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Maximize Storage Efficiency with Dell PowerMax Data Reduction

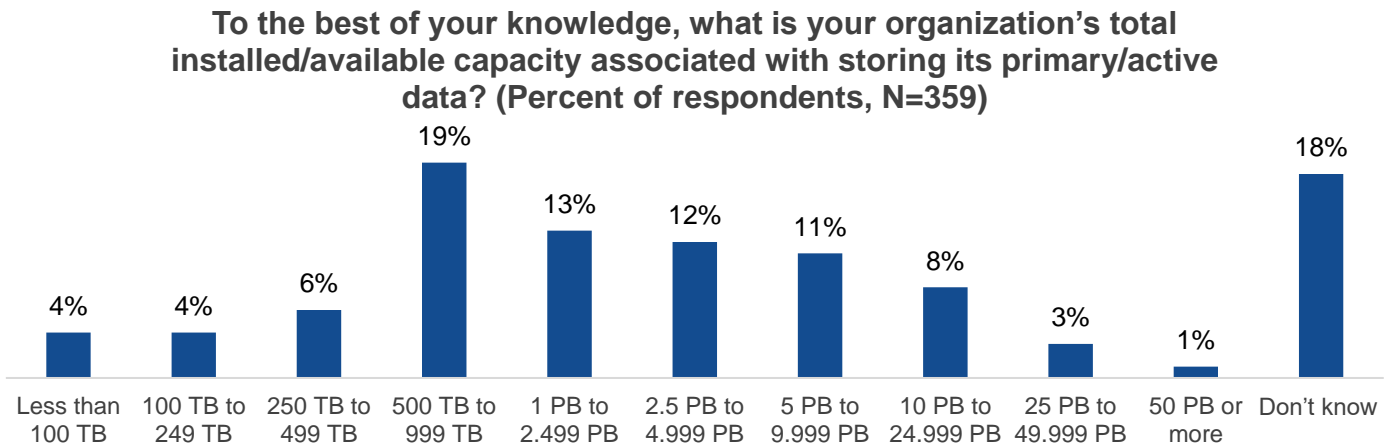Tony Palmer, Principal Validation Analyst

Abstract

This Technical Review from TechTarget's Enterprise Strategy Group (ESG) documents our evaluation of Dell PowerMax 2500/8500 data reduction. We reviewed how data reduction with Dell PowerMax combines inline compression for both mainframe (CKD) and open systems data, inline deduplication, pattern detection, and data compaction to increase system efficiency, drive capacity savings, and enhance sustainability.

The Challenges

Data growth has become a constant in modern IT environments. According to Enterprise Strategy Group (ESG) research, 59% of survey respondents believe their organization's total volume of data is growing by 21% or more annually, with 28% reporting more than 50% year-over-year growth.[1] Driven by this growth, IT organizations are storing increasing amounts of data. More than two-thirds (67%) of respondents report that their organization currently manages at least 500 TB of active data storage across its entire environment with nearly half (48%) reporting that they manage at least 1 PB of active data storage (see Figure 1).[2]

Figure 1. Total Available Capacity Associated with Storing Primary Data

To the best of your knowledge, what is your organization's total installed/available capacity associated with storing its primary/active data? (Percent of respondents, N=359)

4%	4%	6%	19%	13%	12%	11%	8%	3%	1%	18%
Less than 100 TB	100 TB to 249 TB	250 TB to 499 TB	500 TB to 999 TB	1 PB to 2.499 PB	2.5 PB to 4.999 PB	5 PB to 9.999 PB	10 PB to 24.999 PB	25 PB to 49.999 PB	50 PB or more	Don't know

Source: Enterprise Strategy Group, a division of TechTarget, Inc.

As data growth continues to accelerate, the sheer volume of data organizations need to store and access climbs from terabytes to petabytes; many organizations are looking for ways to optimize their storage infrastructure to keep costs down and minimize footprint. Effective data reduction is no longer just a nice-to-have for today's storage platforms.

