

In our tests, PowerEdge R7725 servers performed better on data analytics and transactional database workloads than a legacy server while also delivering better performance per watt

If you last purchased servers before 2020, your data center infrastructure may be underperforming, especially if your user base and services have grown and evolved over the last five years. A McKinsey article states that in the year 2025, "most employees will use data to optimize nearly every aspect of their work," but "only a fraction of data from connected devices is ingested, processed, queried, and analyzed in real time due to the limits of legacy technology structures" and other challenges.¹ Newer, more powerful Dell[™] PowerEdge[™] servers have the potential to enable the next five years of growth and reduce your ongoing budget for data center space and power.

To measure what kind of benefit you might see from upgrading to new PowerEdge servers, we compared the performance of a Dell PowerEdge R7725 server with cutting-edge 128-core AMD EPYC[™] 9755 processors to a legacy HPE ProLiant DL380 Gen10 server with 16-core Intel[®] Xeon[®] Gold 6142 processors. We looked at performance and performance per watt on two common workloads: a TPC-H-like data analytics workload with a PostgreSQL database and a TPC-C-like transactional database workload with a SQL Server database.

We found that the new AMD processor-powered Dell PowerEdge R7725 server handled significantly more work than the older HPE server—so much more work that you could replace 14 servers running analytics workloads onto one PowerEdge R7725, or 13 servers running online transaction processing (OLTP) workloads onto one PowerEdge R7725. We also saw improved performance per watt from the new Dell and AMD solution, which could let you reduce your overall power consumption and save on power costs. Consolidate up to 14 legacy servers Do more work with fewer servers



Get up to 4x the performance per watt

Save on energy costs in the data center

Speed data-driven decision making

14.1 times the query sets per hour

Get more performance for each per-core license

62.9 percent more transactions per core

Dell PowerEdge R7725 with AMD EPYC 9755 processors

HPE ProLiant DL380 Gen10 with Intel Xeon Gold 6142 processors

How we tested

We compared a new Dell PowerEdge R7725 server, powered by new AMD EPYC 9755 processors with 128 cores, to a legacy HPE ProLiant DL380 Gen10 server, powered by Intel Xeon Gold 6142 processors with 16 cores. We assumed that an organization buying new servers would choose a configuration with enough resources for both today's needs and their future requirements, so in addition to higherend processors with more cores, the newer PowerEdge server had NVMe drives and 3 TB of DDR5 memory. The older server, representing a legacy purchase, had 256 GB of DDR4 memory, an amount that was common at the time an organization would have purchased it. For the data analysis testing, we configured the legacy server with 8 960GB SATA SSDs, and for the transactional database testing, we added 8 1.6TB PCIe NVMe drives. We used VMware vSphere 8 as the hypervisor on both servers.

First, we evaluated both servers' data analysis performance and power consumption while running a PostgreSQL database using a TPC-H-like data analytics workload from HammerDB called TPROC-H. To do this, we measured how long it took the servers to complete query sets and how much power they consumed while doing so. (Note that we used the same workload on the same legacy server in another recent project; to read more about that comparison, which highlights the strengths of the Dell PowerEdge R7625 server, go to https://facts.pt/3qhZD07.)

Then, we evaluated both servers' OLTP performance and power consumption while running SQL Server VMs and using a TPC-C-like OLTP workload from HammerDB called TPROC-C. To do this, we captured the TPROC-C output transactions per minute (TPM) and how much power they consumed while doing so.

About the Dell PowerEdge R7725 server

Part of the Dell AI Factory hardware portfolio, the Dell PowerEdge R7725 server powered by 5th Generation AMD EPYC processors is a 2U, dual-socket rack server. It supports up to 192 cores—50 percent more than the previous gen Dell PowerEdge R7625 with 4th Gen AMD processors.² According to Dell, the server has a new data center modular hardware system (DC-MHS) chassis design that "enables enhanced air cooling and dual 500W CPUs, conquering tough thermal challenges for power and efficiency."³ The server could be an excellent choice for big data analytics, AI/ML, and high-performance compute (HPC) with optional acceleration.

To learn more about the new Dell PowerEdge R7725, visit <u>https://www.dell.com/en-us/shop/cty/pdp/spd/poweredge-r7725</u>.

Run data analytics faster for speedy insights

Increasing the speed of your data analytics and decision support capabilities can lead to more accurate predictions and more informed strategies for your business. Based on the core counts of each server, the Dell PowerEdge R7725 supported 50 10-vCPU VMs while the HPE ProLiant DL380 Gen10 supported only 6. In addition to the staggering VM increase, the PowerEdge R7725 with AMD EPYC 9755 processors completed all 50 data analytics workloads faster than the HPE server with Intel Xeon Scalable processors completed its 6 workloads. Figure 1 shows the completed query sets per hour results from our TPROC-H testing.

Based on this data, the PowerEdge R7725 can complete 14.1 times as many the query sets in a hour as the HPE legacy server can complete—694 vs. 48 total query sets, which is less than the 50 workloads that the PowerEdge R7725 completed in 4 minutes and 19 seconds. See the <u>science behind this report</u> for detailed results.

