High performance Oracle deployments on Azure with Excelero NVMesh technology

When Oracle databases are at the heart of your business, you know your data needs fast access to data while being protected and fully available at all times. NVMesh makes it simple and efficient to migrate and maintain Oracle instances from your data center to Microsoft Azure.

Oracle has been a database world leader for decades, widely used by enterprise customers around the globe. With the growth and acceleration of cloud computing, enterprises now face the challenge of moving their on-premises Oracle workloads to the public cloud.

Oracle databases are often a key component of application deployments, containing important business logic. Changes require significant planning and testing. Wholesale cloud migration to a different database system can be costly and prone to errors that can often disrupt business operations.

There are various challenges when migrating Oracle and Exadata workloads to the public cloud. The main ones are listed here:

1. **Performance for data intensive workloads**: To maintain good user experience and ensure that queries or batch jobs execute quickly, it is essential that data can be read and written at high speed.
   Transactional workloads typically require low latency, i.e. the ability to read and write small amounts of data as fast as possible. Data warehousing workloads rely on high throughput, i.e. pumping large volumes of data through the database at the highest possible bandwidth. It is very important that data performance is predictable through the upper limits of access speed and throughput by the cloud providers.

2. **Resiliency**: Many on-prem Oracle customers, for example, incur considerable license costs to use the Real Application Clusters (RAC) option, which allows highly available solutions to be built across multiple nodes. In the public cloud however, Oracle RAC is supported in Oracle’s own cloud and customers who wish to move to Azure have to find alternative methods to architect for resilience.

Excelero provides breakthrough solutions for the most demanding public and private cloud workloads. Excelero NVMesh technology is a transparent, low-latency distributed storage software layer between the application stack and cloud infrastructure, which enables high speed and high throughput of data.

Excelero NVMesh for Azure simplifies the challenge of migrating Oracle and Exadata workloads to Azure. For such data-intensive workloads, achieving performance, ensuring resiliency and maintaining cost efficiency including taking Oracle’s licensing model into account - are all part of the solution.

The reference architecture diagram below for deploying Oracle on Azure leverages NVMesh storage solutions that can cater to even the largest and most demanding Oracle database workloads.

The primary database node in availability zone 1 performs three types of write operations:

1. Write redo
2. Commit to DBF
3. Copying the redo to archive for backup and data replication.
Hence, it includes a standard Oracle Data Guard broker, Oracle Cloud Control and Excelero NVMesh storage for the first two write types. Microsoft Azure Premium SSDs can be used for backup and data replication.

The primary node includes Oracle Automatic Storage Management (ASM) as the recommended storage management solution that provides an alternative to conventional volume managers, file systems, and raw devices. It supports single-instance Oracle Database and Oracle RAC configurations.

The standby database node in availability zone 2 has a single write operation type for applying the logs shipped from the primary. Hence, it includes the standard Oracle Data Guard broker, RMAN backup target and Excelero NVMesh storage. The purpose of the data guard and RMAN backup target are to offload the demand on the primary database, as well as offload the intra-block logical checks to the standby in its active read-only mode.

A third availability zone includes the observer for the Oracle Data Guard broker.

The setup has two options for network configuration and drive density. In both cases, the Oracle VM runs as the Excelero NVMesh client.

1. **Ultimate Performance with Excelero’s NVMe-over-InfiniBand Protocol**

   The combination of a high bandwidth and low-latency RDMA network fabric and local NVMe drives makes the virtual machines an ideal choice for NVMesh storage. NVMesh transforms the drives inside the compute VMs into a storage layer on par with state-of-the-art onpremises HPC cluster storage. It leverages the InfiniBand network to aggregate the capacity and performance of the NVMe drives into a shared pool to create protected volumes that minimize the chance of data loss if a drive or VM is disconnected.

   NVMesh on HBv3 VMs using NVMe and RDMA provides sub-100 microsecond latencies, over 23 GBs per second of bandwidth and up to three million IOs per second satisfying any Oracle workload. SLOB OLAP tests show over 18.3 GBs per second for a single-node Oracle. With NVMesh on Azure, even the most mission-critical and demanding Oracle workloads run easily on the Azure cloud. Customers experience 10x the performance and save on cloud costs. All of this is done without refactoring your application or database.
2. Capacity and Performance with TCP/IP Networking

Storage optimized Lsv2 VM types offer high disk throughput and IO, and are ideal for Big Data, SQL, NoSQL databases, data warehousing and large transactional databases. The Lsv2-series features high throughput, low latency, directly mapped local NVMe storage running on the AMD EPYC™ 7551 processor.

Using Lsv2 VMs, Oracle performs transactions with latencies as low as 250 microseconds facilitating high transactions per minute and data flow of 4 GBs per second and over 400K IOs per second. This solution layout provides great performance for large capacity databases with ultimate data reliability and cost efficiency.