



Financial Comparison of On-premises Cloud-first Options for Oracle Databases

BY DAVID FLOYER

INTRODUCTION

Most large enterprise mission critical systems of record run on Oracle databases. Enterprise CIOs and CXOs have been struggling with the problem of how to bring a cloud-like operating model to core mission critical systems without major disruption to their businesses. This Wikibon research shows that Cloud-First Hybrid Architectures can solve this problem. For largely homogeneous Oracle workloads, the Oracle Cloud at Customer approach simplifies migration, lowers costs and improves availability more than alternatives, and is the best financial option.

PREMISE

Most large enterprise mission critical systems of record run on Oracle databases. Enterprise CIOs and CXOs have been struggling with the problem of how to bring a cloud-like operating model to core mission critical systems without major disruption to their businesses. Our research shows that Cloud-First Hybrid Architectures can solve this problem.

Based on discussions with early users and previous Wikibon research, this report quantifies the TCO and business benefits of moving to a cloud-first architecture and compares two vendor approaches within an Oracle mission critical environment:

- 1) Oracle Exadata Cloud at Customer
- 2) Microsoft Azure Stack.

In our opinion, Oracle Exadata Cloud at Customer currently provides the most complete offering for this class of workload. We don't see Microsoft Azure Stack as a viable alternative for mission critical Oracle workloads today, unless customers plan to support highly heterogeneous environments (e.g. a mix of Oracle, Microsoft and other systems). For largely homogeneous Oracle workloads, the Exadata Cloud at Customer approach simplifies migration, lowers costs and improves availability more than alternatives.

DEFINING CLOUD-FIRST HYBRID ARCHITECTURE

Wikibon defines Cloud-first Hybrid Architectures as a consistent set of hardware, software, services, APIs, security, data planes, and control planes that are native to and display the characteristics of public cloud infrastructure-as-a-service. These attributes can be identically resident on other hybrid nodes independent of location (e.g. in the cloud, on premises or at the edge). Future functionality is developed first in the cloud and then pushed down to the hybrid nodes as a service.

When any application or application service can run on any node of the hybrid cloud without re-writing, re-compiling or re-testing, Wikibon refers to this capability as "True Hybrid Cloud." In this model, developers bring code to data, with lower data access latency and lower costs of data transfer than traditional approaches. We believe this capability is critical for integration with other cloud applications.

VENDOR LANDSCAPE FOR CLOUD-FIRST HYBRID ARCHITECTURES

Oracle Database¹ customers have four broad choices to modernize infrastructure for their mission critical workloads on-premises: Oracle Exadata Cloud at Customer, Microsoft Azure Stack, AWS Outposts, Other Vendors

OPTION 1: ORACLE EXADATA CLOUD AT CUSTOMER

Oracle has developed a number of Cloud at Customer offerings. The most appropriate for large mission critical workloads in Oracle Exadata Cloud at Customer, which is the first Cloud-first Hybrid Architecture platform specifically designed for Oracle Databases. This platform is assumed as the basis of this research.

This platform includes a full integration of Oracle Database function and hardware delivered on-premises. The pricing, packaging, software delivery, and maintenance come as a service. The hardware and software are identical in every node and fit the Cloud-first and True Hybrid Cloud definitions we've put forth. For support there is a single throat to choke and for business transactions there is a single hand to shake.

Cloud at Customer offerings are managed and operated by the same team as the equivalent Oracle Cloud offering. Cloud at Customer uses the same control plane as Oracle Cloud. This leads to significant savings in IT operational costs, and the basis for significant improvements in availability and recovery. As in all enterprise cloud operations, enterprise IT is responsible for working with Oracle on overall cloud architecture, SLA management, and budgeting.

One important difference in licensing is that the Oracle Database is offered as a service with Oracle Exadata Cloud at Customer. The Exadata Cloud at Customer Enterprise Edition Extreme Performance service model (assumed in this analysis) includes all the Oracle Database high availability features and all the other features (including the Database In-memory feature). See Figure 6 in Footnotes 3 and more detail, and links for full details. This is a major simplification of license management and enables improved developer productivity. It provides developers with a comprehensive set of capabilities to enable enhanced features in existing and new applications, delivered faster. This in turn leads to additional IT value delivered to the enterprise.

One of the additional benefits of the shared control plane, together with the ability to move applications and data across the hybrid cloud, is that the peak requirement for infrastructure can be set closer to the average requirement. Suitable applications (e.g., many development workloads) can be dynamically moved from Exadata Cloud at Customer to the Exadata Cloud as required for (say) month-end and/or year-end processing. This can make a significant difference to IT investments, and was emphasized by a number of managers of Oracle Customer at Cloud.

