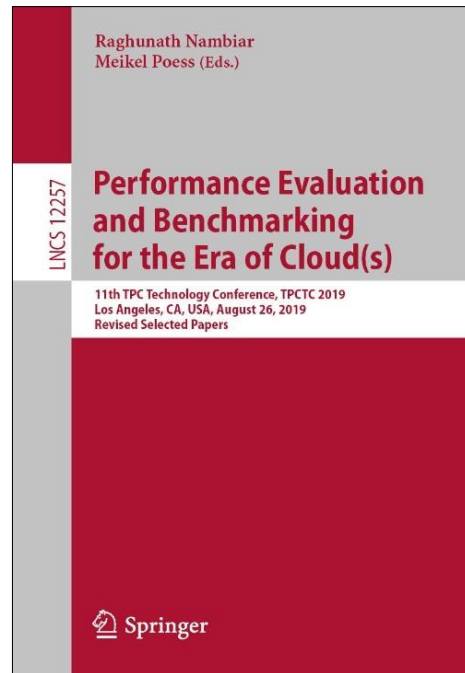


peakmarks® Key Performance Metrics and AWR Reports

February 2025



peakmarks® presented its software at the
11th Technology Conference of the Transaction
Processing Performance Council (TPC)
2019 in Los Angeles.



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Nodes number of cluster nodes
Jobs number of workload processes

[GBps] gigabyte per second
[MBps] megabyte per second
[kBps] kilobyte per second
[kBpt] kilobyte per transaction

[IOPS] I/O operations per second

[dbps] database blocks per second
[rbps] redo blocks per second

[s] seconds
[ms] milliseconds
[μs] microseconds

BuCache Database Buffer Cache
FlCache Database or Exadata Flash Cache

[qps] queries per second
[rps] rows per second
[tps] transactions per second
[sps] SQL executions per second
[ops] operations per second



- 1 peakmarks® Performance Metrics and AWR snapshots
- 2 Server System Performance Metrics
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- 7 Data Scan Performance Metrics
- 8 Online Transaction Processing Performance Metrics
- 9 PL/SQL Application program Performance Metrics



Performance is not everything.
But without performance, everything is worth nothing.

