PROWESS

Dell™ Servers Versus HPE® Servers for Virtualization: a CSP-Centric Price-Performance Comparison

Analysis conducted by Prowess Consulting finds that Dell™ PowerEdge™ R650xs servers can provide better overall value and relative performance for transactional and virtualization workloads, compared to HPE® ProLiant® DL360 Gen10 Plus servers.

Technical Research Report

Moreso than enterprises, tier-2 and tier-3 cloud service providers (CSPs) and other small and medium-sized businesses (SMBs) need servers that can strike a balance between meeting medium-duty virtualization and transactional workloads. Because Dell Technologies and Hewlett Packard Enterprise (HPE) are the two largest server vendors in the world by market share, Prowess Consulting evaluated servers targeted at virtualization and transactional workloads by price performance: the Dell™ PowerEdge™ R650xs server and the HPE® ProLiant® DL360 Gen10 Plus server. Our evaluation and testing showed that Dell PowerEdge R650xs with out-of-the-box settings provided 2.12x performance and supported 11 percent more virtual machines (VMs) than the HPE ProLiant DL360 Gen10 Plus with default settings, all while costing 12 percent less.

Market Trends for CSPs

The question for many organizations is whether to run workloads on-premises or in the cloud. Deploying workloads to the cloud can open the door to almost infinite scalability, whereas on-premises implementations can provide lower latency and help solve tricky issues with data sovereignty. But what if your premises are the cloud? What are your choices if you are a CSP?

Customers come to tier-2 and tier-3 CSPs for lower costs and more individualized customer service. Smaller-size and specialty cloud players make up a crucial part of the cloud ecosystem by being closer to their customers and better knowing (and accommodating) their needs. However, this market niche comes with its own challenges, with price competition being prominent among those challenges.

Hardware selection is intimately tied up with CSPs' strategies for controlling costs while meeting their customers' needs. Not only must server hardware be efficient in terms of both VM density and power draw, but it must also be at a price point at which CSPs can viably refresh their hardware as necessary.

Dell™ PowerEdge™ R650xs servers with default settings supply:

12%
lower cost

2.12x
more new orders per minute (NOPM)

11%
greater VM capacity

than HPE® ProLiant® DL360 Plus servers with default settings

Study Motivation and Methodology

Dell Technologies and HPE are the number 1 and number 2 worldwide server vendors by revenue, respectively.[1] Each of these two server titans has server platforms geared toward medium-duty virtualization with low-to-medium local storage capacity: the Dell™ PowerEdge™ R650xs server and the HPE® ProLiant® DL360 Gen10 Plus server. When coupled with scale-out capabilities, both servers are targeted at CSPs.

Prowess Consulting examined differentiators between these two workhorse products from Dell Technologies and HPE for sub-enterprise organizations such as tier-2 and tier-3 CSPs to help you determine which server provides the best value for your workloads. Our investigation included examining both quantitative and qualitative differentiators of the servers. In order to compare these servers, we looked at configurations of the Dell PowerEdge R650xs server and the HPE ProLiant DL360 Gen10 Plus server that were as identical as possible, as detailed in Table 1.

Table 1. System configurations used for testing

Component	Dell™ PowerEdge™ R650xs	HPE® ProLiant® DL360 Gen10 Plus
Processor	2 x Intel® Xeon® Silver 4310 processor	
Memory	8 x 16 GB 3,200 megatransfers per second (MT/s)	
Storage	4 x 480 GB mixed-use Serial ATA (SATA®) solid-state drive (SSD)	
RAID	Dell™ PowerEdge RAID Controller 10 (PERC 10) H745 with rear-load bracket	HPE® Smart Array P816i-a SR Gen10
Network interface controller (NIC)	Broadcom® 57414 dual-port	Broadcom® 57416 dual-port
Baseboard management controller (BMC)	Integrated Dell™ Remote Access Controller 9 (iDRAC9)	HPE® Integrated Lights Out (iLO) 5
Server profile setting	General Power Efficient Compute(default)	Performance Per Watt(default)

Quantitative Differentiators

The quantitative differentiators that Prowess captured between the Dell PowerEdge R650xs and HPE ProLiant DL360 Gen10 Plus servers were purchase price and performance. The Dell PowerEdge R650xs server was the clear winner in terms of both price and performance.

