



## **RESEARCH NOTE**

# **Oracle Exadata X9M turbocharges analytics and OLTP performance**

***Doubling down on RoCE and PMem***

## Executive Summary

### Trigger

Oracle is once more taking Exadata up a notch by nearly doubling analytic and transaction processing performance. The Exadata X9M generation is initially being released for deployment in conventional on-premises configurations (Exadata Database Machine X9M) and as a major upgrade of Oracle Exadata Cloud@Customer (ExaC@C). While delivering significant performance enhancements and new capabilities, Oracle is keeping pricing level with the older X8M.

### Our Take

The X9M generation benefits from the springboard provided by the previous X8M generation which embraced RDMA over 100Gb/s industry-standard networking (RoCE), and Intel Optane persistent memory (PMem). X8M doubled transaction performance and reduced latency by an order of magnitude. X9M nearly doubles performance again, but this time for OLTP *and* analytics. And because Oracle has kept prices flat with the previous generation, the result is lower costs for all workloads – customers get higher IOPS and less latency at no additional cost.

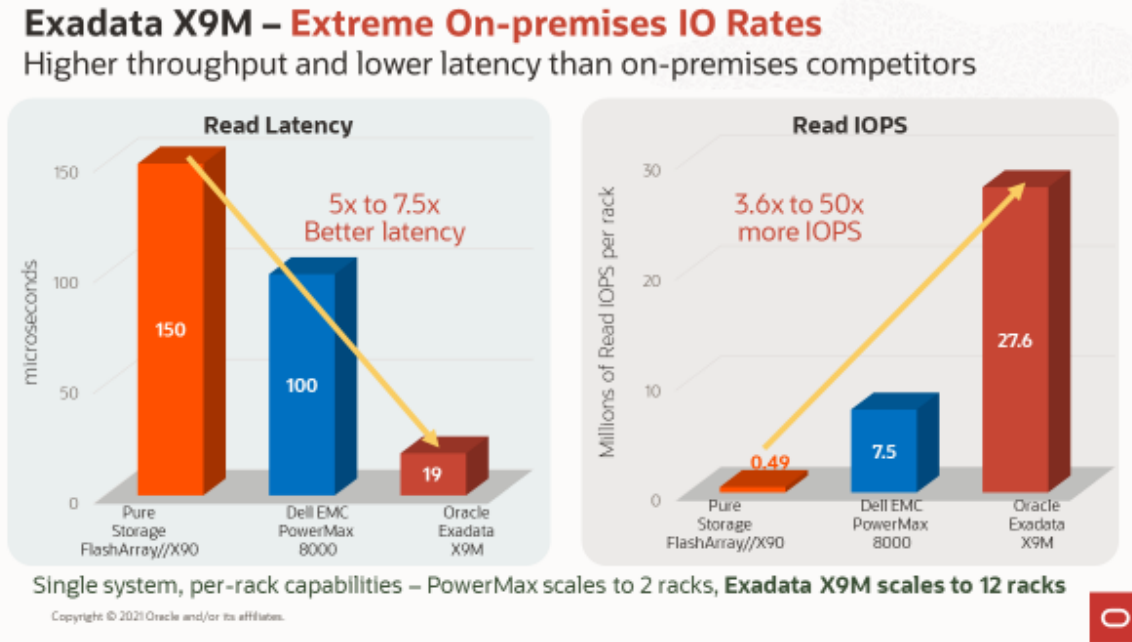
Accompanying the Exadata refresh is the next edition of Oracle's Database backup appliance, the Zero Data Loss Recovery Appliance X9M, which increases backup capacity; introduces a new lower-priced entry tier (50% less); adds cloud connectivity to OCI for long-term data retention; and guards against malware and ransomware.

## Cranking up Exadata

The new Oracle Exadata X9M generation significantly expands capacity, raises performance, and lowers processing costs. It is being released in three editions: the dual socket Exadata X9M-2 database machine; the higher capacity eight-socket Exadata X9M-8 system; and ExaC@C X9M system (which is also a dual socket system).

Exadata is well known as an enterprise database consolidation platform; some customers have folded as many as 4,000 servers into 100 Exadata instances. Oracle has regularly published its own benchmarks documenting Exadata's price/performance. Figure 1 benchmarks the comparative OLTP performance of the storage server component of X9M, claiming up to 5 -7.5x faster latency and 3.6 to 50x more IOPS vs. storage arrays from Pure Storage and Dell EMC. It has also published benchmarks for OLTP and analytic performance vs. AWS and Azure using comparable (Flash) storage (see Figures 2 and 3).

