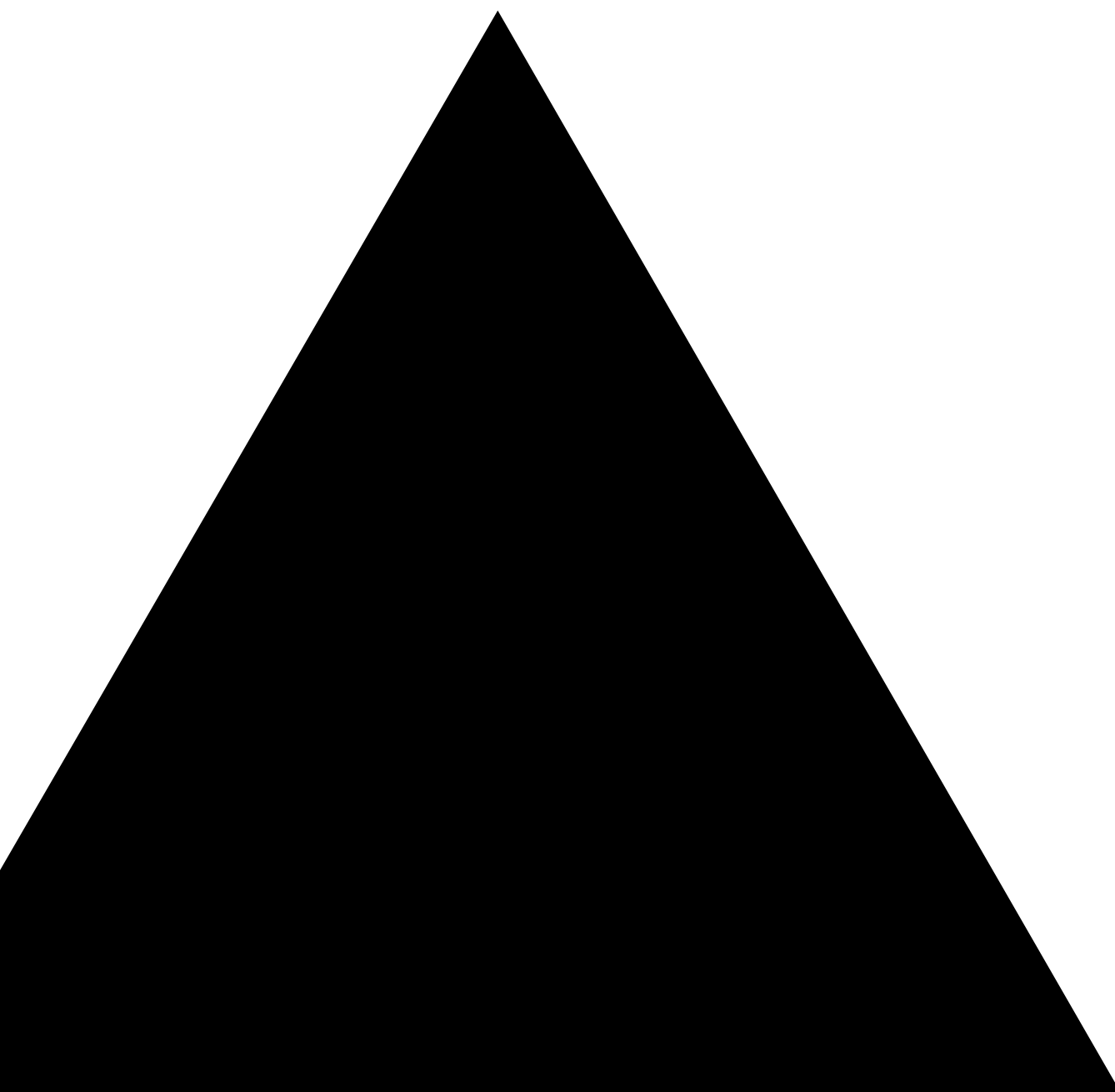


# Challenging the cloud status quo

Why DXC Brazil selected  
Oracle Cloud to replace  
its card processing system



In any technology market, vendors compete to be perceived as the market leader, which typically translates into increased sales and expanded media coverage. The enterprise cloud market in 2018 is no different, with leading vendors claiming the top spot based on varying factors and debatable proof points. Although selecting a vendor purely on its status as the perceived market leader is one choice, DXC Technology decided to consider other cloud providers in a recent selection process.

In the selection process, DXC Technology primarily targeted enterprise cloud vendors because the flexibility and cost savings typically provided by cloud solutions aligned well with the bid requirements for an intensive transaction processing environment. However, migrating to the cloud and re-architecting such an environment is complex and requires extensive strategic planning. That was particularly true for this environment, a card and payment services (C&PS) environment operating dozens of workloads and applications essential for smooth and timely transaction processing.

Therefore, when DXC's Business Process Services (BPS) team in Brazil decided to implement a replacement C&PS system for clients in Latin America, the team drew on its extensive customer experience to carefully plan a migration approach to the cloud, evaluate potential solutions, and choose a platform that offered significant business and IT advantages over the existing, traditionally hosted — and outdated — system.

## **Challenges of the existing cards and payment services system**

DXC BPS Cards & Payment Services support the entire value chain for card services and merchant acquiring, including card authorization, tokenization, exception management and other functions. Processing these transactions involves many stages and networks that ferry transactions between merchants, processors and banks **(Figure 1)**. DXC administers the card issuer's credit criteria for applicants; authorizes transactions via plastic, e-commerce or mobile payments; assesses interest and fees; and produces statement data.