The closer you get to real-time processing of your data at scale, the more value you can get from that data, enabling you to build short- and long-term strategies informed by the latest information.

 Query sets completed per hour (TPROC-H workload)

 Number of query sets | Higher is better

 Dell PowerEdge R7725 server with AMD EPYC 9755 processors

 HPE ProLiant DL380 Gen10 server with Intel Xeon Gold 6142 processors

Figure 1: Number of query sets of a TPROC-H workload each solution can complete in an hour. Higher numbers are better. Source: Principled Technologies.

About the TPROC-H workload

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To assess the solutions' TPC-H-like performance, we ran a TPROC-H workload from HammerDB. Per HammerDB, TPROC-H "represents the typical workload of a retailer running analytical queries about their operations."⁴ 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 this data. It 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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Analytics workload use case: Decision Support System in retail inventory

Managing inventory across a multitude of brick-and-mortar retail stores requires some degree of accuracy. A typical percentage for Exact Match, a measurement of individual SKU accuracy based on actual counts, is within 55 to 65 percent.⁵ Achieving and maintaining inventory accuracy helps retail companies set sales expectations and minimize loss from unsold merchandise and poor sales.

Retail companies can use Decision Support System (DSS) applications to help their inventory management process. Imagine a retail chain using a DSS to collect real-time sales data from each of its stores and integrate the data with historical trends and seasonal demand.

Once per week, the retail chain's DSS analyzes sales data and predicts demand for SKUs. The system alerts store managers to restock items as necessary and recommends shifting inventory between locations to balance stock levels. The DSS can also suggest bulk orders for SKUs that could experience high demand soon. This proactive approach helps reduce SKUs going out of stock in stores and overstocking low-selling SKUs, improving overall inventory efficiency. As a result, the retail chain also boosts customer satisfaction with product availability.

The hardware backend of the DSS must deliver powerful compute resources to run the weekly read-only analysis quickly. Despite this analysis running once a week, speed is key due to the volume of data coming from numerous stores across many time zones. The speed of the solution behind the DSS contributes to the overall inventory management accuracy that's so crucial to the retail chain. The company could benefit even more by running the analysis more frequently, which would require more computing resources.

Handle more database transactions to save on licensing

Newer, better-performing processors with more cores can deliver a cost-saving solution for boosting overall transactional database performance. By handling more transactions per core with Dell PowerEdge R7725 servers backed by AMD EPYC 9755 processors, you can save on licensing costs when consolidating the workloads of older servers.

We configured the Dell and AMD environment with 50 SQL Server VMs and assigned 10 vCPUs to each guest (or workload) VM. We could deploy only 6 10-vCPU SQL Server VMs to the HPE and Intel solution because it had fewer cores. The staggering difference in VMs produced a substantial OLTP performance improvement for the Dell and AMD solution. Figure 2 shows that when executing this OLTP workload, the Dell and AMD solution supported 62.9 percent more TPM per core than the legacy HPE server with Intel Xeon Scalable processors.



Figure 2: The transactions per minute per core that each solution supported in our testing. Higher is better. Source: Principled Technologies.

This head-to-head comparison reflects the improved performance and ability to handle more workloads of the Dell and AMD solution, and part of that advantage comes from the higher core count in each newer server. We use this TPM data in the section "<u>Consolidate through improved performance</u>" to demonstrate how you can reduce licensing costs when consolidating OLTP workloads.

About the TPROC-C workload

We chose the TPROC-C (TPC-C-like) workload to demonstrate the online transaction processing performance capabilities of each solution, which benefit from high core counts and fast memory. TPROC-C runs a transaction processing workload that simulates an ecommerce business with five types of transactions: receiving a customer order, recording a payment, delivering an order, checking an order's status, and checking stock in inventory.⁶ Note that our test results do not represent official TPC results and are not comparable to official TPC-audited results.

To learn more about HammerDB and our two workloads, visit <u>https://www.hammerdb.com/</u>.

Improve performance per watt to save energy costs

The cost of electricity continues to rise. According to a September 2024 IDC report, "Electricity is by far the largest ongoing expense for datacenter operators, accounting for 46% of total spending for enterprise datacenters and 60% for service provider datacenters," and consumption is growing fast.⁷ In this environment, reducing energy costs and making the most of your electricity bill is paramount.

We assessed the performance per watt of both servers while running the TPROC-H and TPROC-C workloads (see Figure 3). The Dell solution consistently delivered over four times the server efficiency of the legacy solution in performance per watt.



Figure 3: On the left, the performance per watt of both servers, in query sets per hour per watt, while running the TPROC-H workload. On the right, the performance per watt of both servers, in transactions per minute per watt, while running the TPROC-C workload. Higher is better. Source: Principled Technologies.