OPTION 2: MICROSOFT AZURE STACK

The Microsoft Azure Stack with Microsoft SQL Server database is also a Cloud-first Hybrid Architecture. Some customers may consider Azure Stack for mission critical Oracle Databases. [Oracle and Microsoft have a positive partnership](#) (in contrast to Oracle and AWS), and Oracle supports Oracle Database running on Hyper-V and Microsoft Azure. In addition, there is Oracle Database license mobility, and licensed Java is supported.

Microsoft make a very clear differentiation that Azure Cloud is managed by Microsoft Azure operators, and Azure Stack (on-premises) is managed by customer operators, outside the Azure control plane. This is in contrast to the Oracle approach in the previous section. This is explained in "[Why your team need an Azure Stack Operator](#)", which defines the training and certification requirements. The customer operations team for Azure Stack needs an overall Azure Cloud Architecture team, an Azure SLA Manager(s), and DevOps interface.

For Microsoft Azure with Oracle environment, the customer is responsible for purchasing Oracle software licenses, and working with Oracle to update and maintain the Oracle Software products. In addition, the Azure hardware is supplied by vendors such as HPE and Dell. This means there are a minimum of three vendors that need to be managed by the enterprise. There are significant overheads associated with managing multiple vendors, and managing multiple control planes. Customers must weigh these overheads against the risks of choosing a single vendor.

There is a significant difference between the base license on Microsoft Azure and Oracle Exadata Cloud at Customer. The latter includes all the Oracle Database high availability features and all other features as described in the previous section, and in Footnotes 3 below. These features have to be purchased and maintained separately on Microsoft Azure.

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OPTION 3: AWS OUTPOSTS

Announced in late 2018, AWS has announced [AWS Outposts](#). Outposts are EC2 instances using the same hardware, software, APIs, data plane, and control plane as AWS uses in its public cloud. Outposts is delivered and serviced by AWS and conceptually is similar in its approach to Oracle's Cloud at Customer.

Outposts is in early beta, and will not be available until late 2019. Many details of pricing, egress charges, and database support are not yet available, nor are the details of Oracle services. At the moment, some services are not available on Outposts (e.g., Lambda).

Wikibon believes that AWS will soon meet the definition of True Hybrid Cloud above. However, because of uncertainty in product detail and pricing, AWS is not included in the detailed cost analyses.

OPTION 4: OTHER VENDORS

Other potential Cloud-first vendors with True Hybrid Cloud potential include Cisco, Dell in partnership with VMware, HPE with Simplicity and/or in partnership with VMware, IBM with Red Hat & in partnership with

VMware, Iguazio, Nutanix, Pivot3 (for security workloads), and Pure Storage. To implement a Cloud-first setup, these vendors would need their own software/hardware service definitions, their own continuous update processes, and would have to move away from the traditional "versioning" of software releases. This "roll-your-own" approach is not quantified in this report as there are no clear True Hybrid Cloud examples we could find running in the market. This will be an area for future Wikibon research.

WIKIBON IT BUDGET AND BUSINESS VALUE ASSESSMENT MODELS

The base case comparison scenario for financial analysis is "Do Nothing." That is staying on traditional IT infrastructure for 4 years. The two other scenarios are: **1)** Moving to a Cloud-first Hybrid Architecture by deploying Oracle Database on Exadata Cloud at Customer **2)** Moving to a Cloud-first Hybrid Cloud with Oracle Database on Microsoft Azure Stack

Wikibon defined three financial models to compare the cost and business value of each of the three scenarios. These are: **1) IT Infrastructure Budget Model, 2) Extended IT Budget Model, 3) Business Value Model**

IT Infrastructure Budget Model, taking into account the affected infrastructure line-items of the IT budget, including acquisition expense, migration costs and IT staff. The key metric is the dollar value reduction of the IT infrastructure budget.

Figure 1 below shows the results of the IT Infrastructure Budget Model analysis.

It shows that the 4-year infrastructure & staff costs for traditional IT are 39% higher than Exadata Cloud at Customer, & Microsoft Azure is 31% higher than Exadata Cloud at Customer. Most of the benefit is a direct result of IT improved staff productivity

