Achieve faster analytics performance and better energy efficiency on Dell PowerEdge R7625 servers powered by AMD EPYC 9654 processors

Based on our results, seven legacy HPE ProLiant DL380 Gen10 servers could consolidate onto one Dell™ PowerEdge™ R7625

Effective analytics enable organizations to make swift, data-driven decisions; respond to customer needs with agility; and identify competitive opportunities. However, these workloads can demand significant computational resources, leading to high energy costs. To address energy demands and boost performance, organizations should consider updating their data center with newer, energy-efficient servers such as Dell PowerEdge R7625 servers with AMD EPYC™ 9654 processors.

Our tests with the HammerDB TPROC-H workload show that replacing seven-year-old HPE ProLiant DL380 Gen10 servers powered by 16-core Intel® Xeon® Gold 6142 processors with Dell PowerEdge R7625 servers powered by 96-core AMD EPYC 9654 processors could speed up data analytics—enough that a single PowerEdge R7625 can do 7.8 times the work of the legacy system. This jump in performance can improve an organization's data-driven decision-making or even allow them to consolidate seven older servers onto a single new Dell PowerEdge R7625 (with headroom), paving the way to shrink data center costs. In addition to the performance boosts and competitive advantages that the PowerEdge R7625 can bring, replacing the seven-year-old server could alleviate escalating maintenance costs, avoid warranty expiration, and minimize other risks from keeping the older server in production.

The Dell PowerEdge R7625 also improved energy efficiency in a head-to-head comparison, offering 2.9 times the performance per watt of the legacy HPE ProLiant DL380 Gen10. Or, consolidating seven legacy servers onto a single new Dell PowEdge R7625 would cut power utilization by 61.2 percent. Moving from legacy HPE ProLiant DL380 Gen10 servers to higher-performing, energy-efficient Dell PowerEdge R7625 servers can give organizations a strong platform for data analytics while helping them potentially cut operating costs and leaving room for future growth.
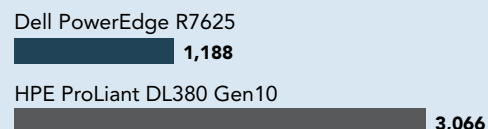
Process data analytics faster

7.8x more queries per hour

Dell PowerEdge R7625
385

HPE ProLiant DL380 Gen10
48
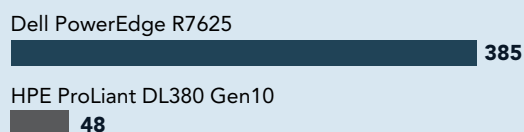
Save money on energy costs with better energy efficiency

61.2 percent less power utilization consolidating 7 legacy servers to 1 Dell PowerEdge R7625

Dell PowerEdge R7625
1,188

HPE ProLiant DL380 Gen10
3,066

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How we tested

We used the TPROC-H workload from the HammerDB benchmark to analyze queries on PostgreSQL 16 databases running on virtual machines using VMware vSphere 8 as the hypervisor. While running the TPROC-H workload, we captured power consumption by using iLO and iDRAC sensor data. We recorded performance statistics from the benchmark and power utilization from the following servers:

- Legacy HPE ProLiant DL380 Gen10 server with 16-core Intel Xeon Gold 6142 processors
- Current-gen Dell PowerEdge R7625 server with 96-core AMD EPYC 9654 processors

During testing, the average CPU utilization for the legacy solution was 77.6 percent and the average CPU utilization for the PowerEdge R7625 was 78.3 percent. Due to the nature of the TPROC-H tests, some VMs finished the work before others which contributed to lower CPU utilization as the test progressed. Peak CPU utilization for both servers was 100 percent.

To learn more about the configurations we tested and see step-by-step details for completing testing, please see the science behind the report.

New vector search in PostgreSQL makes it suitable for AI

If your organization is looking to the future, adding PostgreSQL extensions pgai and pgvector can expand PostgreSQL databases to include vector data used in high-profile, high-potential artificial intelligence (AI) or machine learning (ML) workloads.