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[1] Source: Enterprise Strategy Group Research Report, *The Evolution of Intelligent Data Management*, January 2022.
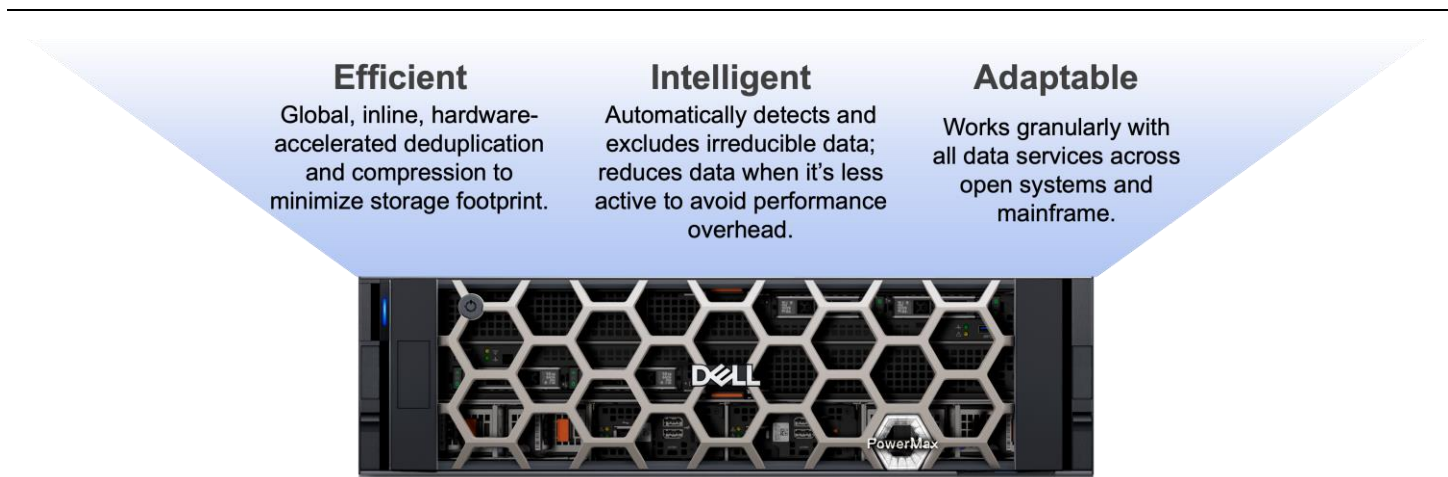[2] Source: Enterprise Strategy Group Research Report, *Data Infrastructure Trends*, November 2021.

Dell PowerMax 2500/8500

Dell's next-generation PowerMax storage is engineered to provide secure, mission-critical storage. According to Dell, PowerMaxOS 10 software includes numerous features designed to enhance data reduction, intelligence, and automation while delivering cybersecurity and resiliency capabilities. The new NVMe scale-out architecture adds flexibility to the efficiency, performance, and massive scalability PowerMax is known for.

The hardware's multi-node scale-out design supports open systems and mainframe environments with massive scale and efficiency. According to Dell, PowerMax 2500/8500 delivers improvements in performance and storage density, along with impressive data reduction improvements over the previous generation of PowerMax. Dell offers a 5:1 data reduction guarantee for open systems and the industry's first—according to Dell—3:1 data reduction guarantee for mainframe data.[3] These guarantees exclude irreducible data, so organizations aren't penalized for data that doesn't reduce well—video, audio, images, or encrypted or compressed workloads, for example.

Figure 2. Dell PowerMax Data Reduction

Source: Enterprise Strategy Group, a division of TechTarget, Inc.

Dell PowerMax data reduction uses a combination of technologies to reduce the amount of physical capacity required to store a given amount of written data. PowerMax data reduction is designed for efficiency, using hardware-assisted global inline deduplication and compression. In practice, there are data sets that may not be optimal for data reduction—already compressed or encrypted data, for example—and PowerMax is designed to detect these data sets and workloads and exclude that data, conserving resources and optimizing performance. PowerMax data reduction also works transparently across open systems and mainframe data. According to Dell, PowerMax is the first technology compress mainframe data at the storage level. Unlike zEnterprise Data Compression (zEDC) or host-based compression, all mainframe data is eligible for compression within PowerMax, regardless of data type or access method.