peakmarks® Performance Metrics



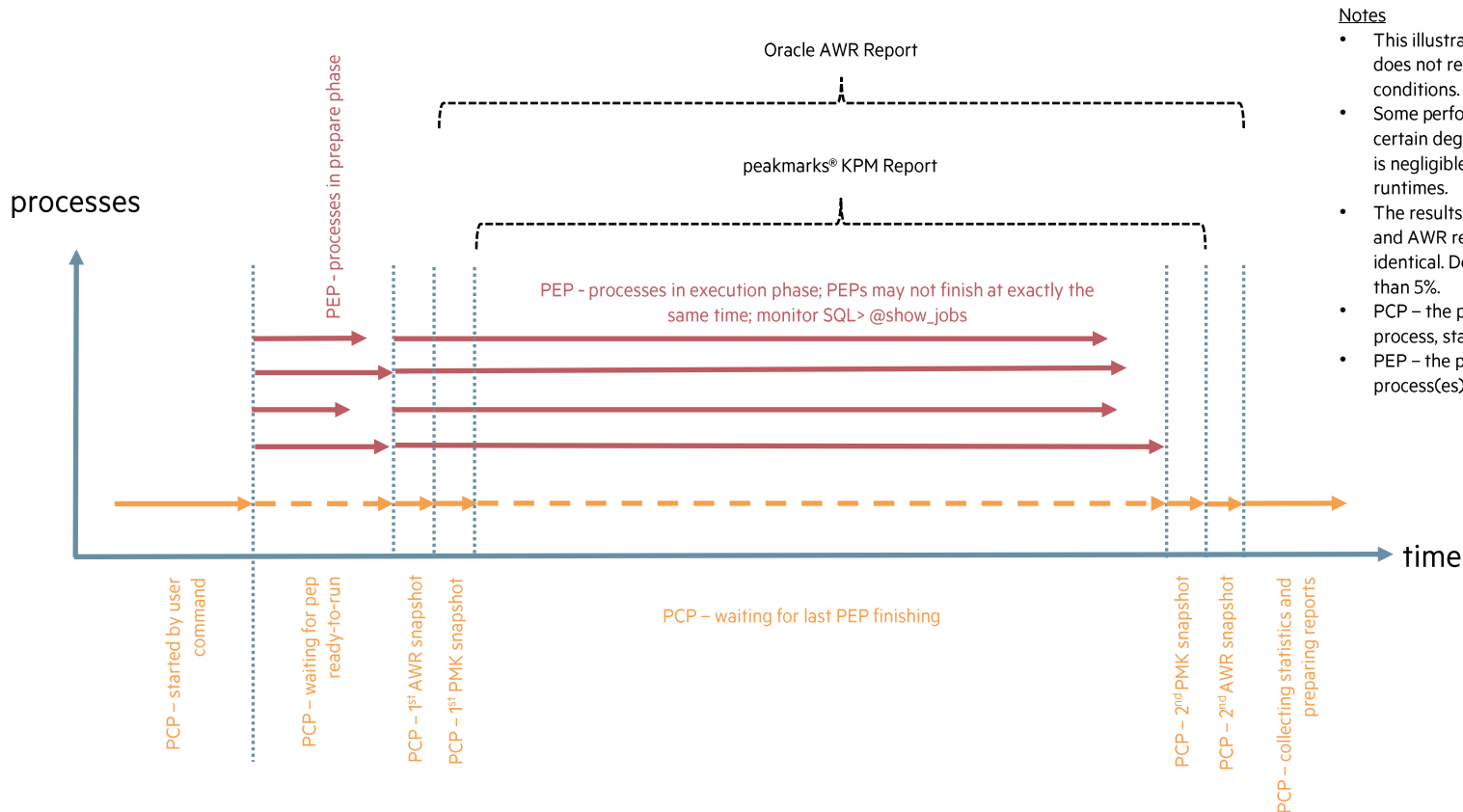
Introduction

peakmarks® Performance Metrics are based on

- AWR performance statistics
- peakmarks® performance statistics; e.g. row counter for offload table scans and data load
- peakmarks® calculations based on AWR and/or peakmarks® statistics; e.g. response times for transactions and SQL executions

peakmarks® conducts its own statistical snapshots in addition to AWR snapshots, both immediately before and after each performance test.

The next slide describes the statistical calculation process in detail. It shows why there can be differences between peakmarks® and AWR metrics.



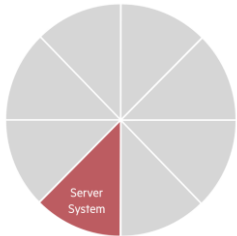
Notes

- This illustration is schematic and does not represent the actual time conditions.
- Some performance statistics have a certain degree of fuzziness, but this is negligible with longer workload runtimes.
- The results in peakmarks reports and AWR reports should be almost identical. Deviations should be less than 5%.
- PCP – the peakmarks control process, started by user command.
- PEP – the peakmarks execution process(es) runs the workload.



Stop guessing. Start measuring.

Server System Performance Metrics





CPU Utilization

kpm_query.sql

Run	Test	Workload	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	Queries total [qps]	Queries per cpu [qps]	Response time [ms]	Log reads total [dbps]	Log reads per cpu [dbps]	BuCache read [%]	Elapsed time [s]
3	2	SRV-MIXED2	1	1	2	1	0	98	4,403	4,403	0.227	372,475	372,475	100.00	184
	3	SRV-MIXED2	1	24	25	25	0	75	91,813	3,826	0.257	7,361,353	306,723	100.00	185
	4	SRV-MIXED2	1	48	51	50	0	49	158,833	3,309	0.298	12,592,731	262,349	100.00	185
	5	SRV-MIXED2	1	72	74	73	0	26	189,900	2,638	0.372	15,083,281	209,490	100.00	186
	6	SRV-MIXED2	1	96	98	97	0	2	217,982	2,271	0.435	17,250,276	179,690	100.00	184
	7	SRV-MIXED2	1	120	98	97	1	2	206,998	2,156	0.574	16,919,829	176,248	100.00	184

Operating System Statistics - Detail							DB/Inst: 019/019	Snaps: 80-81
Snap	Time	Load	%busy	%user	%sys	%idle	%iowait	
23-Jan	16:28:42	46.9	N/A	N/A	N/A	N/A	N/A	
23-Jan	16:31:49	87.3	97.5	96.4	0.5	2.5	0.0	

AWR Report
Run 3, Test 6



Logical Reads

kpm_query.sql

Run	Test	Workload	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	Queries total [qps]	Queries per cpu [qps]	Response time [ms]	Log reads total [dbps]	Log reads per cpu [dbps]	BuCache read [%]	Elapsed time [s]
3	2	SRV-MIXED2	1	1	2	1	0	98	4,403	4,403	0.227	372,475	372,475	100.00	184
	3	SRV-MIXED2	1	24	25	25	0	75	91,813	3,826	0.257	7,361,353	306,723	100.00	185
	4	SRV-MIXED2	1	48	51	50	0	49	158,833	3,309	0.298	12,592,731	262,349	100.00	185
	5	SRV-MIXED2	1	72	74	73	0	26	189,900	2,638	0.372	15,083,281	209,490	100.00	186
	6	SRV-MIXED2	1	96	98	97	0	2	217,982	2,271	0.435	17,250,276	179,690	100.00	184
	7	SRV-MIXED2	1	120	98	97	1	2	206,998	2,156	0.574	16,919,829	176,248	100.00	184