Some AI applications, such as large language models (LLMs), rely on vector search capabilities in databases for development and maintaining data during training. As one vendor defines them, "Vector databases make it easier for machine learning models to remember previous inputs, allowing machine learning to be used to power search, recommendations, and text generation use-cases."[1]

To adapt PostgreSQL to meet developers' growing AI needs, two new open-source extensions—pgai and pgvectorscale—add new capabilities for building AI applications.[2] According to Timescale, "Pgai is a PostgreSQL extension that brings more AI workflows to PostgreSQL, like embedding creation and model completion," while "pgvectorscale enables developers to build more scalable AI applications with higher-performance embedding search and cost-efficient storage."[3]

Using PostgreSQL in this way can offer many advantages, including:[4, 5, 6]

- Storing vector data alongside relational data in a single PostgreSQL database can help simplify your architecture and reduce the need for multiple databases or services
- SQL features, such as joins, subqueries, and window functions, can enable powerful and complex queries that combine relational and vector data

- Scalability that can extend to vector data
- Simplified AI workload deployment and management from centralized data stores and simple data transfer processes
- Saving on AI workload costs by choosing PostgreSQL with pgvector compared to a specialized vector database

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About Dell PowerEdge R7625 servers

The Dell PowerEdge R7625 is a two-socket, 2U server that features 4th Generation AMD EPYC processors. Compared to the legacy HPE solution we tested, the PowerEdge R7625 offers six times the processor cores and a significant RAM upgrade. It also supports the option for DLC for efficient cooling of high-performance processors.

According to Dell, the PowerEdge R7625 "easily expands and is ideal for traditional and emerging workloads like: High Performance Compute (HPC), Virtual Desktop Integration (VDI), [and] Data Analytics."[7]

To learn more about the Dell PowerEdge R7625, visit https://i.dell.com/sites/csdocuments/Product_Docs/en/poweredge-r7625-spec-sheet.pdf.

Hands-on testing shows the benefits of the Dell PowerEdge R7625

Are you looking to complete analytics workloads faster? Test results show that moving to a new Dell PowerEdge R7625 server with AMD EPYC 9654 processors can speed up data analytics and optimize power utilization compared to running analytics on a legacy HPE ProLiant DL380 Gen10 server with Intel Xeon Gold 6142 processors. We present results below for comparison with the legacy server. For detailed performance results, see the science behind the report.

About HammerDB TPROC-H

Per HammerDB, the creator of this workload and the harness we use to run it, TPROC-H "represents the typical workload of a retailer running analytical queries about their operations."[8] Results from TPROC-H are, however, useful outside of retail environments. Any organization, from finance to healthcare and beyond, that runs data analytics or decision support workloads might find value in these test results.

TPROC-H outputs results in terms of how long a system takes to complete sets of queries. HammerDB derived this workload from the TPC-H benchmark specifications, but it is not a full implementation of official TPC-H standards. Consequently, TPROC-H results are not directly comparable to published TPC-H results.

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Run more analytics query sets per hour

When we compared the Dell PowerEdge R7625 server to the HPE ProLiant DL380 Gen10, we found that the new AMD processor-powered server completed 7.8 times as many TPROC-H query sets per hour (see Figure 1).
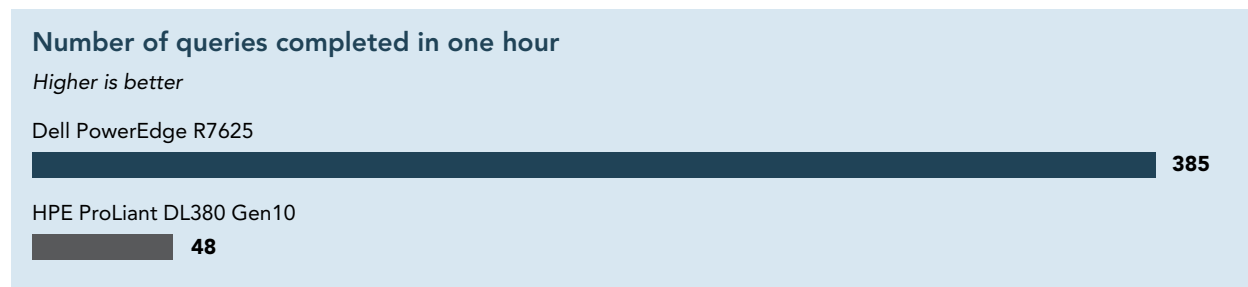
Number of queries completed in one hour
Higher is better

Dell PowerEdge R7625
385

HPE ProLiant DL380 Gen10
48

Figure 1: The number of query sets each system would able to complete in one hour. Higher numbers are better.
Source: Principled Technologies.