Enterprise Strategy Group Analysis

PowerMax Data Reduction

Enterprise Strategy Group (ESG) validated PowerMax data reduction by examining the data reduction ratio achieved by customers in the real world over time with VMAX and previous generation PowerMax systems, along with data reduction models built for the feature set included in PowerMaxOS 10 software.

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[3] Source: Dell Technologies, *Future-Proof Program*.

ESG reviewed anonymous call home data collected by Dell and compared data reduction across PowerMax generations.

Figure 3 illustrates Dell's continuous data reduction improvement over time. In 2016, the VMAX platform delivered nearly 3:1 data reduction using just activity-based LZS inline compression.

**Figure 3.** PowerMax Technology Evolution
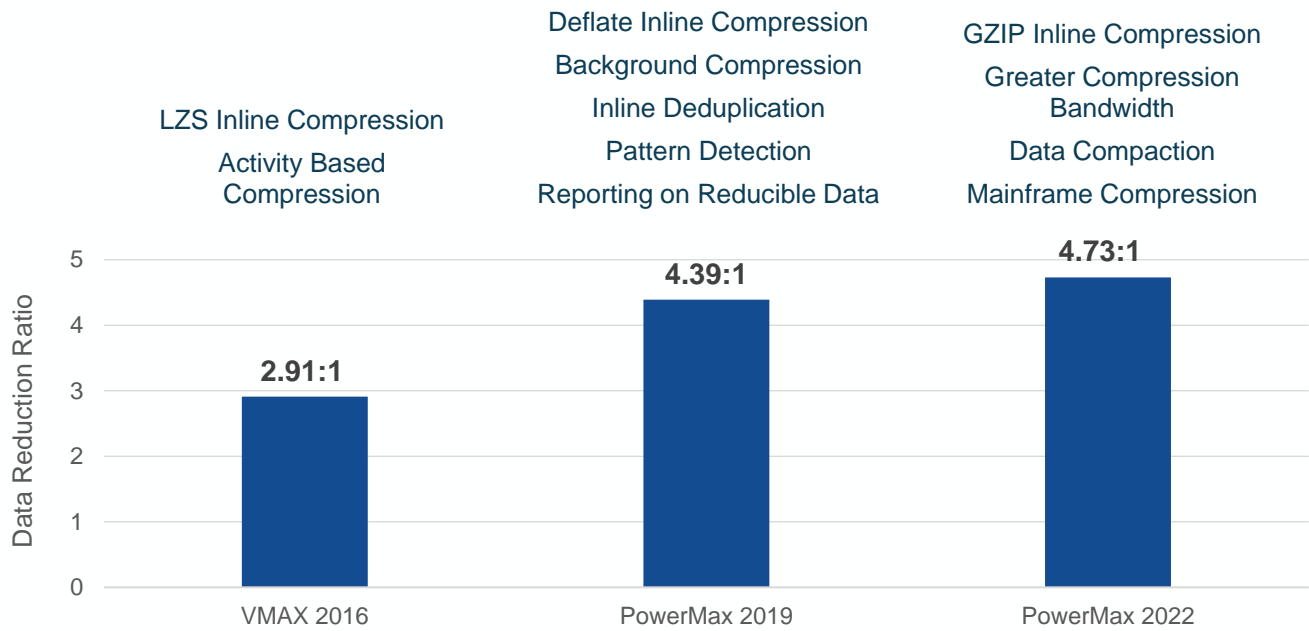
Source: Enterprise Strategy Group, a division of TechTarget, Inc.

In 2019, Dell replaced LZS with Deflate inline compression, adding the ability to compress in the background when needed. Dell also introduced inline deduplication with pattern detection. The combination of these technologies increased the average data reduction to 4.39:1. 2022 saw another evolutionary change, replacing Deflate with GZIP inline compression. An increase in compression bandwidth and data compaction further reduced the already low impact of data reduction on performance in the PowerMax Platform.

