A single-socket Dell EMC PowerEdge R7515 solution delivered better value on a transactional database use case than a dual-socket HPE ProLiant DL380 Gen10 solution
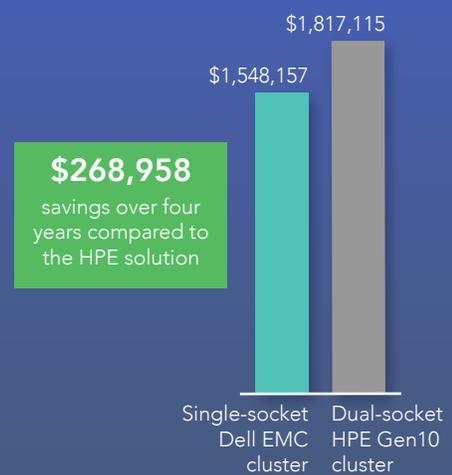
In a VMware vSAN environment, the Dell EMC solution performed more transactional database work for each dollar spent on hardware and software

When companies are shopping for new data center hardware, price and performance are both important. Determining the value of a server requires understanding how well it can run your critical workloads, as well as its upfront and ongoing costs.
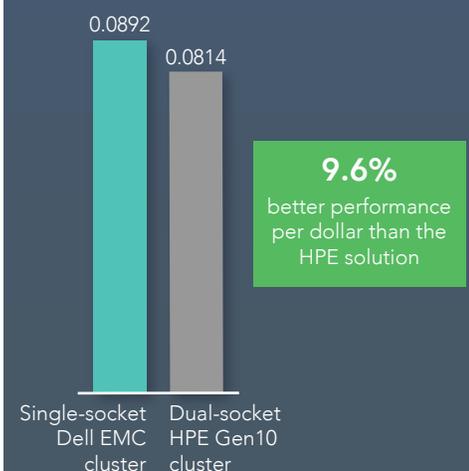
Principled Technologies conducted hands-on transactional database testing of two VMware vSAN™ clusters: one with three single-socket Dell EMC™ PowerEdge™ R7515 servers powered by AMD EPYC™ 7502P processors and one with three dual-socket HPE ProLiant DL380 Gen10 servers powered by Intel® Xeon® Gold 6240 processors. As a baseline, we tested a vSAN cluster with three five-year-old legacy servers. For the current-generation clusters, we also calculated hardware and four-year software costs, which were $268,957.71 lower for the Dell EMC cluster.

Both current-generation vSAN clusters outperformed the legacy cluster, with the Dell EMC PowerEdge R7515 cluster delivering 93.4 percent of the database orders per minute (OPM) that the HPE ProLiant DL380 Gen10 cluster achieved, despite having half the number of physical processors and four fewer cores per server. When we combined performance results with hardware and software costs, the single-socket Dell EMC cluster delivered a 9.6 percent better cost/performance ratio than the dual-socket HPE cluster did.
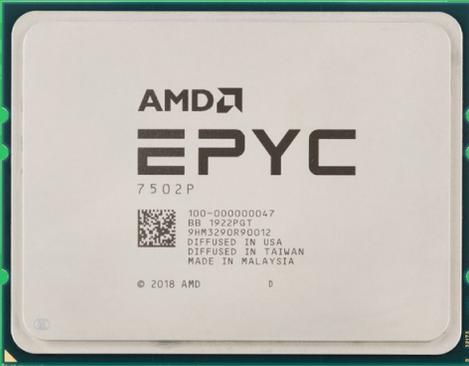
Lower hardware and software costs*

$1,817,115 — Dual-socket HPE Gen10 cluster

$1,548,157 — Single-socket Dell EMC cluster

$268,958 savings over four years compared to the HPE solution

Single-socket Dell EMC cluster | Dual-socket HPE Gen10 cluster

Greater performance for each dollar spent on hardware and software

0.0892 — Single-socket Dell EMC cluster

0.0814 — Dual-socket HPE Gen10 cluster

9.6% better performance per dollar than the HPE solution

Single-socket Dell EMC cluster | Dual-socket HPE Gen10 cluster

For more details on our data, see page 3 of this report.

