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ENTERPRISE WORKLOADS MEET THE CLOUD

Understanding Oracle Databases in the Cloud

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CLOUD COMPUTING HAS BECOME MAINSTREAM, BRINGING NEW LEVELS OF FLEXIBILITY AND EFFICIENCY TO TECHNOLOGY.

Today, cloud is used across industries to run a long list of applications—but that list does not yet include many of the mission critical production applications.

THE REASON

Companies are unsure if the cloud is ready for those key applications. More specifically, they are unsure about running the large databases that underpin applications in the cloud. That is not to say that there is a history of problems with databases in the cloud. Rather, there is a lack of experience with and information about such database usage—and that makes companies reluctant to move mission critical applications to the cloud.

Those applications are central to the business, of course—and executives wonder if the cloud will be able to run them as well as their on-premises systems. Many are also asking if moving to the cloud will actually be an improvement. Will costs go really go down? Will response time improve? Or will they simply be doing the same things in a different way? In other words, is it worth the effort? The value lies not in replacing on-premises applications and workloads, but rather in using the cloud as a tool to create new value and support business results.

To bring greater clarity to the issue, Accenture conducted a battery of tests looking at Oracle databases in the cloud. Nearly half the world's data runs on Oracle databases, making them a valuable focal point for such tests. The load on those vital databases continues to grow: with 2.5 quintillion bytes of data being generated every day, the performance and scalability of the database in the cloud is increasingly important.[1] With that in mind, Accenture conducted hundreds of tests across multiple applications, looking at performance, stability and costs—and the results demonstrated that Oracle Cloud technology is ready to handle the large, high-powered database workloads that are fundamental to critical enterprise applications.

EXAMINING THE FOUNDATION: INFRASTRUCTURE AND DATABASE

Simply put, an enterprise system consists of an application and the underlying database and infrastructure. Regardless of whether the solution in on-premises or delivered 'as a service' the application relies on those two components. Thus, the performance, uptime and security of an application will depend on how well the infrastructure and databases support those attributes.

Today, businesses have a fairly clear understanding of cloud-based infrastructure. Gartner, the research and advisory firm, forecasts that the market for "cloud system infrastructure services" will more than double by 2020, reaching $71.5 billion.[2] That means there are a great many organizations looking to move to the cloud. But right now, they are struggling to understand how to do so without impairing performance, stability and costs.

Accenture has done a fair amount of research on cloud-based infrastructure. For example, last year an Accenture study found that Oracle cloud infrastructure offerings can provide solid performance with a dramatic price benefit.[3]

While Accenture's research focused on highly transactional databases to test infrastructure performance, it did not address large databases for complex systems relying on complex data. To determine whether databases in the cloud can support critical applications, Accenture conducted another round of cloud research, this time examining Oracle Database, and associated applications and networking, in the cloud. These tests compared Oracle's cloud offerings with those of another leading cloud vendor.

THE RESULTS: FASTER AND CHEAPER

The test results were very positive for Oracle. Using Oracle's Cloud Infrastructure, Accenture was able to execute OLTP transactions up to 7.8 times faster, compared to the other cloud provider.

On the other hand, when researchers attempted to replicate these tests with the other cloud provider, they were unable to achieve the same kinds of results in terms of total transactions processed. By adding more processing power, they were eventually able to do so—but the additional hardware meant significant additional expense. In the end, the tests showed that the Oracle Cloud Infrastructure can provide up to a more than eight-fold reduction in costs for a given amount of capacity, compared to the other cloud provider. (See Figure 1).

Often, it was difficult to implement high-performance databases on non-Oracle clouds because of the architectural limitations of the servers involved. For example, Oracle Cloud Infrastructure provides a set of servers with high-performing flash storage that is based on architectural principles similar to that of memory. This Non-Volatile Memory Express (NVMe) technology can provide some of the fastest storage on the market. With Oracle Cloud Infrastructure, companies can leverage NVMe for persistent storage to host databases and applications. However, other cloud providers typically do not offer such a capability. In cases where NVMe storage was an option with other vendors, it was not persistent. This meant that the multi-terabyte database that researchers loaded to this storage was lost when the server stopped. Oracle Cloud Infrastructure's approach can avoid that problem.

Tests of large analytical workloads reinforced Accenture's theory that Oracle databases run best on Oracle Cloud. Oracle is unique in offering a variety of database deployment options. Accenture tested both the Oracle Cloud Infrastructure Dense IO physical servers with NVMe storage, and Exadata cloud service. (Dense IO servers are Oracle Cloud Infrastructure's top-of-the-line physical servers.) These servers provided impressive performance for small read-and-write operations, much like those of an OLTP application. With workloads on Oracle Cloud Infrastructure's Dense IO servers, researchers were able to get up to nearly 11 million OLTP transactions completed in one hour with 200 concurrent users.

