



Finish machine learning preparation tasks on Kubernetes containers in less time with the Dell EMC PowerEdge R7525

This Dell EMC solution did image processing work more quickly than a similarly priced server from HPE

At Principled Technologies, we configured two current-generation, dual-socket servers so that they each had a similar hardware price: a Dell EMC™ PowerEdge™ R7525 powered by AMD EPYC™ 7502 processors and an HPE ProLiant DL380 Gen10 powered by Intel® Xeon® Gold 6240 processors.

To test each server, we ran a synthetic, containerized workload on Kubernetes. We designed this workload to emulate simple image processing tasks that a company might run in the preparation phase of machine learning. The PowerEdge R7525 server required less time to process 3.3 million images, finishing in 11 minutes, 12 seconds compared to 25 minutes, 22 seconds for the ProLiant DL380 Gen10 server. On average, the Dell EMC server processed images at 2.26 times the rate of the HPE server—4,922 frames per second (FPS) versus just 2,173 FPS.

Because the Dell EMC server completed its work faster than the HPE solution and at a similar price, it presented 2.32 times the value in terms of image processing performance vs. hardware cost.

Prepare images in 55.8% less time



The PowerEdge R7525 processed 3.3 million images in 11 min, 12 sec while the HPE server* took 25 min, 22 sec

Process 2.26x the images each second



The PowerEdge R7525 processed 4,922 frames per second (FPS) while the HPE server* processed just 2,173 FPS

2.32x the performance/cost ratio



The PowerEdge R7525 had a performance/cost ratio of 0.128 FPS per dollar while the HPE server's* ratio was 0.055 FPS per dollar

*HPE ProLiant DL380 Gen10 server



Image preparation for machine learning: Process images in less time

Before you can feed data into a machine learning algorithm, you must first prepare the data. For image-based machine learning workloads, this preparation step commonly includes several chained image-processing operations such as scaling, rotation, conversions, and more. Sorting millions of images is standard fare for training algorithms for quality control in manufacturing, self-driving cars, medical diagnoses, and more—so, it pays to have a solution that can make these preparations as quickly as possible. The sooner your machine completes preparation, the sooner you can get to the next phase. Because machine learning is a cycle, a solution that saves time in preparation will save time on every iteration.

Figure 1 shows the time results from our image processing test. The Dell EMC PowerEdge R7525 required 55.8 percent less time to process 3.3 million images, taking 11 minutes, 12 seconds compared to 25 minutes, 22 seconds for the HPE ProLiant DL380 Gen10.

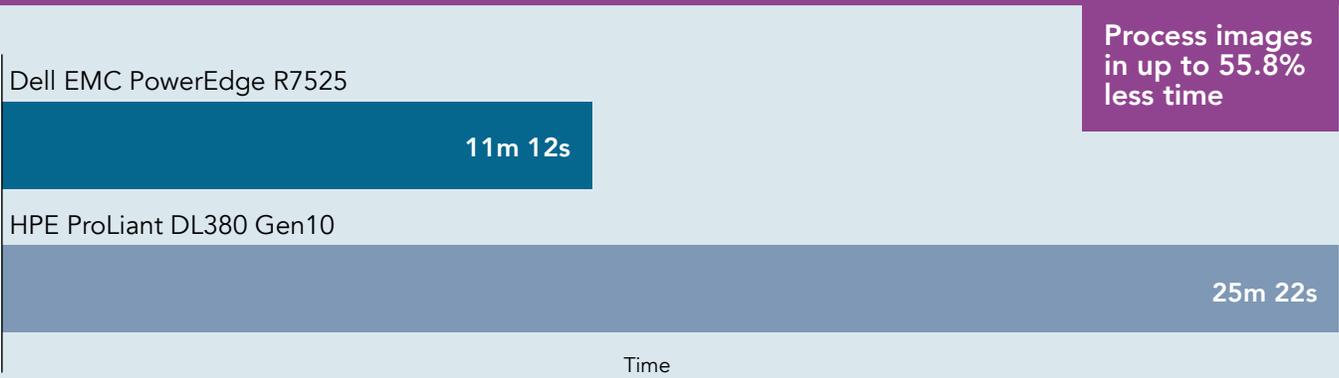


Figure 1: Time to prepare a set of 3.3 million images from our synthetic benchmark for machine learning preparation. Lower is better. Source: Principled Technologies.

