

OPTIMIZE YOUR ORACLE DATABASE MIGRATION

by Leveraging Cloud Adjacency and
Cloud Exchange Fabric



TABLE OF CONTENTS

Introduction	3
Maximizing Value While Minimizing Risk	5
Challenges of Migrating Your Oracle Database to the non-Oracle Public Cloud	5
Equinix Provides Alternatives to Consider	7
Equinix Can Help with Next Steps	8

FOR MOST MEDIUM TO LARGE BUSINESSES, the question is no longer whether to adopt the cloud for enterprise platform modernization, but when. Since many organizations rely heavily on their Oracle relational database management system (RDBMS) as the backbone of their IT enterprise, it's important to develop a strategy for effecting digital transformation with the lowest risk and cost of ownership.

Different organizations have different levels of investment in their RDBMS infrastructure. Smaller organizations that don't have significant performance demands may operate a version of the Oracle database on their own managed hardware platforms. Other organizations, whose applications demand performance and scalability, may have significant investments in implementing their Oracle database on an on-premises Oracle Exadata platform, a high-performance database machine engineered with scale-out database servers and scale-out storage servers connected via a high-bandwidth, low-latency 100 Gb/sec RDMA over converged ethernet Remote Direct Memory Access (RoCE) network fabric.

Suffice it to say, there are different types of Oracle database customers at different phases in their cloud modernization journey. These include:

- Customers currently hosting their Oracle database at an on-premise data center and want to migrate to a cloud solution within the near term.
- Customers that have already moved their applications that interoperate with Oracle database technology to the traditional cloud provider and now want to benefit from migrating their Oracle database to a cloud solution that offers high performance and low latency.
- Customers that want to manage control and security of their database but need a high-performance “cloud-like” solution that integrates with applications across a multi-cloud enterprise.
- Customers sensitive to the challenges of data migration associated with data sovereignty, data compliance, or simply lack of trust of a public cloud provider’s data security.

Migration to a cloud solution holds many benefits, inspiring numerous organizations to shut down their on-premises data center in deference to a cloud strategy. At the same time, there may be situations in which an organization may have limitations on what it can and cannot move to a public cloud – either due to regulatory compliance, internal corporate policies, or architectural constraints associated with security, latency, performance, and overall quality of service. As you develop your cloud modernization strategy, it’s important to balance the risks, challenges, and potential limitations of migrating your Oracle database to the other public clouds, but also realize that modernization is not necessarily a binary choice between managing your own on-premises data center or moving everything to a single public cloud. There are alternatives to consider, and in this whitepaper we’ll examine those options and provide guidance on how to leverage cloud adjacency and an Equinix Cloud Exchange Fabric to maximize value and minimize risks.



MAXIMIZING VALUE WHILE MINIMIZING RISK

In general, organizations benefit from moving systems and applications to the cloud. This includes the use of Software as a Service (SaaS) products, the adoption of Platform as a Service (PaaS) or Infrastructure as a Service (IaaS) environments, to private cloud, hybrid cloud, or public cloud platforms and services. For Oracle database customers, one option involves deploying their applications coupled with the Oracle database platform software atop cloud computing resources to protect the experience and investment in their existing on-premises applications and technologies.

And while there are clear economic advantages to the operating expenditure (OPEX) costing model of cloud deployment, there are lingering concerns about minimizing potential risks in moving from on-premises to the cloud, such as:

- **Complexity of migration:** Cloud computing has changed the nature of organizational IT applications. The enterprise application infrastructure used

to be deployed across platforms and systems managed on-premises within a corporate data center. Today, the IT enterprise spans multiple cloud environments with siloed applications often deployed among SaaS, PaaS, private clouds, and public cloud services. Migration becomes complex in deploying siloed IT applications across a multi-cloud environment.

- **Data security, sovereignty, and compliance:** The physical location of data in the cloud introduces risks associated with governance and oversight of compliance with a wide variety of data protection laws. While most cloud service providers have addressed data security issues, oversight of compliance remains a risk.

- **Performance:** When Oracle database performance is mission critical, choosing the appropriate configuration alternative is essential. Opting for a simplistic “lift and shift” from on-premises specialty appliance hardware such as Oracle Exadata to commodity hardware services hosted at a public cloud will not provide the same performance. In

addition, mission critical databases are often tightly coupled with on-premises applications. Moving these applications to the cloud may introduce performance bottlenecks.

- **Continuity and disaster recovery:** Configuring a lifted and shifted deployment is not only challenging to architect, the need to establish mirrored failover systems (for each supported database) at other cloud data center locations to support disaster recovery will obviously increase operational expenses.

