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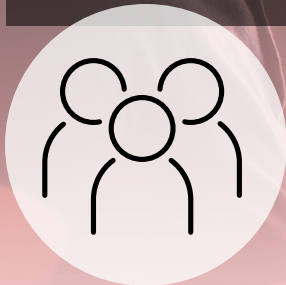
A Dell EMC PowerEdge MX840c did the work of four
HPE ProLiant DL380 Gen9 servers while delivering better performance:

Support more workers
2.8x the VDI users*

Handle more online orders
25% more orders per minute*

Speed time to insight
30% less time to process queries*

Refresh to a Dell EMC PowerEdge MX modular chassis with a PowerEdge MX840c server and improve the performance of critical workloads

A Dell EMC PowerEdge MX840c compute sled, powered by Intel Xeon Platinum processors, did the work of four HPE ProLiant DL380 Gen9 servers—and then some

Are your mission-critical workloads running on legacy servers? An upgrade to newer server technologies could enable you to consolidate these workloads, minimizing the hardware you have to manage and reducing your data center footprint. We put an older HPE ProLiant DL380 Gen9 server to the test against a Dell EMC™ PowerEdge™ MX modular chassis with a PowerEdge MX840c server powered by Intel® Xeon® Platinum 8270 processors, comparing performance across virtual desktop infrastructure (VDI), online transaction processing (OLTP), and data analytics workloads.

The four-socket Dell EMC PowerEdge MX840c hosted these workloads and critical infrastructure database VMs simultaneously and still outperformed the two-socket HPE ProLiant DL380 Gen9: supporting 2.8 times the VDI users, handling 25 percent more orders per minute, and analyzing a query set in 30 percent less time. These results indicate that the Dell EMC solution could do the work of four HPE servers and still deliver stronger results, allowing organizations to consolidate critical workloads onto a single server while enjoying better VDI, OLTP, and analytics performance.

**Dell EMC PowerEdge
MX modular chassis
with PowerEdge
MX840c compute sled**

*Dell EMC PowerEdge MX840c hosting this
workload, two other workloads, and an
infrastructure server simultaneously vs. HPE
ProLiant DL380 Gen9 running each workload
and hosting an infrastructure server individually

How we tested

In order to determine the maximum performance the HPE ProLiant DL380 Gen9 could deliver, we ran each of the three workloads individually on the HPE solution. We then ran these workloads, with comparable parameters, simultaneously on the Dell EMC PowerEdge MX840c. We used similar configurations on both solutions: for example, we created identically configured VMs to run the workloads on each. We also used the same number of VMs for all tests on both testbeds, with the exception of the VDI tests, where the Dell EMC solution was able to support more VMs than the HPE solution. Below are the details of each workload.

- VDI workload: Using VMware Horizon®, Windows 10 desktops, and VMware View Planner, we replicated the behavior of typical office workers interacting with productivity applications such as Microsoft Outlook, Word, Excel, and PowerPoint, as well as web browser-based tools. Using the VMware View Planner benchmark, we determined how many VDI users each solution could support while still delivering acceptable latencies.
- OLTP workload: We used the DVD Store 2 database benchmark to find the maximum number of online orders per minute (OPM) each solution could process.
- Data analytics workload: Using HammerDB, we measured how quickly each solution could complete data warehouse query sets.

The four-socket Dell EMC PowerEdge MX840c with Intel Xeon Platinum 8270 processors handled these workloads while also hosting critical data center infrastructure VMs, doing the work of four two-socket HPE ProLiant DL380 Gen9 servers (one server per workload plus an additional infrastructure server, which hosted critical services such as Active Directory, Domain Controller, and DNS services, VMware Horizon® Composer and Connection servers, and a vCenter® virtual appliance). We were able to scale up workload performance on the Dell EMC PowerEdge MX840c and still keep CPU utilization below 90 percent; by contrast, CPU utilization on the HPE solution was a minimum of 89.2 percent (OLTP workload) and a maximum of 99.2 percent (VDI workload). For more details about our testing and the configurations we used, see the science behind the report.

