Microsoft

Maximising value while migrating your Oracle Estate to Microsoft Azure

VERSION 1

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Executive summary

There is often a misconception that migrating Oracle workloads to public cloud will be expensive, difficult and unsupported. What are the main concerns of the business decision-makers? The key concerns of organisations seeking to migrate Oracle workloads to the Microsoft Azure public cloud environment are as follows:

- **Can the same service levels and scalability still be obtained?**
- **Will licensing costs for my solution increase?**
- **Will my Oracle implementation still be supported, and can we obtain relevant patches?**

This white paper aims to provide organisations moving to the Microsoft Azure cloud with the necessary knowledge and business strategies to navigate these issues. It aims to explain the common misunderstandings and challenges in this area, and reassure enterprise organisations that Oracle workloads can be moved to Microsoft Azure cloud in an equivalent and cost-effective manner.

Introduction

Public cloud technology provision can take a range of forms but is largely based on the use of highly commoditised infrastructure to achieve scale, availability and resilience. Solutions can be easily deployed, scaled, and reinstated to achieve scalability and service levels.

Increasingly, enterprise-scale organisations are putting in place strategies to assess and maximise the advantages and benefits of the public cloud, and it is becoming more commonplace for business decision-makers to progress a **cloud-first strategy**.

While a cloud-first approach can offer transformative benefits for the business, there is a common challenge that the majority of enterprise organisations share. It is very likely that an organisation of enterprise scale will be highly dependent on a range of established and mature, mission-critical applications that provide their core business and operational capabilities. These solutions are usually the most complex and highly integrated systems in the business technology landscape. This also means they are also often the most challenging to migrate to the public cloud.

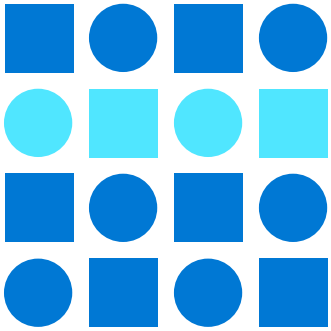
Unless these critical business solutions can be successfully migrated for the enterprise organisation, the full financial and scalability benefits of the public cloud cannot be realised. Alongside other enterprise technology vendors (e.g. SAP, IBM), Oracle-based technology provides a significant element of many corporate enterprise solutions.

Due to the factors outlined above, migration to such cloud native solutions can be considered too risky or difficult to provide a suitable business case to justify the level of business and technology change required. We believe, however, that there are many ways to reduce expense and mitigate the relevant risks and support scenarios.

In the following white paper, we will address these concerns and explore the key areas for consideration when specifically migrating Oracle workloads to Microsoft Azure.

Version 1 is a leader in enterprise cloud services, specialising in migrating and running complex enterprise applications in Public Cloud. With broad and deep expertise across the Microsoft stack, Version 1 can look beyond specific requirements to underlying customer issues and identify integrated solutions that leverage the entire technology stack. As a leading Azure Fast Track enabled Microsoft partner, Version 1 possesses end-to-end Microsoft capability with demonstrated Microsoft expertise, awards and accreditations across a wide number of competencies. With a track record and in-depth experience in Oracle which extends back to Version 1's inception in 1996, Version 1 works closely with Microsoft to help customers maximise value while migrating their Oracle estate to Microsoft Azure.

www.version1.com



Oracle support on the Microsoft Azure platform

Oracle solutions usually consist of a specific mix of underlying operating systems, native Oracle technology elements and corresponding business applications that consume the relevant data and outputs. Many different combinations of these operating systems and technologies are fully available to run on the Microsoft Azure cloud platform.

Microsoft Azure is deemed by Oracle to be an Authorized Cloud Environment and therefore Oracle technology software solution elements can be run either individually (e.g. standalone Oracle Linux Virtual Machine Images or Java applications) in Microsoft Azure or in combination with other Oracle business application technology platforms e.g. Oracle E-Business Suite. A range of hybrid cloud deployment scenarios may also be possible. It should be recognised that this is because Oracle certifies operating system/product combinations, not platform/product combinations for compatibility, patching and support purposes. To run specific Oracle workloads in Azure, it may be necessary to use specific operating system variants in order to be supported and certified by Oracle. For example, Oracle 12.1 is only certified by Oracle for use in a Microsoft Azure Cloud environment when using Oracle Linux as the base underlying operating system. A partial list of Oracle programs eligible for use in Authorized Cloud Environments is provided at **http://aka.ms/OracleAuthorizedCloudEnv**.[1]

Whilst specific compatibility, suitability, licensing terms and associated costs should always be assessed and validated before any migration, the majority of common Oracle software workloads should be capable of being run in Microsoft Azure. Given this baseline Microsoft Azure suitability, many Oracle solution migration scenarios (especially those involving legacy versions or technologies), can rapidly move towards balancing the required levels of solution functionality, customisation, integration, licensing and specialist behaviour needed against the future cost, effort, timescales and business impact involved in migrating, implementing, securing and supporting them.

