Achieve more storage performance with Dell PowerEdge R750 servers equipped with Broadcom PCIe Gen4 switches

vs. a PowerEdge R740xd server equipped with Broadcom PCIe Gen3 switches

Investing in the right new servers can provide your organization with the resources it needs to grow business and keep customers happy. The Dell PowerEdge™ R750 server comes equipped with the Broadcom PCIe® Gen 4.0 ExpressFabric Platform, which delivers latest-gen features and benefits that have the potential to help you accelerate data transfer speeds.

Process more storage requests

Up to 2.1x the raw IOPS on random read workloads*

Sustain more concurrent throughput

Up to 2.2x the GiB/s on sequential read workloads*

Up to 1.9x the GiB/s on sequential write workloads*

*compared to a PowerEdge R740xd server with a Broadcom PCIe Gen3 switch

How we tested

We compared the server and storage switch performance of a Dell PowerEdge R750 equipped with the new Dell PEX88000 series switch, which is a Broadcom PCIe Gen4 switched topology storage adapter, to that of a Dell PowerEdge R740xd, equipped with a Broadcom PCIe Gen3 switch (Dell PEX 9733).

To measure each solution's block storage performance, we captured Flexible input/output (FIO) benchmark performance metrics, which offer insight into server and storage adapter performance.

To show how much data each server solution could process per second on multiple drive and core configurations, we ran a FIO workload with small blocks (4 KB) of data—once using random reads and again using random writes. These are our IOPS results.

Then, we repeated the process on large blocks of data (1 MB)—once using sequential reads and again using sequential writes. These are our GiB/s results.

Performance & scalability
Running 4KB random read and write workloads as well as 1MB sequential read and write workloads provides an overarching view of how each solution handles the transfer of different data types and sizes.

See the testing details →

Learn how PT tests →

What is the difference between random and sequential workloads?

Our FIO benchmark testing incorporated random and sequential workloads, which use different patterns for accessing and storing data. Random workloads are those where systems pull data from multiple drives. Sequential workloads involve a continuous flow of data from one drive. Running both types of workloads provides insight into how the server solution handles the access, retrieval, and saving of data.

Random

A user who browses multiple web pages in an online store before making a purchase represents a read-heavy random workload because the application may have to pull data from multiple drives.

Sequential

Streaming video necessitates that a server read that data sequentially in a single continuous stream. The same rule applies to storing data.

Process more storage requests

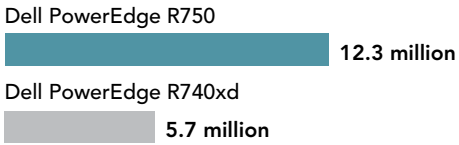
The number of IOPS a solution can handle indicates whether it can process a high volume of incoming and outgoing storage requests at once.

We found that the Dell PowerEdge R750 server with a Broadcom PCIe Gen4 switch processed significantly more outgoing storage requests than the Dell PowerEdge R740xd server with a PCIe Gen3 switch.

Random read FIO results on 24 NVMe drives

with 56 cores for the PowerEdge R750 and 36 cores for the PowerEdge R740xd

IOPS | Higher is better

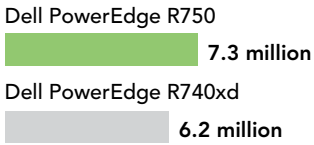


Up to 2.1x the raw IOPS

Random write FIO results on 24 NVMe drives

with 56 cores for the PowerEdge R750 and 36 cores for the PowerEdge R740xd

IOPS | Higher is better



Up to 1.1x the raw IOPS*

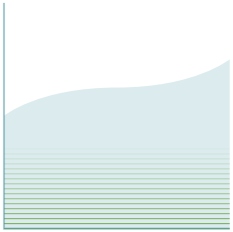
We tested with 8, 12, and 24 NVMe drives and 8,16, 36 (R740xd max), and 56 (R750 max) cores. We show only the 24 NVMe drive and max core results here.

*In the random write comparison, we found that the NVMe drives, not the Broadcom switch or processors, were a bottleneck. See the results →

How upgrading to 15G Dell PowerEdge servers could grow your business

Based on the raw IOPS output in FIO benchmark testing, upgrading from previous-generation Dell PowerEdge R740xd servers to the latest-generation Dell PowerEdge R750 servers deliver results that could:

- Help your organization expand its user base
- Leverage performance gains for I/O-intensive applications
- Process more outgoing and incoming storage requests



Some estimates forecast that worldwide retail commerce sales will "grow by 50 percent over the next four years, reaching about 7.4 trillion dollars by 2025."[1]

In this evolving landscape, the speed at which your infrastructure responds to queries can make the difference between discarded shopping carts and successful sales.