4:1 consolidation ratio:

VDI workload

HPE ProLiant DL380 Gen9

OLTP workload

HPE ProLiant DL380 Gen9

Data analytics workload

HPE ProLiant DL380 Gen9

Infrastructure

HPE ProLiant DL380 Gen9

Dell EMC PowerEdge MX840c running all three workloads and infrastructure VMs simultaneously

Image provided by Dell

Support more VDI users

To determine the maximum number of virtual desktop users each solution could support, we ran VMware View Planner 4.5, a benchmarking tool that emulates the activity of a typical office worker using productivity apps. On the HPE ProLiant DL380 Gen9, we could support only 60 virtual desktops running Windows 10 VMs before the benchmark reported response latency scores outside of the acceptable range. The Dell EMC PowerEdge MX840c, on the other hand, supported 170 virtual desktops while still delivering acceptable response times. (We configured these VMs comparably on each solution.) These results indicate that the Dell EMC PowerEdge MX840c could support almost three times as many employees—enabling organizations to host more VDI users without having to invest in new hardware—while simultaneously running the other test workloads and hosting infrastructure VMs.

VDI workload

The Dell EMC PowerEdge MX840c achieved its performance while simultaneously running two other workloads and hosting infrastructure VMs. The HPE ProLiant DL380 Gen9 ran a single VDI workload and hosted infrastructure VMs separately.

(number of VMs each solution supported)

Dell EMC PowerEdge MX840c

170 ———— **2.8x** *the VDI users*

HPE ProLiant DL380 Gen9

60

Figure 1: Number of VMs each solution supported. Higher is better. Source: Principled Technologies.

About Intel Xeon Scalable processors

The 2nd Generation Intel Xeon Scalable processor platform offers multiple tiers of performance (Bronze, Silver, Gold, and Platinum) to support specific workloads and meet varying needs. According to Intel, the 2nd Generation Intel Xeon Scalable platform can handle a variety of workloads, including enterprise, cloud, HPC, storage, and communications.[1] To learn more about the 2nd Generation Intel Xeon Scalable processor family, visit **https://www.intel.com/content/www/us/en/products/processors/xeon/scalable.html**.

Handle more online orders

We created four comparably configured VMs running Windows Server 2019 on each solution, then ran the DVD Store 2 benchmark on each VM. DVD Store 2 runs a workload that models customer activity at an online store, demonstrating how many orders per minute a system can handle—and consequently what the kind of performance organizations using that system could expect. Figure 2 shows the total OPM across each system's four VMs; for more details, including the OPM each individual VM supported, see the science behind the report. The Dell EMC PowerEdge MX840c handled 25 percent more OPM than the HPE ProLiant DL380 Gen9 while simultaneously supporting the VDI and analytics test workloads and infrastructure VMs. With this ability to support more online customers while hosting other critical workloads, organizations using the Dell EMC solution could expand their customer base, potentially increasing revenue.

OLTP processing workload

The Dell EMC PowerEdge MX840c achieved its performance while simultaneously running two other workloads and hosting infrastructure VMs. The HPE ProLiant DL380 Gen9 ran a single OLTP workload and hosted infrastructure VMs separately.

(orders per minute or OPM)