DXC Brazil's more than 1,000 BPS employees process 61 million transactions each month for 15 major clients. With more than 20 years of experience in payments processing, DXC Brazil can deliver broad capabilities ranging from support for commercial agreements to fraud prevention.

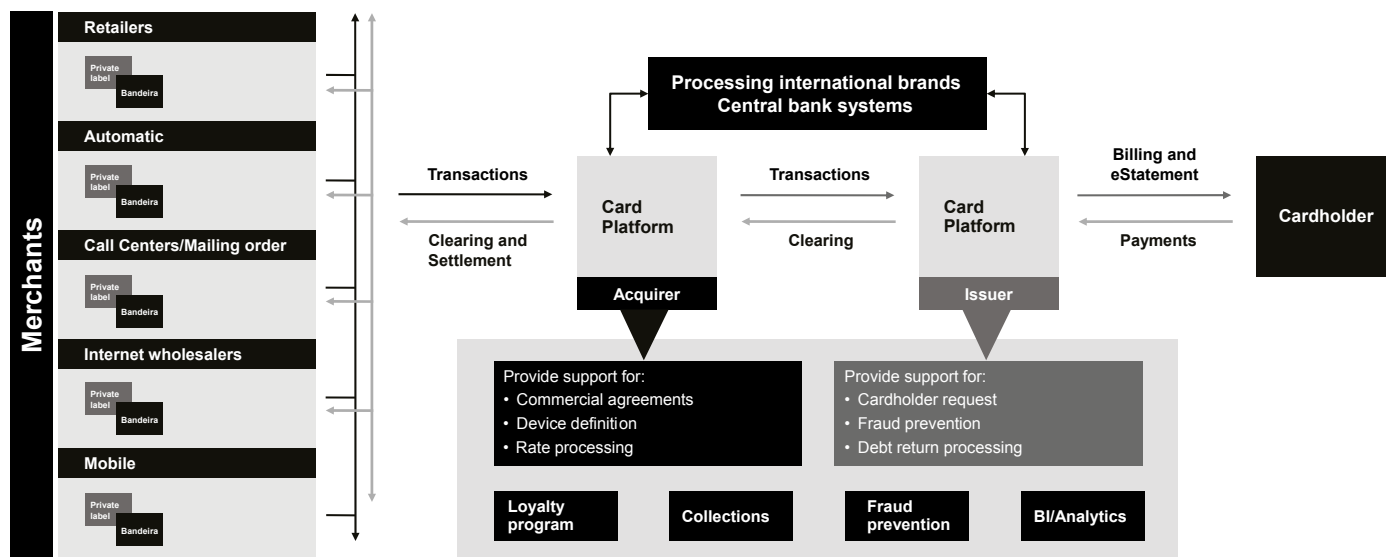


Figure 1. DXC payments processing

The organization's card processing system adequately served the needs of its BPS clients. However, the hardware was aging, and DXC Brazil wanted a more efficient, cloud-based solution that would integrate effectively with emerging technologies and deliver the following benefits:

- **Increased scalability and flexibility.** Because credit card transaction volumes are seasonal by nature, the team needed a flexible cloud environment and OPEX model that would provide the ability to expand (and contract) based on volume.
- **Improved performance.** System latency was periodically causing customer dissatisfaction. A transformation to a fully integrated environment in the cloud would enhance performance in many areas, such as the ability to process more transactions faster.
- **Cost savings.** A major goal was to reduce hardware purchasing and maintenance costs. The BPS team wanted to tap into the power, flexibility and cost reductions that a cloud vendor could provide with as-a-service pricing.