Load Profile	Per Second	Per Transaction	Per Exec	Per Call
~~~~~	-----	-----	-----	-----
Logical read (blocks):	18,180,116.6	8,234,800.5		
Physical read (blocks):	0.3	0.1		

AWR Report  
Run 3, Test 6



## Buffer Cache Hitrate

kpm_query.sql

Run	Test	Workload	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	Queries total [qps]	Queries per cpu [qps]	Response time [ms]	Log reads total [dbps]	Log reads per cpu [dbps]	BuCache read [%]	Elapsed time [s]
3	2	SRV-MIXED2	1	1	2	1	0	98	4,403	4,403	0.227	372,475	372,475	100.00	184
	3	SRV-MIXED2	1	24	25	25	0	75	91,813	3,826	0.257	7,361,353	306,723	100.00	185
	4	SRV-MIXED2	1	48	51	50	0	49	158,833	3,309	0.298	12,592,731	262,349	100.00	185
	5	SRV-MIXED2	1	72	74	73	0	26	189,900	2,638	0.372	15,083,281	209,490	100.00	186
	6	SRV-MIXED2	1	96	98	97	0	2	217,982	2,271	0.435	17,250,276	179,690	100.00	184
	7	SRV-MIXED2	1	120	98	97	1	2	206,998	2,156	0.574	16,919,829	176,248	100.00	184

Load Profile	Per Second	Per Transaction	Per Exec	Per Call
~~~~~	-----	-----	-----	-----
Logical read (blocks):	18,180,116.6	8,234,800.5		
Physical read (blocks):	0.3	0.1		
Instance Efficiency Percentages (Target 100%)				
~~~~~				
Buffer Hit %:	100.00	In-memory Sort %:	100.00	

AWR Report  
Run 3, Test 6



## SQL executes

kpm_query.sql

Run	Test	Workload	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	Queries total [qps]	Queries per cpu [qps]	Response time [ms]	Log reads total [dbps]	Log reads per cpu [dbps]	BuCache read [%]	Elapsed time [s]
3	2	SRV-MIXED2	1	1	2	1	0	98	4,403	4,403	0.227	372,475	372,475	100.00	184
	3	SRV-MIXED2	1	24	25	25	0	75	91,813	3,826	0.257	7,361,353	306,723	100.00	185
	4	SRV-MIXED2	1	48	51	50	0	49	158,833	3,309	0.298	12,592,731	262,349	100.00	185
	5	SRV-MIXED2	1	72	74	73	0	26	189,900	2,638	0.372	15,083,281	209,490	100.00	186
	6	SRV-MIXED2	1	96	98	97	0	2	217,982	2,271	0.435	17,250,276	179,690	100.00	184
	7	SRV-MIXED2	1	120	98	97	1	2	206,998	2,156	0.574	16,919,829	176,248	100.00	184

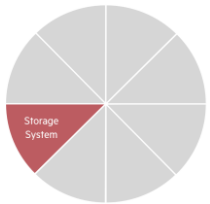
Load Profile	Per Second	Per Transaction	Per Exec	Per Call
~~~~~	-----	-----	-----	-----
Executes (SQL):	214,881.5	97,332.0		

AWR Report
Run 3, Test 6



Swiss precision in performance measurement.

Storage System Performance Metrics





Sequential Read Throughput

kpm_ioread.sql

Run	Test	Workload	Wri [%]	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Phys reads total [IOPS]	IO time read [ms]	Phys reads total [MBps]	Phys reads FlCache [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
5	1	STO-READ	0	1	1	1	1	1	0	99	0	408	1.309	402	402	100.00	0.00	311
	2	STO-READ	0	1	6	1	3	2	1	97	0	3,160	0.964	3,146	3,146	100.00	0.00	338
	3	STO-READ	0	1	12	1	3	2	1	97	0	6,123	1.771	6,103	6,103	100.00	0.00	277
	4	STO-READ	0	1	18	1	6	5	1	94	0	5,305	2.752	5,254	5,254	100.00	0.00	333
	5	STO-READ	0	1	24	1	3	2	1	97	0	5,128	3.912	5,116	5,116	100.00	0.00	293

IO Profile		Read+Write/Second	Read/Second	Write/Second
~~~~~		-----	-----	-----
Total (MB):		6,026.7	6,022.2	4.4
Database (MB):		6,023.5	6,022.0	1.4
Optimized Total (MB):		6,026.7	6,022.2	4.4
Instance Efficiency Percentages (Target 100%)				
~~~~~				
Flash Cache Hit %:		100.00		