Despite the above, many people still believe that Oracle solution technology will not run successfully or in a performant manner in environments such as Microsoft Azure. With the exception of very specific Oracle technologies that have dependencies on native features in underlying specialist infrastructure (such as Oracle Exadata) and which do not have a direct Microsoft Azure equivalent (and so may prove more challenging to migrate), the majority of Oracle software workloads can be migrated and run successfully in a manner which matches the relevant business requirements.

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Such migrations can either be achieved natively or, as in the case of Oracle RAC, can (subject to support considerations) be run on Azure with the potential addition of third-party product solutions, such as FlashGrid. Even in these specialist infrastructure scenarios, challenges can often be overcome when the solutions move away from trying to replicate the existing on-premises solution approach, and instead focus on delivering to business requirements through the use of native and best practice cloud architecture.

Migrating Oracle workloads—strategies

There are several key strategies to successfully assess, migrate and optimise the migration of Oracle workloads to the Microsoft Azure cloud environment in a way that delivers the full range of enterprise business benefits obtainable from cloud computing provision models. These potential strategies are as follows:

Understand the service levels and availability you really need

Many organisations utilising Oracle technologies cite the scalability, availability and performance offered by such Oracle technologies as some of the key reasons for their retention and continued use in public cloud. These organisations believe that deployment of Oracle workloads to public cloud cannot match on-premise or private cloud service levels and associated non-functional characteristics.

For many Oracle workloads however, in terms of actual current business requirements, this is not the case. Often the current technology provision level is based on historical business and service level requirements, which may no longer apply or be needed. In addition, the nature of the current provision may not meet the future provision needs of the organisation, or enable suitable enterprise transformation to support future digital strategies.

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To address these challenges, it is essential to understand the current service level agreements and non-functional requirements that apply to the targeted Oracle solution, rather than those that were originally derived to build and implement it. As part of this, it is imperative to focus on how to meet the current business requirements and the actual SLA requirements of each individual or collective workload. This understanding will then allow an appropriate Microsoft Azure public cloud infrastructure and deployment strategy to be defined, which in turn enables Oracle workloads to be easily migrated with an appropriate match to service and availability needs.

Understand fully your current licensing position

Put simply, many organisations may not fully understand their current Oracle licensing position or existing terms and conditions. This can range from the number, type and products licensed, through to the structure of support agreements. To effectively manage the journey to Microsoft Azure, it is essential to be fully aware of your relevant licensing position, support agreements and associated terms and conditions.

Having full visibility of where you currently stand provides a solid basis for understanding your options going forward and how to effectively manage your Oracle licences and support. Version 1 provides a range of assessment options around Oracle licensing and support, from rapid engagements to in-depth analysis.

Understand whether you are using the right Oracle edition

As of Oracle 12c, the Oracle database product family consists of four different database editions: Standard Edition 2, Enterprise Edition, Express Edition and Personal Edition. Typically, Enterprise Edition and Standard Edition 2 are preferred for most business workloads.

It is not unusual for an organisation to have adopted, consciously or unconsciously, a single edition as the default for all Oracle database deployments; typically, Oracle's database flagship class Enterprise Edition (EE). However, in some cases the features of EE may not be required by the currently deployed solution. At one time, the solution or scale of implementation may have been appropriate, but it no longer meets the functional needs of the solution. This scenario is often due to historical benevolent licensing procurement arrangements that may once have been in place, or may be due to over-provisioning by third party solution providers as part of support for bespoke solutions.

Oracle Enterprise Edition is highly suitable for mission-critical applications such as high-volume online transaction processing (OLTP) applications, query-intensive data warehouses, and demanding Internet applications. Typically, however, this description fits only a fraction of most organisations' average database estate needs or business use cases. There are other variants of Oracle database technologies that are still highly capable, but which potentially provide the required level of capability for these remaining workloads in a more cost-effective manner.

Consider Standard Edition for Microsoft Azure cloud migrations and transformations

Whilst many organisations or solutions will need the features and scale of Oracle Enterprise Edition (EE) in their Microsoft Azure migration, a careful appraisal of whether the needs of a given database workload could also be satisfied by Standard Edition (SE) with minimal solution impact should be actively considered. This could achieve significant licence efficiencies, potentially up to five times your annual maintenance fee.

There are a number of key differences between EE and SE, which should be fully explored in order to optimise any migration to the Microsoft Azure public cloud.

