Oracle Database Estate Planning Guide

With the current maturity and competitiveness of database products and cloud services, now is an ideal time for organizations to look at how to modernize, upgrade, re-home, or even re-platform their existing Oracle Databases both to save money and leverage new capabilities. The right decisions and technical know-how can turn a short-term investment into long-term savings.

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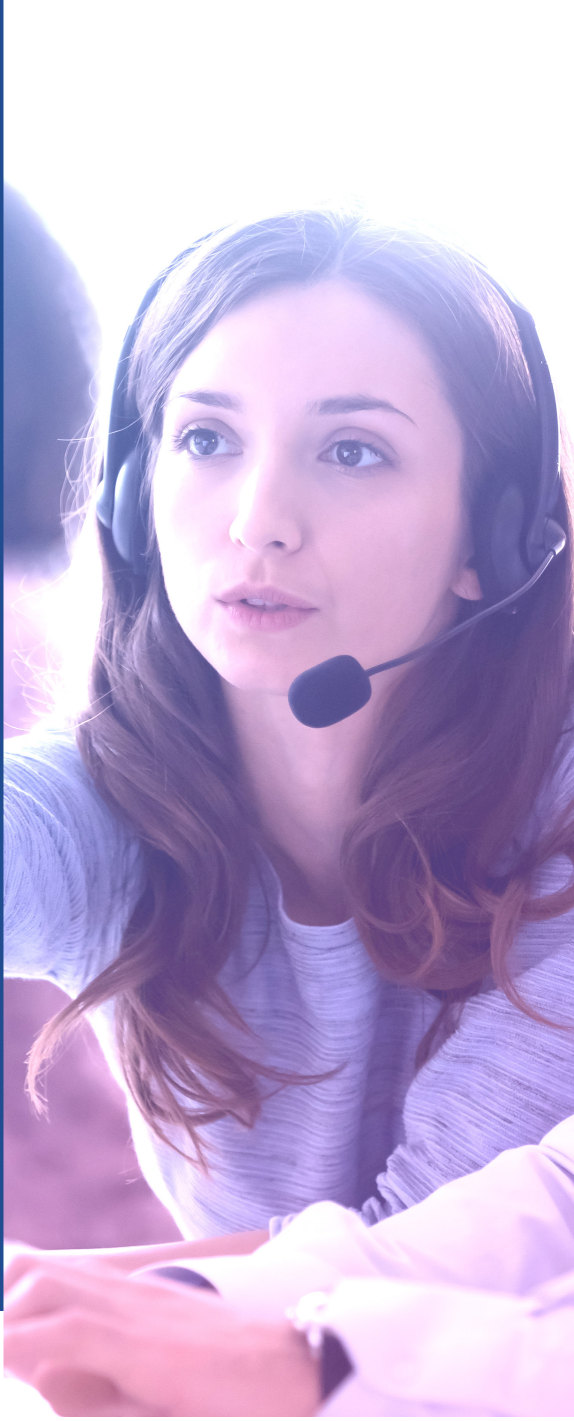
Introduction

With the current maturity and competitiveness of database products and cloud services, now is an ideal time for organizations to look at how to modernize, upgrade, re-home, or even re-platform their existing Oracle Databases both to save money and leverage new capabilities. The right decisions and technical know-how can turn a short-term investment into long-term savings. Several well-documented database and business pressures are driving this kind of change at organizations across the world, including:

- Reducing licensing or other costs, such as operational support
- Enhancing performance and reliability to better meet service-level agreements
- Increasing your security posture
- Accessing new cloud-only features, cloud unique licensing models, or features more easily accessible in the cloud
- A need to scale up (or down) more easily and flexibly
- A lack of specialized IT skills



But the choices available are numerous and complex, while there is no mandatory approach (no right or wrong way). Assuming that Oracle remains the platform for the short to medium term at least, the decision tree typically then navigates to “where things should exist” – meaning, is now the right time for a cloud shift, or does it make sense to realize savings on-premises first? If a cloud shift is on the horizon, the next logical question is: Which cloud? Unlike other relational database management system (RDBMS) platforms (which may reside on any public cloud with virtually no cloud vendor specific uniqueness), Oracle Database workloads are much more complex both in terms of technical possibilities and licensing options.

In this guide, we’ll outline the best options – both in the cloud and on-premises – for organizations who want to realize cost savings and performance benefits by upgrading their current on-premises Oracle Database.