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About AMD EPYC 7502P processors

2nd Gen AMD EPYC processors are the latest offering from AMD. The Dell EMC PowerEdge R7515 rack servers we tested were each powered by a single AMD EPYC 7502P processor. This 32-core processor uses AMD Infinity Architecture and is part of the AMD EPYC 7002 Series.

Learn more at https://www.amd.com/en/processors/epyc-7002-series.

About our testing

Our hands-on testing compared the following VMware vSAN clusters:

- **Single-socket Dell EMC cluster.** Three new single-socket Dell EMC PowerEdge R7515 servers powered by AMD EPYC 7502P processors. The list price of each server in this cluster as of August 30, 2019 is $32,974.43.[1]
- **Dual-socket HPE Gen10 cluster.** Three new dual-socket HPE ProLiant DL380 Gen10 servers powered by Intel Xeon Gold 6240 processors. The list price of each server in this cluster as of July 16, 2019 is $46,053.00.[2]
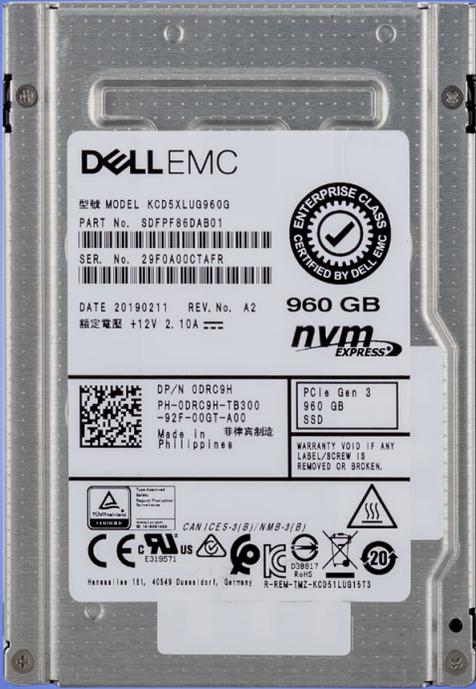
We also tested a legacy vSAN cluster equipped with three five-year-old dual-socket HPE ProLiant DL380 Gen9 servers powered by Intel Xeon E5-2680 v3 processors.

For our legacy baseline cluster, we chose the Intel Xeon E5-2680 v3 12-core processor as a common processor for a 5-year-old server of that generation. For the HPE ProLiant DL380 Gen10 cluster, we chose the Intel Xeon Gold 6240 18-core processor following the published vSAN ReadyNode AF-6 all-NVMe configuration.[3] This configuration gives the HPE cluster 36 cores per server. The Dell EMC PowerEdge R7515 cluster configuration uses the AMD EPYC 7502p 32-core processor and hardware that is certified for vSAN on the VMware Compatibility Guide.[4] The 2nd generation AMD EPYC processor line does not include a 36-core option. So for our comparison, the Dell EMC PowerEdge R7515 cluster had 32 cores per server while the HPE ProLiant DL380 Gen10 cluster had 36 cores per server.

We analyzed the costs of the two current-generation clusters using list pricing for hardware and four-year licensing and support for the following software products: Microsoft Windows Server® 2019 Datacenter, Microsoft SQL Server® 2017 Enterprise, VMware vSphere™ 6.7 U3 Enterprise Plus, and VMware vSAN Enterprise.

We measured the transactional database performance of the clusters using Microsoft SQL Server 2017 and the DVD Store 3 benchmark, which targets a transactional database and produces a metric of orders per minute.

Finally, we compared the price and performance of each solution by calculating a price-to-performance ratio.