For organizations with years of experience using an Oracle database environment, it's critical to minimize these risks to maximize the value when planning a cloud modernization strategy.

CHALLENGES OF MIGRATING YOUR ORACLE DATABASE TO THE NON- ORACLE PUBLIC CLOUD

Organizations looking to migrate their Oracle database to the cloud have numerous solutions. A simple approach is to deploy the Oracle database platform on

top of generic computing services provided by public cloud vendors. However, non-Oracle public clouds are unable to support the operational, performance or commercial needs of those enterprises that are accustomed to the power and usability of an on-premises Oracle Exadata database for a number of reasons:

1. Scalability constraints: Like all high-performance relational database systems, the Oracle database is mainly I/O-driven and therefore is suited to vertical scaling (in which computing, memory, and storage resources are added to the monolithic server). Yet, vertical scaling is an unnatural fit for the non-Oracle cloud environments. Rather, those environments are designed to be favorable toward applications benefitting from horizontal scaling through the addition of commodity hardware and virtual machines.

2. Missing performance expectations: The Oracle database software has been optimized to take advantage of

the specialized Exadata architecture, and the Exadata architecture is engineered to optimally support Oracle's database applications. Migrating an Oracle database to the commodity resources typically available in the public cloud will likely result in diminished execution performance.

3. Licensing costs: Oracle's licensing policies for deployment in public cloud environments have pricing based on the size of the instance, with additional limitations and costs depending on the product license and computing instance configuration. In other words, your Oracle database license costs can increase dramatically when run in non-Oracle public clouds.

4. Database feature constraints: When deploying Oracle databases in non-Oracle public cloud environments, features like real application cluster and maximum availability architecture are not readily available.

These challenges reinforce the infeasibility of lifting and shifting the Oracle database from on-premises specialty Exadata hardware to generic hardware instances at a public cloud service provider. For customers who cannot put their database in the public cloud, Oracle's Cloud@Customer solution allows them to place that rack within their own data center, and Oracle will own and manage it as a cloud service. The customer pays the same as the Oracle cloud service but locating that hardware on-premises addresses key data compliance and sovereignty issues. It provides a cloud "experience" (with a costing and management structure identical to Oracle's Exadata Cloud Service), and can ensure scalability, performance, and flexibility.

According to Oracle, your database deployment using Exadata Cloud@Customer can accommodate up to 4,096 databases simultaneously in a multitenant deployment. And your database "runs faster and with higher consolidation rates using more than 60 unique Oracle database capabilities and up to 12X more SQL read IOPS, 10X higher SQL throughput, and 98% lower SQL latency than Amazon Relational Database Service (RDS) on AWS Outposts."¹ This approach, however, can lead to an architectural quandary when the organization's strategy is to shut down its own data center: an on-premises deployment is no longer an option, nor is moving to a public cloud environment.



EQUINIX PROVIDES ALTERNATIVES TO CONSIDER

Equinix provides an alternative that seeks to balance the benefits of Oracle's Cloud@Customer yet alleviates the issue of maintaining a legacy data center. The solution is deploying Oracle's Cloud@Customer within the Equinix colocation data center environment. This allows you to carefully navigate and overcome the complexity of migration, as it simplifies the ability to lift and shift your Oracle database directly from your existing on-premises implementation to an effectively identical one in an off-premises environment.

Your organization can then maintain the high performance and scalability of specialty database appliance hardware and software optimizations (such as Oracle database deployed on top of Exadata). At the same time, you can derive the benefits of the cloud environment in that your mission critical database and applications are moved off-premises, which means your organization benefits from cloud OPEX economics.

With this cloud adjacent solution, customers managing an Oracle Exadata Cloud@Customer at an Equinix colocation environment can place and connect their Oracle database "adjacent" to the cloud data center running their applications via Equinix Cloud Exchange Fabric (ECX Fab-



ric™). This can leverage a cloud providers' dedicated and high-speed interconnects (such as Oracle Cloud Infrastructure's FastConnect) to provide high-speed connectivity to applications deployed in a public cloud, especially when the colocation center is geographically closer to the public cloud environments.

This approach will protect your organization's significant resource investment in the Oracle database and allow you to retain control of your organization's data while simultaneously allowing you to maintain or even increase operational performance. It also allows the customer to effectively retain the benefits of a specialty database appliance like Exadata as well as the benefits of migrating other applications to the public cloud. An Exadata instance at a data center like Equinix's configured the same way as it had been configured on-premises addresses several common issues:

- Using the Oracle-managed environment means your implementation will not be limited in terms of available features.

