



ESG WHITE PAPER

Oracle Exadata Cloud Service X8M Accelerates Mission-critical Applications in/to the Public Cloud

Takes Database Cloud Elasticity to a Whole New Level

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Executive Summary

There are times and places when a “mix and match” approach is valid, and even desirable—maybe choosing different types of candy at the movies or opting for dramatic sartorial flourish at a party. There are other times when the mix and match approach is acceptable but debatable—using third-party replacement parts in your expensive sports car or generic drugs rather than the brand-name prescription spring to mind. And then there are the times when mix and match is available but amounts to using hope as a strategy—when your mission-critical business operations are on the line as you drive to run more applications in the cloud is one of those times.

The move to the public cloud is well documented—virtually all organizations now use some form of cloud service, be it SaaS, PaaS, or IaaS. Within that general move, there is also a key subset of workloads. As IT groups increasingly transition mission-critical production applications such as Oracle Database to the cloud, it’s imperative that they deliver to their organization an enterprise-class experience, spanning demonstrably excellent availability, scalability, elasticity, security, automation, complete solution integration, and, of course, performance. Their chosen solution must not only deliver—across the gamut of IT measurements (including a consumption-based, compelling financial model)—at least as well as the best on-premises deployments, it must also seamlessly integrate with these systems to embrace contemporary approaches, enable flexibility, and eliminate refactoring.

Oracle Database Exadata Cloud Service X8M does exactly (all) that. It is an “as-a-service” offering from Oracle; an enterprise-class database cloud platform that enables organizations to accelerate the seamless transition of their mission-critical Oracle Database and associated applications to the Oracle Cloud Infrastructure (OCI) public cloud without any concerns about decreased performance or support across any metric...and with complete congruence across systems, rather than forcing organizations to reformat, compromise, and/or learn and accommodate new and disparate applications and approaches.

While the obvious use case for Exadata Cloud Service X8M encompasses Oracle Database (including Database consolidation) and its associated business applications and cloud analytics, the Oracle Exadata X8M platform—with its PMEM and RoCE 100Gbs fabric power—is of course also perfectly well suited to deliver its industry-leading performance to other mission-critical applications. Less obvious, perhaps, are the more “horizontal” uses such as data warehousing, BC/DR, and dev/test, whether as a proving ground for cloud suitability for these applications or indeed as a long-term home for data-intensive cloud-native applications of all sorts as a result of the Oracle solution’s impressive affordability.

Overall, the Exadata Cloud Service X8M can be succinctly described by adapting a phrase made famous by FedEx—it’s what you use when your mission-critical Oracle Database cloud services *absolutely, positively* have to be delivered in the best possible way...no ifs, buts, maybes, compromises, or doubts..

Transformation to Cloud and Cloud Services is Accelerating

Two converging themes have recently dominated—and continue to dominate—how “IT gets done.” They combine to drive the decision of what workloads run where:

1. **Digital Transformation** – These initiatives encompass people, process, and technology, and tend to lead to a more flexible and responsive IT delivery system. Some 19% of organizations have mature digital transformation initiatives, with a further 57% in process or starting.¹ All these organizations are chasing ever-improving business process optimization, and their most common goals are to become more operationally efficient, and to deliver

¹: Source: ESG Research Report, [2020 Technology Spending Intentions Survey](#), February 2020. All ESG research references and charts in this white paper have been taken from this research report, unless otherwise noted.

better and more differentiated user experiences. Achieving these objectives demands innovation and resilient solutions.