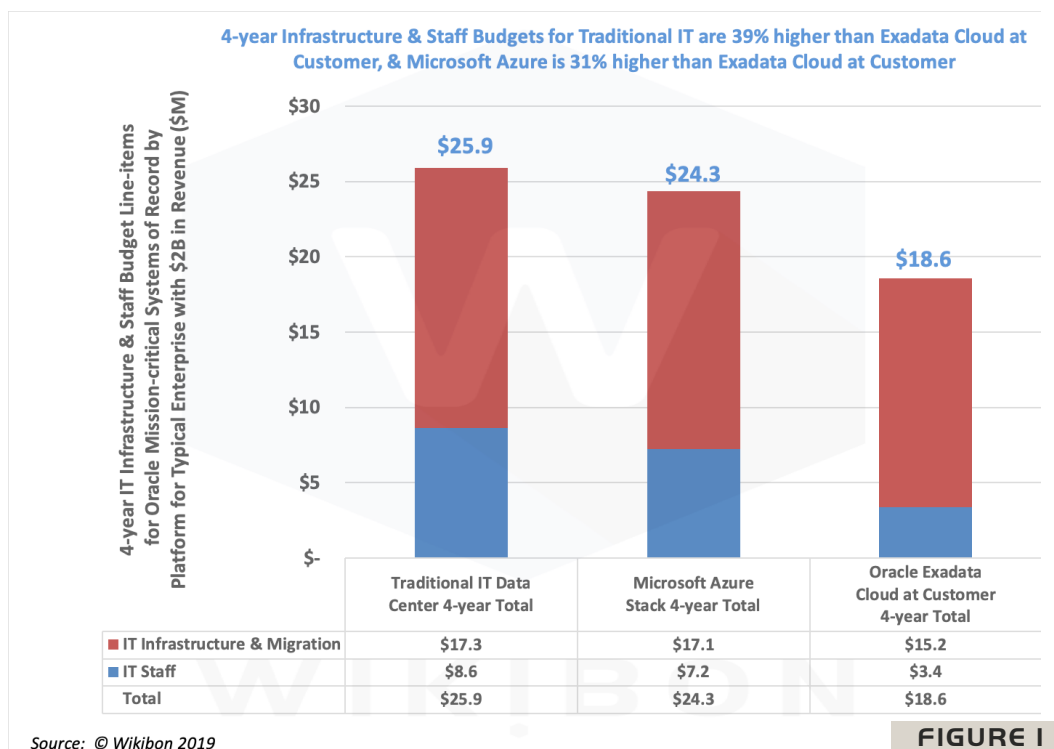


FIGURE I

BUSINESS VALUE ASSESSMENT MODELS

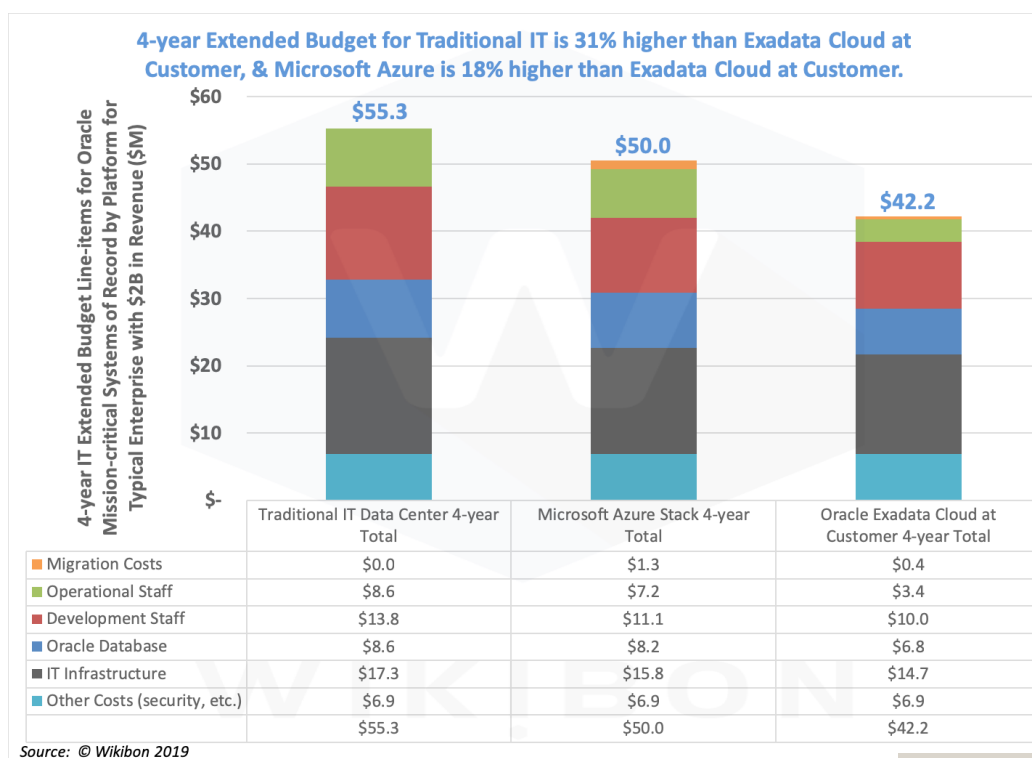


FIGURE 2

Extended IT Budget Model, taking into account the impact of the majority of the rest of the IT budget to include database costs and other factors such as application development staff. The key metric includes the dollar value reduction on the full IT budget.