Cloud-Only Options

A.Oracle Cloud (OCI)

While Oracle might even admit it was late to the cloud game, its second-generation cloud known as Oracle Cloud Infrastructure (OCI) has caught up with the field. OCI is now a feature-rich cloud, arguably on par with the other major cloud vendors in terms of scope and broadness of offerings including geographic scope and the number of global regions. It is also the most performant and cost-effective cloud for running Oracle Databases, by far, for several reasons including compatibility and licensing options.

When it comes to compatibility and architectural options, when running Oracle Databases on-premises, almost anything is possible. A wide variety of configurations are possible, including a broad choice of operating systems such as mainstream OSs like Linux and Windows, but also older OSs such as Solaris and AIX. With on-premises deployments any number of real application cluster (RAC) nodes are possible and, similarly, just about any disaster recovery (DR) configuration including multiple and/or cascading standby replicas. While cloud solutions from the major vendors generally offer a very limited and restrictive set of configurations, OCI adds more configuration flexibility for Oracle Database than any other cloud, with options such as:

- Virtual machine or bare metal deployment options
- Completely unmanaged (build yourself) to fully managed ("Autonomous Database")
- Fully supported 2-node RAC on bare metal
- User implemented or automatic Data Guard options
- Exadata in the cloud with a variety of Exadata shapes and sizes

In addition, OCI offers more flexibility with respect to Oracle licensing:

- The option of Bring Your Own License (BYOL) or license included model for many Oracle DB services (including the ability to adjust the licensing option of existing infrastructure)
- New High Performance and Extreme Performance (along with the existing Standard and Enterprise) database editions
- Transparent Data Encryption (TDE) of database files on disk (for managed database services) included for all editions without requiring a separate license[1]
- Competitive Oracle Cloud CPU (OCPU) (OCI's version of a Virtual CPU or vCPU) pricing with a Core Processor Licensing Factor applicable to OCI uniqueness compared to other supported clouds[2]

The end result is that while an almost infinite number of installation and configuration options are available on-premises, and a third-party cloud offers somewhat limited deployment options, OCI sits in the middle. That's important, as the more compatibility between your on-premises environment and cloud capabilities, the less refactoring work (time, effort, and expense) will be required. To learn more about how OCI uniquely supports Oracle Database workloads in the cloud, click HERE.

1. Oracle TDE provided in OCI is for specific cloud services and for specific functionality. It is not a full equivalent to the separately licensed Oracle TDE option pack. Reference: https://www.oracle.com/a/tech/docs/dbsec/aso/advanced-security-wp-19c.pdf

2. Reference: http://www.oracle.com/us/corporate/contracts/processor-core-factor-table-070634.pdf and https://www.oracle.com/assets/cloud-licensing-070579.pdf

Cloud-Only Options

B. Oracle Database in Third-Party Clouds

Running Oracle Database on non-Oracle clouds is certainly a possibility, and in some cases is a great solution for certain customers and certain workloads.

However, there are complexities as well, the exact implications of which may depend on facets such as:

- The specific cloud vendor
- The number of databases and the size of the associated servers
- The desired level of service management
- Whether Oracle Database on the non-Oracle cloud is a desired end state, or a transitory first step in a conversion or transformation effort

Regardless, Oracle product licensing is a key and significant consideration. Oracle software must be licensed everywhere it runs, is typically licensed by the processing unit (i.e. CPU core or thread), and has hardware and platform variances on what a processor license applies to.

Generally speaking, Oracle provides a Cloud Licensing Policy[3], which arguably gives the OCI a competitive advantage over third-party clouds by effectively requiring twice as many processor licenses to run the Oracle Database than in the supported Microsoft Azure and Amazon Web Services clouds. OCI also has extremely performant virtual machine shapes often, providing twice the memory and IO throughput to similar vCPU count virtual machines in other clouds.

Other advantages of OCI are software editions unique to OCI and not available on other clouds, lower overall cloud services costs (for example ingress and egress costs), and superior cloud performance compared to similarly specified infrastructure in competing clouds. Each of the major cloud vendors also provides unique counter -measures to some degree:

Microsoft Azure

Running Oracle Database natively on Azure VMs is fully supported but arguably is the most expensive option when performance equivalence is required. The counter to this is the “Azure-OCI interconnect” that both Microsoft and Oracle promotes, allowing customers to maximize their usage of Azure services while running Oracle workloads in OCI (for maximum performance and minimum costs).