- You continue to benefit from using the highest performance hardware and software configuration.
- Deploying at an Equinix colocation center within a specific geographic region resolves regional/country specific data sovereignty and privacy compliance issues.
- Choosing the right colocation center allows your database to be physically seated much closer to the public clouds that are running customer applications and web services, thereby reducing network latency between the database and applications and helping to maintain an acceptable response time.
- Using the high-speed interconnection enables the applications to communicate with the database with no impact from network latency.

In fact, colocation centers like Equinix can address a broader range of off-premises "cloud-like" deployment. If customers would like a whole private cloud experience not limited to just their Oracle database, then a service like Dedicated Region at Equinix can satisfy that need.

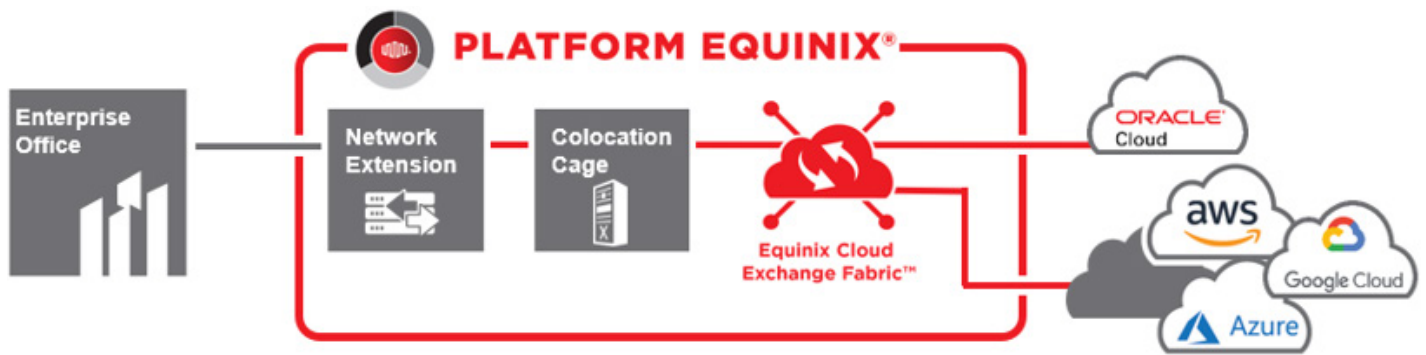


Figure 1: The Equinix Multicloud architecture supports migration to OCI from other cloud providers and supports inter-cloud connectivity.

EQUINIX CAN HELP WITH NEXT STEPS

Clearly, the need for digital transformation and managing a large data center can be a costly and complicated activity for any enterprise. These costs and complexity are compounded when Oracle database performance is mission critical. Global data center providers like Equinix can help customers understand the different options for cloud migration and deployment to facilitate digital transformation while minimizing risk, ensuring performance, and providing operational agility.

For customers that have already moved their applications with Oracle database to non-Oracle clouds, there are two possible options. For metropolitan areas such as Ashburn, London, Silicon Valley or Tokyo, where the Oracle Cloud Infrastructure region is in close proximity to the cloud service provider, one can take advantage of Equinix's Network Edge. Equinix's Network Edge is a virtual device works together with Oracle Cloud Infrastructure's FastConnect and the ECX Fabric to

establish secure access to cloud platforms that may not be local to a business' data center locations. It enables organizations to select, configure and connect virtual network services to rapidly access cloud platforms without additional space, power, hardware or equipment, thereby simplifying the ability to securely deploy and interconnect virtual network services with less complexity and cost. This approach allows the customer to move the database tier into Oracle's cloud solution via OCI FastConnect and then either use virtual network services optimized for instant deployment and interconnection of services or deploy a physical router to connect the two clouds together.

For metropolitan areas where the Oracle Cloud Infrastructure region is not in the same metropolitan area as your other cloud service provider (e.g., Dallas or Paris), one can move the database to an Exadata Cloud@Customer deployment or Dedicated Region Cloud@Customer at an Equinix data center that is physically adjacent to the other cloud service provider.

The cloud adjacent approach provides an alternative for organizational data environment modernization that minimizes risks, maximizes value, and alleviates both the complexity of migration and the concerns of diminished performance. Modernization is not limited to the on-prem/cloud binary option. By partnering with Equinix and Oracle, your organization can benefit from a collocated Oracle Exadata Cloud@Customer solution that combines the benefits of a cloud strategy without exposure to compliance, total cost and security risks of the public cloud.