Figure 2 above shows a more detailed break-out of most other budget line-items and calculates the extended budget savings. The only line-item missing is devices (e.g. PCs) as they are not impacted in a meaningful way. Figure 2 also shows the 4-year Extended Budget for Traditional IT is 31% higher than Exadata Cloud at Customer and Microsoft Azure is 18% higher than Exadata Cloud at Customer. In addition, Figure 2 shows that Exadata Cloud at Customer lowers infrastructure and staff costs by \$13.1M relative to Traditional IT, and by \$5.3M relative to Azure Stack.

BUSINESS VALUE ASSESSMENT MODELS

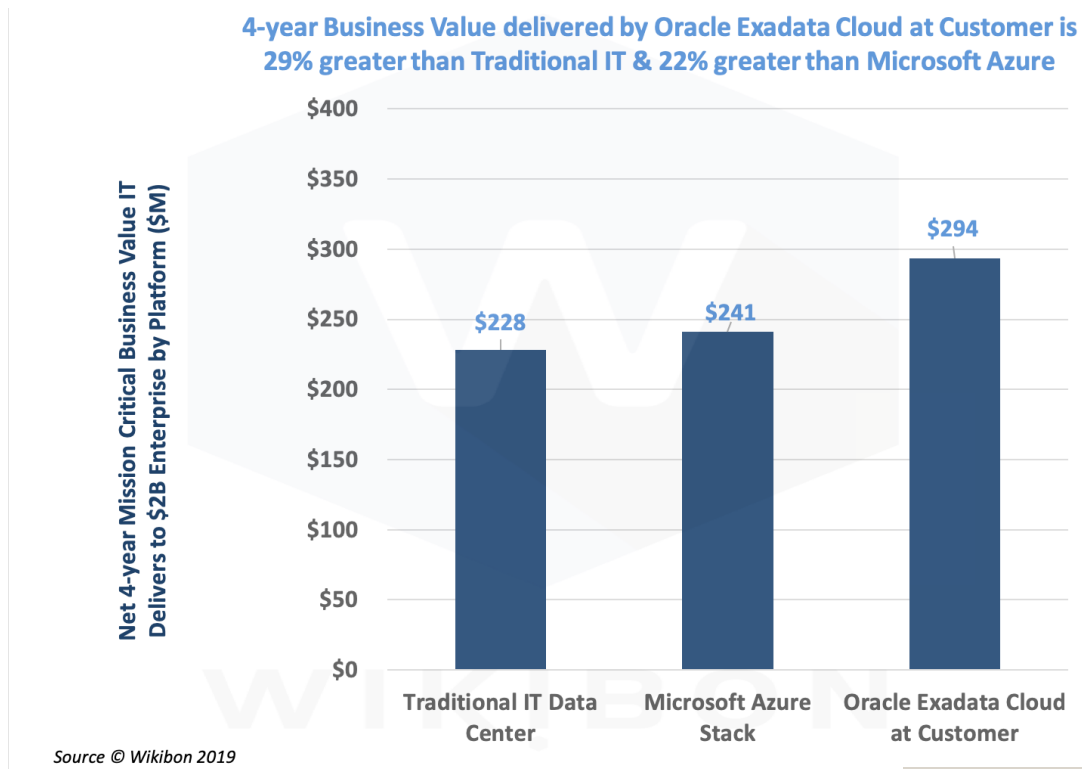


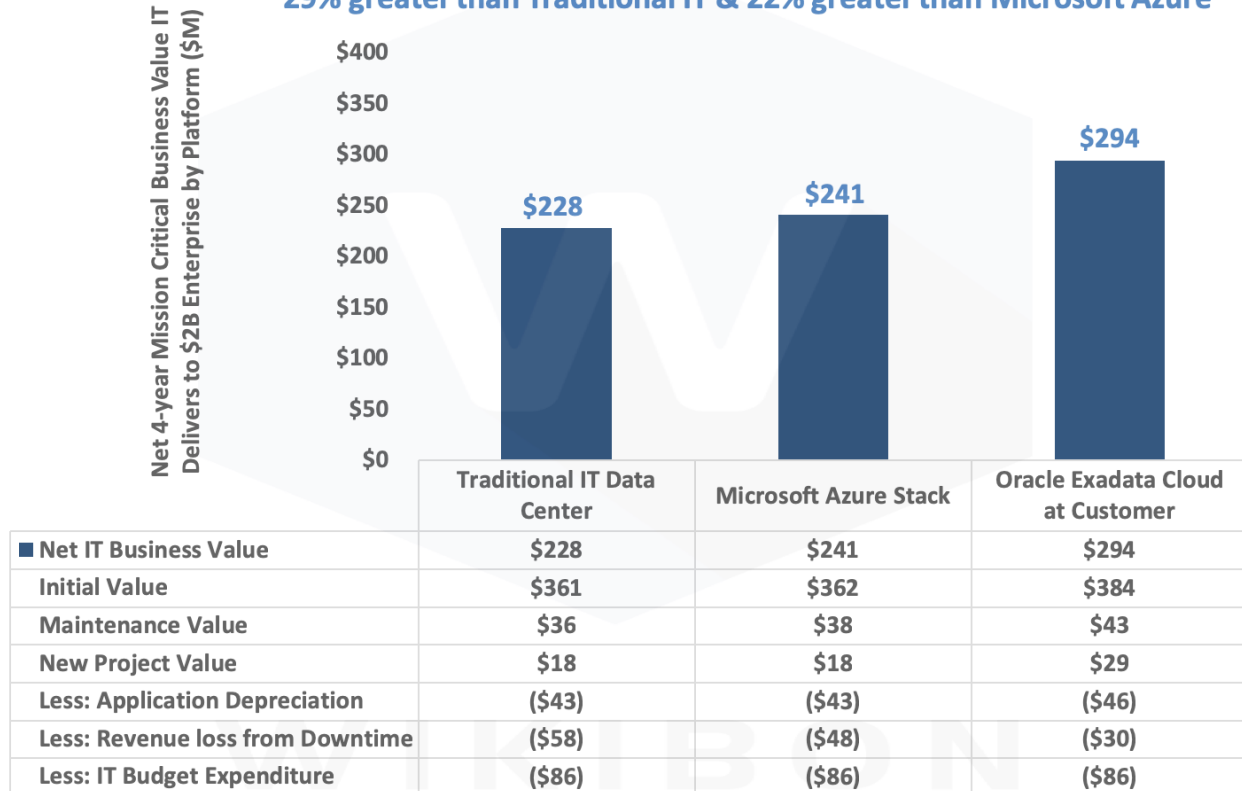
FIGURE 3

Business Value Model, which takes into account the value delivered by IT to the lines of business.

Figure 3 shows the 4-year Business Value delivered by Oracle Exadata Cloud at Customer is 28% greater than Traditional IT & 22% greater than Microsoft Azure Stack for Oracle Database mission-critical workloads. This is meaningfully more than doing nothing or deploying Azure Stack for these workloads. Figure 3 also shows the business benefit of Exadata Cloud at Customer is \$66M greater than Traditional IT, and is \$53M greater than Microsoft Azure. The reasons for this include much lower migration and operational costs, higher availability, greater agility, and accelerated capabilities to solve difficult business problems. The savings in operational staff, development staff and other IT budget items allow more budget to be applied to additional IT projects. This generates more business value from IT.

BUSINESS VALUE MODE IN DETAIL

4-year Business Value delivered by Oracle Exadata Cloud at Customer is 29% greater than Traditional IT & 22% greater than Microsoft Azure



Source © Wikibon 2019