A single-socket Dell EMC PowerEdge R7515 solution delivered better value on a transactional database use case than a dual-socket HPE ProLiant DL380 Gen10 solution

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About KIOXIA CD5 Series Data Center NVMe SSDs

In our testing, we used the KIOXIA CD5 Series Data Center NVMe SSD for our capacity tier. According to KIOXIA, "Data Center NVMe is a low latency, very high performance SSD designed to replace SATA in PowerEdge servers. It requires an NVMe SSD infrastructure in the server and is priced to compete with SATA."[5]

It is available in 960GB to 7680GB capacities, and KIOXIA states that it has random read/write capabilities up to 550K/50K IOPS and sequential read/write capabilities up to 3,140/1,980 MB/s.[6]

Learn more at https://business.kioxia.com/en-jp/ssd/data-center-ssd/cd5.html.

Costs for hardware and software

As we noted on the previous page, the retail price of each single-socket Dell EMC PowerEdge R7515 server we used in our testing is $32,974.43. This is $13,078.57, or 28.4 percent, lower than the retail price of each dual-socket HPE ProLiant DL380 Gen10 server, $46,053.00.

Each Dell EMC PowerEdge R7515 server we tested had one 32-core processor, while each of the HPE ProLiant DL380 Gen10 servers we tested had two 18-core processors for a total of 36 cores. This means that in addition to spending less on hardware, a company that invests in the Dell EMC PowerEdge R7515 configuration we tested would also have lower licensing and support costs for any software that uses a per-socket pricing model (such as VMware vSphere and VMware vSAN) or a per-core pricing model (such as Microsoft Windows Server and Microsoft SQL Server). For our Dell EMC PowerEdge R7515 test cluster, the four-year licensing and support costs for these four software packages would be $1,449,234.00. This is $229,722.00, or 13.6 percent less than the $1,678,956.00 licensing and support costs the HPE cluster would incur.[7]

The chart below presents the combined hardware and four-year software costs for the two clusters. The cost for the cluster of single-socket Dell EMC PowerEdge R7515 servers is $268,957.71 less, or 14.8 percent less, than that of the cluster of dual-socket HPE ProLiant DL380 Gen10 servers.

Hardware and software pricing (lower is better)

$1,548,157.29   **$268,957.71 less**

$1,817,115.00

■ Single-socket Dell EMC cluster   ■ Dual-socket HPE Gen10 cluster

A single-socket Dell EMC PowerEdge R7515 solution delivered better value on a transactional database use case than a dual-socket HPE ProLiant DL380 Gen10 solution

Performance

In our performance testing using the DVD Store 3 benchmark, both current-generation clusters dramatically outperformed the legacy cluster, delivering more than 1.5 times the average number of orders per minute the legacy cluster did. This means that a company replacing their older cluster would see performance improvements of 60.6 percent with the single-socket Dell EMC cluster and 71.8 percent with the dual-socket HPE cluster. The performance difference between the two current-generation clusters was modest: the single-socket Dell EMC PowerEdge R7515 cluster delivered 93.4 percent of the OPM the dual-socket HPE ProLiant DL380 Gen10 cluster delivered. (See the science behind the report for more information about our testing.)

	Single-socket Dell EMC cluster	Dual-socket HPE Gen10 cluster	Dual-socket HPE legacy cluster
Orders per minute (higher is better)	138,128	147,873	86,026

About Dell EMC PowerEdge R7515 rack servers

Each Dell EMC PowerEdge R7515 rack server is powered by one AMD 2nd Gen EPYC processor with up to 64 cores. (The configuration we used in our testing had 32 cores.) According to Dell EMC, these servers boast the following high-level specifications:[8]

- Twice as many processing cores and 20 percent more memory performance than the previous-generation AMD processor-based Dell EMC PowerEdge R7415 server
- Faster data transfer with PCIe Gen 4
- Direct connect SAS/SATA/NVMe for vSAN
- High core count performance to support VM density
- Multi-die architecture for low latency and floating-point performance for big data and containers

Learn more at https://www.dell.com/en-us/work/shop/povw/poweredge-r7515.

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Putting performance and pricing together

When we take the number of orders per minute each cluster achieved in a VMware vSAN environment and divide it by the total cost for hardware and four-year licensing and support, we find that the single-socket Dell EMC PowerEdge R7515 cluster achieved a 9.6 percent better cost/performance ratio than the dual-socket HPE ProLiant DL380 Gen10 cluster did.