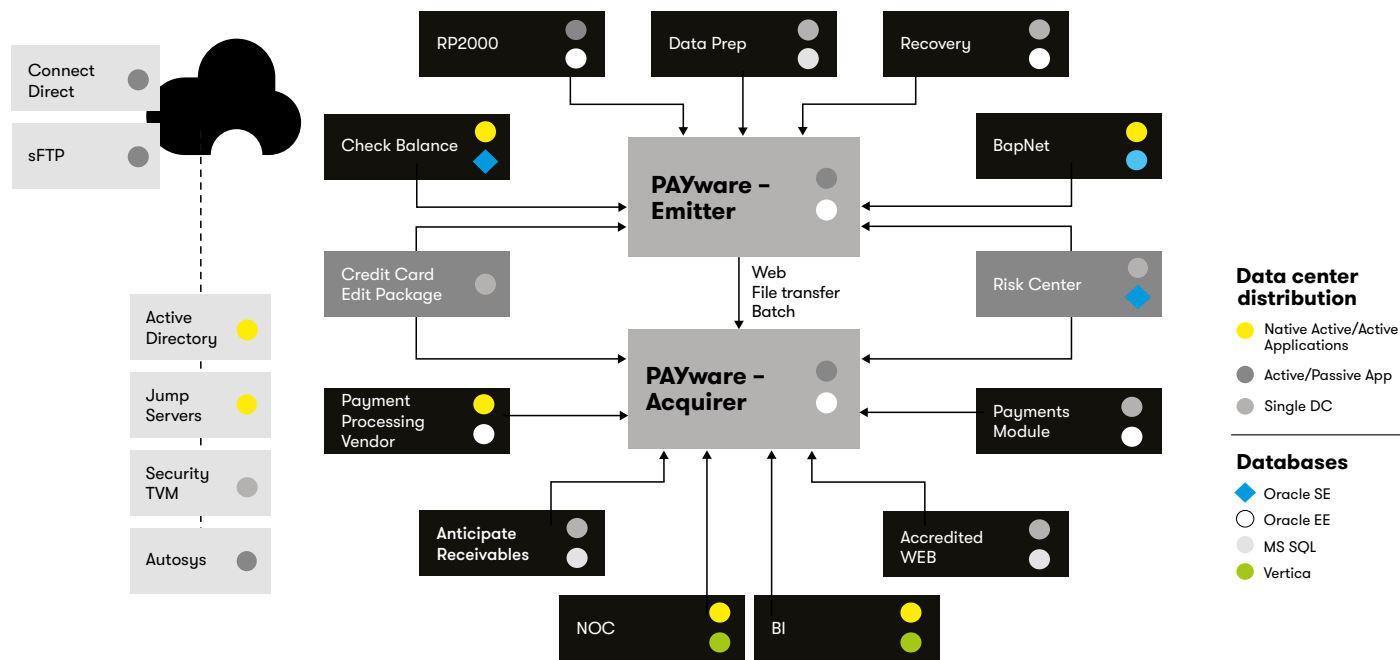
## Migration approach

To manage the complexity of migrating C&PS to the cloud, the BPS team adopted a general strategy to first migrate databases and then follow with applications. The team divided the migration strategy into three primary components — treatment, complexity and wave definition:

- **Treatment.** The basic task facing the team was to migrate 60 business workloads and 24 apps that support the business. The team opted to migrate 19 workloads and 9 apps through *image migration*. This included workloads that were already virtualized and running on Windows Server 2012. The team planned to migrate 35 workloads and 13 apps through *reinstall*, including Windows Server 2008 workloads needing to be upgraded to Windows Server 2012. The remainder, six workloads and two apps, would be migrated through *recompilation*.

- **Complexity.** The team assigned one of three complexity levels to each of the apps supporting the business. Thirteen apps were categorized as *simple* to migrate, given their size and treatment. This included apps such as Linux jump server and Windows. Nine apps, such as PAYware and Postilion Office, were assigned *medium* complexity. Finally, two apps, PAYware Batch and Connect Direct, were deemed *complex*.
- **Wave definition.** The current system was based on a “star” architecture with the most important app, PAYware, located at the center (**Figure 2**). Given the nature of the apps architecture, the team opted to mitigate the migration risk by using a wave approach that aligned the app with the database type and migrated three to eight apps and 12 to 18 servers in each wave. They would start by migrating the satellite apps and non-production databases in Waves 1 and 2, continue with production databases in Wave 3 and conclude with PAYware in Wave 4.

Figure 2. DXC Cards and Payment Services app infrastructure



## Choosing the best solution

With the migration strategy and approach firmly in place, it was time for the Brazil BPS team to select the best vendor to support it. The primary requirement was to identify a solution that would allow DXC to modernize the existing hosting environment based on equipment acquisition. The new infrastructure layer needed to scale easily to meet new demands and growth without purchasing and/or duplicating the hardware and software.

The team also sought a solution that would deliver a lower cost per transaction to make the C&PS more competitive from a price perspective.

During the selection phase, the team collected a trove of information, such as the number and types of transactions being processed, storage input/output

operations per second (IOPS) requirements, and current environment capacities. From a technical standpoint, the team needed a solution that could meet the following requirements:

- Level 1 Payment Card Industry Data Security Standard (PCI DSS) compliance
- SLAs of 99.95 percent and 99.99 percent for critical applications
- Ability to accommodate vendor colocation encryption appliances from leading credit card providers
- Hardware security module (HSM) appliance to encrypt transactions
- Connectivity with partners and customers over dedicated MPLS links
- Infrastructure environment for quality assurance, development, production and disaster recovery, including a disaster recovery plan (DRP) infrastructure for the production environment
- Large capacity for storage IOPS
- Ability to maintain performance at 400 transactions per second and accelerate if necessary

With operational and technical requirements clearly established, the team reviewed prospective solutions (see **Table 1** for summary).

### Option 1: Oracle Cloud at Customer solution

Oracle presented a solution centered on deploying Oracle Cloud at Customer (OCC) as the primary cloud solution. The approach (**Figure 3**) would use current DXC Brazil data centers and OCC for virtualization and application migration. The OCC solution includes both an Oracle Exadata Cloud at Customer (ExaCC) instance and an Oracle Cloud at Customer (OCC) instance.