FIGURE 4

Applications running in IT support the mission of the business. In a for-profit company, that translates in some way to revenue in the form of direct revenue or employee productivity. The Initial Value in Figure 4 represents the base value being delivered to the business and sets a baseline for understanding the impact of change. An investment in modernizing infrastructure (IT Budget Expenditure in Figure 4) should deliver benefits in the form of lower TCO (Figures 1 and 2), faster deployment of new function (Maintenance and New Project Values less Application Depreciation in Figure 4) and a reduction in Revenue Loss from Downtime (Figure 4). These sum to Net Business Value above and represent the 4-year value delivered by the mission critical applications on each alternative platform in Figure 4.

The table in Figure 4 shows the 4-year sum for each component of Net Business Value delivered by IT in a Traditional IT Data Center, in a cloud-first Microsoft Azure Stack, and in a cloud-first Oracle Exadata Cloud at Customer.

The reductions in IT budget for Exadata Cloud at Customer derive mainly from staff savings and database licensing cost reductions. The IT Budget Expenditure line item in Figure 4 remain the same across all alternatives because we assume in the model that TCO savings are reinvested to enhance application function. This value is reflected in the New Project Value line item. The implementation time and cost for the integrated Exadata Cloud at Customer (4 months, \$0.4M) are significantly better than the less integrated Microsoft Azure Stack (9 months, \$1.3M), and lead to greater value delivered earlier from new projects. The greater integration and higher volumes of business lead to significantly less revenue or productivity lost from downtime.