Amazon Web Services (AWS)

As well as having a supported option to run Oracle Databases on IaaS using a BYOL model, Amazon Relational Database Service (RDS) for Oracle provides a managed DB service with both a BYOL and license-included pricing model. This provides additional flexibility with respect to both expense and management (though also with some technical limitations/restrictions due to the nature of the service).

Google Cloud Platform (GCP)

Since GCP is not explicitly mentioned in Oracle’s Cloud Licensing Policy (for support and licensing), Google’s Bare Metal Solution (BMS) leverages Google Cloud’s rich partner ecosystem that is tightly coupled to all other GCP services. Google takes care of provisioning the infrastructure and maintaining the interconnect, and the nature of the service is designed to minimize Oracle licensing risk. However, the BMS machine shapes are medium-to-large, and can be oversized for small-to-medium sized Oracle Database workloads. Explore Google Bare Metal Solution for your Oracle Database workloads, and see the possibilities that make Bare Metal Solution a viable option for your organization. Learn more about other Google Cloud options like Cloud SQL, Cloud Spanner and Big Query.

[3] Reference: https://www.oracle.com/assets/cloud-licensing-070579.pdf

Migrating Oracle Database workloads to non-Oracle clouds is most suitable when choosing the cloud vendor based on other requirements and workloads, and when the Oracle Database portion of the estate is possibly more modest in size, less performance demanding, applicable to cost savings in other ways (discussed herein), or all of the above.

Options for On-Premises or Cloud Deployment

A. Oracle Database upgrade

Oracle Database upgrades are complex, time consuming, and sometimes risky, and can be done either on-premises or in the cloud. Customers are often forced into them to remain supported from either an application or vendor perspective, Oracle support perspective, or both. Fortunately, though, the upgrade process has recently improved greatly for two reasons:

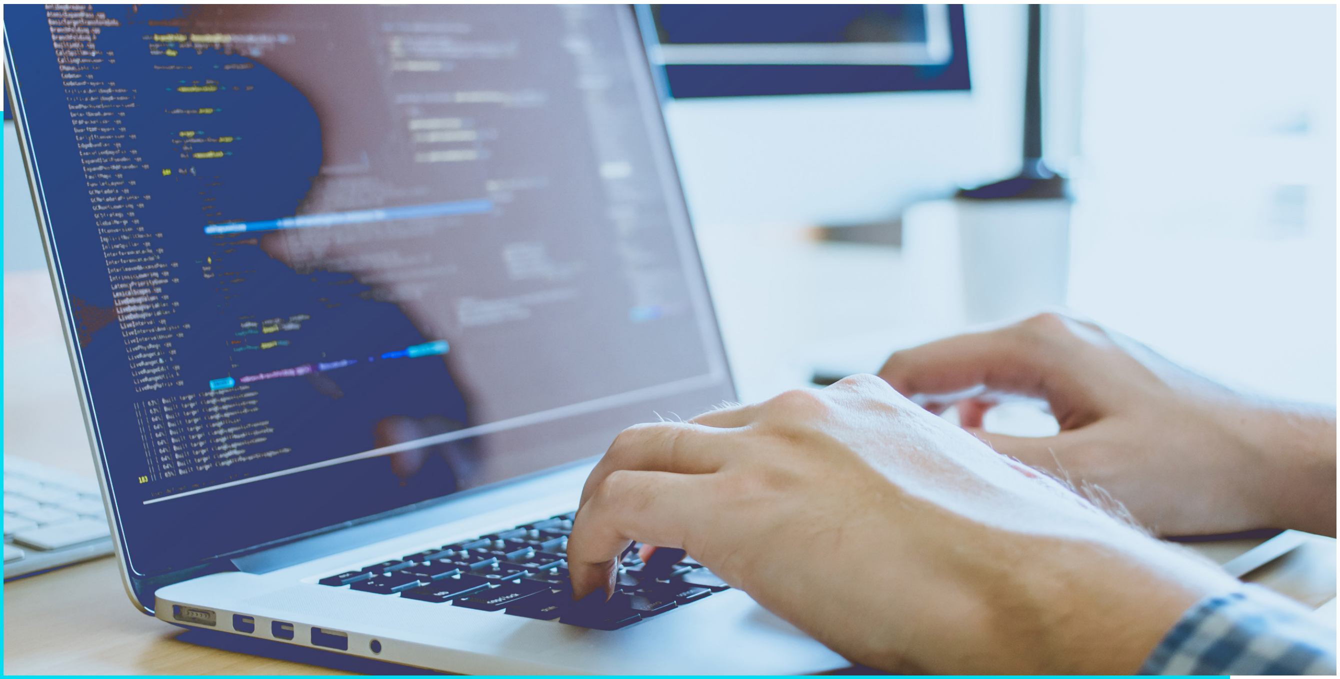
1. Oracle has added new upgrade tooling[4] to make the upgrade process simpler (especially at scale).
2. Oracle's new release model and the fact that Oracle Database 19c is a "long term release" (LTR).