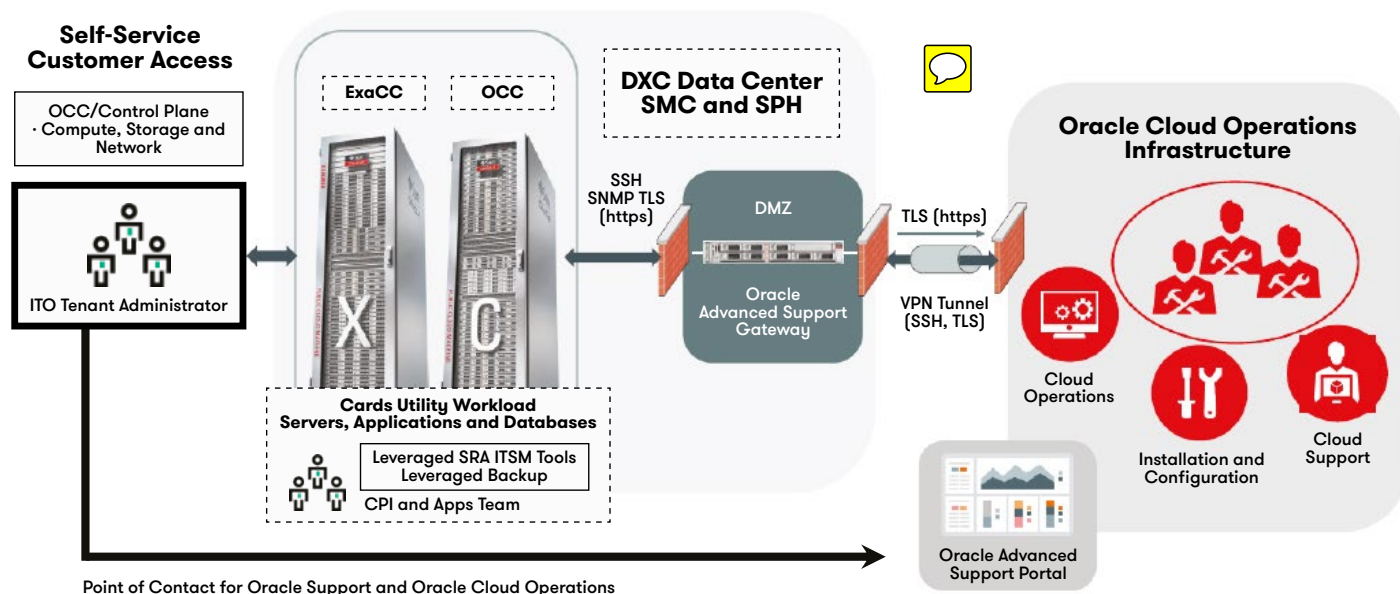
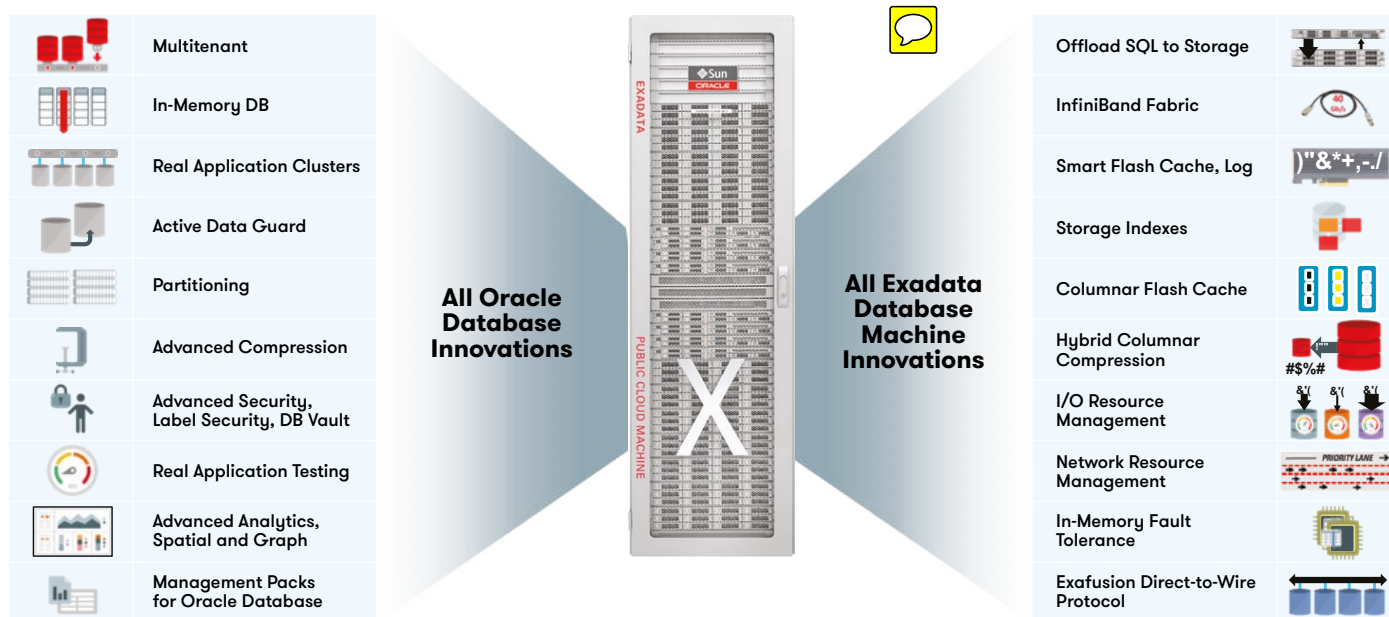


Figure 3. Oracle Cloud at Customer solution Source: Oracle

**Pros:** A key selling point of this solution was that it would bring the power and flexibility of Oracle Cloud to DXC’s own data centers, combining cloud simplicity with the convenience of an on-premises deployment. The solution also provided subscription-based, pay-as-you-go pricing and a smooth migration path of existing databases with no application changes.