Dell EMC PowerEdge MX840c

92,267 — **25%** *more OPM*
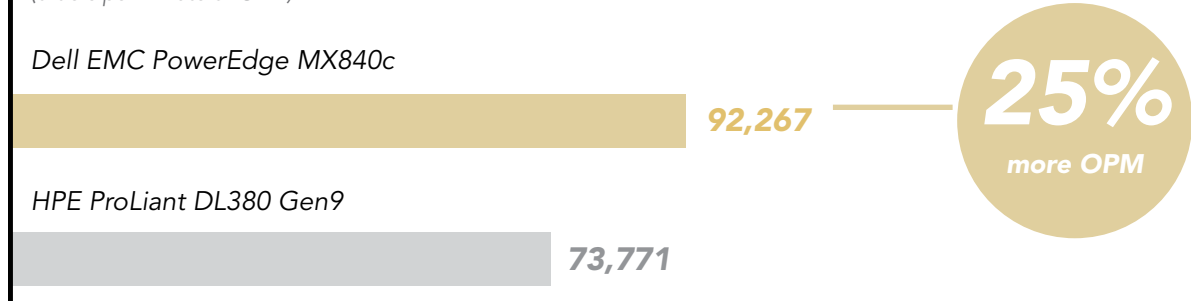
HPE ProLiant DL380 Gen9

73,771

Figure 2: Number of orders per minute each solution processed. Higher is better. Source: Principled Technologies.

About the Dell EMC PowerEdge MX modular solution

This modular chassis comes equipped with eight front bays that can hold up to four PowerEdge MX840c compute sleds. According to Dell EMC, the PowerEdge MX solution "is designed to support a combination of dense virtualization, software-defined storage, software-defined networking, AI and big data projects."[2] Scalable SmartFabric integrates the Intel Ethernet Network Adapter XXV710, which Intel describes as "for 25GbE connectivity that is backwards compatible to 1/10GbE, making migration to higher speeds easier."[3] For more information about how these technologies could enable faster VM migrations, see the August 2018 Principled Technologies report **Migrate VMs faster with a new Dell EMC PowerEdge MX solution**.

Learn more about the family of Dell EMC PowerEdge MX modular infrastructure products at **https://www.delltechnologies.com/en-us/servers/modular-infrastructure/poweredge-mx/index.htm**.

Speed time to insight

To measure how quickly each solution could analyze data, we created a TPC-H-like database and loaded it onto four VMs per solution. (We configured these VMs comparably on each solution.) We then used HammerDB to run an online analytical processing workload on the VMs. Below, we show the time it took each solution to complete database queries on all four VMs (Figure 3). For the full details of our testing, see the science behind the report. The Dell EMC PowerEdge MX840c analyzed the data in 30 percent less time than the HPE ProLiant DL380 Gen9 while simultaneously running the other workloads we tested and hosting infrastructure VMs. With the insights gleaned from faster data analysis, organizations can move more quickly to make strategic decisions that boost profits.

Data analytics workload

The Dell EMC PowerEdge MX840c achieved its performance while simultaneously running two other workloads and hosting infrastructure VMs. The HPE ProLiant DL380 Gen9 ran a single analytics workload and hosted infrastructure VMs separately.

(min:sec)

Dell EMC PowerEdge MX840c

1:28 — **30%** less time to analyze dataset

HPE ProLiant DL380 Gen9

2:07

Figure 3: Time to complete a 22-query set (min:sec). Lower is better. Source: Principled Technologies.

About the Dell EMC PowerEdge MX840c

Part of the PowerEdge MX kinetic infrastructure ecosystem, the Dell EMC PowerEdge MX840C is a four-socket compute sled that can support up to four 28-core 2nd Generation Intel Xeon Scalable processors. Dell EMC describes it as a "scalable, high-performance modular server" that provides "dense four-socket compute, memory and storage for the modern data center."[4] The Dell EMC PowerEdge MX840C can support up to 48 DDR4 DIMMs and up to eight 2.5-inch SAS/SATA (HDD/SDD) or NVMe™ PCIe SSD drives. Learn more at **https://www.dell.com/en-us/work/shop/povw/poweredge-mx840c**.

Dell EMC PowerEdge MX840c

Image provided by Dell

Scale up compute resources with just a few steps

Typical server deployment can be complex and time-consuming. It requires racking, cabling, assigning a dedicated power source, and in some cases reconfiguring the network and system settings. But with the Dell EMC PowerEdge MX modular solution, adding an additional compute node requires simply inserting a new compute sled into the MX chassis and applying a pre-configured server template. Moreover, the modular structure creates a framework for future expansion: although we tested with a single PowerEdge MX840c compute sled, we could have added three additional nodes to the MX chassis without racking more infrastructure, increasing the datacenter footprint or adding more cabling.