Next, ESG navigated to the PowerMax data reduction dashboard (see Figure 4). The layered graphical representation shows the data reduction ratio for reducible data—the top layer—but also includes a visual representation for nonreducible data—the middle layer—and data sets with data reduction disabled—the bottom layer. It's important to note that PowerMax automatically detects nonreducible data like encrypted data sets and does not waste cycles trying to reduce them with no user intervention needed.

Figure 4. PowerMax Data Reduction Dashboard
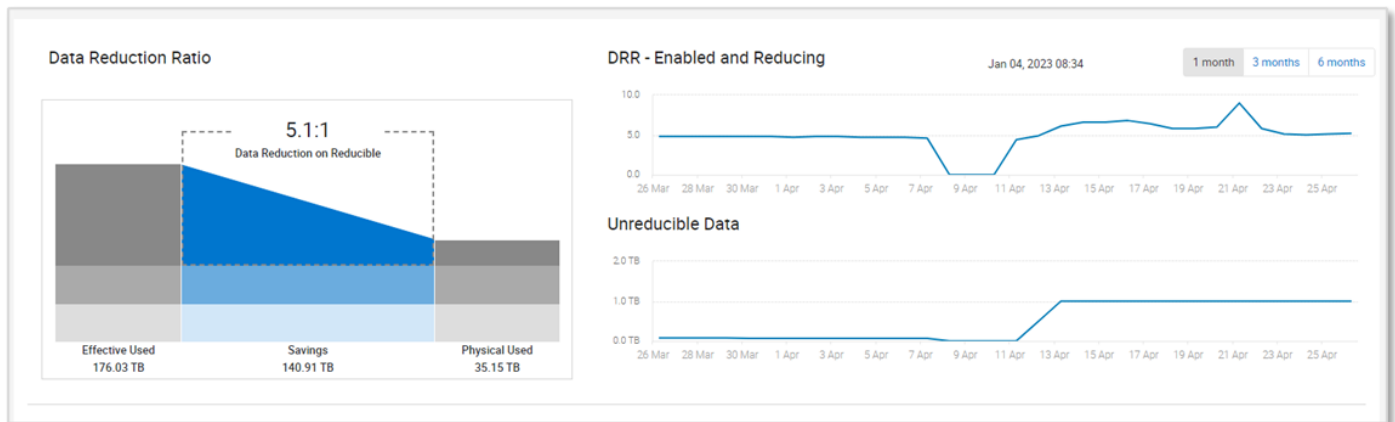
Real-world Customer Experiences

- Life Sciences—Boston Scientific needed to consolidate an exponentially growing volume of data that was being stored on different systems. Their primary business goals were to reduce the cost and effort to maintain and manage infrastructure, build and scale environments, and obtain actionable insights from their data. Dell PowerMax delivered dramatic results, increasing the performance of applications and workloads while delivering sub-millisecond latency for improved responsiveness, six nines of availability, and simplified management. Boston Scientific documented up to 5:1 data reduction, which enabled more product and patient data to be stored at a lower cost.

- Healthcare—Fresenius Medical Care collects critical data from tens of thousands of dialysis machines in approximately 3,500 clinics globally. Fresenius was beginning to feel performance issues with numerous IOPS- and latency-sensitive applications with an aging IT infrastructure. The business goal was to improve performance while keeping costs within a constrained budget. With Dell PowerMax, Fresenius was able to cut their data center footprint in half, which reduced power and cooling costs by 35%. PowerMax was able to improve performance significantly while delivering impressive data reduction. PowerMax delivered I/O with sustained response times as low as one millisecond with a 5.1:1 data reduction ratio.

- Manufacturing—Plex Systems provides multi-tenant, cloud-based ERP (enterprise resource planning) and MES (manufacturing execution systems) software as a service (SaaS) to thousands of manufacturers in 22 countries. Plex needed to upgrade its data center infrastructure and increase storage capacity. Key requirements included ease and speed of implementation and maintenance to allow IT staff to focus on solution development. The full-stack Dell solution reduced costs and simplified IT operations while PowerMax provided 5:1 data reduction and cut application response times in half.