In summary, Figure 4 shows that the 4-year Business Value delivered by Oracle Exadata Cloud at Customer is 29% greater than traditional IT & 22% greater than Microsoft Azure Stack for Oracle database mission-critical workloads. Figure 4 also shows the absolute business value of Exadata

CLOUD-FIRST HYBRID CLOUD BENEFITS AND CONCLUSIONS

Wikibon focused this research on mission-critical systems using Oracle Databases. The environment is the most difficult to migrate to the cloud and very few large enterprises have successfully migrated or converted a complete set of mission-critical systems of record to a public cloud. The cost of conversion and the 2-5 year timescale make such conversions almost always a monumental mistake. The business case to add more value to existing installed assets with enhanced integration is overwhelmingly positive.

The emergence of Cloud-first architectures allows CXOs to embrace the cloud experience in their own datacenters, and choose where the applications and data reside. This is particularly important for mission-critical systems of record. These are the starting points of many workflows within an enterprise, and the source of data for many subsequent analytic and systems of engagement applications. The flexibility to migrate applications and data across a hybrid cloud with nodes that use identical hardware and software avoids most of the costs and disruptions of conversion and mass migration.

Our analysis concludes that there is no equivalent to the Oracle Exadata Cloud at Customer offering available from other vendors at the moment. In our interviews of enterprises that have implemented or plan to implement Oracle Cloud at Customer, there were some comments on teething problems with the services. However, they were unanimous in support of the principles and benefits of moving to a services model, rather than assembling and maintaining the thousands of piece parts of infrastructure and software. They were also unanimous in wanting to move resources away from operations, and towards higher value support of the business, and that Exadata Cloud at Customer would enable them to achieve those objectives.

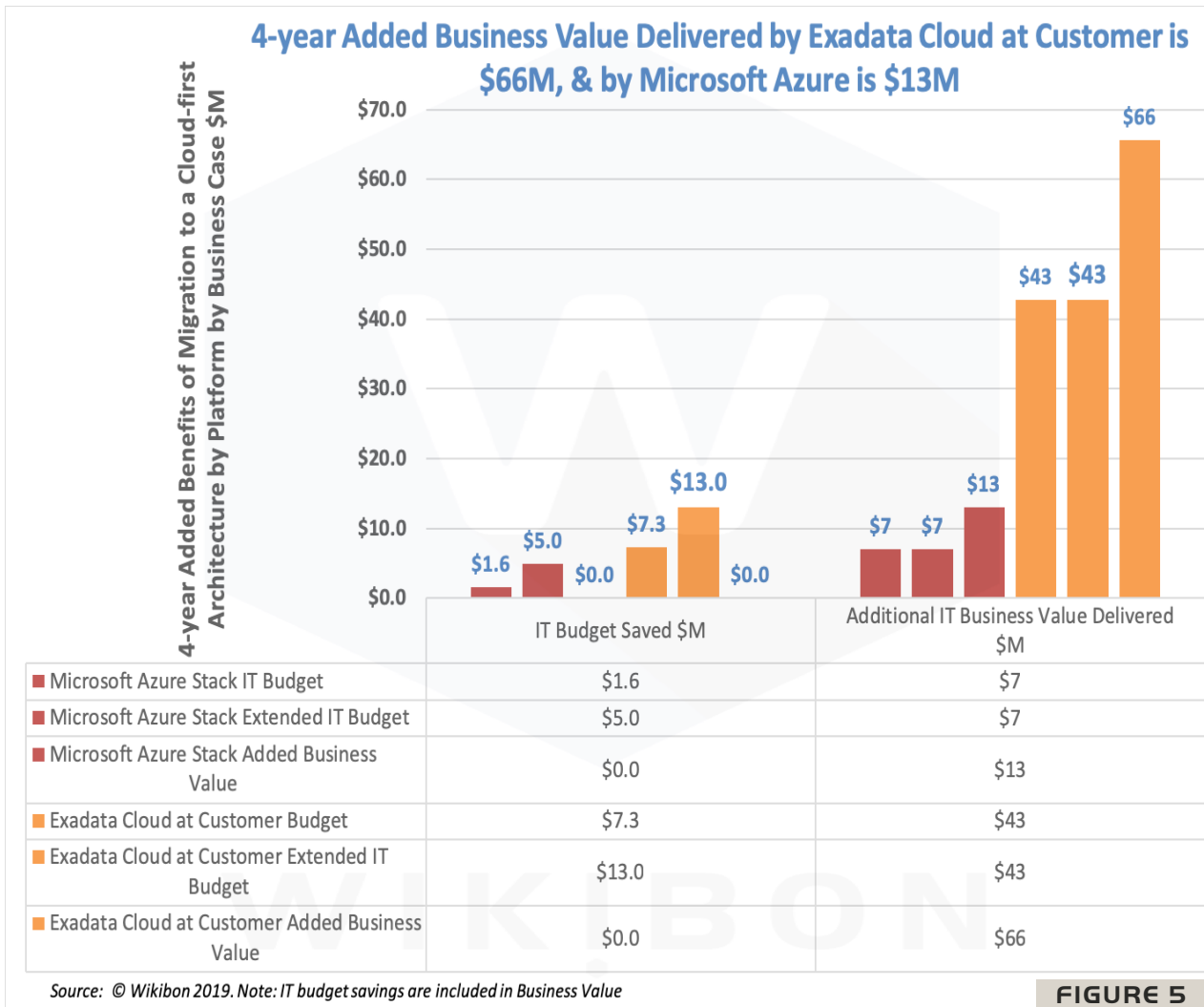
The fundamental finding of this research is that the two current alternatives (Traditional IT & Azure Stack) to Exadata Cloud at Customer were more expensive, took longer to implement, offered lower availability, and delivered less business value to the lines of business. Table 1 below shows the Microsoft Azure Stack Infrastructure and Staff TCO is 31% more expensive than Exadata Cloud at Customer. Table 1 also shows the business value benefit of Exadata Cloud at Customer is \$66M greater than traditional IT and is \$53M greater than Microsoft Azure.