AWR Report
Run 5, Test 3



Sequential Read Service Time

kpm_ioread.sql

Run	Test	Workload	Wri [%]	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Phys reads total [IOPS]	IO time read [ms]	Phys reads total [MBps]	Phys reads FlCache [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
5	1	STO-READ	0	1	1	1	1	1	0	99	0	408	1.309	402	402	100.00	0.00	311
	2	STO-READ	0	1	6	1	3	2	1	97	0	3,160	0.964	3,146	3,146	100.00	0.00	338
	3	STO-READ	0	1	12	1	3	2	1	97	0	6,123	1.771	6,103	6,103	100.00	0.00	277
	4	STO-READ	0	1	18	1	6	5	1	94	0	5,305	2.752	5,254	5,254	100.00	0.00	333
	5	STO-READ	0	1	24	1	3	2	1	97	0	5,128	3.912	5,116	5,116	100.00	0.00	293

Top 10 Foreground Events by Total Wait Time

Event	Waits	Total Wait Time (sec)	Avg Wait	% DB Wait time	Class
direct path read	1,495,014	2584.3	1.73ms	73.8	User I/O

Note
Oracle uses different wait events (depending on the underlying technology such as PMEM and XRMEM) to determine I/O service times. peakmarks takes all the different I/O service times into account.



Sequential Read Throughput using Offload Technology

kpm_ioread.sql

Run	Test	Workload	Wri [%]	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Phys reads total [IOPS]	IO time read [ms]	Phys reads total [MBps]	Phys reads FlCache [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
5	33	STO-OFFLOAD	0	1	1	1	1	1	0	99	0	67,363	0.306	67,256	67,256	100.00	0.00	180
	34	STO-OFFLOAD	0	1	6	1	2	1	1	98	0	73,411	0.514	73,318	73,318	100.00	0.00	182
	35	STO-OFFLOAD	0	1	12	1	2	1	1	98	0	72,846	0.605	72,752	72,752	100.00	0.00	186
	36	STO-OFFLOAD	0	1	18	1	2	1	1	98	0	73,194	1.026	73,101	73,101	100.00	0.00	185
	37	STO-OFFLOAD	0	1	24	1	2	1	1	98	0	72,724	1.543	72,632	72,632	100.00	0.00	186

IO Profile		Read+Write/Second	Read/Second	Write/Second
~~~~~		-----	-----	-----
Total (MB):		71,436.6	71,436.4	0.2
Database (MB):		71,436.3	71,436.2	0.1
Optimized Total (MB):		71,436.6	71,436.4	0.2

AWR Report  
Run 5 Test 36



## Sequential Read Service Time using Offload Technology

kpm_ioread.sql

Run	Test	Workload	Wri [%]	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Phys reads total [IOPS]	IO time read [ms]	Phys reads total [MBps]	Phys reads FlCache [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
5	33	STO-OFFLOAD	0	1	1	1	1	1	0	99	0	67,363	0.306	67,256	67,256	100.00	0.00	180
	34	STO-OFFLOAD	0	1	6	1	2	1	1	98	0	73,411	0.514	73,318	73,318	100.00	0.00	182
	35	STO-OFFLOAD	0	1	12	1	2	1	1	98	0	72,846	0.605	72,752	72,752	100.00	0.00	186
	36	STO-OFFLOAD	0	1	18	1	2	1	1	98	0	73,194	1.026	73,101	73,101	100.00	0.00	185
	37	STO-OFFLOAD	0	1	24	1	2	1	1	98	0	72,724	1.543	72,632	72,632	100.00	0.00	186

### Top 10 Foreground Events by Total Wait Time

Event	Waits	Total Wait Time (sec)	Avg Wait	% DB Wait time Class
cell smart table scan	3,042,452	3122.5	1.03ms	88.4 User I/O

AWR Report  
Run 5 Test 36



## Random Read Throughput

kpm_ioread.sql

Run	Test	Workload	Wri [%]	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Phys reads total [IOPS]	IO time read [ms]	Phys reads total [MBps]	Phys reads FlCache [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
5	65	STO-RANDOM	0	1	1	1	2	1	1	98	0	35,826	0.229	280	280	100.00	31.94	180
	66	STO-RANDOM	0	1	8	1	11	6	3	89	0	245,413	0.239	1,917	1,917	100.00	7.09	184
	67	STO-RANDOM	0	1	16	1	21	12	5	79	0	434,423	0.287	3,394	3,394	100.00	4.60	184
	68	STO-RANDOM	0	1	24	1	29	17	8	71	0	570,017	0.373	4,453	4,453	100.00	3.94	184
	69	STO-RANDOM	0	1	32	1	35	21	9	65	0	649,853	0.558	5,077	5,077	100.00	3.91	184
	70	STO-RANDOM	0	1	40	1	39	24	10	61	0	684,729	0.846	5,349	5,349	100.00	3.94	184
	71	STO-RANDOM	0	1	48	1	43	26	11	57	0	703,278	1.184	5,494	5,494	100.00	3.84	184

IO Profile		Read+Write/Second	Read/Second	Write/Second
~~~~~		-----	-----	-----
Total Requests:		560,096.5	558,551.0	1,545.5
Database Requests:		559,997.8	558,537.1	1,460.7
Optimized Requests:		558,551.0	558,551.0	0.0