For example, the restrictions of SE currently include:

- It cannot utilise Enterprise Edition ability to utilise any of the extra optional packs such as partitioning, or performance-tuning packs.
- It is limited to a maximum of eight Azure vCPUs for DBSE1/2 or 16 Azure vCPU for SE.
- It does not support the Oracle Data Guard feature, which is a product used to create, manage and monitor one or more standby databases.

However, with extensive experience in conducting licence audits, Version 1 has witnessed that typically more than 60% of databases are not fully exploiting Enterprise Edition extra cost optional packs or features, and the average database DBSE1/2 is using considerably less than the equivalent of 8 Azure vCPUs. In addition, whilst Data Guard is not an option, there are ways in which many companies can create, manage and monitor standby databases with SE whilst providing 24/7 support and business critical SLAs.

Oracle Standard Edition 2 is the current offering and covers all SE deployments, as well as release 12.1.0.2 and above (which the legacy Standard Edition/Standard Edition 1 do not).[2] At a high level, SE licensing is based on the number of vCPUs, and Oracle defines the maximum server instance sizes which are permitted to run Standard Edition. However, the approach in counting usage is somewhat different to that used to license EE. SE is capped at a maximum of 16vCPU and Standard Editions 1 & 2 have a maximum of 8 vCPU. In turn a Processor (for licensing purposes for Standard Edition) is counted as 4 vCPU.

Re-evaluating your database edition choices should be considered as a viable option given the performance, availability and scalability of Standard Edition 2 backed by Azure cloud, combined with the significant potential financial savings.

> It should be noted that when migrating customer data from on-premises to Azure cloud, the exercise of migrating data from one Oracle Edition to another has very little effect on the overall effort required to migrate the data.

Optimise CPU Utilisation

According to leading technology analysts, less than half of the available on-premises CPU performance capacity is typically in active use. Through our Oracle licensing asset management activities, Version 1 has witnessed that most Oracle clients typically allocate (and therefore license) 60–80% more cores than they need, to ensure appropriate performance and support for potential maximum workloads. When this factor is combined with the flexible nature of the Microsoft Azure environment (which allows small increments of resource to be allocated), we believe that given suitable levels of workload analysis and optimised Azure virtual machine matching and provisioning, these levels of over provisioning can be reduced. A suitable strategy should be engaged to reduce the over-provisioning as part of the migration to Azure.

Many organisations are running Oracle systems on old hardware and processors which can be five years old or more, and these were often procured through significant capital expenditure outlay. As hardware in the Microsoft Azure Cloud is typically newer and is upgraded on a more frequent refresh interval than most on-premises systems, it is likely that substantial performance benefits can be gained in Microsoft Azure environments by using fewer processor cores/or CPU in comparison to the existing on-premises provision. This level of overcapacity is often being paid for on a 'just in case' basis, but is not delivering tangible business value or capacity. Using new processors with higher processing capacity and throughput often means that the same Oracle workloads can be handled with reduced processor allocation volumes and so Oracle licensing costs can be reduced further.

The ability to manage your consumption on a 'pay for what you use' basis, via an optimised public cloud reference architecture for Oracle in the Microsoft Azure cloud, can often help to reduce over-provisioning and therefore negate any additional increased licence costs. Although the number of licences needed per processor core may increase due to Oracle's licensing policy, the reduction in CPU count, together with targeted Oracle edition selection, will potentially significantly reduce the overall total cost of ownership (TCO).

Understanding and optimising software licensing and support costs

Oracle licensing and support can be a complex topic. Support arrangements are unique for each organisation based on the contractual history, and relevant terms and conditions may vary from customer to customer or agreement to agreement.

Understanding these terms and conditions, in conjunction with various Oracle policies, is crucial to navigating a successful Oracle migration path to Microsoft Azure. There is therefore a common misconception that moving Oracle database workloads to the Microsoft Azure cloud will result in considerably higher software licensing and support costs. This does not have to be the case. By maximising a range of cost-effective measures, there are ways in which annual spend in support on-premises fees (based on current list price) could cost an organisation significantly less when on Microsoft Azure.

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Right-sizing Microsoft Azure cloud server virtual machines for Oracle workloads

When considering the migration of designated Oracle workloads, it is important to choose a suitably sized and specified target server IaaS environment that meets service needs and does not over-provision, particularly with regard to the number of vCPUs required which drive applicable licensing. 'Right-sizing' in Microsoft Azure terminology is an important cloud cost optimisation principle as part of a best practice based to designing an effective Oracle-based solution. For Oracle workloads and environments, choosing the right level of Microsoft Azure virtual machine can deliver benefits such as faster processors and increased memory levels. These in turn may reduce the physical processing count needed and potentially yield corresponding reductions in the Oracle licence requirement.

