



peakmarks® Executive Summary

August 2023

peakmarks® introduced its software to a broader audience at the 11th TPC Technology Conference 2019 in Los Angeles. The peakmarks® Software is a powerful tool that quickly and accurately identifies key performance metrics for database services, whether hosted on-premises or in the cloud. These performance metrics serve as a solid foundation for

- **Evaluations.** Performance metrics are used to evaluate the price/performance of various database platforms, technologies, components, and configurations.
- **Capacity planning.**
- **License cost optimization** by identifying the optimal infrastructure components.
- **Quality assurance.** Database service is regularly audited for its performance specifications.

peakmarks® Software is a comprehensive tool for assessing database service efficiency, covering over 30 workloads. peakmarks® is updated regularly to support new Oracle versions and technologies, distinguishing it from open-source tools. A detailed analysis of each workload is presented in a PowerPoint presentation, and AWR reports are also provided for a thorough performance evaluation. This report summarizes the most important key performance metrics for the decision-maker's convenience.

Database Service – peakmarks Reference System

Platform	Database Server, each	Storage Server High Capacity, each	Database	peakmarks®
Oracle Exadata X7-2 Flex <ul style="list-style-type: none">▪ 2 database servers (RAC)▪ 3 storage servers	Exadata X7 <ul style="list-style-type: none">▪ Intel Xeon 8160, 2.1 – 3.7 GHz▪ 2 sockets, 48 cores, 96 threads▪ 786 GByte DDR4 2.6 GHz▪ PCI Gen 3	Exadata X8 <ul style="list-style-type: none">▪ 12 x 14 = 168 TByte HDD (raw)▪ 4 x 6.4 = 25.6 TByte flash cache▪ ASM high redundancy	Oracle 19.10 EE <ul style="list-style-type: none">▪ db block size 8 kByte▪ 384 GByte buffer cache▪ data guard off▪ archiving off▪ encryption off	Version 10.1 <ul style="list-style-type: none">▪ Build 230801▪ database size 2 x 2 TByte

peakmarks® Key Performance Metrics for platform components in database operations

Category	Key Performance Metric	Throughput	Response time	peakmarks® Workload
Server System All accessed data is stored entirely in the database buffer cache. No I/O operations.	Throughput of mixed queries and scans	2,736,163 qps	0.029 - 0.070 ms	SRV-MIXED
	Throughput logical reads	66,502,195 dbps	-	SRV-REPORT
	Buffer cache scans	258,579 MBps	-	SRV-SCAN
Category	Key Performance Metric	Throughput	Service time	peakmarks® Workload
Storage System Database SQL statements generate all I/O operations.	SQL sequential I/O throughput	12,132 MBps	-	STO-READ
	SQL sequential I/O throughput - using smart scan	72,394 MBps	-	STO-OFFLOAD
	SQL random read throughput - 100% read	745,340 IOPS	< 500 μs	STO-RANDOM
	SQL random read throughput - 80% read	423,127 IOPS	< 500 μs	STO-RANDOM
	SQL random write throughput	359,573 dbps	-	STO-SCATTER

peakmarks® Key Performance Metrics for critical database background processes

Category	Key Performance Metric	Throughput	Latency	peakmarks® Workload
Log Writer (LGWR)	Commit throughput and latency for small transactions	209,735 tps	1.443 ms	LGWR-LAT1
	Log writer throughput	1,215 MBps	-	LGWR-THR
Category	Key Performance Metric	Throughput		peakmarks® Workload
Database Writer (DBWR)	Database writer throughput	328,586 dbps	-	DBWR-THR

Abbreviations and metrics:

[qps]	queries per second	[Mops]	million operations per second	[ms]	milliseconds
[tps]	transactions per second	[MBps]	megabyte per second	[s]	seconds
[dbps]	database blocks per second	[IOPS]	I/O operations per second	[rpt]	rows per transaction

peakmarks® Key Performance Metrics for representative database operations

Category	Key Performance Metric	Throughput	Throughput	peakmarks® Workload
Data Load	Throughput transactional data load - using the buffer cache, 5 rpt	136 MBps	476,194 rps	DL-BUFFER
	Throughput data warehouse data load - bypassing the buffer cache	2,295 MBps	8,020,544 rps	DL-DIRECT
Category	Key Performance Metric	Throughput	Throughput	peakmarks® Workload
Data Analytics	Throughput data scan - using the storage system	12,516 MBps	36,765,045 rps	DA-STORAGE
	Throughput data scan - using smart scan	68,525 MBps	201,142,122 rps	DA-OFFLOAD
	Throughput data scan - using row store	255,266 MBps	845,157,690 rps	DA-ROWSTORE
	Throughput data scan - using column store	39,916,054 MBps	131,717,969,993 rps	DA-COLSTORE
Category	Key Performance Metric	Throughput	Response time	peakmarks® Workload
Transaction Processing	Read-intensive OLTP transactions - throughput and response time	2,317,660 tps	0.094 ms	TP-MIXED1
	Write-intensive OLTP transactions - throughput and response time	51,392 tps	2.478 ms	TP-MIXED2

peakmarks® Key Performance Metrics for PL/SQL application programs

Category	Key Performance Metric	Throughput	Elapsed time	peakmarks® Workload
PL/SQL Application Programs	Throughput of mixed PL/SQL operations	6,937 Mops	-	PLS-MIXED
	Execution time prime number (n = 8000), data type NUMBER	-	80 s	PLS-PRIME

Abbreviations and metrics

[qps]	queries per second	[Mops]	million operations per second	[ms]	milliseconds
[tps]	transactions per second	[MBps]	megabyte per second	[s]	seconds
[dbps]	database blocks per second	[IOPS]	I/O operations per second	[rpt]	rows per transaction