AWR Report
Run 5 Test68



Random Read Service Time

kpm_ioread.sql

Run	Test	Workload	Wri [%]	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Phys reads total [IOPS]	IO time read [ms]	Phys reads total [MBps]	Phys reads FlCache [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
5	65	STO-RANDOM	0	1	1	1	2	1	1	98	0	35,826	0.229	280	280	100.00	31.94	180
	66	STO-RANDOM	0	1	8	1	11	6	3	89	0	245,413	0.239	1,917	1,917	100.00	7.09	184
	67	STO-RANDOM	0	1	16	1	21	12	5	79	0	434,423	0.287	3,394	3,394	100.00	4.60	184
	68	STO-RANDOM	0	1	24	1	29	17	8	71	0	570,017	0.373	4,453	4,453	100.00	3.94	184
	69	STO-RANDOM	0	1	32	1	35	21	9	65	0	649,853	0.558	5,077	5,077	100.00	3.91	184
	70	STO-RANDOM	0	1	40	1	39	24	10	61	0	684,729	0.846	5,349	5,349	100.00	3.94	184
	71	STO-RANDOM	0	1	48	1	43	26	11	57	0	703,278	1.184	5,494	5,494	100.00	3.84	184

Top 10 Foreground Events by Total Wait Time

Event	Total Wait Waits	Total Wait Time (sec)	Avg Wait	% DB Wait time Class
cell single block physical rea	1,026,492	382.7	372.86us	8.3 User I/O

Note
Oracle uses different wait events (depending on the underlying technology such as PMEM and XRMEM) to determine I/O service times. peakmarks takes all the different I/O service times into account.



Random Write Throughput

kpm_iowrite.sql

Run	Test	Workload	Wri [%]	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Phys writes total [dbps]	Phys writes total [IOPS]	Phys writes total [MBps]	Phys writes FlCache [MBps]	FlCache write [%]	Elapsed time [s]
5	129	STO-SCATTER	100	1	1	2	1	1	98	0	53,708	13,449	421	421	100.00	183
	130	STO-SCATTER	100	1	6	8	4	3	92	0	248,108	62,072	1,947	1,947	100.00	183
	131	STO-SCATTER	100	1	12	15	9	4	85	0	295,538	73,917	2,320	2,320	100.00	183
	132	STO-SCATTER	100	1	18	21	14	5	79	0	295,837	73,999	2,322	2,322	100.00	183
	133	STO-SCATTER	100	1	24	27	20	5	73	0	296,160	74,112	2,325	2,325	100.00	182

IO Profile		Read+Write/Second	Read/Second	Write/Second
~~~~~		-----	-----	-----
Total Requests:		72,542.4	20.6	72,521.9
Database (blocks):		289,809.9	8.0	289,801.8

AWR Report  
Run 5 Test 133



Swiss precision in performance measurement.

## Log Writer Performance Metrics





Commit Throughput Log and File Synchronization Time

kpm_lgwr.sql

Run	Test	Workload	REDO size [kBpt]	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	#prc LGWR	Commit thrput [tps]	Commit latency [ms]	LogFile sync [ms]	REDO data [rbps]	REDO data [IOPS]	REDO data [MBps]	FlCache write [%]	Elapsed time [s]
6	1	LGWR-LAT	1	1	1	1	1	0	99	0	9	3,191	0.313	0.231	9,663	3,193	4	100.00	182
	3	LGWR-LAT	1	1	24	6	5	1	94	0	9	38,219	0.627	0.533	119,575	3,969	48	100.00	180
	5	LGWR-LAT	1	1	48	10	8	1	90	0	9	63,144	0.753	0.640	189,559	4,151	78	100.00	183
	7	LGWR-LAT	1	1	72	15	12	2	85	0	9	80,266	0.894	0.762	229,039	3,509	99	100.00	184
	9	LGWR-LAT	1	1	96	15	12	2	85	0	9	92,218	1.040	0.897	257,882	2,923	113	100.00	180
	11	LGWR-LAT	1	1	120	18	15	2	82	0	9	99,403	1.205	1.058	273,291	2,497	121	100.00	185
	13	LGWR-LAT	1	1	144	20	18	2	80	0	9	104,926	1.371	1.216	285,241	2,203	128	100.00	184
	15	LGWR-LAT	1	1	168	22	19	2	78	0	9	108,548	1.547	1.381	292,286	1,969	132	100.00	183

AWR Report  
Run 6 Test 15

Load Profile	Per Second	Per Transaction	Per Exec	Per Call
~~~~~	-----	-----	-----	-----
Transactions:	100,993.4			
Top 10 Foreground Events by Total Wait Time				
~~~~~				
Event	Waits	Total Wait Time (sec)	Avg Wait	% DB Wait time Class
-----				
log file sync	19,655,339	27.2K	1.38ms	82.0 Commit



REDO Data

kpm_lgwr.sql

Run	Test	Workload	REDO size [kBpt]	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	#prc LGWR	Commit thrput [tps]	Commit latency [ms]	LogFile sync [ms]	REDO data [rbps]	REDO data [IOPS]	REDO data [MBps]	FlCache write [%]	Elapsed time [s]
6	1	LGWR-LAT	1	1	1	1	1	0	99	0	9	3,191	0.313	0.231	9,663	3,193	4	100.00	182
	3	LGWR-LAT	1	1	24	6	5	1	94	0	9	38,219	0.627	0.533	119,575	3,969	48	100.00	180
	5	LGWR-LAT	1	1	48	10	8	1	90	0	9	63,144	0.753	0.640	189,559	4,151	78	100.00	183
	7	LGWR-LAT	1	1	72	15	12	2	85	0	9	80,266	0.894	0.762	229,039	3,509	99	100.00	184
	9	LGWR-LAT	1	1	96	15	12	2	85	0	9	92,218	1.040	0.897	257,882	2,923	113	100.00	180
	11	LGWR-LAT	1	1	120	18	15	2	82	0	9	99,403	1.205	1.058	273,291	2,497	121	100.00	185
	13	LGWR-LAT	1	1	144	20	18	2	80	0	9	104,926	1.371	1.216	285,241	2,203	128	100.00	184
	15	LGWR-LAT	1	1	168	22	19	2	78	0	9	108,548	1.547	1.381	292,286	1,969	132	100.00	183

AWR Report  
Run 6 Test 15

Load Profile	Per Second	Per Transaction	Per Exec	Per Call
~~~~~	-----	-----	-----	-----
Redo size (bytes):	128,835,792.6	1,275.7		
Statistic	Total	per Second	per Trans	
-----	-----	-----	-----	
redo blocks written	53,555,318	272,003.5	2.7	
redo size	25,366,736,876	128,835,792.6	1,275.7	
redo writes	360,813	1,832.5	0.0	