Both of these reasons means now is an ideal time to upgrade your Oracle Databases. The new tooling helps DBAs with the process although comprehensive application compatibility testing (and possibly application vendor certification) is of course required. But while chances are that performance will improve, regression is also possible.

Regardless of the upgrade process simplicity or complexity, eventually upgrades become a necessity. The good news is that Oracle Database 19c being a Long Term Release (vs an Innovation Release) is supported through April 2024 or April 2027 (for customers with extended support or an unlimited license agreement) meaning that putting in the effort now can result in maximum bang for your buck and the next upgrade cycle being deferred for the maximum amount of time.

Of course, upgrading is about more than simply maintaining supportability. Granted that may be a primary motivator for many – but Oracle Database 19c also brings a wide range of new features, capabilities, hopefully performance improvements, and reliability.

[4] Reference: https://blogs.oracle.com/imc/get-rid-of-upgrade-trouble-once-and-for-all-by-using-oracle-database-autoupgrade-utility



Options for On-Premises or Cloud Deployment

B. Consolidation – New options

Oracle introduced true in-database multi tenancy back in 2012. Unlike many other database platforms, Oracle's multi-tenancy is complete and comprehensive meaning absolute security isolation (a query can't escape its tenant database) and, depending on the hardware platform, complete performance control as well.

Oracle's multitenant option is known as the Container Database (CDB) architecture with tenants called Pluggable Databases (PDBs).

Previously, adoption of CDB architecture was slow to modest at best due to concerns over performance controls, perceived complexity, and most significantly licensing costs. Since Oracle Database 12c the

multitenant option has been separately licensed. With this option, customers could add as many tenant PDBs to one CDB as they like, but without this option they were limited to only one. With a one-to-one ratio, the perceived functional benefits were minimal and adoption of this configuration has typically been low.

However, with Oracle Database 19c (along with a number of functional PDB improvements and capabilities since the release of Oracle Database 12c) the number of tenant PDBs allowed without a license for Oracle Multitenant increases to three.

While not a large number, it is a comfortable value allowing customers to consolidate a small amount with lower risk – for example, three related production applications in a single container database or, if applicable, a DEV, QA, and Production copy of the same application in the same container database. All without risk of cross contamination or access.

Consolidating can potentially save on license requirements when the source databases come from different servers (Oracle licenses vary, but are often based on the number of CPUs), and can save on administrative aspects of database management (i.e. monitoring, patching, and backing up) when source databases are consolidated from the same server.

C. Platform transformation and edition changes

Most customers benefit from the extreme functionality and performance that Oracle Database (and its options and management packs) provides. Many can't afford to risk their business by changing such a critical component of their application stack.

However, some implementations may be over-provisioned from a software perspective. In these cases, organizations can potentially save on Oracle licensing costs by considering an open source database alternative. But such initiatives can be involved and understanding the full range of implications is necessary. Learn more about the considerations of transforming from Oracle Database to other RDBMS platforms.

Fortunately, complete platform transformations are not the only option. Some customers realize license savings by finding a compromise between downgrading editions and the associated reduced capabilities. A good example is with respect to DR. Oracle Data Guard (provided with Enterprise Edition) provides a powerful and robust DR solution with many capabilities including options for zero data loss. Some customers, however, can tolerate a modest and quantified amount of potential data loss as their recovery point objective (RPO) in extreme circumstances, and can easily get by with a business acceptable DR solution at reduced cost by using Oracle Database Standard Edition and a manual standby or third-party DR tooling.

In some rare edge cases, Oracle's Express Edition (XE) which is provided at no cost , can suffice.5 Oracle Database XE has capacity and feature limitations and is not patched/patchable, but for some situations it may be applicable. For example, if an application has a small data volume, low usage, and is used just for legacy reasons (to not lose it, essentially) then XE might be a fit that allows for the continued use of much of the power of the Oracle Database without having to move that data elsewhere and write new or adapt existing interfaces accordingly.