2. **Public Cloud Usage** – The near-ubiquity of cloud environments as part of organizational IT mixes (94% of organizations have adopted some form of public cloud service) is driven both by the increasing efficacy of cloud solutions as well as its inherent suitability to be a dynamic resource. In parallel, cloud is no longer reserved for less critical uses: of the 67% of organizations leveraging IaaS public cloud services, the top use cases demonstrate this clearly: 51% of them run BI queries, 45% run production apps, 44% have their development and test environments there, and 39% use IaaS as their DR targets.²

Figure 1. Cloud Service Use Cases

94% of organizations use some form of cloud service (IaaS or SaaS)



Source: Enterprise Strategy Group

While the combination of digital transformation and cloud suitability means that mission-critical workloads, such as Oracle Databases, can and indeed should sometimes be moved to the cloud, nonetheless it is imperative that the chosen cloud environment be capable of reliably delivering the performance, scale, elasticity, availability, and services (including tools, support, security, etc.) to host them. After all, not all clouds are created equal!

Not All Clouds are Created Equal: The Challenges with Existing Approaches

Once an organization has decided that it needs/wants to migrate mission-critical databases and workloads to a public cloud, it needs to carefully evaluate the service, as there are a number of areas of potential sub-optimization (at least) or pitfalls (at worst). In particular, organizations need to check and evaluate:

- The ability to meet **performance, scaling, and availability requirements**. Organizations need to verify the levels of performance that are available, how they compare to their existing on-premises performance and needs, and whether they are going to vary significantly over time. Can the cloud database support large-scale databases? Is scalability and granular elasticity available and sufficient? Can scaling be done—up or down—online and without interrupting their applications? Does the cloud provider charge any/significant egress fees? What certainty and speed does the provider offer for technology upgrades (this can also impact costs)? Does the cloud provider have exclusions when calculating

² Source: ESG Master Survey Results, [2020 Technology Spending Intentions](#), January 2020.

availability SLAs (perhaps covering such actions as upgrades, patching, adding compute or storage, and regional outages)?

- Is the public cloud environment **fully compatible or certified** to host Oracle Database, and indeed other applications? Does the potential cloud provider have enterprise-class experience in, and expertise with, Oracle environments and your specific industry? In addition, will there be any need to modify the database or applications to deliver at least the same capabilities as on-premises?
- **Total cost of ownership.** Organizations need to ensure full understanding of the costs involved with adopting any given public cloud service. What will the long-term cost of the service be and are there any hidden charges that could impact this cost? They should make sure to include both the initial and ongoing costs to move data into and out of the service, as ingress, egress, and migration fees can be a most unpleasant and unexpected shock with some services. In addition, any low performance will obviously mean longer processing times, which in turn will mean higher costs.
- **Cloud database lock-in.** If needed, organizations need to discover whether they can run their Cloud Database in their own data centers or are they restricted to using proprietary tools only in that one cloud provider's data center locations? And even if they can move workloads, they shouldn't forget to check that they get the same/full capabilities on-premises as in the cloud; and check again the point above about the costs of so doing.
- **Database proliferation & convergence.** Many cloud databases deal with multiple database and data types by having multiple different services; so they offer analytics, OLTP, JSON, Spatial, etc., databases, and users end up having to fund, manage, and secure each one (plus expend the time and labor to move data across databases). This is a level of cost and complexity that a converged database capability precludes.
- **Security.** Not just system-wise (which matters hugely, of course, as cybersecurity is the most common issue on the industry "CIO whiteboard" these days, according to ESG research), but also in terms of the physical environment, availability of regional recovery centers, and assurance that their data is well protected and will continue to run through outages and upgrades.

Oracle Exadata Cloud Service X8M: Enterprise-class Database Cloud Platform

The Oracle Database Exadata Cloud Service X8M lands on the right side of technology and capabilities with respect to all the challenges mentioned in the preceding section. As such it is—very intentionally—*not* created equal to other offerings. It is built to exceed the competition as an enterprise-class database cloud platform service; tuned specifically for Oracle Database and—as a direct result of that—capable of supporting a wide range of mission-critical applications.

