Collecting IO requirements.

- Requirements are typically expressed in MB/s or IOPS.
- It is important to know both the read and write requirements as they can be very different.
- Notice there is always a unit of work and a unit of time.
- The unit of time is nearly always seconds.
- Oracle `v$` views provide data for both MB/s and IOPS, plus read and write details.
- The data source changes with Oracle 10g.
- OraPub has a number of IO requirement reports.

OraPub IO requirement reports.

```
SQL> @iosumx
Remember: This report must be run twice so both the initial and
final values are available. If no output, press ENTER a few times.

Database: prod3                                      27-AUG-09 06:25pm
Report:   iosumx.sql          OSM by OraPub, Inc.          Page  1
                  Oracle IO Interval (v$sysstat) Summary

IOP/s and IOP
   Total Read                     :       197.043              45714
   Total Write                    :       469.539             108933
   Total R+W                      :       666.582             154647
MB/s and MB
   Total Read                     :         3.131             726.477
   Total Write                    :         7.029            1630.771
   Total R+W                      :        10.161            2357.248
Detailed Component Data
   Interval (s)                   :           232
   SRVR Read IOP/s, IOP           :       197.043              45714
   SRVR Read MB/s, MB             :         3.131             726.477
   DBWR+SRVR Write IOP/s, IOP     :       460.866             106921
   DBWR+SRVR Write MB/s, MB       :         3.741             867.945
   LGWR Write IOP/s, IOP          :         8.672               2012
   LGWR Write MB/s, MB            :         3.288             762.826
```

10g+ SQL for IO requirements.

```
Server process
        read IO operations, total
                v$sysstat.physical read IO [total] requests
        read MBs, total
                v$sysstat.physical reads X block size / (1024X1024)

Database writer and server process
        write IO operations, total
                v$sysstat.physical write IO [total] requests
        write MBs, total
                v$sysstat.physical writes X block size / (1024X1024)

Log writer process
        write IO operations, total
                v$sysstat.redo writes
        write MBs, total
                v$sysstat.redo size / (1024X1024)
```

IO capacity data sources.

- Only the IO administrator can tell you the IO capacity…if you're lucky.

- However,

  – We know Oracle's requirements, both in IOPS and MB/s, plus the read and write details.

  – One Oracle IO call can result in multiple IO actions by the IO subsystem.

  – The Oracle IO wait events provides the "truer" IO response time.

  – Only requests that result in a wait *occurrence* are recorded by the wait interface. When there are lots of direct and async reads and there is a clear IO issue, the ORTA response time will typically be much less then the average IO wait time or the IO subsystem's recorded IO response time.

  – If the ORTA IO RT or the wait interface event time is greater than your rule of thumb or SLA, then you know the requirements are exceeding the available capacity.

  – As presented later in this course, since we know the IO arrival rate, response time, and queue time, we can infer the IO subsystem's capacity! But be careful because once you hit the elbow in modern IO subsystems, it skyrockets… sometimes without warning!

Introducing OraPub's FF diagnostic template.

- The free template takes input statistics from standard performance data sources, but is formatted to naturally enable a completely quantified response time analysis.

- The numerics can then be used for 3-Circle ORTA firefighting work, RT graph creation, and also for anticipating a performance solution.

- There are four <u>integrated</u> worksheets in the workbook covering the Oracle RTA, the Oracle workload, the operating system, and application SQL.

"Ora RT" worksheet

This should come as no surprise as it is standard Oracle RTA information.

Notice there are **two** average calculations.

The use of Excel makes it much easier to quickly quantify the situation, use more precise data and math, and reduce mistakes.

"Ora WL" worksheet

OraPub

Firefighting Diag Tempate 1a copy.x

Oracle Workload Diagnosis

Metric	Workload (total)	ST (ms/wl)	QT (ms/wl)	RT (ms/wl)	Workload (wl/ms)	Workload (wl/sec)
Block Changes	1178	291.9493735	3.1578947	295.1072683	0.000654	0.654212
Phys Blk Gets	2	171958.1810000	1860.0000000	173818.1810000	0.000001	0.001111
Log Blk Gets	36954234	0.0093065	0.0001007	0.0094072	20.522833	20522.832993
Executions	53123	6.4739635	0.0700262	6.5439896	0.029502	29.502288
User Calls	103618	3.3190793	0.0359011	3.3549804	0.057545	57.545095
Interval	1800.640 sec					

The sample interval can be entered with high precision.

Make sure the time unit is in seconds!

The workload metrics are common instance statistics (v$sysstat) and one will likely be the best RT curve arrival rate.

With the workload, CPU consumption, and wait time known, the Oracle arrival rate, service time, queue time, and RT can be calculated!

"Appl" Worksheet

OraPub

Firefighting Diag Tempate 1a copy.xls

Application SQL Diagnosis

SQL_ID	Elapsed Time (sec)	PIO (tot)	LIO (tot)	CPU (tot sec)	Exec (tot)	Rows (tot)	Sorts (tot)	SQL Type	Elapsed Time (ms/exec)	CPU Time (sec/exe)	PIO (pio/exe)	LIO (lio/exe)
7pkuzfhjsgp0f	51.842	0	8,409,060	51.842	395	396	0	SELEC	0.131	0.131	0.000	21288.759
40k7ynchcjggt	25.201	0	4,077,120	25.201	191	192	0	SELEC	0.132	0.132	0.000	21346.178
fmy27wpg8x0ya	3.261	0	318,525	3.261	14	15	0	SELEC	0.233	0.233	0.000	22751.786
cvwf9j5kmx4h7	1.518	0	148,645	1.518	6	7	0	SELEC	0.253	0.253	0.000	24774.167
bhd50g0yh9b2y	3.247	0	318,525	3.247	14	15	0	SELEC	0.232	0.232	0.000	22751.786
65a7uqrtgz26p	3.890	0	382,230	3.890	17	18	0	SELEC	0.229	0.229	0.000	22484.118
g4y6nw3tts7cc	0.158	0	0	0.158	1021	1021	0	PL/SQ	0.000	0.000	0.000	0.000
4djdxkc6qg0jx	0.506	0	1,866	0.506	120	12	0	INSER	0.004	0.004	0.000	15.550

Data entry can be a hassle, so being able to copy/cut/paste using a text editor and Excel is very helpful.

Ensure the units of time and units of work are correct!

All data are deltas ($T_1 - T_0$) and can be gathered from v$sql, Statspack, or AWR.

The data in this worksheet is **not** linked to the other worksheets. This means you do NOT need to enter ALL the cells and can limit the SQL entered.