

Speed Massive Data Access with Dell EMC PowerMax and Intel® Optane™ SSDs

Challenge

Storage infrastructure in the data center is often unable to quickly access the massive data volumes needed for analytics, high-demand financial transactions, fraud detection, interactive retail, and more. Such high-priority workloads require high input/output operations per second (IOPS), low latency, and resiliency that legacy storage systems cannot support. In addition, data is siloed on proprietary storage arrays that are difficult to integrate with new applications for emerging business initiatives.

Solution

The Dell EMC PowerMax storage platform is designed to handle enormous amounts of data quickly and intelligently with end-to-end NVMe Express (NVMe), storage-class memory (SCM), and machine learning (ML). Dual port Intel® Optane™ solid state drives (SSDs) help provide the exceptional resiliency and performance needed for consolidated, mixed workloads.

Intel Optane SSDs help reduce latency for applications while enabling organizations to consolidate block, file, and mainframe workloads to shrink the hardware footprint, streamline management with consistent data access, and lower total cost of ownership (TCO).

Benefits

Dell EMC PowerMax and Intel Optane SSDs bring a combination of high performance and low latency needed for mission-critical enterprise applications. Benefits include:¹

- Significantly lower system read and write latencies
- Consistent, high-performance response times, even under heavy data workloads
- Support for near-real-time analytics and high-demand online transaction processing (OLTP)
- A built-in ML engine that increases efficiency by automatically placing the most critical and active data into the Intel Optane SSD storage tier
- Seamless integration with existing applications and container environments

Near-Memory Speeds and Performance

Validation testing by Enterprise Strategy Group (ESG) demonstrated that PowerMax with Intel Optane SSDs as SCM delivered significant performance improvements compared to using NAND flash storage as SCM:¹



500%

more write input/
output operations
per second (IOPS)

100%

more bandwidth

26%

lower latency

ESG testing also recorded Oracle Database and Microsoft SQL Server response times of less than 0.25 ms—even as IOPS doubled. These are performance levels close to memory speeds.



About Dell Technologies

Dell Technologies helps organizations and individuals build their digital future and transform how they work, live, and play. The company provides customers with the industry's broadest and most innovative technology and services portfolio for the data era.



Figure 1. Dell EMC PowerMax 8000 and an Intel® Optane™ SSD DC D4800X drive



Figure 2. Dell EMC PowerMax and Intel® Optane™ SSDs help companies access critical data quickly, with greater efficiency

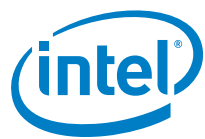
Why Intel Optane Technology?

Intel Optane technology provides industry-leading capabilities for breakthrough performance, predictably fast service, responsiveness under load, and high endurance. Combining performance with data-path redundancy gives enterprise storage-array providers multiple options when designing mission-critical solutions. The dual port Intel Optane SSD DC D4800X offers:

- 24/7 data availability with redundant paths and a hot-plug capability for continued data access in the event of system upgrades or failure
- Accelerated data delivery and amplified system performance for NVMe or Serial-Attached SCSI (SAS) NAND SSDs
- The ability to scale service levels and performance while balancing overall design costs

Fast Processing with End-to-End NVMe

Moving to an NVMe interface means no longer being constrained by input/output (I/O) bottlenecks. Designed for non-volatile, high-speed flash media, NVMe offers a streamlined connection to the host CPU, along with a simpler software stack. That reduces I/O processing time and CPU overhead, which helps improve performance and reduce latency to accelerate existing applications and support new applications that demand real-time processing.



High Performance for Heavy Workloads

When NAND SSD performance reaches its limit, Intel Optane SSDs step in. PowerMax, with dual port Intel Optane SSDs as a persistent storage tier, can help significantly reduce system latencies.¹ With the unique ability to read and write simultaneously, Intel Optane SSDs maintain consistent high-performance platform response times—even under heavy loads. PowerMax and Intel Optane SSDs provide a strong solution for near-real-time analytics and high-demand OLTP.

In addition, PowerMax is ideal for situations in which high-priority workloads retain high IOPS and low latency while lower priority workloads can continue to function at consistent and predetermined acceptable performance levels.

Learn More

Intel Optane SSDs: [intel.com/content/www/us/en/products/memory-storage/solid-state-drives/data-center-ssds/optane-dc-ssd-series.html](https://www.intel.com/content/www/us/en/products/memory-storage/solid-state-drives/data-center-ssds/optane-dc-ssd-series.html)

Dell EMC PowerMax NVMe Data Storage: delltechnologies.com/en-us/storage/powermax.htm

¹ ESG. "ESG Technical Validation: Dell EMC PowerMax and SCM Powered by Dual-port Intel Optane Technology Combine to Improve Overall System Performance." Commissioned by Dell EMC. September 2019. [esg-global.com/validation/esg-technical-validation-dell-emc-powermax-and-scm-powered-by-dual-port-intel-optane-technology](https://www.esg-global.com/validation/esg-technical-validation-dell-emc-powermax-and-scm-powered-by-dual-port-intel-optane-technology).

² Based on Dell EMC internal analysis of Random Read Hits Max IOPS (within a single array) for the PowerMax 8000, July 2019.

³ Based on Dell EMC internal analysis of published bandwidth of the PowerMax 8000 versus competitive mainstream arrays, July 2019.

⁴ Based on Dell internal testing using the Random Read Miss benchmark test in July 2019, comparing the PowerMax 8000 against the Dell EMC VMAX 950F with Serial-Attached SCSI (SAS) flash drives.

⁵ Based on Dell EMC internal analysis of Random Read Hits latency with 8K blocks for the PowerMax 8000, July 2019.

⁶ Based on Dell EMC internal analysis of SAP HANA nodes for the PowerMax 8000, July 2019.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit [intel.com/benchmarks](https://www.intel.com/benchmarks).

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