- It leverages the **same architecture as an on-premises** Oracle solution: This means it uses the cutting edge Exadata X8M system (including PMEM, for blistering performance) in the cloud service and the end-to-end integration and optimization of an Oracle Engineered System, which of course also means real performance and availability-based SLAs.
- **Cloud-based simplicity** that enables elasticity, automation, and lifecycle maintenance: For users, the point is that they get the same management UIs that they have on-premises (so they can "lift-and-shift" trouble-free) plus the Oracle Cloud Infrastructure web interfaces (to simplify operations with, for example, easy clicks to add new services and complete patching). The feature list for automation and ease is long, from security (where all Databases always have

TDE enabled) and backups to the ability to seamlessly move Databases between not only “homes” but also version upgrades.

- **Proven solution in both cloud and on-premises:** This simplifies migration to the cloud, with not only 100% Oracle Database and Exadata compatibility, but also Zero Downtime Migration (ZDM) that makes the move of an Oracle Database to the cloud automatic with one click.
- It provides **consumption-based pricing:** This, of course, is all about only paying for what you use when you use it. OCPUs are charged by the second; and, at the extreme, the 48-hour minimum means that a user could spin up a pretty big database service for, as an example, some peak dev/test requirements, quickly restore data from a backup on OCI with data redaction to protect sensitive information, do the testing, and then blow it away. Elastic scaling, together with the blistering performance of Exadata X8M mentioned earlier, combine to reduce costs. When a user scales something, the database keeps on running. There’s no need to bounce it and interrupt operations while specifying and moving the data to a new configuration as would be the case with many competitors.
 - Regarding usage costs, it is notable and valuable that Oracle Cloud Infrastructure users are charged a predictable flat rate per port with *no data egress charges*.
- **Enterprise-class service and support:** Given this is all-Oracle, there’s not much to add to this statement, as Oracle does not need to prove itself in this regard. It has decades of experience and expertise (both in IT and across numerous vertical industries) in keeping the world’s largest database and mission-critical environments up and running, which means extensive best practices built into machine learning algorithms to automate a plethora of management tasks.

Customer Value and Competitive Comparisons

Exadata Cloud Service X8M offers a multitude of advantages over its principal competitors in the areas of elasticity, scalability, latency, non-disruptive online patching, operational ease, and performance. To avoid mere chest-beating or assertion, this section aims to give some specific examples. It will be no surprise that most of the comparisons used are to AWS, partly because it is such an obvious “big dog” in the cloud world, and partly because the comparisons used are all generated from data that is publicly available on Amazon’s website.

Here are some key areas of differentiation that [potential] users should consider:

Extended Elasticity

Exadata Cloud Service X8M offers impressive elasticity; its users can make just a few online clicks to scale compute and storage as required, whether for OLTP, database consolidation or data warehouses, and whether concurrently or individually. This Independent scaling of compute and storage enables systems to be sized “just right” and “just as and when needed.” This real-time elasticity can be compared to such offerings as the AWS RDS and Aurora services, which have more of a “stair step” approach (and also don’t offer the non-disruptive patching and maintenance that comes standard with Oracle).

Extreme Scalability

When talking scalability, the numbers from Oracle really do speak (actually scream might be a better word) for themselves: Exadata Cloud Service X8M can handle relational databases of up to 2.5PB in size (by comparison, AWS RDS is capped at 64TB). And with its Hybrid Columnar Compression, Oracle can expand to 25 Petabytes for a data warehouse. That’s something akin to a DBA “mic drop” compared to anything else available in the cloud database market today (including

one of the most-noted new entrants, Snowflake, which is a managed service but does not have its own infrastructure or cloud and thus relies upon its partners, including AWS today, to provide and therefore set parameters for infrastructure availability, scalability, and packaging)

Extremely Low Latency

Latency is superficially just about achieving the best possible application speed and overall performance, which of course is always attractive and often business-critical; *but* in the cloud world, speed is also directly linked to elapsed time, and time in turn is money. The less time a user spends using any given billed-by-the-granular-use cloud service, the lower their bill will be. Therefore being “in and out” as fast as possible matters. Exadata Cloud Service X8M’s use of PMEM and 100Gb/s RoCE provides a massive latency reduction (to 19 microseconds or less) compared to the competition (where, for instance, AWS RDS would typically run on its high performing EBS storage which is “designed to achieve single-digit millisecond latencies”³).