Sustain more concurrent throughput

The amount of information (in GiB) a solution can process per second (throughput) indicates how well it can process a high volume of data, where higher results are better.

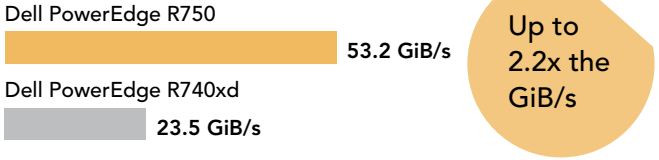
We found that the Dell PowerEdge R750 server with a PCIe Gen4 switch sustained more concurrent throughput both to and from storage than the Dell PowerEdge R740xd server with a PCIe Gen3 switch.

Performance & scalability
To determine each solution's scalability, we gathered 8, 16, and 36 (plus 56 for the PowerEdge R750) core performance metrics for both server solutions in three NVMe drive configurations. See the results →

Sequential read FIO results on 24 NVMe drives

with 56 cores for the PowerEdge R750 and 36 cores for the PowerEdge R740xd

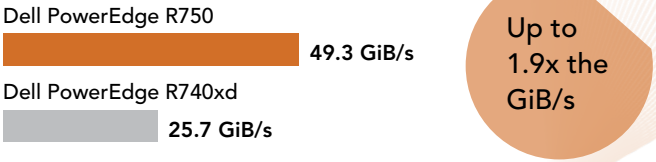
Throughput | Higher is better



Sequential write FIO results on 24 NVMe drives

with 56 cores for the PowerEdge R750 and 36 cores for the PowerEdge R740xd

Throughput | Higher is better



The importance of throughput

Investing in a solution with high throughput and IOPS could have a direct impact on a company's bottom line.

According to Data Center Knowledge, "Throughput is the result of IOPS, and the block size for each I/O being sent or received. Since a 256KB block has 64 times the amount of data as a 4K block, size impacts throughput. In addition, the size and quantity of blocks impacts bandwidth on the fabric and the amount of processing required on the servers, network and storage environments. All of these items have a big impact on application performance."[2]

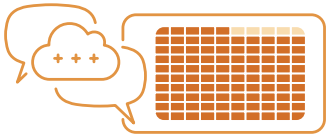
Keep up with a connected, data-driven world

The PCIe 4.0 capabilities in the Dell PowerEdge R750 server double the throughput rate per lane over previous-generation 3.0 capabilities.[3] This could potentially help you:

- Improve the customer experience with faster data handling, video rendering, and app performance
- Increase employee productivity with efficient storage access, smooth network experiences, and quick copying or moving of data

Is your server ready?

PwC reports that 63 percent of insurance company CEOs think Internet of things (IoT) is important in their business strategy.[4]



Tipalti predicts that AI will power 95 percent of all customer interactions in the next decade.[4]

The global edge computing market size for "industries relying on IoT devices, sensors through edge nodes, devices, and localized data centers […] telehealth services […] autonomous vehicles and connected car infrastructure […]" is projected to reach $55.9 billion by 2028.[5]

Conclusion

Investing in the right new servers could help you grow your business and keep customers happy. We found that Dell PowerEdge R750 servers equipped with Broadcom PCIe Gen4 switches improved data transfer speeds over a previous-gen PowerEdge R740xd. In our FIO benchmark tests, this 15G Dell PowerEdge server processed significantly more storage requests and sustained more concurrent throughput both to and from storage than a Dell PowerEdge R740xd server with PCIe Gen3 switches.

Read the full report at
https://facts.pt/yjZGZ6O

1 Statista, "Retail e-commerce sales worldwide from 2014 to 2025," accessed February 2, 2022, https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/.

2 Data Center Knowledge, "The Impact of Block Sizes in a Data Center," accessed February 14, 2022, https://www.datacenterknowledge.com/archives/2016/05/04/impact-block-sizes-data-center.

3 MiniTool Partition Wizard, "PCIe 3.0 vs. 4.0: What's the Difference and Which is Better [Clone Disk]," accessed April 12, 2022, https://www.partitionwizard.com/clone-disk/pcie-3-vs-4.html.

4 Tipalti, "Chart-Topping FinTech Stats for 2022," accessed February 10, 2022, https://tipalti.com/fintech-stats-for-2022/.

5 Valuates Reports, "Global Edge Computing Market Insights and Forecast to 2028," accessed March 23, 2022, https://reports.valuates.com/market-reports/QYRE-Auto-35M1599/global-edge-computing.

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