About Dell EMC PowerEdge R7525 servers

The Dell EMC PowerEdge R7525 we tested featured two AMD EPYC 7502 processors that contained 32 cores each. According to Dell EMC, this server also boasts the following:

- Up to 24 NVMe™ direct connections
- 32 DDR4 RDIMM or LRDIMM memory module slots
- Automated server life cycle management
- Security features such as AMD Secure Memory Encryption (SME) and Secure Encrypted Virtualization (SEV)

To learn more, visit <https://www.dell.com/en-us/work/shop/povw/poweredge-r7525>.



Get more CPU power and improve your image processing rate

Both solutions ran our workload on an equal number of Kubernetes containers, and each container processed a discrete number of images. We observed that the containers with more compute power processed images faster.

The Dell EMC server we tested contained 64 total processor cores, while the HPE server contained just 36. The higher core count on the Dell EMC server allowed us to dedicate more threads per container. This increased thread count contributed to each container processing more frames per second (FPS) on the Dell EMC server. Additionally, the Dell EMC server processed more FPS per processor core. Figure 2 shows the processing rate for each workload. On average, the Dell EMC PowerEdge R7525 processed 4,922 FPS compared to just 2,173 FPS with the HPE ProLiant DL380 Gen10. Dividing the FPS results by the number of cores in each server, the Dell EMC server handled 76.9 FPS per core versus 60.4 FPS per core on the HPE server.

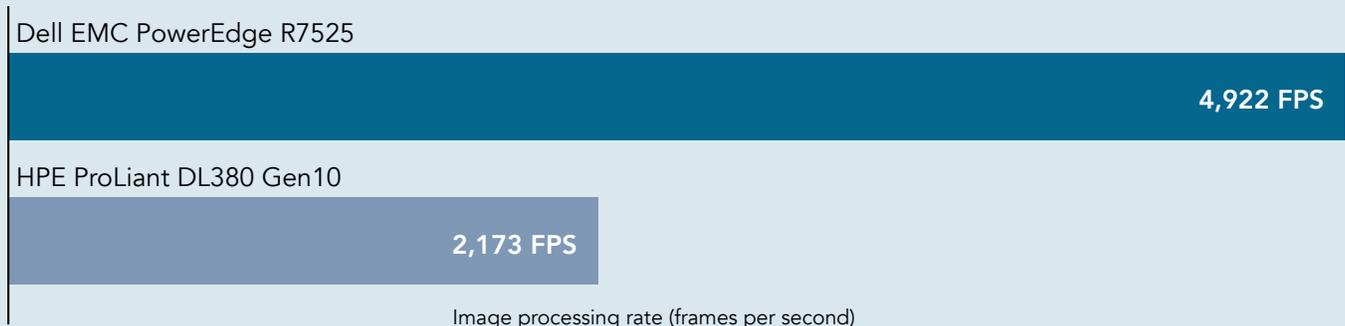


Figure 2: The image processing rate for each solution in frames per second (FPS). Higher is better. Source: Principled Technologies.

Process up to
2.26x the images
per second

Hardware cost and value: Get more performance for your dollar

To perform a fair comparison of these servers, we considered two options: configuring the servers to have similar hardware components or configuring them to have similar hardware cost. Because many companies have to follow a strict budget, we opted to configure the servers to match cost. After we built the HPE server, we found that we could outfit the Dell EMC server with some higher performing hardware components for around the same price. The two systems had comparable drives, RAM size, and network cards, but differed in power supplies, RAM speed, and CPU cores. The Dell EMC server had higher wattage power supplies (2,400W vs 800W), slightly faster RAM (3,200MHz vs 2,933MHz), and processors with a higher core count (32 vs. 18).

Figure 3 shows the list price for each server configuration.^{1,2} Hardware costs fluctuate often, but at the time of this writing, the prices for the two servers we tested were similar, differing by just three percent.

Even though the prices are similar, the fact that the Dell EMC PowerEdge R7525 processed 2.26 times the frames per second than the HPE ProLiant DL380 Gen10 means it offered a better value in terms of hardware cost and image processing performance. Figure 4 illustrates this comparison. The Dell EMC server had a performance/cost ratio of 0.128 FPS per dollar, while the HPE server's ratio was only 0.055 FPS per dollar. Thus, the Dell EMC PowerEdge R7525 offered 2.32 times the performance/cost ratio for our specific test case.