About AMD EPYC 9755 processors

As part of the 5th Gen of AMD EPYC server processors, AMD EPYC 9755 processors are based on nextgeneration Zen 5 cores. These new AMD EPYC 9755 processors can reach clock speeds up to 4.1 GHz, feature up to 128 cores and up to 256 threads, and support AMD Infinity Guard and AMD Infinity Architecture technologies.⁸ According to AMD, the new chip offers "out-of-the-box performance and density leadership for the growing demands of AI-enabled, business-critical data center workloads."⁹

Consolidate through improved performance

You could replace multiple older systems with a single newer, higher-performing server, which would decrease costs for server management, power usage, and licensing and save space. By analyzing the performance differences we saw in testing, we found that replacing legacy servers with Dell PowerEdge R7725 servers featuring AMD EPYC 9755 processors could significantly reduce the number of required servers to handle data analysis and OLTP workloads. This upgrade can enable an organization to reduce the need for additional servers dramatically, which could also enable an organization to reduce administrative overhead, simplify management tasks, and reduce power and cooling costs. An organization upgrading to Dell PowerEdge R7725 servers can also allocate resources more effectively to focus on other priorities.

As Figure 4 reflects, one PowerEdge R7725 attaining the same level of performance as we saw in testing could do the work of 14 older servers. This consolidation is based on the query-sets-per-hour metric.



Consolidation potential for **data analysis** workloads

Figure 4: The consolidation potential of upgrading to Dell PowerEdge R7725 servers running data analysis workloads. Source: Principled Technologies.

As with our PostgreSQL data analysis workload testing, the improved capabilities of the PowerEdge R7725 would allow for consolidating multiple legacy servers running OLTP workloads onto a single new AMD EPYC 9755 processor-powered server. You could see the same SQL Server OLTP performance from one Dell PowerEdge R7725 as you would see from 13 of the legacy servers we tested (see Figure 5). This consolidation is based on the total transactions per minute each server supported. See the <u>science</u> <u>behind the report</u> for total and per-core results.

Consolidation potential for **transactional database** workloads



Figure 5: The consolidation potential of upgrading to Dell PowerEdge R7725 servers running OLTP workloads. Source: Principled Technologies.

VMware licenses VMware vSphere 8 on a per-core basis, with a licensing minimum of 16 cores. The older HPE server we tested required 32 VMware vSphere 8 licenses because it contained two 16-core Intel Xeon Scalable processors. The Dell PowerEdge R7725 had two 128-core AMD EPYC processors, requiring 256 vSphere licenses. However, scaling the licenses to match our OLTP consolidation scenario (13 legacy servers to 1 PowerEdge R7725) would bring the number of per-core VMware licenses down from 416 to 256, which means 160 fewer licenses—a 38.4 percent reduction—to handle roughly the same amount of OLTP work. Fewer licenses would cut operating costs, thus potentially helping the bottom line of your organization or department.

When we combine the consolidation factor with the improved power efficiency of the Dell and AMD solution, the reduction in power usage—and your monthly electricity bill—become dramatic. Compared to the 14 legacy servers you would need to run the TPROC-H workload or the 13 legacy servers you would need for the TPROC-C workload, a single Dell PowerEdge R7725 server with AMD EPYC 9755 processors would reduce power usage by 75.4 and 76.2 percent respectively. That means you would pay less than one-fourth the amount to power these workloads every month.

Transactional database use case: Optimizing financial transactions in a banking institution

The popularity of digital banking continues to rise, and at least 71 percent of US consumer respondents to an American Bankers Association survey said they prefer to manage their bank accounts through a mobile app or a computer.¹⁰ In response to that level of digitization, consider a regional bank that wants to enhance the efficiency of its core transactional SQL Server systems to improve customer experience, minimize latency, and ensure that it processes every transaction as quickly as possible. The bank handles thousands of financial transactions daily, from customer account activities, such as deposits and withdrawals, to credit card payments and real-time fund transfers. As part of its strategy, the institution has decided to migrate its OLTP workloads from legacy servers onto Dell PowerEdge R7725 servers with AMD EPYC 9755 processors.

By leveraging the PowerEdge R7725 server's capabilities for handling OLTP transactional workloads, the team tasked with implementing and coordinating the move can start by refining credit card payment processing or managing real-time fund transfers. After identifying the most promising optimization strategies, the team can easily scale up SQL Server environments on the Dell PowerEdge R7725 servers, enabling the institution to handle increased transaction volumes and meet regulatory compliance requirements.

Running transactional SQL Server workloads on these more powerful PowerEdge R7725 servers can enable the banking institution to meet its goals of improving transaction processing efficiency and providing customers with a seamless and fast banking experience. As the institution grows, they can continue to scale their infrastructure, potentially optimizing operations and minimizing downtime while maintaining robust transactional ability.

Conclusion

Organizations face myriad IT challenges, with the need for greater computing power and faster service delivery clashing against the realities of IT admin costs, high power bills, and limited server space. In our testing, we proved that the new Dell PowerEdge R7725 server with AMD EPYC 9755 processors can deliver better performance on both data analytics and transactional database workloads while improving performance per watt. With AMD processor-powered Dell PowerEdge R7725 servers, you have the potential to consolidate the work of dozens of older servers onto a single new server, all while reducing your electricity bills.

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Read the science behind this report at https://facts.pt/3maXgBz >





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