The Dell PowerEdge R7625 was able to support more than six times as many VMs as the legacy HPE ProLiant DL380 Gen10—38 compared to 6—and completed all queries in just 355 seconds, compared to 441 seconds. By choosing servers that can support more workloads and complete analytics faster, your organization can get answers in less time, which improves your ability to make quick decisions.

Improve energy efficiency

Power and cooling costs don't appear to be dropping anytime soon, so optimizing energy efficiency can have positive impact on your data center operating costs. When we captured power consumption of the servers during our TPROC-H tests, we found that the Dell PowerEdge R7625 consumed more power overall, but only because it was handling so much more work than the HPE ProLiant DL380 Gen10. We divided the total server performance by the average consumed power to compare overall energy efficiency. As Figure 2 shows, the Dell PowerEdge R7625 with AMD EPYC 9654 processors offered 2.9 times the performance per watt of the legacy server—making it a better choice for organizations seeking to optimize energy efficiency.

Figure 2: Performance per watt for the two systems, normalized to the performance of the HPE ProLiant DL380 Gen10. Higher numbers are better. Source: Principled Technologies.

Normalized performance per watt
Higher is better

Dell PowerEdge R7625
2.9

HPE ProLiant DL380 Gen10
1

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The Dell PowerEdge R7625 can put you on the path to savings through consolidation

To put the performance gains of the Dell PowerEdge R7625 in a different context—because it can do 7.8 times the data analysis work of a HPE ProLiant DL380 Gen10 server, an organization could replace seven legacy servers with a single PowerEdge R7625. This would allow them to complete the same amount of data analysis queries they currently do, while leaving headroom for future growth as well.

Figure 3 shows the number of servers needed to complete a set data analysis workload.

Consolidation ratio

Lower is better

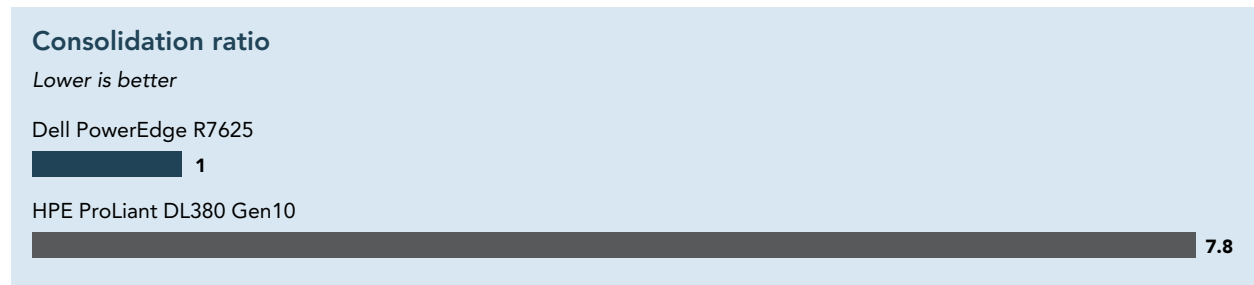Dell PowerEdge R7625
1

HPE ProLiant DL380 Gen10
7.8

Figure 3: Consolidation ratio of older HPE ProLiant DL380 Gen10 servers to the new Dell PowerEdge R7625. Lower numbers are better. Source: Principled Technologies.

Consolidating your data center in this manner can lead to savings: in maintenance time, per-server licensing costs, rack space, and also power and cooling costs. We monitored the energy consumption of the servers during our tests. Because our results show that a single Dell PowerEdge R7625 could replace seven older HPE ProLiant DL380 Gen10 servers, we estimate that the average power consumption for seven legacy servers would be 3,066 watts during this workload, while a single PowerEdge R7625 consumes only and average 1,188 watts—a 61.2 percent decrease in average power consumption for the same work (see Figure 4).