Admins can leverage the embedded Dell EMC OpenManage Enterprise software to create a deployment template from a reference device to automatically clone multiple system settings such as networking, BIOS, RAID, and iDRAC across multiple servers. They can also apply deployment templates to multiple servers at once, or assign these templates to empty chassis slots in anticipation of inserting new servers into the chassis. With the Dell EMC PowerEdge MX modular solution, we were able to create and deploy a new server template in 10 steps and just 1 minute and 40 seconds.

Note that, for our test environment, we used a Dell EMC Unity external storage array to provide storage to the PowerEdge MX840c compute node. Organizations using this same setup could add three additional PowerEdge MX840c compute sleds to the existing chassis while taking advantage of the external SAN-based storage on the Dell EMC Unity array. For the HPE testbed, we used a legacy NFS storage array. Note that neither the HPE nor Dell EMC solutions faced storage limitations in our testing; in other words, storage was never a bottleneck that affected workload performance.

Improve CPU utilization

CPU utilization indicates how much strain a workload is putting on a system, and what capacity the system has to handle other work. A solution that can handle critical workloads while utilizing a lower percentage of CPU capacity is thus preferable. While simultaneously handling all three workloads and hosting critical database infrastructure VMs, the Dell EMC PowerEdge MX840c outperformed the HPE solution and still only reached a maximum CPU utilization of 89.8 percent. The HPE ProLiant DL380 Gen9, by contrast, encountered CPU bottlenecks on the VDI and data analytics workloads. On the OLTP workload, the HPE ProLiant DL380 Gen9 reached a CPU utilization of 89.2 percent, but did so while delivering 25 percent fewer OPM than the Dell EMC PowerEdge MX840c. When we tried to increase the number of orders per minute past that CPU utilization threshold, OLTP performance on the HPE solution degraded.

Table 1: CPU utilization (percentage) on the Dell EMC PowerEdge MX840c.

	CPU utilization (percentage) on the Dell EMC PowerEdge MX840c
While running three workloads concurrently (VDI, OLTP, and analytics) + infrastructure VMs	89.8%

Table 2: CPU utilization (percentage) on the HPE ProLiant DL380 Gen9.

	CPU utilization (percentage) on the HPE ProLiant DL380 Gen9
While running only VDI workload	99.2%
While running only OLTP workload	89.2%
While running only data analytics workload	98.7%

Conclusion

We ran VDI, OLTP, and analytics workloads simultaneously on a Dell EMC PowerEdge MX modular chassis with a four-socket PowerEdge MX840c server and individually on a two-socket HPE ProLiant DL380 Gen9. Even while running these workloads and hosting infrastructure VMs simultaneously, the Dell EMC solution still outperformed the HPE solution on all three workloads. With this modular solution from Dell EMC, organizations could replace four HPE ProLiant DL380 Gen9 servers with a single solution that offers better performance on critical workloads—freeing data center space and reducing the hardware management burden.

1   Intel, "Intel Xeon Scalable processors," accessed October 13, 2020, https://www.intel.com/content/www/us/en/products/processors/xeon/scalable.html.

2   Ravi Pendekanti, "Meet PowerEdge MX, the First Platform Designed with Kinetic Infrastructure," accessed October 14, 2020, https://blog.dellemc.com/en-us/announcing-poweredge-mx/.

3   Intel, "Intel® Ethernet Network Adapter XXV710," accessed October 14, 2020, https://www.intel.com/content/www/us/en/products/docs/network-io/ethernet/network-adapters/ethernet-xxv710-brief.html.

4   Dell EMC, "MX840c Spec Sheet," accessed October 13, 2020, https://i.dell.com/sites/csdocuments/Product_Docs/en/poweredge-mx840c-spec-sheet.pdf.

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

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This project was commissioned by Dell Technologies.