Cost of Acquisition

The Dell PowerEdge R650xs server costs 12 percent less. This price difference takes into account the cost to purchase all of the hardware for the Dell PowerEdge R650xs and HPE DL360 Gen10 Plus configurations detailed in Table 1. Given the extreme similarities between the two server configurations in terms of memory, storage, and power, we presumed that operating expenses for the two servers would be close to identical.
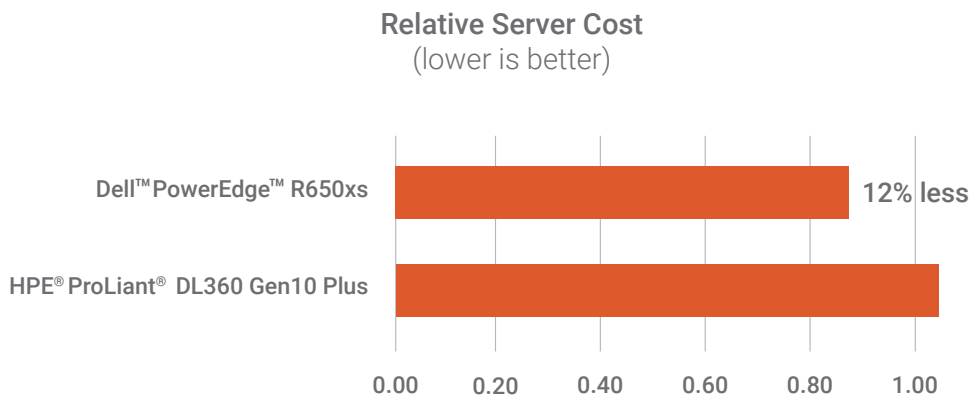
Relative Server Cost
(lower is better)

Figure 1. Relative cost of acquisition of servers evaluated in this study

Part of the cost advantage of the Dell PowerEdge R650xs server is that it is optimized for virtualized workloads. The Dell PowerEdge R650xs server is available with processors with up to 32 cores, the maximum number of cores supported by VMware vSphere® without additional licenses. The Dell PowerEdge R650xs server is also designed to use memory efficiently. Its 16 DIMM slots can support sufficient memory for VMs so that virtualization workloads can fully utilize all of the threads available from the processors, while only requiring a smaller, more cost-effective motherboard for the server. Overall, the server is designed to meet the needs of Dell Technologies customers who plan to optimize VM density on the Dell PowerEdge R650xs server (such as CSPs).

Performance Test Results

Beyond pricing, the Dell PowerEdge R650xs server differentiated itself from the HPE ProLiant DL360 Gen10 Plus server in terms of performance. Prowess tested the performance of the servers using the MySQL® HammerDB online transaction processing (OLTP) benchmark. The results of the OLTP testing are shown in Figure 2.
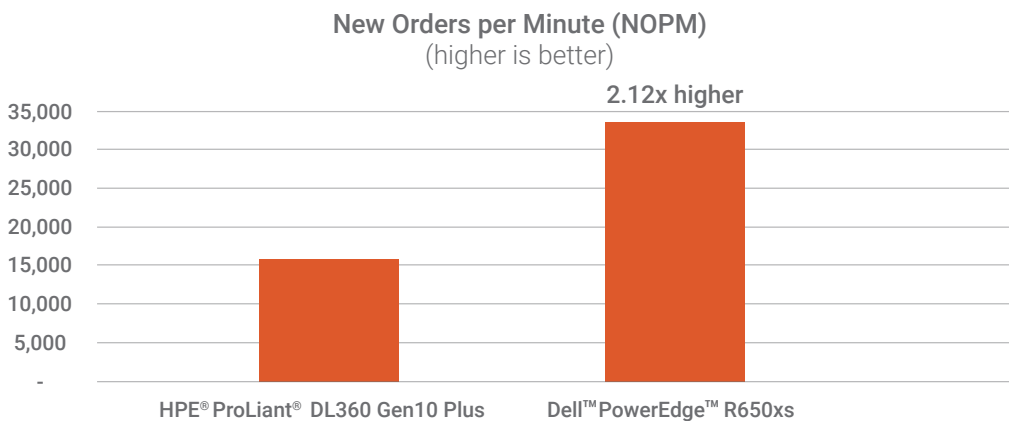
New Orders per Minute (NOPM)
(higher is better)

Figure 2. HammerDB results on MySQL® transactional-processing performance of servers evaluated as measured in new orders per minute (NOPM)