The good news for CXOs is that there are multiple Cloud-first hybrid cloud solutions in the marketplace, and there will be additional offerings in the future. Microsoft's Azure Stack is a good solution for systems that run on Microsoft enterprise software such as Microsoft SQL Server. With the recent announcement of AWS Outposts, AWS can offer MySQL hybrid cloud solutions, for applications that only need this level of database functionality. VMware can offer Cloud-first hybrid cloud solution in conjunction with AWS, with AWS providing the control plane.

Wikibon expects that other vendors, such as VMware and Nutanix, will move from a "version" model of introducing new function to a continuous Cloud-first model of introducing new function in the central cloud, and pushing this out to other nodes in the true hybrid cloud. This will enable them to introduce their own control-plane in the future.

However, for mission critical systems running on Oracle databases, Wikibon unequivocally recommends the starting point for evaluation should be Oracle Exadata Cloud at Customer and other Oracle Cloud at Customer solutions. Oracle has proven itself with early on-premises cloud deployments. It is the only platform that integrates support for full-function Oracle Database on hardware identical in the cloud and on-premises.

SUMMARY OF RESULTS



The base case is a traditional on-premises IT Oracle Database Infrastructure. The figures in yellow are the benefits of a 4 month migration to Exadata Cloud at Customer. The red figures are from the longer (9 month) and more expensive migration to Microsoft Azure Stack.

The left hand side of Figure 5 focuses on just the IT Budget savings. Exadata Cloud at Customer is \$5.7M better for the IT Budget model, and \$8.0M better for the Extended IT budget model. The right hand side focus on the Optimizing for Business Value model, with the same original budget for all scenarios. The budget savings for this model are deployed to creating new applications, which in turn provide higher Business Value.

The bottom line is that the 4-year Added Business Value Delivered by Exadata Cloud at Customer is \$66M vs. Microsoft Azure's \$13M. Migrating to Exadata Cloud at Customer delivers about 5 times more Business Value than Microsoft Azure Stack.

ACTION ITEM

Wikibon strongly recommends that CXOs take a cloud-first tightly integrated “True” hybrid model for systems that need to integrate data and applications across multiple locations. Wikibon assess Oracle Cloud at Customer as best of breed for mission-critical systems running on full-function Oracle databases. We assess it is well established nationally and internationally, and ideal for deployment in places with less access to highly trained infrastructure staff. Wikibon strongly advises CXOs to include Oracle Exadata Cloud at Customer in RFPs, and evaluate Oracle as a strategic partner for digital transformation.

FOOTNOTES

1. Oracle Database Assumed In Research

Wikibon did not include the Autonomous version of Oracle Database on Exadata Cloud at Customer in this analysis. Wikibon analyzed the enterprise edition of Oracle Database 18C running on Exadata Cloud at Customer and the same database running on Microsoft Azure Stack. We would expect that the machine learning within Oracle Autonomous Database would represent additional value, and plan to revisit this in future research.

2. Table 1

Table 1 below is the source data for Figure 5 above.