More specifically, Oracle Cloud at Customer was presented as an innovative solution that could accommodate the migration of all the databases for DXC’s C&PS operations in Brazil. In addition, the solution provided many other innovative database and engineered systems features **(Figure 4)**.

**Cons:** One of the drawbacks was that the Oracle Cloud at Customer contractual requirements meant DXC would need a longer-term contract than with the other options. The solution also did not leverage the existing DXC C&PS system’s existing storage environment, and the existing application environment would need to be migrated from Red Hat to Oracle Linux. Additionally, DXC would need to purchase incremental Oracle licenses.



**Figure 4.** Oracle Exadata Cloud at Customer features

Source: Oracle

### Option 2: Third-party leading cloud provider

A leading third-party cloud provider proposed a solution centered on a scalable public cloud environment that would place application and database colocation appliances at the vendor’s data centers in Brazil.

**Pros:** The vendor provided a clear migration path to its data centers and the necessary colocation appliances from the leading credit card providers. Primary selling points were ease of use, reliability, flexibility, scalability and cost reductions from an OPEX model.

The solution was fully on-demand, allowing workloads to be adjusted easily based on business needs, and could be cancelled at any time. As with any public cloud infrastructure, this vendor's solution essentially provides unlimited scalability.

**Cons:** Since the DXC BPS team in Brazil relies on Oracle database technology, going with this solution would require implementing a third-party product to emulate the Oracle cluster. DXC would also need to purchase numerous Oracle licenses, including an Oracle Data Guard license for the database environment DRP.

Locating the environment at the vendor's data centers also presented some shortcomings. For one, DXC would not be able to install its appliances and HSM equipment at the vendor's data centers. In addition, DXC would not be able to leverage the storage used in the existing C&PS environment.

### **Option 3: Third-party leading hardware provider**

A third-party leading hardware provider proposed an approach that would combine a rack-scale hyperconverged system with networking software in a validated, ready-to-order package.

**Pros:** Key selling points of this solution were ease of scalability, high performance and a smooth migration from similar hardware. The turnkey solution provided a desirable server replication path from DXC's main site to the vendor's site. The vendor ensured the optimization of DXC's C&PS operations to a fully integrated environment.

**Cons:** As with the first two solutions, DXC would need to purchase Oracle licenses and not be able to leverage the existing DXC C&PS storage. However, unlike the first two options, this solution would mean operating under a CAPEX model, and thus, this solution did not meet critical project requirements.

### **Option 4: Traditional refresh from a third-party leading hardware provider**

DXC Brazil also had the option of using a traditional refresh that would maintain the existing operating model, refreshing only the servers that would be furnished by a third-party leading hardware provider. This option would result in the continued use of the on-demand DXC offering and present no migration impact. Notably, the traditional refresh and other approaches included the use of Oracle Database servers.

**Pros:** This solution was the only one in which DXC could continue to use its existing on-demand storage offering. The solution would also allow DXC to maintain its existing network. By refreshing only the existing servers, DXC would avoid the impact of a large migration of workloads and applications.

**Cons:** This solution did not meet critical project requirements. The obvious drawback was maintaining the existing CAPEX operating model. This solution also did not provide the performance and scalability improvements the other options provided, including the ability to easily meet peaks in need.

### **Option 5: Third-party leading technology provider**

A leading technology provider offered a well-proven cloud solution; however, it was not closely considered due to the company's lack of a data center presence in Brazil.

**Table 1.** Vendor solution pros and cons

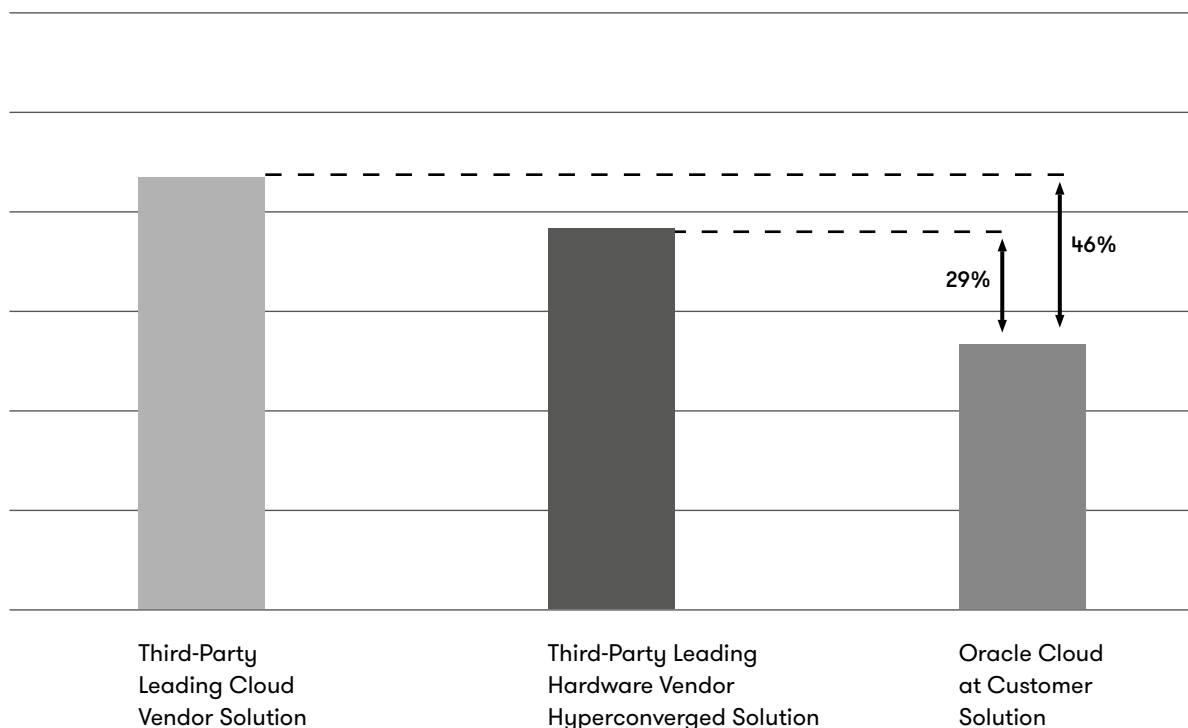
\* While “Option 5: Third-party leading technology provider” offered a well-proven cloud solution, it was not closely considered due to the company’s lack of a data center presence in Brazil and is therefore not depicted in this table.

