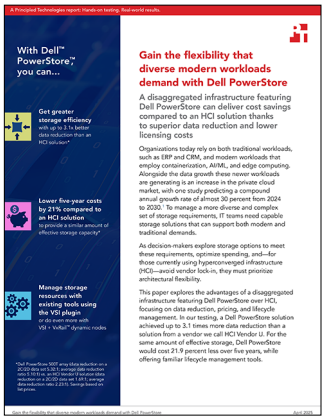

The science behind the report:

Gain the flexibility that diverse modern workloads demand with Dell PowerStore

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report Gain the flexibility that diverse modern workloads demand with Dell PowerStore.

We concluded our hands-on testing on January 17, 2025. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on January 16, 2025 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

To learn more about how we have calculated the wins in this report, go to http://facts.pt/calculating-and-highlighting-wins. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Data reduction testing

Table 1: Results of our testing.

	Physical space needed to store 2 TB of data (GB)	Data reduction ratio
2:1 compression and 2:1 deduplication ratio		
Dell™ PowerStore™ solution	384.40	5.32:1
HCI Vendor U solution	1,213.52	1.69:1
4:1 compression and 1:1 deduplication ratio		
Dell PowerStore solution	416.47	4.90:1
HCI Vendor U solution	742.12	2.77:1

System configuration information

Table 2: Information on the Dell PowerStore™ 500T we tested.

Storage configuration information	Dell PowerStore 500T
Controller firmware revision	4.0.0.1 Release, Build 2334337
Number of storage controllers	2
Number of storage shelves	1 base enclosure
Number of drives per shelf	12 on base enclosure
Drive vendor and model number	Dell 005054042
Number of drives	12
Drive size (TB)	3.8
Drive information (speed, interface, type)	NVMe® SSD TLC

Table 3: Information on the HCI Vendor U solution we tested.

Storage configuration information	HCI Vendor U solution
Number of drives	48
Drive size (TB)	3.2
Drive information (speed, interface, type)	PCIe 4.0 x4, NVMe

How we tested

Setting up our test beds

We set up a cluster of dual-socket Dell PowerEdge servers, each configured with 256 GB of RAM, to serve as Vdbench clients and host the HCI Vendor U solution. For the PowerStore 500T solution, we used two dual-port 32GB Emulex Fibre Channel adapters and the Fibre Channel storage protocol. For the HCI Vendor U solution, we employed a 100GbE switch and dual 100GbE server ports for storage traffic. Additionally, testbed management and VM traffic leveraged the 100GbE network. We also ensured that the setups for the Dell PowerStore 500T and HCI solution closely followed the best practices published by each storage vendor.

Testing data reduction

For all our tests, we used a CentOS 7 VM with eight vCPUs and 48 GB of RAM running Vdbench 5.04.07. For Dell PowerStore, we provisioned a 2TB LUN to the virtual machine as a raw device mapping (RDM). For HCI Vendor U, we created a 2TB virtual disk on the software-defined storage layer.

We ran write tests with 256KB blocks, filling each 2TB disk with data on both solutions. After completing each test, we analyzed deduplication and compression efficiency by reviewing data reduction ratios reported in each system's management console. This allowed us to assess how well each platform identified and eliminated redundant data, as well as how effectively it compressed stored data.

To evaluate data reduction performance across different data types we ran two separate test on each solution:

2C/2D (2:1 compression, 2:1 deduplication representing moderately compressible and deduplicable data)

```
messagescan=no
compratio=2
dedupratio=2
dedupunit=4096
dedupsets=5%
hd=default,shell=ssh,user=root,jvms=1
hd=hd1,system=localhost
sd=default,openflags=o_direct
sd=sd101,hd=hd1,lun=/dev/sdb
wd=default,sd=*
wd=wd_prefill,sd=sd*,xfersize=256k,seekpct=eof,rdpct=0
rd=default
rd=rd_prefill,wd=wd_prefill,elapsed=20h,interval=10,iorate=max,forthreads=(1)
```

4C/1D (4:1 compression, 1:1 deduplication simulating highly compressible but non-deduplicable data)

```
messagescan=no
compratio=4
hd=default,shell=ssh,user=root,jvms=1
hd=hd1,system=localhost
sd=default,openflags=o_direct
sd=sd101,hd=hd1,lun=/dev/sdb
wd=default,sd=*
wd=wd_prefill,sd=sd*,xfersize=256k,seekpct=eof,rdpct=0
rd=default
rd=rd_prefill,wd=wd_prefill,elapsed=20h,interval=10,iorate=max,forthreads=(1)
```

Cost analysis

Table 4 presents the findings of our cost analysis. For the cost analysis portion of this study, we priced solutions that did not match those we used in the data reduction testing section. The VDbench test design we used required servers for both solutions, but because we were testing only the data reduction ratios, it was not critical to exactly match server configurations because server generation and compute capabilities are irrelevant to the data reduction measurements. For testing, we used older-generation PowerEdge servers because of availability; for pricing for both solutions, we used PowerEdge R760 servers because we assume that a customer purchasing a solution would use the newest widely available PowerEdge servers.

The goal of the pricing exercise was to build two solutions as similar as possible to meet a specific capacity requirement of 253 TB of usable storage. Based on best practices from Dell and HCI Vendor U, we sized both solutions to provide similar effective storage capacity with double drive failure resiliency and a comparable level of storage redundancy. The HCI Vendor U solution required seven servers with large-capacity drives for software-defined storage, while the Dell PowerStore solution required six servers with drives only for the OS, as it used the PowerStore array for its primary capacity.

Table 4: Total costs over five years for the two solutions to provide comparable effective storage capacity. Lower is better.

	Five-year costs to provide 235 TB of effective capacity Lower is better
Dell PowerStore solution with six Dell PowerEdge R760 servers	$1,180,165.52
HCI Vendor U solution with seven Dell PowerEdge R760 servers	$1,511,104.77

View the original version of this report at https://facts.pt/7OcQ7nT

Read the report

This project was commissioned by Dell Technologies.

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