4-year Benefits of Migration to Cloud-first Architecture by Platform by Business Case Model \$M							
Platform	Business Case Model	4-year Budget Total	IT Budget Saved \$M	IT Budget % Saved	4-year Business Value Total	Additional IT Business Value Delivered \$M	Percentage IT Business Value Added
Microsoft Azure Stack	IT Budget	\$24.3	\$1.6	7%	\$235	\$7	3%
Microsoft Azure Stack	Extended IT Budget	\$50.0	\$5.0	10%	\$235	\$7	3%
Microsoft Azure Stack	Added Business Value	\$86.4	\$0.0	0%	\$241	\$13	6%
Exadata Cloud at Customer	Budget	\$18.6	\$7.3	39%	\$271	\$43	19%
Exadata Cloud at Customer	Extended IT Budget	\$42.0	\$13.0	31%	\$271	\$43	19%
Exadata Cloud at Customer	Added Business Value	\$86.4	\$0.0	0%	\$294	\$66	29%

Source: © Wikibon 2019

FIGURE 6

3. Oracle Exadata Cloud at Customer Database Software & Hardware Features

[Exadata Cloud at Customer Enterprise Edition Extreme Performance](#) is Database as a Service.

This subscription model includes all of the features of Oracle Database Enterprise Edition, plus all of the Oracle Database Enterprise Manager Packs and all Database Enterprise Edition Options. These capabilities include Database In-Memory, Real Application Clusters (RAC), Active Data Guard, Automatic Storage Management (ASM), Partitioning, Advanced Compression, Advanced Security, Database Vault, Real Application Testing, OLAP, Advanced Analytics and Spatial and Graph. Also included is the Exadata Cloud at Customer PaaS subscription is Oracle Multitenant. This enables higher consolidation density, faster provisioning and cloning, automated patching and upgrades, and simplified database management. Figure 7 below shows the detailed Database and Exadata functions.

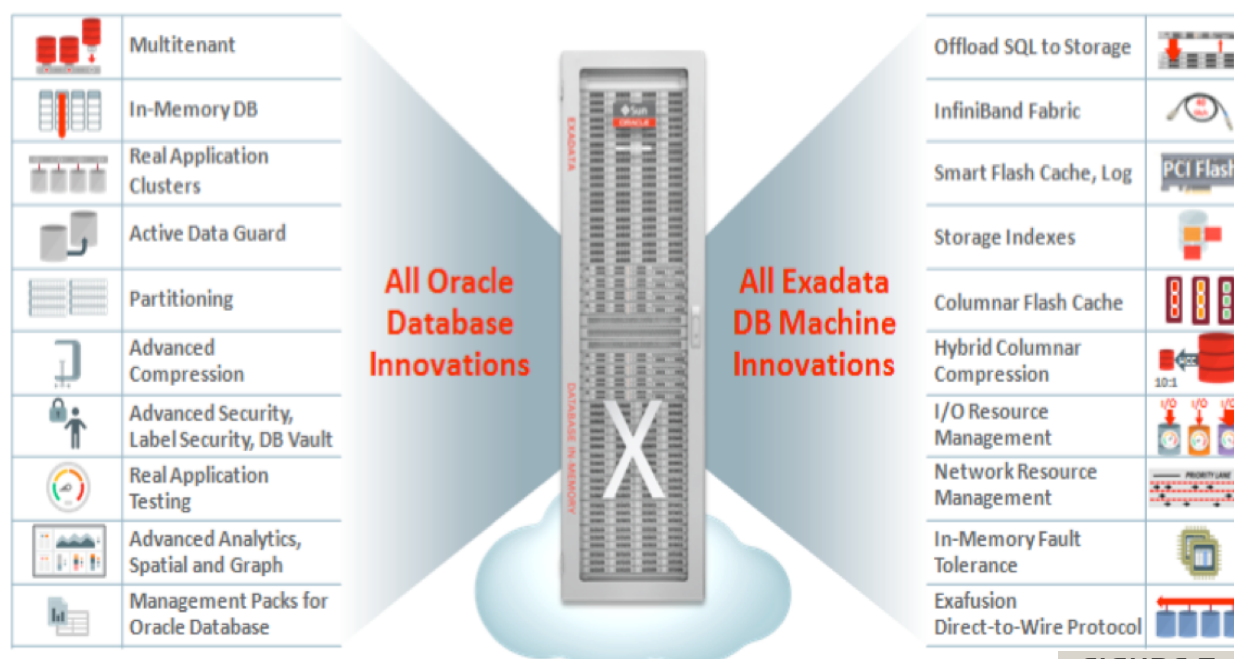


FIGURE 7

WIKIBON TEAM



DAVID FLOYER

Chief Technology Officer

@dfloyer

david.floyer@wikibon.org

David Floyer spent more than 20 years at IBM, holding positions in research, sales, marketing, systems analysis and running IT operations for IBM France. He worked directly with IBM's largest European customers, including BMW, Credit Suisse, Deutsche Bank and Lloyd's Bank. Floyer was a Research Vice President at International Data Corporation (IDC) and is a recognized expert in IT strategy, economic value justification, systems architecture, performance, clustering and systems software.



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