It is possible to reduce the level of processing load of Oracle systems by pursuing targeted assessments in the following areas:

- **CPU & Storage**
  If the workload is I/O bound, then consider the use of more performant server instance types and faster premium SSD storage types in Microsoft Azure environments as a method of increasing performance and reducing load.
- **Memory**
  If the Oracle workload is memory bound, then the available memory options in the range of applicable Microsoft Azure virtual machine types should be considered.
- **Caching**
  Caching solutions in Azure such as Azure Redis Cache or Azure CDN should be considered for implementation to reduce applicable database query load. Use of a cache could significantly reduce the number of reads from your database, thereby reducing the overall processing power and high-speed storage required.

Appropriate virtual machine selection works well when considering the performance of existing hardware provision alongside future desired performance.

Use of proactive future software asset management strategies

As part of any managed cloud migration or Azure-based cloud transformation, it is likely that the resultant migrated Oracle workload will be running for a sustained period. It is therefore highly valuable and important to have a carefully coordinated plan to manage Oracle software assets and licences over time, with a view to ensuring Microsoft Azure based service is maintained at the optimal cost. Typically, this planning activity should also include proactive management of the stated Oracle licence position and support agreements, to ensure that any saving can be easily realised as the needs of your Oracle estate change. Version 1's Software Asset Management teams, who provide independent advice to enterprise organisations, have a wealth of Oracle licensing experience and are well-placed to advise on relevant techniques, licensing positions and strategies.

The role of automation when migrating Oracle workloads

Technology automation is generally regarded as a significant enabler of improvement in levels of solution implementation quality, efficiency, accountability and predictability, whilst at the same time reducing implementation timescales, costs, solution inconsistencies and associated levels of business risk.

Whilst the benefits are clear, large-scale automation has still been a challenge for many companies to successfully implement in today's modern world. With some of the infrastructure in many organisations being at least one decade old and wide differences in the hardware, operating systems, storage, databases, versions and build standards that underpin their Oracle implementations; the variations any automation process needs to be programmed for, typically make it prohibitively expensive and unreliable to achieve in an on-premises context. Higher levels of automation in Oracle environments therefore only become practical to achieve once these workloads have been migrated to a standardised and more flexible environment.

Unlike many customers' on-premises Oracle environments, Azure cloud offers a unified, standardised programmable platform offering the high levels of automation sought by the customer. It is a scalable landscape that has been built with automation in mind, enabling large-scale delivery provisioning that also provides continuous management of systems on this platform. This helps to realise all the automation benefits originally discussed (quality, accountability, and predictability, whilst reducing time, cost, risk, inconsistency and materials). A migration of suitable Oracle workloads to Azure cloud can successfully integrate infrastructure facilities and services with automation code that can not only deliver marketplace differentiators, but for many is likely to be substantially less costly to implement.

Conclusion: Leveraging the suitability of Microsoft Azure cloud

With more than 100 services across 50 regions, Azure public cloud is suitable for the most demanding and mission-critical enterprise workloads such as Oracle solutions. Microsoft Azure cloud is secure, agile and offers unmatched savings compared to on-premises or private cloud environment provisions. In the same way that Agile software development differs from Waterfall methodologies, deployments of enterprise workloads such as Oracle can be assessed, moved, tested, fixed and delivered rapidly, thus increasing delivery certainty and removing large, upfront assessment costs.

Via the use of expert, predefined cloud reference architectures by Microsoft and trusted cloud partners such as Version 1, the movement of Oracle workloads is no longer complex. With the right migration planning partner, dramatic savings can be achieved. In undertaking this strategy, the organisation is making a conscious decision to become more cloud native and will be working towards wider business transformation, which can in turn be supported by cloud native services.

Depending on your organisation's needs, cloud transformation benefits can be leveraged in a way that complements the Oracle licensing plans you put in place. Version 1 can accelerate these processes in conjunction with any applicable licence management approaches.

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Appendix

[1] The full list of Oracle programs eligible for use in Authorized Cloud Environments is provided in the Oracle Authorized Cloud Environments document on Oracle.com available at **http://aka.ms/OracleAuthorizedCloudEnv**.

[2] Oracle solutions suitable for deployment on Microsoft Azure.

Oracle Product	Vendor	Version
Oracle-Database-EE	Oracle	12.1.0.2
Oracle-Database-SE	Oracle	12.1.0.2
Oracle-Linux	Oracle	6.4
Oracle-Linux	Oracle	6.7
Oracle-Linux	Oracle	6.8
Oracle-Linux	Oracle	6.9
Oracle-Linux	Oracle	7.0
Oracle-Linux	Oracle	7.2
Oracle-Linux	Oracle	7.3
Oracle-Database 11g	Oracle	R2

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