | | | | KTSJ | |
| | PSFT_GROUP | 2 | | | | | SYSADM |
| | HIGH_GROUP | | | | | | |
| | SUML_GROUP | 3 | INMEMORY | ✓ | | | SUMLEDGER_MVREFRESH |
| | NVISION_HIGH_GROUP | 4 | | | | | |
| | NVISION_GROUP | | | | | RPTBOOK | |
| | FTYB_GROUP | 5 | | | | FTPXXXX | |
| | NVSRUN_GROUP | 6 | | | | FTXYZ NVSRUN | |
| | PSQUERY_GROUP | | | ✓ | | | |
| | ESSBASE_GROUP | 7 | | | | | ESSBASECUBE |
| | LOW_GROUP | 8 | | | | | |
| | LOW_LIMITED_GROUP | | | | | SQL Developer | |

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| | Priority | Priority | | | | | |
|----------------|--------------------|-----------------|------------|------------------|---|-------------------------------------|--|
| | | Oracle Function | 1 Explicit | 2 Client Program | 3 Module.Action | 4 Module | 5 User |
| Consumer Group | SYS_GROUP | 1 | | | | KTSJ | |
| | PSFT_GROUP | 2 | | | | | SYSADM |
| | HIGH_GROUP | | | | | | |
| | SUML_GROUP | 3 | INMEMORY | ✓ | | | SUMLEDGER_MVREFRESH PSAE.GL_SUML_% |
| | NVISION_HIGH_GROUP | 4 | | | RPTBOOK.PI=:%USGL1231% RPTBOOK.PI=:%USGL2341:% RPTBOOK.PI=:%USGL1231:% RPTBOOK.PI=:%USGL234R:% RPTBOOK.PI=:%USGL123R:% RPTBOOK.PI=:%USGL234R:% | | |
| | NVISION_GROUP | | | | | RPTBOOK | |
| | FTYB_GROUP | 5 | | | | FTPXXXX FTYB% FTYYY% FTXYZ | |
| | NVSRUN_GROUP | 6 | | | | NVSRUN | |
| | PSQUERY_GROUP | | | ✓ | PSQRYSRV% psqrysrn% | | PSAE.PSQUERY.% PSQRYSRV% psqrysrn% |
| | ESSBASE_GROUP | 7 | | | | | ESSBASECUBE |
| | LOW_GROUP | 8 | | | DBMS_SCHEDULER. AQ\$.PLSQL_NTFN% | | |
| | LOW_LIMITED_GROUP | | | | | SQL Developer | |

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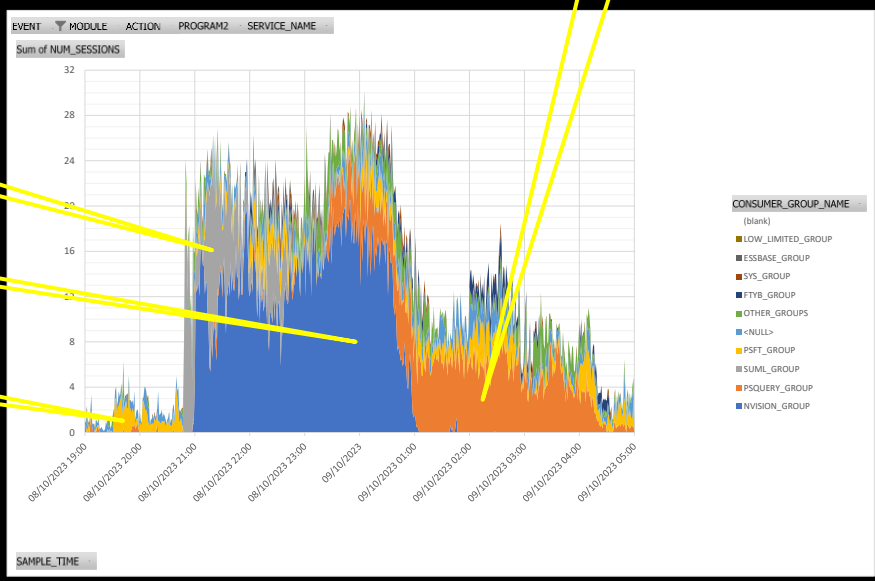
AD-HOC QUERY DURING BATCH