Figure 1: Test Results

	Leading Cloud Provider	Oracle Cloud Infrastructure Classic	Oracle Cloud Infrastructure
vCPU	4	4	4
SGA	6GB	6GB	6GB
Disk Type	General Disk	Latency Optimized	NVMe Attached
Disk Size	612 GB	612 GB	612GB
Total Transactions	1,397,270	4,837,067	10,916,571
Transactions Per Second	383.13	1,343.63	3,032.38
Total List Price Per Month	$345.88	$200.00	$228.12

TESTING: THE HEART OF THE CLOUD

Long before cloud computing was common, John Gage, chief scientist at Sun Microsystems, coined the phrase, "The network is the computer." Today, that is more true than ever—the network is at the core of cloud computing, and it plays a key role in the performance of mission critical applications in the cloud.

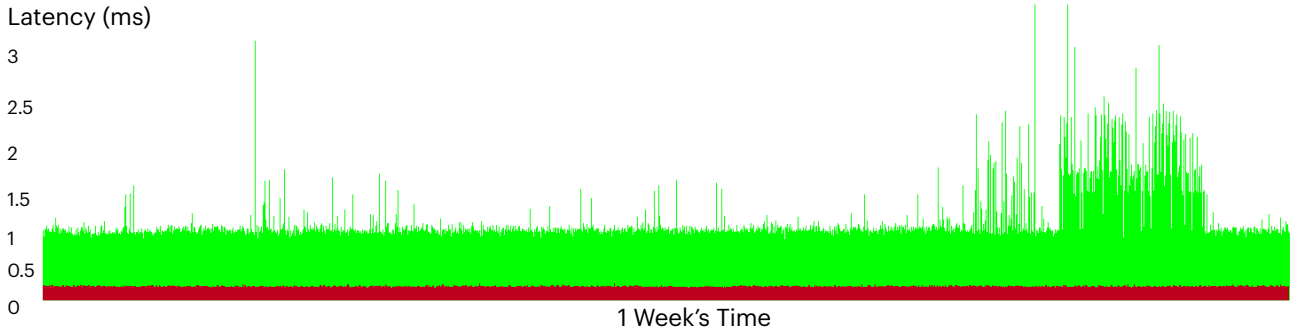
Accenture's analysis of the network capabilities of Oracle Cloud Infrastructure found high levels of consistency and performance. As shown in Figure 2, Accenture researchers found that Oracle Cloud Infrastructure provided much lower latency than the other cloud when connecting between zones or different data centers within a single region.

In fact, Oracle's peak latency levels were up to nearly five times less than those of the other cloud. At an average of just over 0.16ms over the course of 2,000 data points, the Oracle technology can provide better network performance between data centers than many organizations find within a single data center. Accenture also found that the consistency improved on Oracle Cloud Infrastructure. After executing network tests every five minutes over the course of a week, Oracle cloud infrastructure (in red) was consistent hour-over-hour and day-by-day, as illustrated in Figure 3. However, the other cloud (in green) had much more variable network performance based on time of day, day of week, and other unknown factors. The network is the highway that ties the system components together, so one cannot overstate the importance of Oracle's network stability.

Figure 2: Oracle Cloud Infrastructure Latency Averages

	Minimum	Average	Maximum
OCI	0.152ms	0.168ms	0.201ms
Other	0.722ms	0.962ms	8.779ms

Figure 3: Oracle Cloud Infrastructure vs. Other Cloud: Lower latency, greater consistency



Researchers also found that Oracle Cloud Infrastructure provided better scalability and high availability. It is worth noting that a variety of features found in Oracle are not available in other public clouds. For example, Oracle Cloud offers Oracle Real Application Clusters (RAC). This is important, because IT organizations that demand true high-availability with their Oracle databases require Oracle RAC. This unique Oracle capability should be a key consideration when moving from on-premises to cloud deployments of mission critical systems.

Finally, researchers simulated a full data center outage multiple times to test business continuity. The PeopleSoft application that was being run for the test was down for less than 20 seconds, and for as little as 10 seconds in some cases—thanks largely to Oracle's revolutionary network design. This means that with Oracle, one of the most common causes of widespread system outages—a data center going down—would help reduce impact on the business.

What's more, the simulated outage in the test involved the primary data center. But because Oracle Cloud Infrastructure makes it possible to spread work across data centers, a simulated outage in a secondary center resulted in no application downtime. And this solution cost no more than any other production deployment; and unlike some solutions, it did not require redundant servers that sit idle until an outage occurs.

CONCLUSION

Combined with the previous Accenture research on cloud infrastructure, these findings indicate that the cloud foundation for large enterprise applications is in place—it is not an unknown. Armed with these insights, companies should be ready to consider moving their Oracle mission critical workloads to the Oracle Cloud—and reaping the benefits of greater flexibility and more manageable costs.

REFERENCE

1. Sources: Accenture, Technology Vision for Oracle 2017: https://www.accenture.com/us-en/insight-oracle-technlogy-vision-2017 ; IBM, Bringing Big Data to the Enterprise: http://www-01.ibm.com/software/data/bigdata/what-is-big-data.html
2. Gartner: http://www.gartner.com/newsroom/id/3616417
3. Accenture, Performance Testing Results: Oracle's Enterprise-grade Cloud is Here. https://www.accenture.com/t20161013T060358Z__w__/us-en/_acnmedia/PDF-34/Accenture-Oracle-Cloud-Performance-Test-October2016.pdf

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