

White Paper

The Choice for How Best to Run Oracle Database as an On-premises Cloud Service is Clear: Gen 2 Exadata Cloud at Customer

Oracle Exadata Cloud at Customer (ExaCC) Aligns Cloud Advantages for Oracle Database with Users' Real-world Needs

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Introduction/Executive Summary—The Oracle Database User’s On-premises Cloud Service Choice

To get straight to the point, as an Oracle Database user wanting to run Oracle Database as a cloud service in your own environment, you have, at least in theory, a few options in terms of approach. But the choice, at least in practice, starts to look very clear when you drill down. Oracle’s clearly named “Exadata Cloud at Customer” is purpose-built for the task, and not only has the obvious “better together” story in its favor but can additionally deliver added and significantly better outcomes than the alternatives.

This report expands and explains this in more detail, but let’s also take a moment to examine why the scenario of an Oracle Database user wanting an “on-premises cloud” deployment is both likely and growing. It is based on three key facts:

- A hybrid cloud model, more or less heavily, is clearly the main IT delivery style across most organizations today. When ESG asked what best describes their organizations’ approach when it comes to new application deployments, only 14% still attest to an “on-premises first policy” (that percentage was down from 24% in 2018).¹
- Oracle Database is the market leader in mission-critical database deployments.
- There are multiple “cloud journeys” that can be taken by organizations. The “cloud” is neither one homogeneous thing, nor is it deployed in just one way. Many users and/or applications desire to have the benefits of a public cloud model, but various constraints preclude a “traditional” use and drive those users to look for an “on-premises cloud.”

That need has been recognized by key vendors, such as Amazon, Google, Microsoft, and Oracle. However, all of them except Oracle have limitations and/or challenges, such as a lack of architectural congruence, and simply, lack of availability of their offering as yet. Oracle, meanwhile, is now delivering the second generation of its Exadata Cloud at Customer, based on Exadata X8, which offers an integrated and flexible solution from the producer of the Database itself and takes advantage of its “Engineered System” status to deliver capabilities and advantages that the alternatives cannot match.

Now, let’s take a look at the full story.

Embracing Both Public and Private Clouds—Why?

For most IT practitioners, things don’t all fit neatly into one approach...certainly not if they are trying to optimize across their entire ecosystem *and* simultaneously in line with business drivers. There are pros and cons for both private and public clouds; but why, specifically, might you want “the best of both worlds?” The evolution of IT is leading organizations down a transformational path that includes not only embracing modern technologies on-premises with private cloud infrastructures, but also consuming public cloud services to satisfy executive mandates to reduce costs and increase efficiency. But to overcome the challenges inherent with both approaches, such as invariably different underlying architectures, many organizations are rethinking their overall IT infrastructure strategies, which is in turn highlighting a growing need to bridge the gap between private cloud and public cloud.

These organizations are looking for a way to satisfy their mission-critical application demands without the headaches of worrying about the infrastructure. This is especially important when satisfying database workload requirements. In fact, ESG research shows that, when evaluating and selecting a database, “cloud-based” is the capability or attribute most-often cited by organizations as one of the most important.² This driver has encouraged users to significantly adopt public cloud technologies that deliver application environments “as-a-service.” There is certainly value here, but invariably “...aaS” models also come with constraints. They are usually “off-the-rack” clothes, not bespoke tailored outfits. That said, whether

¹ Source: ESG Master Survey Results, [2019 Technology Spending Intentions Survey](#), March 2019.

² Source: ESG Brief, [Database Purchase Criteria](#), June 2017.

organizations are looking to simply “lift and shift” workloads directly to the cloud, leverage the cloud as an extension of an on-premises workload, or consume a fully managed service, ESG research shows that 49% have turned to the public cloud to run production applications, such as their relational database applications.³ As far as cloud-based analytics technology goes, recent ESG research indicates that data warehouses and SQL databases are the platforms most commonly leveraged as public cloud services.⁴ This makes sense, as previously conducted research revealed reduced costs of storage and/or data processing as the biggest advantages of public cloud-based databases (see Figure 1).⁵