Swiss precision in performance measurement.

Database Writer Performance Metrics





Database Writer I/O

kpm_dbwr.sql

Run	Test	Workload	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	#prc DBWR	Completed check points	Phys writes total [dbps]	Phys writes total [IOPS]	Phys writes total [MBps]	REDO data [MBps]	Phys writes FlCache [MBps]	FlCache write [%]	Elapsed time [s]
8	1	DBWR-THR	1	1	4	3	1	96	0	12	4	60,933	44,735	657	44	568	86.37	183
	2	DBWR-THR	1	8	19	12	5	81	0	12	10	243,067	206,954	2,265	177	2,241	98.95	181
	3	DBWR-THR	1	16	20	12	5	80	0	12	10	251,439	216,247	2,343	183	2,340	99.88	181
	4	DBWR-THR	1	24	20	12	5	80	0	12	10	249,037	215,769	2,320	181	2,313	99.68	189
	5	DBWR-THR	1	32	21	13	5	79	0	12	10	242,731	211,724	2,261	176	2,257	99.80	184

Load Profile		Per Second	Per Transaction	Per Exec	Per Call
~~~~~		-----	-----	-----	-----
Redo size (bytes):		179,594,622.1	192,706.7		
IO Profile		Read+Write/Second	Read/Second	Write/Second	
~~~~~		-----	-----	-----	-----
Total Requests:		202,482.8	29.9	202,453.0	
Total (MB):		2,193.5	0.3	2,193.3	
Via Buffer Cache (blocks):		235,419.0	21.4	235,397.6	

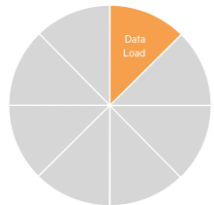
Notes

- Oracle DBWR processes use asynchronous multiblock write operations. The ratio of [dbps] and [IOPS] show the average number of blocks per I/O.
- Oracle does not provide an accurate service time for random write operations..



Swiss precision in performance measurement.

Data Load Performance Metrics





Data Load I/O

kpm_dl.sql

Run	Test	Workload	TXN size [rpt]	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Load rate total [rps]	Load rate total [MBps]	Phys writes total [IOPS]	Phys writes total [MBps]	REDO data [MBps]	FlCache write [%]	Elapsed time [s]
9	1	DL-BUFFER	5	1	1	1	1	0	99	0	15,105	4	6,294	35	12	100.00	182
	3	DL-BUFFER	5	1	16	5	4	1	95	0	127,381	36	14,684	294	99	100.00	183
	5	DL-BUFFER	5	1	32	8	6	1	92	0	193,189	55	17,594	443	150	100.00	184
	7	DL-BUFFER	5	1	48	10	8	1	90	0	214,300	61	12,917	517	167	95.42	186
	9	DL-BUFFER	5	1	64	13	10	2	87	0	239,341	68	14,823	560	186	97.37	190
	11	DL-BUFFER	5	1	80	15	13	2	85	0	257,221	74	14,946	594	200	98.29	187
	13	DL-BUFFER	5	1	96	17	14	2	83	0	270,216	77	13,609	623	209	98.52	184