Prowess tested both servers using default system profile settings. The default system profile on the Dell PowerEdge R650xs—Performance Per Watt (Dell Active Power Controller)—achieved over twice the performance compared to the default Workload Profile on the HPE ProLiant DL360 Gen10 Plus (General Power Efficient Compute). To achieve better performance on the HPE ProLiant DL360 Gen10 Plus, a business would need to spend time and money on server firmware tuning. Note that the HPE ProLiant DL360 Gen10 Plus comes with 13 Workload Profiles,[2] and the Dell PowerEdge R650xs has four system profile settings.[3]

We also evaluated server VM capacity on both servers. To do so, we ran the stress-ng VM load generator as we incrementally started additional VMs on each server until we could start no more VMs. The final VM capacities for the two servers are shown in Figure 3, with the Dell PowerEdge R650xs ultimately supporting 20 VMs and HP ProLiant DL360 Gen10 Plus being able to run 18 VMs.
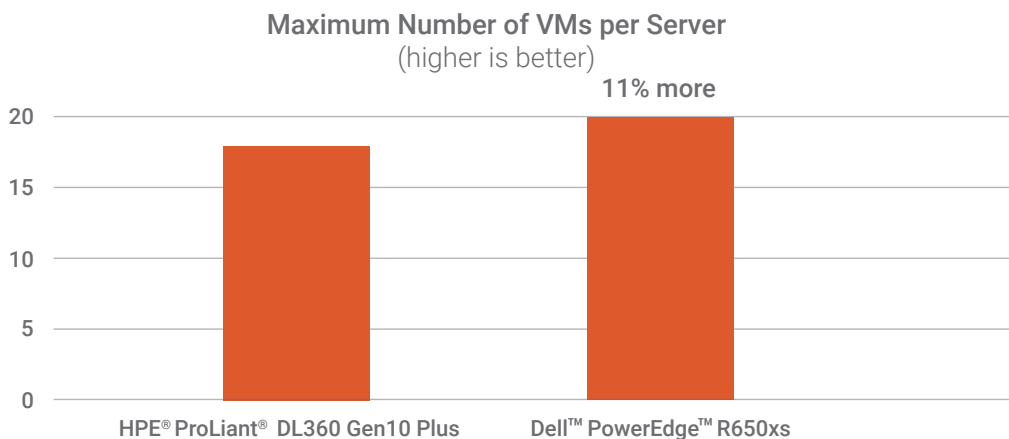
Maximum Number of VMs per Server
(higher is better)

Figure 3 . VM capacity of servers evaluated in this study

Qualitative Differentiators

The Dell PowerEdge R650xs server and the HPE DL360 Gen10 Plus server also differed in qualitative ways. While these qualitative differences ultimately stem from the different business models of the respective OEMs, they manifested themselves in the fulfillment experience that Prowess had and the support experience projected for the future.

Fulfillment

Because Dell Technologies is a direct seller of IT hardware, shopping and fulfillment was both faster and easier with Dell than with HPE. Being able to shop directly from the Dell.com website saved considerable time. The estimated shipping time was also explicitly provided on Dell.com as part of the shopping process; Dell quoted delivery several weeks out but was able to commit to fulfillment.

By contrast, shopping for the HPE server proved to be more time consuming and frustrating. Entry into the HPE sales funnel proved challenging: acquiring the price quote for the HPE ProLiant DL360 Gen10 Plus required phone calls, chat exchanges, and emails to different parts of the HPE sales apparatus. Once in the sales channel, getting an actual price quote was delayed from HPE due to its initial inability to fulfill the order.

For tier-2 and tier-3 CSPs, the delay and uncertainty in getting hardware could prove untenable. The ease and predictability of fulfillment with Dell Technologies better meets the needs of CSPs and similarly sized small and medium-sized businesses (SMBs) and small enterprises.

Ease of Support

Direct sales from Dell Technologies also trigger a subsequent single channel for support directly from Dell Technologies. The single channel eases potential repairs or returns down the road; Dell Technologies customers only have to deal with one party to address hardware issues.

On the other hand, the channel-based sales from HPE can also translate to more complicated support for HPE customers. Future support requests will necessarily involve the channel partner, the distributor, and finally HPE. Rather than providing a single point of contact, the multiplicity of parties involved in support issues can potentially invite buck-passing and costly delays for customers in fixing hardware problems. The channel arrangement could also make repairs or returns more complex.