Query

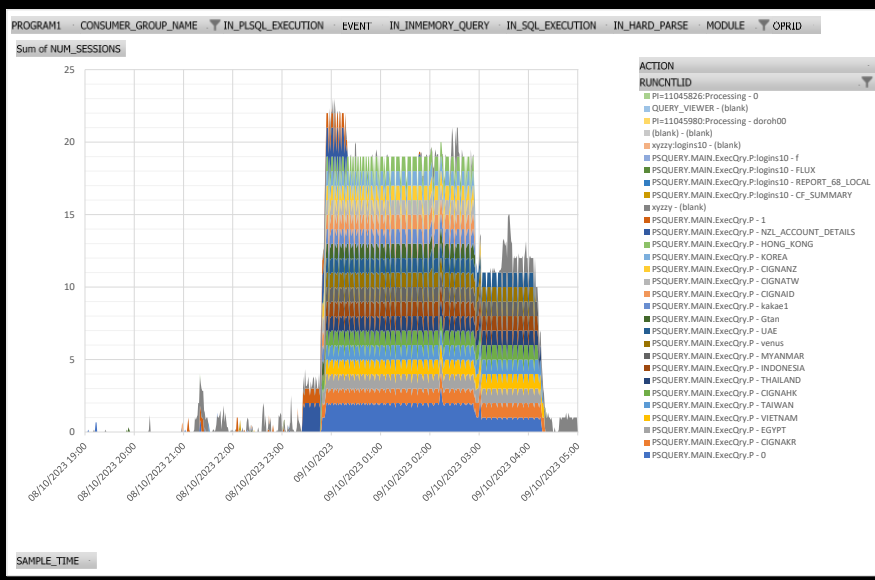
Summary Ledger

nVision

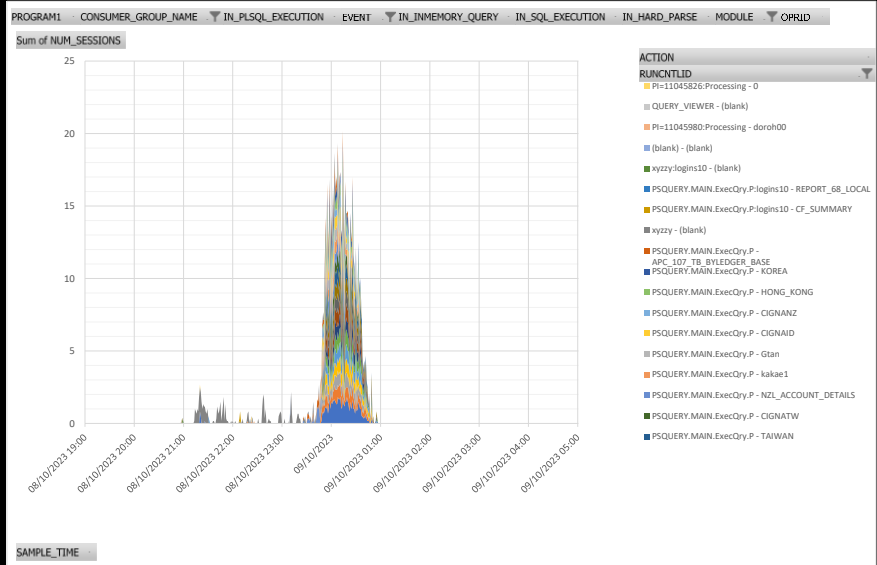
rest of Application



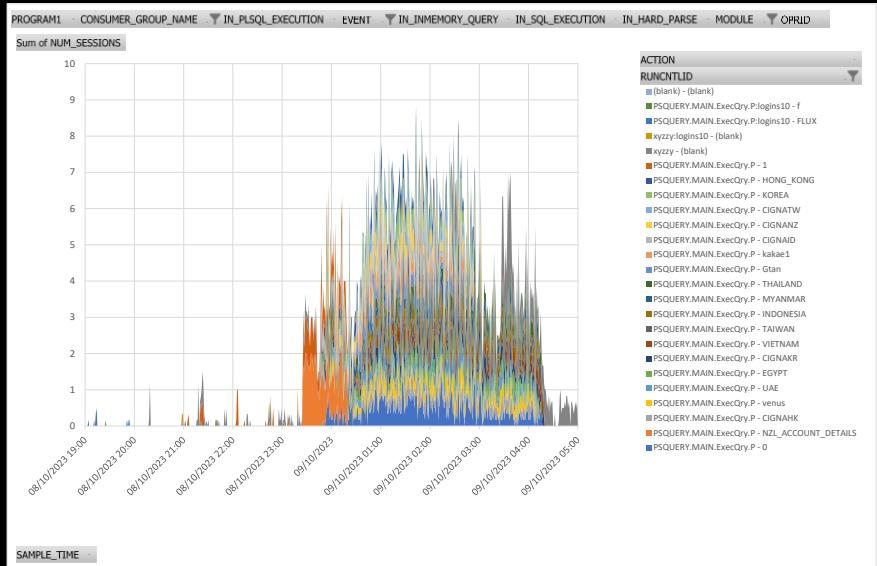
FULL QUERY ACTIVITY



RESMGR: CPU QUANTUM DELAY IMPOSED BY RESOURCE MANAGER



QUERY ON CPU AFTER RESOURCE MANAGEMENT



RESOURCE PLAN

- Custom Resource Plan
 - Up to 8 levels of priority
 - With a level can prioritise one consumer group over another with %CPU guarantee.
 - Restrict degree of parallelism
 - The example shown here evolved over time.
- Default Resource Plan
 - If you don't yet have your own custom resource plan
 - Use the default delivered plan `DEFAULT_PLAN`
 - On any database
 - If you run out of CPU (or exceed `CPU_COUNT`) then waiting processes will report event as `resmgr: cpu quantum`
 - At the very least you have visibility of this, without really changing the behaviour.

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IN THE CLOUD...

Good design and tuning is important and necessary in the cloud as anywhere else.

- The laws of physics are the same in the cloud!

But now

- You can measure how much that is saving you on cloud costs.
- You can choose to spend more, or less, to achieve that.

Effect on human behaviour

- Monthly invoice for 'extras'

You can have as much performance as you are willing to pay for!

- Only pay for as much as you need to achieve your objectives.
- I think it is inevitable that systems will tend to be close to or exceed the CPU available.

Use the resource manager to prioritise critical processes, thus

- Achieve better response time,
- Or consume less CPU to achieve the same,
- Or both.

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**QUESTIONS?
COMMENTS!**



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