But the challenge is that while these organizations are benefiting from the elasticity, pay-as-you-go/consume financial models, and the latest and greatest technology that is often supported by cloud service providers, they are also being forced to rethink their public cloud strategies due to such issues as data security, regulatory compliance, developer requirements/preferences, and sometimes an inability to meet performance/latency and availability expectations.⁶

Figure 1. Top Five Advantages of Public Cloud-based Databases

What do you see as the biggest advantages of public cloud-based databases? (Percent of respondents, N=331, three responses accepted)



Source: Enterprise Strategy Group

Therefore, it’s no surprise that organizations are looking for “the best of both worlds.” They need the control, security, data sovereignty, and performance of an on-premises environment but at the same time they want to enjoy the flexibility, elasticity, rapid technology innovation, and cost savings opportunities of the cloud.

These seemingly contradictory demands, whether driven by legal issues, operational drivers, or simply an organizational preference, can be complicated by IT staff wanting to retain control of their organization’s data and systems, including use of their own firewalls, load balancers, and VPNs to deliver against specific SLAs and KPIs. You can think of this in the same way we discuss things like world peace: It is easy to want and to vote for, but way harder to actually deliver!

³ Source: ESG Research Report, [2019 Technology Spending Intentions Survey](#), February 2019.

⁴ Source: ESG Research Survey, [2019 Data Analytics Trends](#), June 2019.

⁵ Source: ESG Survey, [Enterprise Database Trends](#), January 2017.

⁶ Source: ESG Master Survey Results, [Tipping Point: Striking the Hybrid Cloud Balance](#), October 2018.

Enjoying Both Public and Private Cloud Advantages—How?

In any big endeavor, a herd mentality can dominate. The “rush to the cloud” is sometimes built on a committed belief, corporate zeal, management directive, organizational preference, or whatever, that everything can simply move to the cloud if desired. Period. This faith holds that the only change will be in thereby achieving whatever horizontal benefit was intended, perhaps being more responsive to dynamic business conditions, maybe cost reduction, potentially greater application flexibility, or simply concentrating on core competencies. But one size, or one generic cloud journey, does not fit all. Whether there’s a hybrid cloud initiative or an internal mandate to shutter data centers altogether, organizations are finding out that optimally embracing the public cloud is easier said than done, especially for critical workloads on enterprise databases.⁷

Moreover, organizations don’t want to curtail, or massage, their Oracle Database application requirements based on the limitations of the underlying infrastructure. Those Databases are the lifelines of their business. Yet when selecting either the private cloud or the public cloud alone, there are criteria boxes that simply can’t be checked. Instead, they require a solution that brings together the benefits of both options to simplify operations, maximize productivity, improve agility, reduce risk, optimize cost, and accelerate time-to-value.

That’s one reason why the idea of a managed service is appealing to organizations—having a third party that knows the infrastructure and application(s) attending to routine infrastructure and maintenance tasks, so that in-house IT resources can concentrate on value-added initiatives. In fact, 27% of organizations currently utilized managed services today, with an additional 26% planning to do so in the next 12 months to support analytics applications like databases.⁸

Is it possible to “thread the needle” and get the upsides of each approach, while losing the downsides of both?

The Solution: Oracle Exadata Cloud at Customer (ExaCC)

For organizations that are not able to fully embrace the public cloud due to constraints such as compliance, performance, data sovereignty, custom security standards, and tightly coupled workflows, Oracle brings an instance of the Oracle Cloud into their data centers. Oracle Exadata Cloud at Customer offers a complete cloud experience on-premises, behind an organization’s firewall, so that organizations can more easily address security, compliance, and performance concerns. Customers gain the advantages of a public cloud—feature sets, financial models, and operational models—while their own IT team retains control of data in their own data center behind their firewalls, as well as the means for a seamless transition to the public cloud by leveraging the architectural identity of Exadata Cloud Services, if warranted.