	<b>Option 1: Oracle Cloud at Customer solution</b>	<b>Option 2: Third-party leading cloud provider</b>	<b>Option 3: Third-party leading hardware provider</b>	<b>Option 4: Third-party leading hardware provider traditional refresh*</b>
<b>Pros</b>	<ul style="list-style-type: none"> <li>• Scalable infrastructure</li> <li>• High performance</li> <li>• Hosted by DXC</li> <li>• Pay per use, elastic on-demand Oracle Database as Server usage</li> <li>• Includes all Oracle Database features</li> <li>• Converts cost to OPEX</li> <li>• Data replication via Data Guard instead of additional hardware</li> <li>• Inherent full stack integration and optimization of engineered systems solution</li> <li>• Improved portability and scalability from migration of Red Hat to Oracle Linux</li> <li>• Rental model allows for hardware refresh flexibility</li> </ul>	<ul style="list-style-type: none"> <li>• Scalable infrastructure</li> <li>• Fully on-demand, able to cancel anytime, depending on service-contracting model</li> <li>• Converts cost to OPEX</li> </ul>	<ul style="list-style-type: none"> <li>• High performance</li> <li>• Ease of implementing new environments</li> <li>• Optimization of operations to be fully integrated environment</li> </ul>	<ul style="list-style-type: none"> <li>• Maintains current model by only refreshing servers</li> <li>• Leverages existing available storage capacity</li> <li>• Easy and low-cost implementation</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>• Available capacity of existing storage cannot be used</li> <li>• Current on-premises Oracle licenses will not be used; will be assigned to other projects</li> <li>• Need to maintain longer-term contract</li> <li>• Need to migrate Linux environment from Red Hat to Oracle Linux</li> </ul>	<ul style="list-style-type: none"> <li>• Current on-premises Oracle licenses will not be used; will be assigned to other projects</li> <li>• Third-party product needed in order to emulate Oracle cluster</li> <li>• In theory, Oracle does not support database running on virtual non-Oracle VM environment</li> <li>• Not possible to install MIP/VAP and HSM equipment along with servers – has to be installed in transit center</li> <li>• Available capacity of existing storage cannot be used</li> <li>• Need to implement Data Guard for database environment</li> </ul>	<ul style="list-style-type: none"> <li>• Not true cloud</li> <li>• Does not meet stability requirement to scale without purchase of new hardware</li> <li>• CAPEX model</li> <li>• Available capacity of existing storage cannot be used</li> <li>• Need to implement Data Guard for database environment</li> </ul>	<ul style="list-style-type: none"> <li>• Not true cloud</li> <li>• Does not meet stability requirement to scale without purchase of new hardware</li> <li>• Environment has to be sized by peak demand</li> <li>• CAPEX model</li> </ul>



### Cost comparison

Although cost was only one of the determining factors, it played a significant role in the decision-making process. **Table 2** shows a comparison of the cost of the top three solutions.