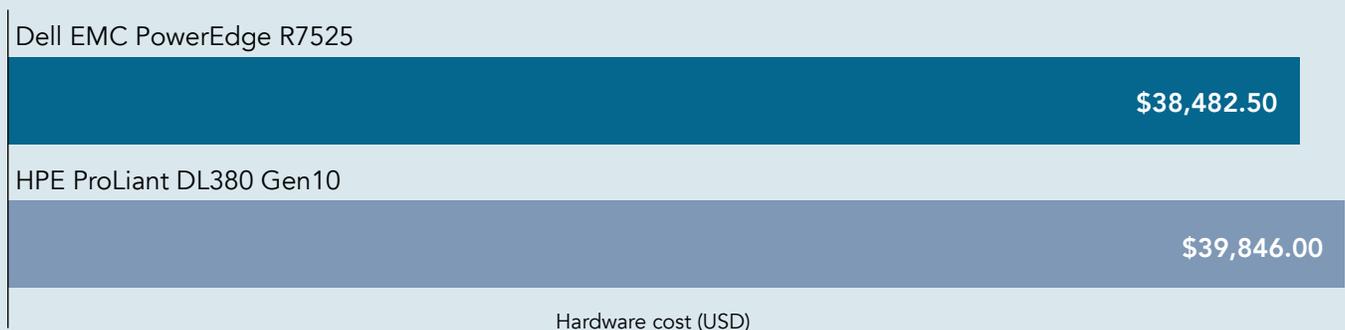


Figure 3: The hardware cost of each server in USD. Lower is better. Source: Principled Technologies.

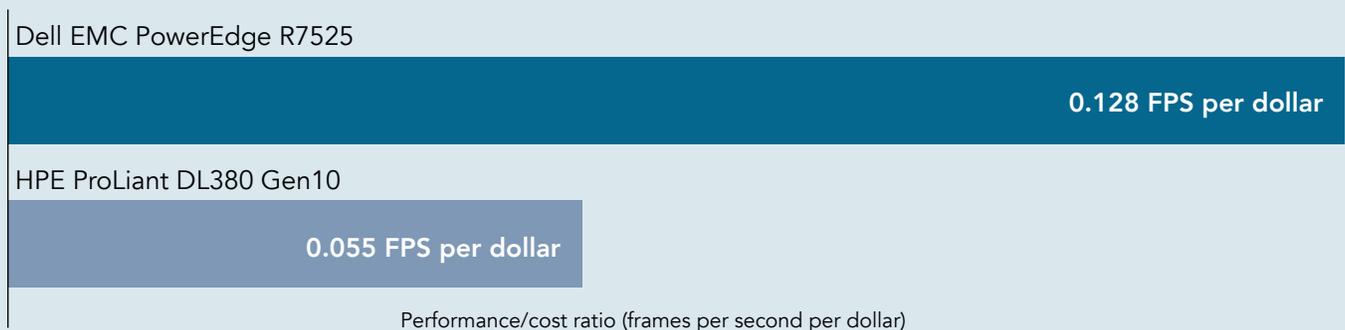


Figure 4: Ratio of image processing performance to hardware cost in frames per second (FPS) per US dollar. Higher is better. Source: Principled Technologies.

2.32x the performance/cost ratio



Conclusion

Because machine learning requires dozens, hundreds, or even thousands of iterative cycles, time you save in one step of the process can save more time in the long run. A solution that can save time during the preparation phase of machine learning could speed the time it takes to train your algorithm to detect manufacturing errors, hidden pathologies, and more.

In our tests comparing a Dell EMC PowerEdge R7525 to an HPE ProLiant DL380 Gen10 server, we found that the Dell EMC server:

- Processed 3.3 million images in **55.8% less time**
- Processed **2.26x the images each second**
- Had **2.32x the value** in terms of image processing rate vs. hardware cost

Though businesses will most often run Kubernetes machine learning workloads on clusters with many nodes, our results should encourage large businesses to explore the potential benefits of the Dell EMC PowerEdge R7525.

- 1 On February 25, 2020, Dell EMC sent us the list price for our configuration of the Dell EMC PowerEdge R7525.
- 2 On March 2, 2020, a certified HPE reseller sent us the list price for our configuration of the HPE ProLiant DL380 Gen10.

Read the science behind this report at <http://facts.pt/a0rn85x> ►



Facts matter.®

Principled Technologies is a registered trademark of Principled Technologies, Inc. All other product names are the trademarks of their respective owners. For additional information, review the science behind this report.

This project was commissioned by Dell Technologies.