Statistic	Total	per Second	per Trans
physical write total IO requests	2,499,470	13,225.8	0.3
physical write total bytes	120,046,205,952	635,215,524.8	12,093.1
redo size	40,338,892,468	213,450,234.0	4,063.6

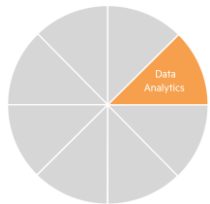
Notes

- peakmarks uses its own data load row counter metric, as there is no suitable AWR metric for data load.
- peakmarks uses its own data load byte counter metric (user data), as there is no suitable AWR metric for data load.



Swiss precision in performance measurement.

Data Analytics Performance Metrics





Data Scan Rates using conventional Storage System

kpm_da.sql

Run	Test	Workload	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Scan rate total [rps]	Scan rate per cpu [rps]	Scan rate total [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
10	1	DA-STORAGE	1	1	1	1	1	0	99	0	3,991,972	3,991,972	1,357	100.00	0.00	180
	2	DA-STORAGE	1	8	1	3	2	1	97	0	18,049,808	2,256,226	6,137	100.00	0.00	184
	3	DA-STORAGE	1	16	1	5	4	1	95	0	16,918,007	1,057,375	5,707	100.00	0.00	198
	4	DA-STORAGE	1	24	1	4	3	1	96	0	18,424,868	767,703	6,187	100.00	0.00	185
	5	DA-STORAGE	1	32	1	4	3	1	96	0	18,121,132	566,285	6,159	100.00	0.00	190

IO Profile		Read+Write/Second	Read/Second	Write/Second
~~~~~				
Total (MB):		6,100.7	6,095.1	5.5
Statistic		Total	per Second	per Trans
-----				
table scan rows gotten		3,416,968,994	18,152,772.6	28,474,741.6

AWR Report  
Run IO Test 4



## Data Scan Rates using Storage Offload Technology

kpm_da.sql

Run	Test	Workload	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Scan rate total [rps]	Scan rate per cpu [rps]	Scan rate total [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
10	33	DA-OFFLOAD	1	1	1	1	1	0	99	0	110,679,393	110,679,393	37,623	100.00	0.00	180
	34	DA-OFFLOAD	1	8	1	2	1	1	98	0	214,337,372	26,792,172	72,853	100.00	0.00	180
	35	DA-OFFLOAD	1	16	1	2	1	1	98	0	218,569,233	13,660,577	74,292	100.00	0.00	180
	36	DA-OFFLOAD	1	24	1	2	1	1	98	0	219,338,875	9,139,120	74,553	100.00	0.00	180
	37	DA-OFFLOAD	1	32	1	2	1	1	98	0	219,524,669	6,860,146	74,617	100.00	0.00	181
	38	DA-OFFLOAD	1	40	1	2	1	1	98	0	219,402,371	5,485,059	74,575	100.00	0.00	181

IO Profile		Read+Write/Second	Read/Second	Write/Second
~~~~~				
Total (MB):		73,224.5	73,224.4	0.2

Note

peakmarks uses its own row counter metric, as there is no suitable AWR metric for offload table scan.



Data Scan Rate

kpm_da.sql

Run	Test	Workload	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Scan rate total [rps]	Scan rate per cpu [rps]	Scan rate total [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
10	97	DA-ROWSTORE	1	1	1	2	1	0	98	0	11,023,663	11,023,663	3,330	0.00	99.40	180
	98	DA-ROWSTORE	1	24	1	25	25	0	75	0	187,128,256	7,797,011	56,520	0.00	100.00	185
	99	DA-ROWSTORE	1	48	1	50	49	0	50	0	290,082,288	6,043,381	87,617	0.00	100.00	185
	100	DA-ROWSTORE	1	72	1	75	74	0	25	0	366,489,046	5,090,126	110,695	0.00	100.00	184
	101	DA-ROWSTORE	1	96	1	98	97	0	2	0	370,420,123	3,858,543	111,882	0.00	100.00	184
	102	DA-ROWSTORE	1	120	1	97	96	0	3	0	334,211,096	3,481,366	100,945	0.00	100.00	183

AWR Report
Run 10 Test 101

Statistic	Total	per Second	per Trans
table scan blocks gotten	2,633,038,389	13,954,751.8	6,329,419.2
table scan rows gotten	68,105,524,494	360,950,183.9	1.6371520E+08