By combining the innovation, power, and performance of the Exadata Database Machine (designed to run any Oracle Database workload or combination of workloads) with a cloud-based deployment model, Oracle Exadata Cloud at Customer delivers an identical experience to that of Oracle Exadata in the Oracle Cloud, *but* in an organization’s own data center, and still fully managed by Oracle experts. And at times of peak need (say, to satisfy increased performance demands during a product launch), Exadata’s scale-out architecture is well suited to deliver additional temporary power: Exadata Cloud at Customer offers bursting capabilities similar to Databases that run in the Oracle Cloud, enabling IT to seamlessly leverage temporary (or of course permanent) compute node processing power to satisfy the increased performance demand without breaking the bank.

⁷ Paragraph adapted from: ESG White Paper, *The Business Advantages of Cloud Adjacent Oracle Databases on Exadata*, published March 2019.

⁸ Source: ESG Research Survey, *2019 Data Analytics Trends*, June 2019.

Gen 2 Oracle Exadata Cloud at Customer—The Details

Exadata Cloud at Customer is simply an Oracle Exadata as a cloud instance that is owned and operated by Oracle and that sits in a user's data center and delivers Database cloud services.

It is like a public cloud in terms of its features, operation and financing; it is like a private cloud in terms of user control and physical data security.

Like any Exadata, it can further link to the broader public cloud and will soon offer an Autonomous version. Unlike competitive DBaaS offerings, it offers operational, security, and technical congruence across and between other Exadata/Oracle Database implementations. Users get the same technology stack and user experience as they would from the Oracle Cloud, together with regular feature, patching, and security updates to ensure the most recent technology is being leveraged, while also ensuring workload portability across a consistent technology stack, whether on-premises, or in the Oracle Cloud. Here are some more granular details:⁹

Public Cloud Management

- Gen 2 Exadata Cloud at Customer leverages a Cloud Control Plane that is deployed in the nearest Oracle Cloud Infrastructure (OCI) region. This enables enterprise cloud management with optimized performance, scalability, availability, and security, while also reducing space, and power and cooling requirements in customers' own data centers.
- The solution enables fast configuration and deployment (features are rolled out in the public cloud management stack with minimal local changes). If you have other Oracle cloud services, it's the same entry point, with an identical user experience and APIs between public cloud and Cloud at Customer.

Infrastructure Elements

- The Exadata Cloud at Customer platform comprises compute, storage (all-flash and/or high capacity disk), and high-speed interconnectivity to ensure low latency. The tightly integrated and purpose-built Exadata hardware architecture is optimized for Oracle Databases. This includes offloading data-intensive operations to the storage servers, optimized data tiering, and other algorithms specifically designed for the Database.
- The latest Exadata X8 hardware offers improvements across the board versus the X7: faster CPUs, more cores, more storage, and greater network configuration flexibility. Throughput is increased by some 25%, while more cores reduce the cost/overhead of completing tasks such as encryption/decryption.

Operational Considerations and Value

- Exadata Cloud at Customer now supports Oracle 19c and, more importantly, offers long-term support for this latest release. Oracle offers ready-to-use capabilities or integrated frameworks, based on specific needs.
- Sovereignty and regulatory compliance are ensured by keeping data on-premises. This is vital to all industries that require infrastructure/data isolation and/or specific security frameworks.

⁹ This is not intended to be a technical paper. Full product specifics are at Oracle.com, and for comprehensive analysis of the Exadata platform, read ESG White Paper, *Oracle Databases Achieve Unprecedented Speed Running on the New Exadata Database Machine X8*, June 2019.

- Business Model: Exadata Cloud at Customer offers pay-as-you-consume subscription pricing, with all management, operations, and support services included (the same as in the Oracle Cloud).