Extra Operational Efficiencies

“Efficiency” can be recognized in many ways. And there isn’t a vendor on the planet that does not tout the term as a generalized claim. No one claims inefficiency! So, rather than falling into the trap of bigger fonts, semantic flourishes, or flashier PowerPoints to try to imply greater efficiency, let’s use specific examples to demonstrate how Oracle’s converged cloud database approach can provide differentiated and added value to its users:

- **More efficient databases:** Any Oracle Database that organizations move onto Exadata Cloud Service X8M will run better than before. This is a direct result of the source code-level engineering between Oracle Database and the Exadata infrastructure. Moreover, system functions such as Exadata Smart Scan and Exadata Storage Server Software deliver levels of rapid scaling and performance that are simply not available on general purpose cloud hardware running in other public clouds.
- **More efficient management:** The proliferation of different, often isolated, databases that can be needed to run mixed workloads when using Oracle’s cloud database competitors can generate significant management challenges; these can include issues with security, training and API expertise, workflow management, and possible data fragmentation. A check of the AWS website shows it offers 11 distinct database services,⁴ while Oracle’s multi-model converged approach allows all common database variants (such as Time Series, Graph, Spatial, Documents, Key Value and so on) to be operated on its one database service.
- **More efficient integrated operations:** Oracle’s converged database allows its users to run operational reports while easily accessing multiple data types...all within the same database. There’s no ETL (extract, transform, load) required as Oracle is effectively bringing the compute to the data rather than forcing users to ETL data from one database to another. Using AWS as our “control group” again, users wishing to combine transactional data with analytical data there would have to use multiple AWS services, and therefore multiple management steps, to achieve the same combination that can be done within Oracle’s single service.

³ <https://aws.amazon.com/ebs/features/> as of 10/16/2020 “When attached to EBS-optimized EC2 instances, io2 and io1 are designed to achieve single-digit millisecond latencies.”

⁴ <https://aws.amazon.com/products/databases/> as of 10/16/2020.

Oracle Database Exadata Cloud Service X8M Use Cases

With all its sophistication, power, security and performance, the range of use cases for the Exadata Cloud Service is commensurately broad and deep. Its SLAs and performance mirror that of the on-premises version of the underlying infrastructure, which are seriously impressive, being delivered by the jaw-dropping Exadata X8M. Some of the ways in which organizations can take advantage of the Exadata Cloud Service are:

Oracle Business Applications

This application set is a *prima facie* use case, being Oracle [Database] mission-critical applications. A need for dynamism and flexibility is increasingly driving these to be fully or partially cloud-based. What's not perhaps quite so obvious is that users of this service will likely get even higher performance than they currently have on-site because it runs *on* Exadata X8M (which not everyone will have upgraded to yet), and because it's run as a service *by* Oracle experts with extreme levels of tuning. The ease of moving applications in and out, as well as upgrading and downgrading, is considerable, facilitated by Oracle's ZDM.

Other Mission-critical Applications and ISV Applications

First, Oracle enables smooth transitions: If something runs on premises, it will run in the Oracle Cloud. One can think here of apps such as SAP, Manhattan Associates, etc. As with Oracle apps, the performance could well be higher than customers currently have on-site because it's being delivered with the new Exadata X8M capabilities. When organizations are engaged in a digital transformation mission, hardware refreshes can provide a useful, and motivating, inflection point. Clearly, users need to evaluate where the application should run; but also, they should evaluate what it needs to run with. If there are multiple applications tied to the same database, they can consider moving all of them at once.