Average energy consumption

Watts | Lower is better

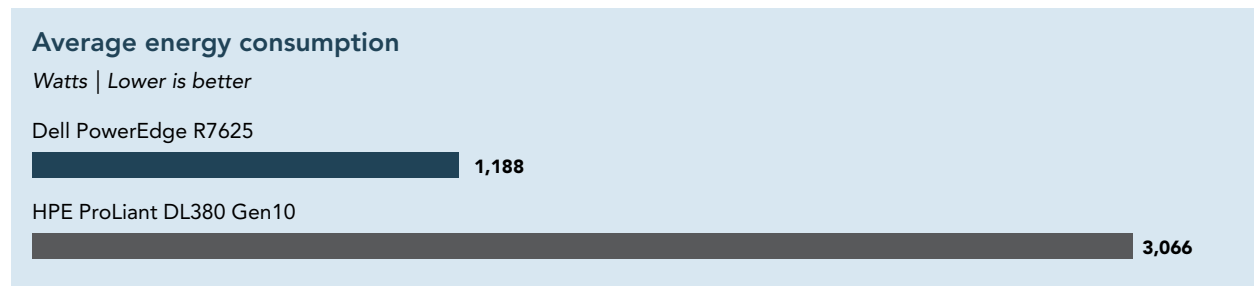Dell PowerEdge R7625
1,188

HPE ProLiant DL380 Gen10
3,066

Figure 4: Average energy consumption during our TPROC-H testing for a single Dell PowerEdge R7625 vs. the seven HPE ProLiant DL380 Gen10 servers it could replace. Lower numbers are better. Source: Principled Technologies.

Consolidation can also yield licensing savings. VMware licenses VMware vSphere 8 on a per-core basis, with a minimum of 16-core licenses per processor. The legacy HPE system we tested contains two 16-core Intel Xeon Scalable processors, requiring a total of 32 VMware vSphere 8 licenses. The Dell PowerEdge R7625 has two 96-core AMD EPYC processors, meaning it requires more licenses in a head-to-head comparison with the legacy HPE server. However, scaling the licenses to match our consolidation scenario would bring the number of per-core VMware licenses down from 224 to 192, which means 32 fewer licenses—a 14.2 percent reduction—to handle roughly the same amount of analytics work. Fewer licenses would cut operating costs, thus potentially helping the bottom line of your organization or department.

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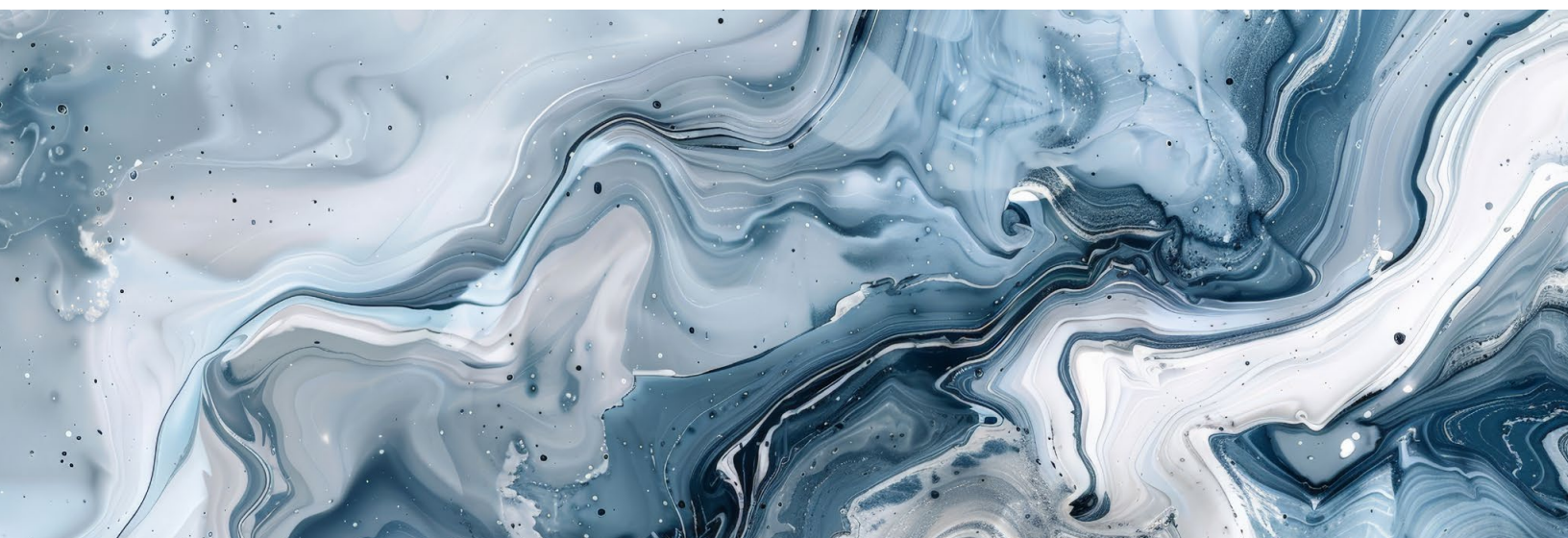November 2024 | 5