Performance-to-price ratio (higher is better)

0.0892 — **9.6% better**

0.0814

■ Single-socket Dell EMC cluster   ■ Dual-socket HPE Gen10 cluster

Below is a chart comparing performance and cost data between the two current-generation clusters. The single-socket Dell EMC cluster offered 93.4 percent of the dual-socket HPE cluster's performance at a 14.8 percent lower price point.

	Single-socket Dell EMC cluster	Dual-socket HPE cluster	Difference (percentage)
Orders per minute (OPM)	138,128	147,873	6.59%
Cluster hardware and software costs	$1,548,157.29	$1,817,115.00	14.80%
Cost/performance ratio	0.0892	0.0814	9.64%

A single-socket Dell EMC PowerEdge R7515 solution delivered better value on a transactional database use case than a dual-socket HPE ProLiant DL380 Gen10 solution

Conclusion

If your company is running important business applications in VMware vSAN clusters of servers that are several years old, chances are good that you're considering upgrading to newer hardware. Our testing demonstrated that our clusters of single-socket Dell EMC PowerEdge R7515 servers and clusters of dual-socket HPE ProLiant DL380 Gen10 servers could both improve upon the database performance of a legacy cluster with five-year-old servers by more than 50 percent, with the Dell EMC cluster achieving 93.4 percent of the performance of the HPE cluster.

Due to its lower socket and core counts, the Dell EMC PowerEdge R7515 cluster we tested would require fewer software licenses than the HPE ProLiant DL380 Gen10 cluster. This, along with its lower purchase price, adds up to savings of $268,957.71 over four years. Taking costs and performance together, the Dell EMC cluster achieved 9.6 percent more OPM per dollar than the HPE cluster.

1   Pricing for the Dell EMC PowerEdge R7515 came in an August 30, 2019 quote we received from Dell EMC.

2   Pricing for HPE ProLiant DL380 Gen10 came in a July 16, 2019 quote we received from PCM.com.

3   VMware Compatibility Guide, accessed October 23, 2019,
    https://www.vmware.com/resources/compatibility/detail.php?deviceCategory=vsan&productid=45383&deviceCat-
    egory=vsan&details=1&vsan_type=vsanreadynode&vsan_partner=515&vsan_generation=4&vsan_workload_pro-
    files=AF-6%20Series&page=1&display_interval=10&sortColumn=Partner&sortOrder=Asc.

4   "VMware Compatibility Guide - System Search," accessed January 29, 2020,
    https://www.vmware.com/resources/compatibility/search.php.

5   "CD5 Series Data Center SSD," accessed January 7, 2019,
    https://business.kioxia.com/en-us/ssd/data-center-ssd/cd5.html.

6   CD5 Series Data Center NVMe SSD.

7   Four-year software licensing and support costs for Dell EMC cluster include $73,920 for Microsoft Windows Server 2019 Da-
    tacenter (48 two-core packages @ $1,540 each), $1,319,808 for Microsoft SQL Server 2017 Enterprise (48 two-core packages
    @ $27,496 each), $21,573 for VMware vSphere 6.7 U3 Enterprise Plus (three single-socket licenses with production support @
    $7,191 each), and $33,933 for VMware vSAN Enterprise (three single-socket licenses with production support @ $11,311 each).
    Four-year software licensing and support costs for HPE cluster include $83,160 for Microsoft Windows Server 2019 Datacenter
    (54 two-core packages @ $1,540 each), $1,484,784 for Microsoft SQL Server 2017 Enterprise (54 two-core packages @ $27,496
    each), $43,146 for VMware vSphere 6.7 U3 Enterprise Plus (six single-socket licenses with production support @ $7,191 each),
    and $67,866 for VMware vSAN Enterprise (six single-socket licenses with production support @ $11,311 each).

8   PowerEdge R7515 Rack Server, accessed September 18, 2019, https://www.dell.com/en-us/work/shop/povw/poweredge-r7515.

Read the science behind this report at http://facts.pt/77wh7oy ▶

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This project was commissioned by Dell EMC.

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