5. Oracle Database Express Edition Licensing information: https://www.oracle.com/downloads/licenses/db18c-express-license.html

Platform Transformation Consideration

Successful database software platform transformations do happen, but are somewhat rare, as they can be incredibly complex, time-consuming, and risk-prone.

Organizations who have decided to leave Oracle typically fall under an 80/20 rule: 80% want a different relational database (RDBMS) such as SQL Server, MySQL, or PostgreSQL. The other 20 percent will want a non-RDBMS platform such as MongoDB, Cassandra, or BigQuery.

If you're thinking of transforming (and by that we mean leaving Oracle), you'll need to weigh several important decisions. The first is whether you want to migrate your existing database to a new platform, or if you want to build a new version of it from scratch in the new platform.

Platform migration is usually complex and sometimes even harder than simply starting with a blank slate on the new platform. You might have made design choices that were better suited to your Oracle platform that would not carry over well to your new platform. You also might have technical debt accumulated on refactoring work that was never completed. Migrating could carry these issues over to your new platform as well.

For these and other reasons, starting from scratch, while sounding like more work, could end up being less. You can take your existing system experience and lessons learned and apply them to a new platform, while at the same time leaving old technical debt behind and making design choices that play to your new platform's strengths.

The second decision is to choose your target platform for migration. In this case, there are many options as well. You could prefer to stay with commercial software backed by a major corporation, such as Microsoft's SQL Server. This will require the purchase of a license for this new software, or use of a cloud billing model.

Another option is to look into an open-source RDBMS such as MySQL, MariaDB or PostgreSQL. Depending on your organization, you could be OK with having ad-hoc support from many consulting and service providers in the industry as opposed to one corporation that owns the software. In this scenario you would also not have to pay licensing costs.

Regardless, not all alternative platforms have feature parity with Oracle, so understanding the Oracle features and options that are used and deliver value is essential. When exploring alternatives consider that manually creating features typically included with Oracle may be necessary to achieve parity, adding to the effort, complexity, and technical depth

Conclusion

As we've seen, a sometimes dizzying array of options – some cloud-only, others available in both the cloud or on-prem deployments – are available for organizations looking to upgrade their Oracle Database for cost and performance benefits.

Organizations can:

- Migrate to Oracle Cloud or other public, third-party clouds
- Perform Oracle Database upgrades
- Consolidate Oracle Databases using new options
- Undergo complete or partial platform transformations

However, as we've also seen, all these options involve their own unique complexities and nuances. Indeed, the complexities of Oracle-based database workloads in terms of technical possibilities, licensing options, compatibilities, configurations, and myriad other factors means organizations usually face a deluge of crucial yet complicated decisions out of the gate that could impact their systems – and their business – for years. Whether one option is best suited for a particular use case often requires deep technical expertise and experience with both Oracle and other technologies.

But which options are best suited for you?

As with all things Oracle, the answer is complex. If moving to the cloud is desirable, Oracle Cloud Infrastructure (OCI) clearly provides the most options, the widest range of supported versions, and by far the most performance for the money for Oracle Database workloads. But other major clouds, including Microsoft Azure, Amazon Web Services (AWS), or Google Cloud (GC)'s Bare Metal Solution (BMS), are other viable options. And even if a cloud push isn't currently viable, numerous on-premises optimization and cost-saving options exist including upgrading or even transforming to a new RDBMS platform, if appropriate.

No matter which solution you choose, Pythian database and cloud experts have decades of experience working with Oracle and other technologies and can get you to value faster, for less money, and without needing to hire specialized IT skills you may only need occasionally.

Register HERE to get a free 30-minute consultation with an Oracle-certified expert to find the right migration approach for your database estate.

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Simon is an accomplished Principal Consultant, who has developed a multitude of complex solutions for Pythian clients. Simon is an Oracle ACE, Oracle Certified Professional, IOUG Board Member, and has experience with literally thousands of database environments at hundreds of client sites ranging from small single database implementations to large corporate enterprises. He leverages his understanding of the industry and technologies such as Oracle, SQL Server, Linux, Oracle Cloud, AWS and more, to propose timely solutions that best suit the needs of clients. As a technology enthusiast, Simon is a highly sought-after speaker at many user groups and international conferences.

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About Pythian

Founded in 1997, Pythian is a data and analytics services company that helps organizations transform how they compete and win by helping them turn data into valuable insights, predictions, and products. From cloud automation to machine learning, Pythian designs, implements, and supports customized solutions to the toughest data challenges.

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