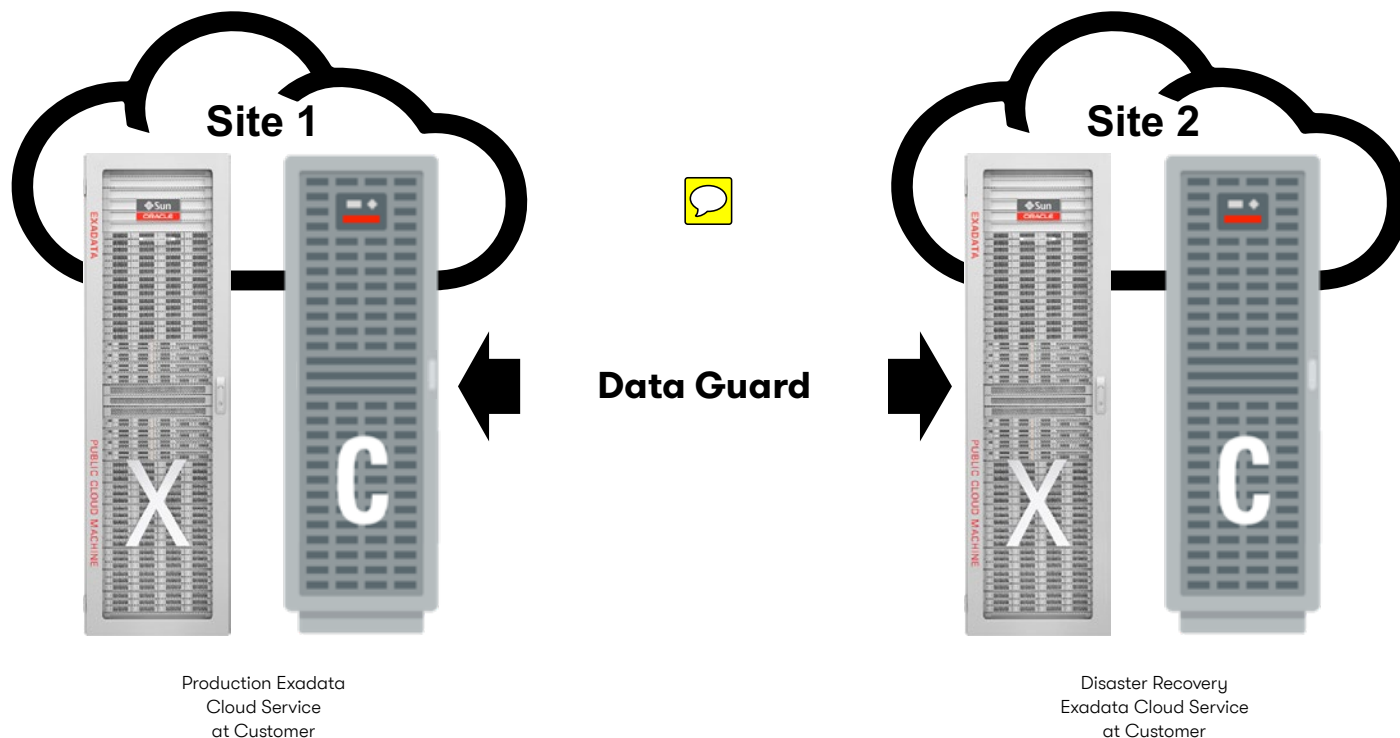
**Table 2.** Cost comparison, by percentage difference

### The winner: Oracle Cloud at Customer

After careful consideration, the BPS team selected the Oracle Cloud at Customer solution (Option 1) because it met all of the team’s operational and technical requirements. The team also judged it the best solution for increasing the existing environment’s performance and database features, including the ability to process more transactions faster. It also provided the greatest anticipated cost savings.

The team elected to implement one Oracle Exadata Cloud at Customer (ExaCC) instance and one Oracle Cloud at Customer (OCC) instance at two different sites (**Figure 5**). DXC will also implement Oracle Data Guard to meet the organization’s stringent disaster recovery requirements.

The flexible environment allowed for the effective integration of DXC’s existing credit card vendor encryption appliances and provided a more secure, more stable service delivery platform than either the leading cloud or hardware vendors could provide.



**Figure 5.** Oracle Data Guard Disaster Recovery

Oracle Cloud at Customer also provides improved performance levels, high availability, optimal security and seamless provisioning. Cloud automation software would reduce administration workloads and alleviate repetitive tasks.

In addition, DXC would be able to tap into the knowledge and resources developed over a strong partnership with Oracle that has been fostered for more than two decades. This includes the ability to leverage the automated tools and standard processes of the DXC Migration Services for Oracle Cloud offering.

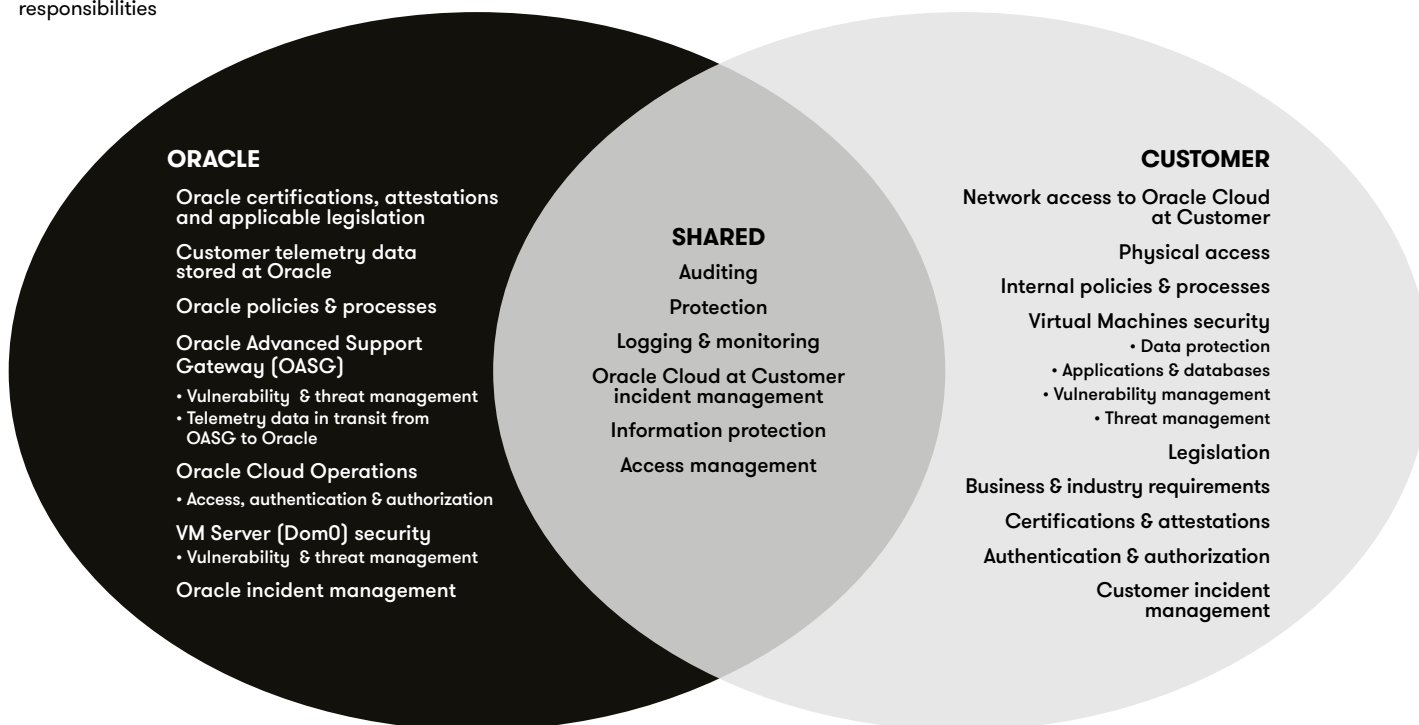
The OCC environment was projected to provide shorter I/O wait times, better CPU times, and a significant improvement in average latency from 15 milliseconds to 0.5 milliseconds. More specifically, Oracle emerged as the best solution by providing:

- Reduced LAN network connectivity time between applications and databases using InfiniBand technology
- Reduced I/O time by using high-performance storage integrated in the solution, including PCI Flash
- Software hybrid columnar compression
- Parallelized queries using smart analytics software
- DRP based on Oracle Data Guard process

The fact that the OCC environment would remain on-premises at DXC would make it easier to add new environments and platforms, meaning better scalability.

By leveraging Oracle’s Cloud at Customer solution, DXC maintains control of many cloud configuration settings and policies that enable BPS to provide unique financial services to clients. Access and control of these critical cloud configuration settings is not available from other leading cloud vendors since their cloud solutions must run in the vendor’s data center. **Figure 6** depicts the allocation of key private cloud responsibilities between DXC and Oracle.

**Figure 6.** Oracle Cloud at Customer shared security responsibilities



The OCC solution also included the opportunity to perform data replication via Oracle Data Guard, which was included in the solution, as opposed to doing it via hardware. Finally, Oracle Exadata Cloud at Customer would accommodate a fully integrated C&PS environment and the preferred OPEX model.

## Expected business benefits

DXC’s BPS team expects the following key business benefits:

**Business agility.** Based on the Oracle Cloud at Customer solution, the DXC BPS business can scale the C&PS system rapidly as credit card transaction volume grows, without purchasing new hardware or hiring incremental IT staff. Likewise, the business can reduce its Oracle Cloud at Customer subscription during an economic downturn without causing capital expense and depreciation issues.

**Data compliance.** DXC can tap into Oracle’s powerful cloud services while keeping the cloud operating environment on-premises. Because the data remains on-premises, DXC can comply with data sovereignty regulations and internal policies, as well as enforce data privacy and residency requirements more readily.

**Better business support.** Oracle Cloud Operations for Oracle Cloud at Customer provides all platform support and change management, giving DXC the benefit of end-to-end management of services delivered in DXC data centers. This is expected to allow C&PS accounts to accelerate time to deployment, increase availability and reduce business risk.

**Resource savings.** The Oracle Cloud at Customer solution provides savings on both hardware and labor. The hardware savings are achieved by taking a cloud approach, where only the required compute resources are purchased, rather than buying too much hardware to ensure sufficient capacity at peaks — which often means capacity goes unused. Labor is saved by reducing the required number of hardware, OS and middleware professionals, who can then be redirected to higher-value business priorities.

## Choose the right approach for your organization

In looking for a solution to improve performance and reduce costs by digitally transforming operations to the cloud, DXC's BPS operations in Brazil leaned on its technology expertise to develop well-defined requirements and then invited bids from proven vendors at the leading edge of the technology curve.

The decision to go with Oracle Cloud at Customer for the cloud migration was based on many factors, most notably: anticipated performance improvements, the opportunity to maintain the environment on-premises, and cost considerations. Any organization performing its own analysis for this type of modernization/transformation program will find that the characteristics of the current system needing modernization will differ from this BPS example, and the chosen solution will of course vary to meet the organization's specific needs.

A key element of identifying the best solution is obtaining and developing a full understanding of the current system so that no elements are overlooked when selecting a future architecture.

Enterprises looking to migrate essential business operations to the cloud should take a carefully crafted approach that does not focus on a single decision factor, but considers the full package being offered, weighing its various benefits and ability to meet project requirements. Enterprises should also carefully consider cloud solutions from several leading vendors, A the perceived market leader is not always the best choice.

### About DXC Technology

DXC Technology (DXC: NYSE) is the world's leading independent, end-to-end IT services company, serving nearly 6,000 private and public-sector clients from a diverse array of industries across 70 countries. The company's technology independence, global talent and extensive partner network deliver transformative digital offerings and solutions that help clients harness the power of innovation to thrive on change. DXC Technology is recognized among the best corporate citizens globally. For more information, visit [www.dxc.technology](http://www.dxc.technology).

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