Get higher performance for your MySQL databases with Dell APEX Private Cloud

Featuring 3rd Gen Intel Xeon Scalable processors, the Dell APEX Private Cloud solution processed more new orders per minute in a transactional database workload than a comparable AWS solution

Many businesses depend on databases to run their daily operations. Everything from HR systems, order fulfillment, payroll, reservation systems, and more use databases to power their features, keeping the company's day-to-day operations flowing smoothly. These businesses need a solution that can support a high level of performance in their database-backed applications without becoming a problematic bottleneck. However, it can be difficult to understand how the capabilities of various solutions match an organization's current and future needs.

As companies face choices between public and private cloud and on-premises solutions, and as traditional on-prem vendors have begun to offer cloud-friendly and as-a-service solutions, the purchasing decision has become even more challenging. There is no single one-size-fits-all solution.

With this context in mind, we compared the performance of two solutions running a number of MySQL virtual machines (VMs): a Dell™ APEX Private Cloud solution and an Amazon Web Services (AWS) solution. Both solutions featured comparable 3rd Generation Intel® Xeon® Scalable processors and had the same amount of virtual RAM. We used the TPROC-C online transaction processing (OLTP) workload in the HammerDB 4.6 benchmark tool. We measured the number of new orders per minute (NOPM) that each solution processed. We found that the Dell APEX Private Cloud solution processed 25.4 percent more NOPM than the AWS solution.

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How we tested

We deployed 16 VMs on a cluster of four Dell APEX Private Cloud servers with Intel Xeon Platinum 8358 processors that Dell configured with VMware® vSphere®. The PowerMax volumes backed the VMware vSphere datastores that held the VMs running MySQL Community Server, as well as the VMs with the workload utility HammerDB. On AWS, we tested m6i instances using Intel Xeon Platinum 8375C processors with gp3 storage for OS volumes and io2 storage for data volumes. We chose this configuration because it best matched the Dell APEX Private Cloud offering we compared it to. For more configuration details, see Table 4 in the science behind the report.

Each VM on both the AWS and Dell APEX solutions had 16 vCPUs, 64 GB of memory, a 50GB OS drive, and a 200GB data drive. We deployed 16 VMs on the Dell APEX Private Cloud environment. Each of the Dell APEX Private Cloud nodes had 64 cores and 512 GB of memory, and we allocated 256 GB of memory to the VMs to match the configuration of the core-to-RAM configuration of commercially available compute-optimized Dell APEX Private Cloud nodes, which gave us room for four VMs per node. We confirmed this resource utilization during discovery testing, where the 16-VM configuration showed the Dell APEX Private Cloud cluster CPU utilization exceeding 90 percent. We then matched the configuration on AWS. On each VM, we installed MySQL Community Server, version 8.0.32.

About the HammerDB workload

We used the TPROC-C workload from the HammerDB benchmark to measure the performance of the two solutions. According to HammerDB, this workload "is intentionally not fully optimized and not biased towards any particular database implementation or system hardware."[1] HammerDB developers derived their OLTP workload from the TPC-C benchmark specifications; however, as this is not a full implementation of the official TPC-C standards, the results in this paper are not directly comparable to published TPC-C results.

For more information, please visit https://www.hammerdb.com/docs/ch03s01.html.

To test the database performance of each environment, we used the HammerDB benchmark suite with the TPROC-C workload. Each VM had a single MySQL instance with a 500-warehouse TPROC-C database. We targeted the maximum NOPM each environment could achieve by increasing the user count until performance degraded. The maximum user count was 64 users per VM for both Dell APEX Private Cloud and AWS VMs.

We deployed four physical servers for HammerDB clients to drive the workload on Dell APEX Private Cloud. Each of these four servers ran four client VMs, for a total of 16 client VMs. We configured each client VM with eight vCPUs, 32 GB of memory, and 50 GB of OS storage. We used m6i.2xlarge instances on AWS for clients, with specs matching those of the Dell APEX Private Cloud clients.

We also created a controller VM on each environment so we could easily configure changes and run scripts across the various test and client VMs.

For more information about our testing and detailed results, see the science behind the report.

Performance testing

To evaluate the performance of the two solutions, we ran the HammerDB benchmark on the Dell APEX Private Cloud solution and the comparable AWS solution. We measured the number of new orders per minute each solution processed.

As Figure 1 shows, the Dell APEX Private Cloud solution processed 5,215,469 NOPM, 25.4 percent more than the 4,157,909 NOPM that the AWS solution processed. Figure 2 shows the average number of NOPM per VM, which is the performance users can expect for a single VM and MySQL instance within the cluster. As Figure 2 shows, the Dell APEX Private Cloud solution processed an average of 325,967 NOPM per VM, 25.4 percent higher than the average of 259,869 NOPM per VM that the AWS solution processed. These results show that for organizations with similar configurations to our testing, the Dell APEX Private Cloud solution enables greater transactional database performance.