- Healthcare—Steward Health Care is a physician-led healthcare network based in the United States and Malta. Steward's mission is to improve the quality of care and expand access for underserved communities—while reducing costs for patients and small businesses. In 2017, Steward experienced unprecedented growth that triggered multiple performance issues and intermittent, potentially life-threatening outages. One of Steward's primary requirements was improved performance and reliability for their electronic health records (EHR) platform. The Dell solution has supported their continued growth—they are currently supporting more than six-million patient encounters annually—with PowerMax scaling capacity and performance seamlessly while providing 6:1 data reduction, reducing footprint, power, and cooling costs.

Finally, Enterprise Strategy Group reviewed internal performance test data to evaluate the impact of data reduction on PowerMax performance. A 100% random workload with 70% reads and 30% writes was run with and without data reduction. The workload was scaled from approximately 50,000 IOPS to about 500,000 IOPS. The difference in response time between the two workloads was insignificant, ranging from .0125 ms to .07 ms.

Why This Matters

Data growth is accelerating, and organizations are reporting multiple challenges with their on-premises storage environments, including management, optimization, and automation of data placement (27%); hardware costs (26%); performance (25%); and power and cooling costs (21%). Enterprise Strategy Group (ESG) believes that data reduction is an important technology for storage infrastructure, and a solution that can deliver extremely high performance and significant data reduction can go a long way toward solving all of these challenges.[4]

ESG validated that Dell PowerMax improved data reduction across multiple workloads using AI/ML to determine when to use compression, deduplication, and other data reduction technologies.

PowerMax proved able to balance performance and efficient capacity consumption, leveraging improved back-end capacity usage, a single storage resource pool, and efficient allocation of physical capacity.

PowerMax data reduction helps customers to store more data using less capacity with effectively zero impact on performance. With a smaller footprint comes reduced power/cooling needs, enabling customers to achieve their sustainability goals.

Conclusion

IT organizations are storing increasing amounts of data driven by unabated data growth and they need storage solutions that can scale performance and capacity while reducing costs and simplifying operations.

Dell PowerMax uses a combination of technologies to reduce the amount of physical capacity required to store written data on open systems and mainframes. PowerMax data reduction is designed for efficiency, using hardware-assisted global inline deduplication and compression to minimize the impact of data reduction on performance. PowerMax automatically detects nonreducible data sets and workloads and excludes that data, conserving resources and further optimizing performance.

Enterprise Strategy Group validated that:

- Dell PowerMax data reduction enables organizations to store more data on less physical capacity with virtually no performance impact.
- While some workloads are more reducible than others, workloads like mainstream database apps running demanding OLTP workloads result in the best data reduction for PowerMax, for example. Dell PowerMax is designed to automatically detect nonreducible data sets and workloads and exclude them to conserve resources and optimize performance.
- Dell provides data reduction guarantees of 5:1 for open systems and 3:1 for mainframe data. According to Dell, the mainframe data reduction guarantee is an industry first and exclusive to PowerMax.
- Real-world customers report that not only does PowerMax deliver data reduction in excess of Dell's guarantees, but data reduction is transparent, automated, and intelligent. Organizations don't need to spend any cycles managing it.

Data is an increasingly important component of businesses today, and organizations are struggling to keep up with massive growth without compromising performance or reliability. If you are currently looking to refresh your data storage infrastructure to maximize storage efficiency and performance, you should seriously consider Dell PowerMax.

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[4] Source: Enterprise Strategy Group Survey Results, *2021 Data Infrastructure Trends*, November 2021.

About Enterprise Strategy Group
TechTarget's Enterprise Strategy Group provides focused and actionable market intelligence, demand-side research, analyst advisory services, GTM strategy guidance, solution validations, and custom content supporting enterprise technology buying and selling.

contact@esg-global.com
www.esg-global.com