Workload DA-COLSTORE – Data analytics query using buffer cache column store

kpm_da.sql

Run	Test	Workload	Nodes	Jobs	DOP	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	Scan rate total [rps]	Scan rate per cpu [rps]	Scan rate total [MBps]	FlCache read [%]	BuCache read [%]	Elapsed time [s]
10	65	DA-COLSTORE	1	1	1	2	1	0	98	0	6,050,459,708	6,050,459,708	2,076,580	0.00	99.99	180
	66	DA-COLSTORE	1	8	1	9	8	0	91	0	30,947,962,375	3,868,495,297	10,621,700	0.00	100.00	185
	67	DA-COLSTORE	1	16	1	17	17	0	83	0	52,989,350,611	3,311,834,413	18,186,598	0.00	100.00	185
	68	DA-COLSTORE	1	24	1	26	25	0	74	0	63,799,594,918	2,658,316,455	21,896,818	0.00	100.00	185
	69	DA-COLSTORE	1	32	1	34	33	0	66	0	70,800,031,014	2,212,500,969	24,299,409	0.00	100.00	185
	70	DA-COLSTORE	1	40	1	43	42	1	57	0	72,746,966,220	1,818,674,156	24,967,621	0.00	100.00	185
	71	DA-COLSTORE	1	48	1	51	50	1	49	0	71,076,678,233	1,480,764,130	24,394,363	0.00	100.00	184

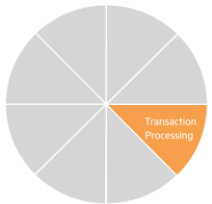
Statistic	Total	per Second	per Trans
IM scan rows	1.344681345315E+13	7.16212254E+10	7.1147161E+10
session logical reads - IM	590,733,541,374	3.14640047E+09	3.1255743E+09

AWR Report
Run 10 Test 70



Swiss precision in performance measurement.

Online Transaction Processing Performance Metrics





Transaction Throughput

kpm_tp.sql

Run	Test	Workload	Upd [%]	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	CPU iow [%]	TXN thrput total [tps]	TXN resp time [ms]	SQL thrput total [sps]	SQL resp time [ms]	BuCache read [%]	FlCache read [%]	FlCache write [%]	Elapsed time [s]
5	2	TP-MIXED1	N/A	1	1	1	1	0	99	0	175	5.714	2,590	0.386	41.50	100.00	100.00	180
	5	TP-MIXED1	N/A	1	24	23	14	6	77	0	4,214	5.661	60,693	0.393	44.80	100.00	100.00	184
	8	TP-MIXED1	N/A	1	48	40	25	10	60	0	7,015	6.782	101,040	0.471	45.15	100.00	100.00	183
	11	TP-MIXED1	N/A	1	72	54	35	13	46	0	8,827	8.064	127,147	0.560	45.24	100.00	100.00	183
	14	TP-MIXED1	N/A	1	96	65	42	15	35	0	10,046	9.459	144,719	0.657	45.31	100.00	100.00	183
	17	TP-MIXED1	N/A	1	120	70	47	16	30	0	10,647	11.178	153,414	0.776	45.28	100.00	100.00	183
	20	TP-MIXED1	N/A	1	144	73	49	17	27	0	10,858	13.136	156,490	0.911	45.32	100.00	100.00	184

Load Profile	Per Second	Per Transaction	Per Exec	Per Call
~~~~~	-----	-----	-----	-----
Executes (SQL):	150,751.4	14.4		
Transactions:	10,458.9			

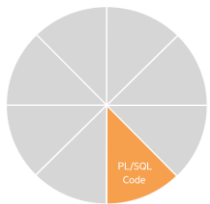
### Note

AWR does not provide metrics for transaction response time or SQL response time. These metrics are calculated by peakmarks.



Swiss precision in performance measurement.

## PL/SQL Application Program Performance Metrics





## PL/SQL Throughout

kpm_pls.sql

Run	Test	Workload	Parameter	Nodes	Jobs	CPU busy [%]	CPU user [%]	CPU sys [%]	CPU idle [%]	Operations total [Mops]	Operations per cpu [Mops]	Operation time [ns]	Elapsed time [s]
11	1	PLS-MIXED2	N/A	1	1	2	1	0	98	12.06	12.06	0.00	183
	2	PLS-MIXED2	N/A	1	24	25	25	0	75	255.42	10.64	0.00	184
	3	PLS-MIXED2	N/A	1	48	50	49	0	50	403.42	8.40	0.00	183
	4	PLS-MIXED2	N/A	1	72	75	74	0	25	400.15	5.56	0.00	185
	5	PLS-MIXED2	N/A	1	96	97	97	0	3	402.79	4.20	0.00	184
	6	PLS-MIXED2	N/A	1	120	97	96	0	3	401.09	4.18	0.00	184

### Note

peakmarks uses its own operations counter metric for PL/SQL executions, as there is no suitable AWR metric.



# peakmarks Mission

Identify Key Performance Metrics for Oracle Database Platforms.

On-Premises and in the Cloud.

For Quality Assurance, Evaluations, and Capacity Planning.