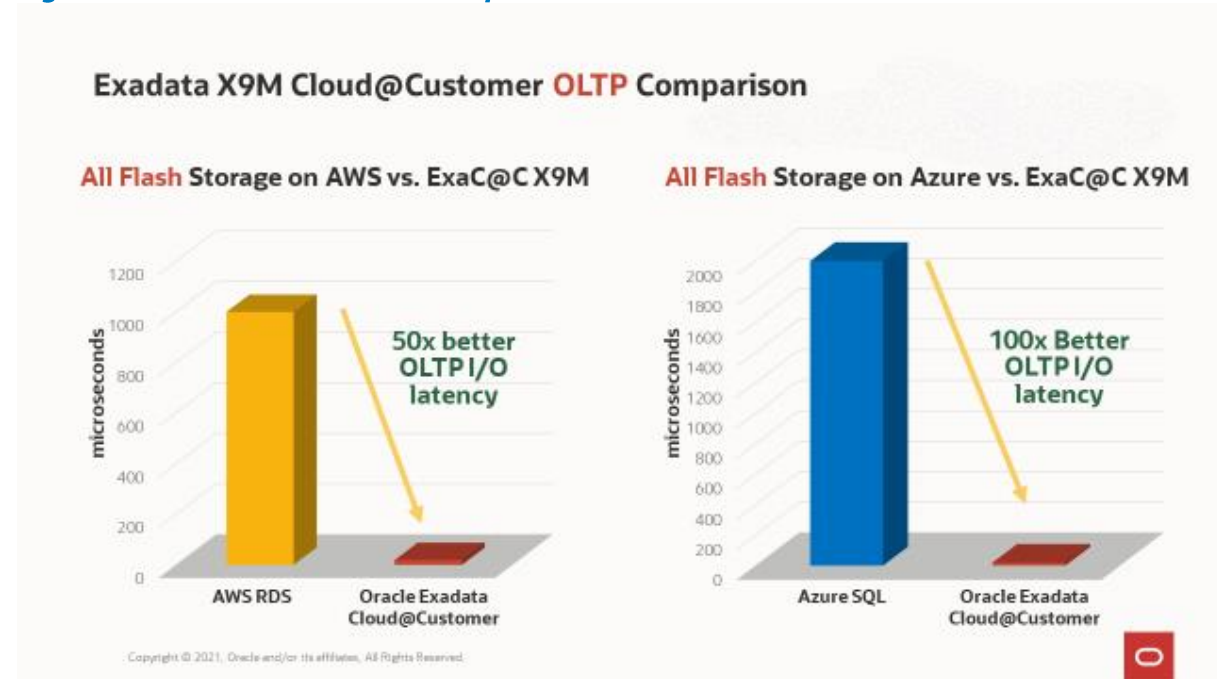
Figure 1. Oracle Exadata X9M comparative storage benchmarks for OLTP



Source: Oracle

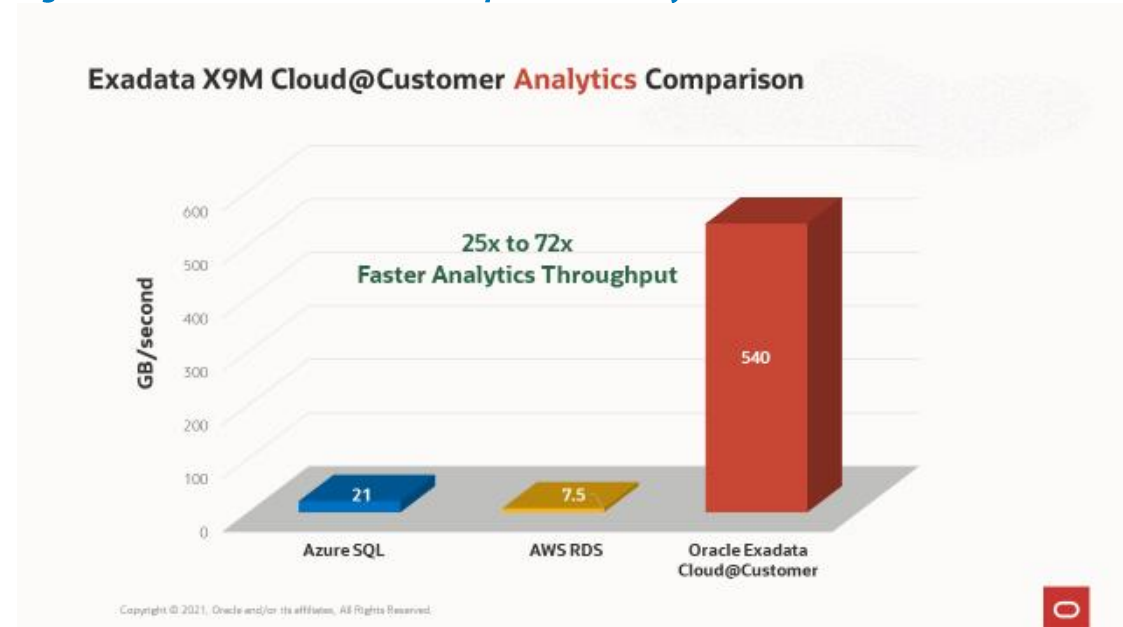
On this go round, the changes were made to the dual-socket system, featuring the latest Intel Ice Lake processors. For the X9M-2 system, it boosts Exadata database (compute) server cores and memory by 33%. The operating system (OS) disk in turn has been replaced with NVMe flash drives to further boost performance and enable each database server to support more Oracle Database virtual machine clusters. On Exadata storage servers, memory has increased by 33% to 256 GB while overall disk storage capacity has expanded by 28% with 18 TB drives. Like the previous edition, the X9M continues to offer three tiers of storage, including hard disk, NVMe, and PMem. RoCE throughput between storage servers and compute servers increases by 80% thanks to PCIe 4.0 dual-port active-active network interfaces.