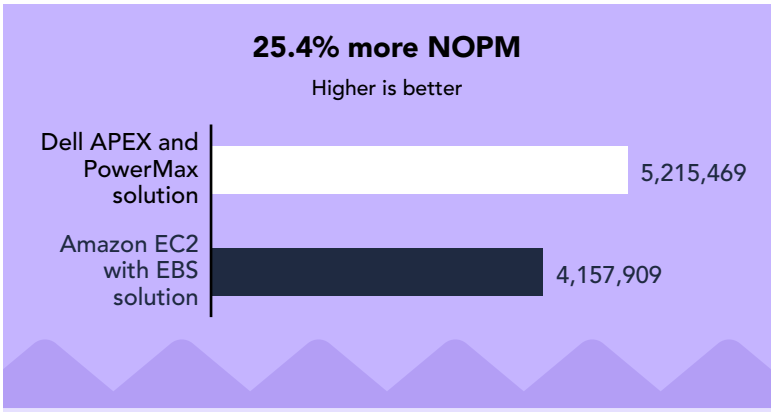

Figure 1: Number of new orders per minute each solution processed running the TPROC-C workload. Higher is better. Source: Principled Technologies.

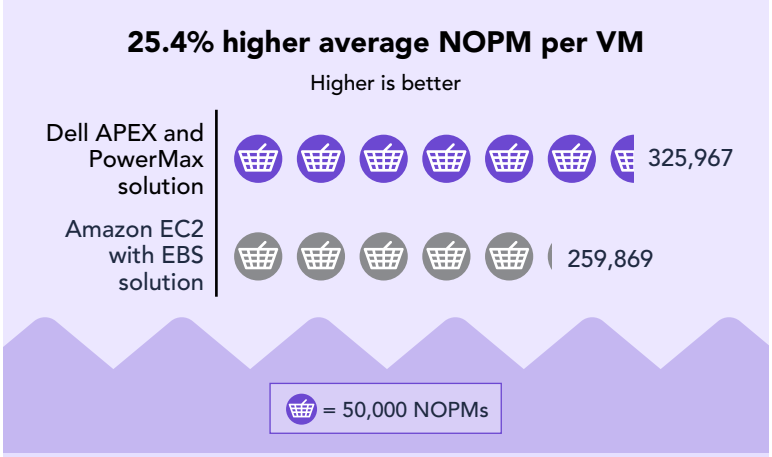

Figure 2: Average number of new orders per minute each solution processed running the TPROC-C workload. Higher is better. Source: Principled Technologies.

Dell APEX Private Cloud

According to Dell, "APEX Private Cloud delivers a small footprint for getting started with cloud or expanding your data center out to the edge."[2] Dell designed APEX Private Cloud to provide flexibility to meet a wide range of workload requirements and freedom in how you choose to store data to best fit your business needs.[3]

For more information about Dell APEX Private Cloud, visit https://www.dell.com/en-us/dt/apex/compute-hci/private-cloud.htm.

About the Intel Xeon Platinum 8358 processor

Part of the 3rd Generation Intel Xeon Scalable processor family, the Intel Xeon Platinum 8358 processor has 32 cores, 64 threads, a maximum turbo frequency of 3.40 GHz, a processor base frequency of 2.60 GHz, and a 40MB cache. According to Intel, this processor family offers optimization for "cloud, enterprise, HPC, network, security, and IoT workloads with 8 to 40 powerful cores and a wide range of frequency, feature, and power levels."[4]

About VxRail dynamic nodes

VxRail dynamic nodes give customers the flexibility to use vSAN or external storage while still enjoying the benefits of VxRail such as lifecycle management. According to Dell, "as processing demand grows, customers can add dynamic nodes to the cluster. As storage capacity demand grows, customers can also provision more storage from external storage resources to dynamic nodes."[5] Because these nodes are compute only and use no internal storage, customers do not need to pay for an additional vSAN license.[6] VxRail dynamic nodes are available in the E660F, P670F, and V670F VxRail models.[7] For more information visit https://infohub.delltechnologies.com/l/dell-emc-vxrail-and-dell-emc-powerstore-better-together/vxrail-dynamic-nodes-4.

Conclusion

When we compared the MySQL database performance of a four-server solution supporting 16 client VMs from Dell APEX Private Cloud to 16 similarly configured VMs on AWS using the TPROC-C workload from the HammerDB benchmark suite, the Dell APEX Private Cloud solution processed **25.4 percent** more NOPM than the AWS solution. These results indicate that to maximize the performance of MySQL databases and the responsiveness of critical applications, the APEX private cloud solution is the better choice compared to a similarly configured solution running on AWS.

1. HammerDB, "HammerDB TPROC-C workload," accessed April 20, 2023, https://www.hammerdb.com/docs/ch03s03.html.
2. Dell, "Dell APEX Private Cloud," accessed April 20, 2023, https://www.dell.com/en-us/dt/apex/compute-hci/private-cloud.htm.
3. Dell, "APEX Specification Sheet,"accessed May 5, 2023, https://www.delltechnologies.com/asset/en-us/solutions/apex/technical-support/h19142-apex-private-cloud-spec-sheet.pdf.
4. Intel, "3rd Gen Intel® Xeon® Scalable Processors," accessed March 23, 2023,https://www.intel.com/content/www/us/en/products/docs/processors/xeon/3rd-gen-xeon-scalable-processors-brief.html.
5. Dell Technologies, "VxRail dynamic nodes," accessed May 5, 2023, https://infohub.delltechnologies.com/l/dell-emc-vxrail-and-dell-emc-powerstore-better-together/vxrail-dynamic-nodes-4.
6. Dell Technologies, "VxRail dynamic nodes."
7. Dell Technologies, "VxRail dynamic nodes."

Read the science behind this report at https://facts.pt/goK8mQ1 ▶

This project was commissioned by Dell Technologies.

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