What do these test results mean to you?

Organizations of all types and sizes use data analysis to identify patterns and shift their strategies to better target their marketing, focus production on what's selling, and ultimately maximize sales for better business.

Take for example a hypothetical clothing business that focuses mostly on well-made t-shirts and sweatshirts. Historical sales data may show that the business should plan to produce more shirts during the summer, when consumers need warm-weather clothing, and more sweatshirts during the winter. Their calendar is (more or less) set for how many articles of clothing they print every month. But what happens when a popular influencer on fashion TikTok recommends one of their t-shirts in the middle of an unseasonably warm November?

If the company isn't constantly and quickly analyzing their social media and sales data—they'd miss the signs that they need to ramp up production on the shirt in question. They'd keep the status quo of their production schedule and would fail to get more shirts available for consumers to purchase. On the other hand, if they're analyzing data quickly, they'll be alerted to a potential sales trend—which allows them to get more shirts on the shelves in time to ride this particular out-of-season t-shirt wave all the way to the bank.

A business such as this one needs high-performing servers that analyze their growing amounts of data quickly, in real time, allowing them to pivot when needed—and sets them up for the future so they aren't worrying about the capacity of their server infrastructure immediately after investing in new hardware.

Our tests results show that the Dell PowerEdge R7625 is poised to meet these needs. Choosing the new Dell PowerEdge R7625 to replace their seven-year-old HPE ProLiant DL380 Gen10 servers would allow our publisher to analyze 7.8 times the data (in a head-to-head, server vs. server comparison) OR consolidate seven older servers onto a single new server while leaving room for future growth. Whichever path the publisher chooses, upgrading their decision support infrastructure from the HPE ProLiant DL380 Gen10 with the Dell PowerEdge R7625 could improve their ability to make quick decisions and reduce their overall footprint, saving them on key operating costs including power and cooling and server licensing.

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Conclusion

If your organization is still running legacy servers like the seven-year-old HPE ProLiant DL380 Gen10, you may expose yourself to the risks of expiring warranties, rising maintenance costs, and more. You also may not be adequately prepared to reap the benefits of high-powered analytics workloads. You may eventually complete your data analytics queries, but you could get answers faster and improve energy efficiency in your data center by moving to new Dell PowerEdge R7625 servers with AMD EPYC 9654 processors.

The Dell PowerEdge R7625 completed up to 7.8 times as many TPROC-H query sets per hour and offered 2.9 times the performance per watt compared to a legacy HPE ProLiant DL380 Gen10. These performance gains mean that you could also take the path of consolidating seven older systems onto a single Dell PowerEdge R7625, which can save on operating costs including maintenance, server licensing, power and cooling, rack space, and more.

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2. Timescale, "Making PostgreSQL a better AI database," accessed July 1, 2024, https://www.timescale.com/blog/making-postgresql-a-better-ai-database/.
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6. r/vectordatabase, "PostgreSQL Vector DB vs. Native DBs," accessed July 17, 2024, https://www.reddit.com/r/vectordatabase/comments/1al71r3/postgresql_vector_db_vs_native_dbs/?rdt=45882.
7. Dell, "PowerEdge R7625 Specification Sheet," accessed July 12, 2024, https://www.delltechnologies.com/asset/en-us/products/servers/technical-support/poweredge-r7625-spec-sheet.pdf.
8. HammerDB, "What is TPROC-H derived from TPC-H?" accessed June 27, 2024, https://www.hammerdb.com/docs/ch11s01.html.

Read the science behind this report at https://facts.pt/MWfB9F3 ▶

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This project was commissioned by Dell Technologies.

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