Figure 2. Oracle Exadata X9M comparative OLTP benchmarks vs. AWS and Azure



Source: Oracle

Figure 3. Oracle Exadata X9M comparative analytics benchmarks vs. AWS and Azure



Source: Oracle

For the ExaC@C X9M system, the enhancements are similar with the exception that the compute server has 24% more usable cores, or 62 per compute server; that boosts overall SQL IOPS numbers by 87% and scan throughput by 80%. Oracle claims that the effective costs for providing OLTP IOPS and analytic scans are reduced by 47% and 42%, respectively for ExaC@C systems.

Additionally, the X9M generation of ExaC@C has inherited the “Elastic Storage” capability that previously debuted in OCI public cloud on the Exadata Cloud Service X8M. The ratio of storage to compute can now be configured more flexibly in ExaC@C, a feature that will be useful for data-intensive scenarios. Specifically, ExaC@C used to be limited to Exadata’s standard rack sizes, which started at the Base System (roughly 1/8 rack) with 2 database (compute) and 3 storage servers, and increasing proportionally in 1/4, 1/2, and full rack units. Now customers for ExaC@C X9M can expand the number of storage servers (up to 12 maximum), regardless of the number of database servers. This will prove useful for Exadata’s sweet spot: enterprise database consolidation, where the configuration of the machine can be optimized to address the organization’s data density.

As for the eight-socket Exadata X9M-8, the CPU count remains the same as with the X8M-8. But it has inherited the same software and storage upgrades as the two-socket edition including the CPUs, flash, memory, and disk storage, resulting in significant storage performance improvements.

## Don’t forget data recovery

For cloud managed database services, data recovery is often taken for granted because replication is typically built-in. But for on-premises deployments, the onus is on the customer to make provision for backup and recovery.

Accompanying the Exadata refresh is the next edition of Oracle’s database backup/recovery appliance, the Zero Data Loss Recovery Appliance X9M. The Recovery Appliance X9M increases backup capacity; introduces a new lower-priced entry tier; adds cloud connectivity to OCI for long-term data retention; and protects against malware and ransomware.

The Recovery Appliance X9M generation lowers the “Base” system entry price by 50%, adds more backup capacity, and adds new Cyber Vault capabilities for protecting against ransomware. Specifically, backup capacity is boosted by 30% with new 18-TB drives, with the “Base” configuration providing 270 TB of usable physical capacity. When compression is factored in, the X9M appliance can protect up to 2 PB of data. The public cloud integration option allows archiving older data to OCI object storage for additional protection or long-term data retention for compliance purposes. The result is that backup protection from outages, malware, and ransomware becomes more affordable to a wider base of customers.

## Takeaways

This is the second generation of Oracle Exadata on its new technology platform. The first, Exadata X8M, significantly moved the needle. It embraced industry standards, replacing the underlying networking technology with 100 Gb Ethernet, implemented the RoCE standard, shifting the hypervisor to the more popular KVM, and helping pioneer the new Intel Optane PMem technology. Analytic and transaction processing performance doubled while IO latency was cut by an order of magnitude, all without requiring any coding changes.

With the new X9M generation, Oracle didn't rest on its laurels. Oracle has turbocharged Exadata by almost doubling performance *once again*. Being able to scan one terabyte/second was unheard of prior to this announcement, and now you can scan 30 terabytes in 30 seconds or one Petabyte in 16 minutes. By keeping pricing level (Oracle hasn't raised pricing with recent upgrades of Exadata), Exadata customers are getting significantly more for their money with significant drops in the costs for IOPS, analytic processing, and data storage capacity. By upping capacity, boosting each of these metrics and delivering microsecond-level latency, Oracle is continuing to stay on top of addressing the escalating needs for enterprise database consolidation. And by adding support of elastic storage in ExaC@C, it is making Exadata accessible to a much broader market.

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## About dbInsight

dbInsight LLC® provides an independent view on the database and analytics technology ecosystem. dbInsight publishes independent research, and from our research, distills insights to help data and analytics technology providers understand their competitive positioning and sharpen their message.

Tony Baer, the founder and principal of dbInsight, is a recognized industry expert on data-driven transformation. *Analytica* named him as one of its influencers for [data](#), [data management](#), and [cloud](#) in 2019, 2020, and 2021. *Analytics Insight* named him one of the [2019 Top 100 Artificial Intelligence and Big Data Influencers](#). His combined expertise in both legacy database technologies and emerging cloud and analytics technologies shapes how technology providers go to market in an industry undergoing significant transformation. His regular ZDnet "Big on Data" posts are read 25,000 – 30,000 times monthly.

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