Competitive Evaluation

- As an integrated, single vendor stack, Oracle Exadata Cloud at Customer combines the benefits of CI/HCI as well as those of software stacks running on third-party hardware (such as Microsoft Azure Stack, Google Anthos, and the—currently unavailable—AWS Outposts). Yet it does so without the downsides common to these other approaches:
 - With CI/HCI infrastructures, organizations gain a platform anchored in virtualization and software-defined constructs. However, organizations looking to optimally embrace the hybrid cloud may encounter challenges or constraints around such things as limited orchestration, database and application integration, security, and performance optimization. There is also rarely a subscription option, so organizations must cut into their CapEx budgets to purchase equipment, and IT must choose and acquire suitable hardware components, and perform and manage all integration, upgrade, and patching tasks.
 - For software-stack vendors, the hardware is of course provided by a third party and requires integration. Google Anthos and Microsoft use Cisco, for example, which is not known to be used in their public cloud services. There is nothing inherently wrong with either the hardware or management software but the chances of the level of co-engineering that Oracle can use to deliver end-user advantages are low to say the least, since both programs use the exact same engineers. Just as important is the lack of 100% technical equivalence between these vendors' main cloud architectures and these on-premises-cloud versions. Furthermore, proprietary virtualization is usually required as well. Organizations are restricted to IaaS and PaaS consumption models and must rely on third-party services when in the public cloud, or DIY for on-premises environments (in this vein, Microsoft also recommends that organizations hire or train a dedicated resource to serve as an Azure Stack operator to properly manage the service, placing more operational burden on IT).

The emulating alternatives show that Oracle's Cloud at Customer conceptual approach is attractive, since, as the saying goes, imitation is the sincerest form of flattery. Oracle's competitors are, however, hampered, not so much by any significant issues with what they do offer, but more by what they don't offer. They pretty much fall into two camps. There's the hardware/cloud-bundling-in-software group, and the software-bundling-in-hardware group. Oracle, having ownership of both the hardware and the software, is a single source for its "Engineered System." Not only that, but ExaCC has already accumulated years of field hardening and proving. This is a "learning curve" that the competitors have mostly still to navigate. And since Oracle is not limited to one cloud approach across its portfolio, it is more able to be driven by the specific needs of a specific user's cloud journey. Finally, Oracle's architectural equivalence across all the consumption options for its Database means it offers enormous, and easy, flexibility as users' journeys change, whether that flexibility is provided in terms of "destination" or of "method."

The Bigger Truth

Contemporary IT, and the world as we understand it, could not function without databases. But exponential data growth, the need to support more database workloads, and the resulting database sprawl have created significant challenges for IT organizations, challenges that are now complicated and extended by the arrival of multiple iterations of the cloud. With most organizations having mandates to adopt the cloud to some extent—database workloads are no exception—they should look to a partner that can not only meet their on-premises requirements, but also provide a path to a cloud that

best fits their specific “cloud journey.” And for many, getting an identical user and operational experience along that journey is also a prerequisite.¹⁰

The Oracle Exadata Cloud at Customer name really says it all: public cloud Oracle Database instances running in customer data centers. Exadata is the perfect “Engineered System” to run Oracle Database. It delivers the performance, scalability, availability, and security that users invariably demand for their critical business and consolidated database environments. Offering that same purpose-built-application-platform for users in their own data centers allows them (when appropriate, by choice and/or constraint) to enjoy the best of both the on-premises/private cloud and public cloud worlds. It’s a case of “and,” not “or.”

No changes are required to existing on-premises applications. Organizations can bring their own Database licenses, and since Exadata Cloud at Customer is an Oracle managed service, the user IT team gains valuable time back to focus on more strategic initiatives. With on-premises deployment and the hallmark features and benefits of its public cloud, Oracle Exadata Cloud at Customer bridges the gap to deliver a “best of both worlds” capability.

Alongside the architectural equivalence within and across Oracle’s Database deployment choices, there is also extensive field experience that Oracle has already garnered with hundreds of Exadata Cloud at Customer deployments. Knowing what a good DBaaS solution looks like, whether fully in the cloud, or Cloud at Customer, is one thing, and many vendors can describe it, but being able to deliver it reliably and consistently is another thing entirely. Yogi Berra¹¹ had a saying that perfectly captures this overall compelling value of the Exadata Cloud at Customer offering: “In theory, there is no difference between theory and practice. In practice, there is.”

Similarly, Oracle Exadata Cloud at Customer makes the choice for how to optimally deploy a cloud instance of an Oracle Database on-premises easy. In theory, there are alternatives, but in practice, there are not.

¹⁰ Source: Paragraph adapted from ESG White Paper, *Oracle Databases Achieve Unprecedented Speed Running on the New Exadata Database Machine X8*, June 2019.

¹¹ Yogi Berra was a catcher for the New York Yankees baseball team, famed for his use of malapropisms and non sequiturs.

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