Intel® Xeon® Scalable Processor Benefits

Both servers benefited from being powered by Intel® Xeon® Silver processors. 3rd Gen Intel Xeon Scalable processors can boost transactional and virtualization workloads in a number of ways. The mesh architecture in 3rd Gen Intel Xeon Scalable processors improves performance between all CPU cores (and threads) and memory, which boosts overall server performance.

3rd Gen Intel Xeon Scalable processors can also specifically improve the performance of virtualized workloads. Intel® Virtualization Technology (Intel® VT-x) helps improve the manageability of virtualized workloads. Intel® Virtualization Technology for Directed I/O (Intel® VT-d) helps improve the security, reliability, and performance of input/output (I/O) devices in virtualized environments. And Intel VT-x with Extended Page Tables (EPT) provides acceleration for memory-intensive virtualized applications.

Prowess Research Uncovers a Clear Winner

In their ruthlessly competitive space, CSPs need cost-efficient hardware that can meet their customers' needs for performant VMs. At the same time, CSPs also need time-efficient means of acquiring their servers and getting support for them.

In Prowess testing and research, the Dell PowerEdge R650xs server had a clear advantage over the HPE ProLiant DL360 Gen10 Plus server in all of these areas. The Dell PowerEdge R650xs server was less expensive up front and more performant for transactional and virtualization workloads. It was also easier to purchase using the Dell Technologies direct sales model, which can make support, returns, and repairs easier.

Appendix

Complete configuration and price data for the HPE ProLiant DL360 Gen10 Plus server and the Dell PowerEdge R650xs server tested by Prowess Consulting in the course of this study are provided in Table 2.

Table 2. System configuration information for the HPE ProLiant DL360 Gen10 Plus server and the Dell PowerEdge R650xs server tested by Prowess Consulting

Model Name	HPE® ProLiant® DL360 Gen10 Plus	Dell™ PowerEdge™ R650xs
Price	$11,847.45	$10,399.46
CPU	Intel® Xeon® Silver 4310 processor at 2.10 GHz	Intel Xeon Silver 4310 processor at 2.10 GHz
Number of CPUs	2	2
Cores/threads per CPU	12/24	12/24
Cores/threads total	24/48	24/48
Frequency (base/SCT/MCT)	2,100 MHz	2,100 MHz
Storage controller 01	HPE® Smart Array P816i-a SR Gen10	Dell™ PowerEdge RAID Controller 10 (PERC 10) H745 Front
Disk	HPE® Hynix® MK000480GWXFF	Samsung® MZ7KH480HAHQ0D3
Number of disks	4	4
Installed memory	128 GB	128 GB
Memory DIMM	Samsung® M393A2K43DB3-CWE	Samsung M393A2K43DB3-CWE
Memory speed	3,200 MHz	3,200 MHz
Number of memory DIMMs	8	8
Operating system (OS)	Red Hat® Enterprise Linux® (RHEL)	Red Hat Enterprise Linux (RHEL)
OS version	8.6	8.6
OS kernel	4.18.0-372.9.1.el8.x86_64	4.18.0-372.9.1.el8.x86_64
Microsoft® SQL Server® version	8.0.26	8.0.26
BIOS version	1.60	1.6.5
Power supply	2 x 800 W	2 x 800 W

[1] IDC. "Worldwide Server Market Revenue Declined 2.5% Year Over Year in the Second Quarter of 2021, According to IDC." September 2021. www.idc.com/getdoc.jsp?containerId=prUS48221821.

[2] HPE. "UEFI System Utilities and Shell Command Mobile Help for HPE ProLiant Gen10, ProLiant Gen10 Plus Servers and HPE Synergy." https://techlibrary.hpe.com/docs/iss/proliant-gen10-uefi/GUID-0F617844-8783-4C74-B8A0-86246A1E723F.html.

[3] Dell. "Dell EMC PowerEdge R650xs BIOS and UEFI Reference Guide." https://www.dell.com/support/manuals/en-uk/poweredge-r650xs/per650xs_bios_ism_pub/system-profile-settings?guid=guid-0f37d9fa-7afc-4ada-a896-b65cfb62b1da&lang=en-us.

[4] Prowess evaluation of OEM fulfillment times was based on time and availability supplied by the vendors.

[5] Intel. "Intel® Xeon® Scalable Platform." June 2017. www.intel.com/content/dam/www/public/us/en/documents/product-briefs/xeon-scalable-platform-brief.pdf.