Data Warehousing and Analytics in the Cloud

As mentioned earlier, ESG research confirms that organizations are shifting BI queries to the cloud; This includes Oracle BI EE and other Oracle business apps. For data warehousing, scale matters big time! Oracle's solution has plenty of sheer capacity, but also offers independent scalability of the database and storage servers so that users can have up to a 25PB data warehouse while perhaps only running a few compute servers and allowing the Exadata Intelligent Storage Servers (which—importantly—do not require any Database licenses) to do much of the data warehouse heavy lifting. Turning to analytics, the focus is on compute sophistication and speed rather than capacity; Here, Oracle's powerful in-database machine learning—an extension of analytics that allows users to quickly and easily build and refine machine learning models inside Oracle Databases without having to invest in dedicated machine learning model-building systems, convert data formats, or move the data to them—is a valuable integrated capability.

Business Continuity/Disaster Recovery

BC/DR is crucial but never popular. It's a necessary evil in the minds of many IT professionals that can also be annoyingly expensive because it demands that, in one form or another, lots of data gets moved. Exadata Cloud Service X8M not only makes BC/DR easy to integrate and run but can also make it easier on the organizational pocket due to Oracle Cloud Infrastructure's low bandwidth charges (which, as noted earlier, can run at a fifth or less of major competitors). Users have deployment flexibility: cloud to cloud or on-premises to the cloud. Oracle sometimes refers to having a warm standby in the cloud as having a "gateway to the cloud." It's certainly an easy way for organizations to start using the cloud.

With Oracle's extensive global presence, customers can also have DR across Availability Zones either within a region or across regions. This is crucial, because Oracle's customers are invariably running mission-critical apps, which makes BC/DR

a prerequisite. It is also one of the reasons that Oracle tends to build multiple data centers per geographical area, e.g., 2 in Korea, 2 in Brazil, as well as the more obvious multi-center-big-geographical-markets of the US and Europe.

Database Consolidation

While some IT pros might think that it only matters that an individual Database runs in the cloud, the fact is that Database consolidation increases both operational efficiency (how many resources are needed for each Database) *and* management efficiency (how many copies of a service are run), meaning that both complexity and costs can be reduced. And Oracle's extensive automation offerings streamline Database consolidation.

Dev Test Environments

This is another self-evidently attractive and pragmatic way to take advantage of Exadata Cloud Service X8M. Not only is it operationally a great way to “try out the cloud,” but from a business perspective, it is extremely low risk, since users can leverage their Oracle Universal Credits and try this out without signing a new contract.

The Bigger Truth

Organizations' IT needs and business desires are shifting more workloads to the cloud, including production applications and mission-critical databases. With burgeoning business demands upon IT and the resulting mantra of “IT- flexibility-asking,” it is nonetheless vital to “get it right the first time” (and every time!) to ensure optimized performance and operational efficiency.

Oracle Database Exadata Cloud Service X8M provides the requisite performance and services to enable organizations to accelerate the migration of their production and mission-critical applications to a highly automated and robust enterprise-class cloud environment. It adds excellent end-to-end security and uses Exadata X8M to deliver leading OLTP and data warehouse performance in the cloud. The story clearly resonates with the market as Oracle's internal tracking shows that a significant percentage of its current Exadata Cloud customers are *entirely new* to Exadata.

Regardless of the use case, when users need to run mission-critical applications in the public cloud, Exadata Cloud Service X8M has them covered. This paper started by mentioning the times that it is maybe wise to mix and match and the times it really is not. Clearly, from an IT perspective, Exadata Cloud Service X8M falls into the latter category. But to close out this paper and to emphasize the value of this Oracle solution, let's freely mix and match our pertinent brand references, and choose a form of delivery service other than FedEx: Let's reference the famous motto that often gets attached to the United States Postal Service: “Neither snow nor rain nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds.” Likewise, there's nothing likely to stop the Exadata Cloud Service X8M from delivering its appointed mission-critical application excellence—neither performance demands, nor scaling up or down, nor system and version upgrades, nor outages, nor the gloom of cyber-attacks. No ifs, buts, or maybes. No compromises, and no doubts. Users considering a move of Oracle Databases to the cloud simply cannot do better than the Exadata Cloud Service X8M.

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