

HPE Scalable Persistent Memory with Storage Spaces Direct

Solution overview

Our joint Windows Server demonstration shows TPC-H like workloads and user workloads using the Server 2017 RC2 CTP release across a 6-node cluster using Storage Spaces Direct, Hyper-V, Windows® Clustering, with HPE Scalable Persistent Memory (PMEM), and high-performance SAS SSD local storage and 100GbE ROCE eliminating complex and costly external shared storage requirements from Windows Server Software-Defined Solutions.

- **The server infrastructure:** HPE ProLiant DL380 Gen10 with Scalable Persistent Memory (Scalable Persistent Memory shipping in CQ4 '17)
- **The operating system:** Windows Server (future release)
- **The storage:** Ultrastar SS300 SSDs from Western Digital's HGST brand
- **The networking:** HPE InfiniBand EDR/Ethernet 100 Gb 2-port 840QSFP28 adapter (Mellanox ConnectX®-4 Dual-Port Adapter) and HPE SN2700M StoreFabric M-series Ethernet switch (powered by Mellanox Spectrum®)

HPE, Microsoft®, Western Digital, and Mellanox demonstrate up to 3X performance improvement with new Windows Server® Storage Spaces Direct solution.

The exponential growth of data being shared and stored by thousands of applications and devices increases the need for high-speed, high-performance compute and resilient storage—and it continues to skyrocket. To meet these demanding requirements, Hewlett Packard Enterprise, Microsoft, Western Digital, and Mellanox have joined forces to deliver a new solution built on Storage Spaces Direct.

Combining the power of the HPE ProLiant DL380 Gen10 with Scalable Persistent Memory, Microsoft Windows Server (future release),¹ Ultrastar® SS300 solid-state drives (SSDs) from Western Digital's HGST brand, and Mellanox's high-performance 100GbE networking adapters connected by the HPE StoreFabric M-series switch powered by Mellanox Spectrum®, this Storage Spaces Direct solution is configured for performance optimization.

Performance and Value

Industry Leading Results

The demonstration of this TPH-C like workload resulted in up to 3x performance improvement—dramatically accelerating execution time, making it up to 3x faster. This notable improvement was demonstrated with a large volume data analytics query using the HPE Scalable Persistent Memory solution as the performance tier with Storage Spaces Direct for SQL Server 2017.

The server infrastructure

HPE ProLiant DL380 Gen10 with Scalable Persistent Memory

As the world's best-selling server,² the HPE ProLiant DL380 Gen10 server delivers the latest advancements in security, performance, and expandability, and is setting a new industry standard for server infrastructure. This solution configuration features a 6-node cluster of HPE ProLiant DL380 Gen10 servers with dual Intel® Xeon® E5 2.3 GHz, a 12-Core CPU, and 768 Gb RAM (640 Gb is designated as Scalable Persistent Memory).

HPE Scalable Persistent Memory: Memory bus speed, terabyte capacity HPE Gen10 servers are the only servers in the world to offer Scalable Persistent Memory. As an integrated storage solution that runs at memory speeds with terabyte capacity, HPE Scalable Persistent Memory leverages the resilient technology currently deployed in your data centers. It features a DRAM layer to accelerate your applications and workloads, a dedicated flash tier for persistence, and backup power to help facilitate moving data from DRAM to flash. Combining checkpoint operations that are up to 27X faster and result in a 20X reduction in database restart time—HPE Scalable Persistent Memory enables larger in-memory compute with persistence, power, and exceptional performance.

¹ Semi-Annual Channel (SAC)

² With one HPE ProLiant server shipping every 14.6 seconds and more than 39.3 million sold, HPE ProLiant servers are the undisputed market share leader CQ2 '17 IDC Server Tracker



Database Server

A single HPE ProLiant DL380 Gen10 server using two Intel Xeon Gold E5 1.8 GHz 24-Core CPUs, with 1.5 TB of RAM running SQL Server 2017 Release: RC2 (CTP).

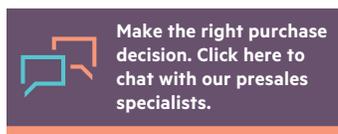
The operating system

Windows Server future release

Help your business evolve with Storage Spaces Direct

The latest version of Windows Server introduces support for Persistent Memory (PMEM) in Storage Spaces Direct—improving the highly available and scalable cloud storage solution. Pairing Windows Server with HPE servers, storage, and networking solutions offers support and features designed to make transitioning to hybrid cloud services and storage solutions easy and simple.

This new support allows customers to take advantage of the incredible capacity and performance offered exclusively by Hewlett Packard Enterprise with ProLiant Gen10 servers featuring Scalable Persistent Memory.



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The storage

UltraStar SS300 SAS SSDs from Western Digital's HGST brand

Increased Productivity and Operational Efficiency with Industry-Leading Quality and Reliability

To complement the HPE PMEM architecture, this solution uses UltraStar SS300 SAS SSDs, designed to deliver both capacity and ultra-high storage performance. The SQL Server database in this solution is stored on the SS300 SSDs, which handle the millions of database read requests made by the TPC-H like data warehouse workload. The consistent and reliable read performance of the SS300 SSDs—double the speed of current 12 Gbps SSDs—is responsible for much of the performance demonstrated by this SQL Server workload. The UltraStar SS300 family also offers significant value in terms of IOPS per watt, reducing total cost of ownership (TCO) through low power consumption, efficient cooling, and reduced space requirements. Western Digital's HGST storage devices offer reliable and resilient storage, boasting decades of proven enterprise storage expertise in Serial-Attached SCSI (SAS) design, reliability, firmware, customer qualification, and system integration.

The networking

HPE StoreFabric M-series switch and ConnectX®-4 Single/Dual-Port Adapter

High-performance storage requires high-performance networking

The M-series SN2700M switch provides a predictable, high density 100GbE switching platform capable of meeting the growing demands of today's data centers. An ideal spine and TOR (top-of-rack) solution, it allows for maximum flexibility with port speeds ranging spanning from 10 Gbps to 100 Gbps per port, and port density that enables full rack connectivity to any server at any speed.

Available as:

SN2100M - 1/2 Width, HA 1U (8p or 16p 10/25/40/100GbE ToR)

SN2410M (24p or 48p 10/25/40/100GbE ToR)

SN2700M (16p or 32p 10/25/40/100GbE ToR)

The Mellanox ConnectX®-4 Dual-Port Adapter supporting 100 Gbps with Virtual Protocol Interconnect (VPI) uses dual HPE InfiniBand EDR/Ethernet 100 Gb 2-port 840QSFP28 adapters based upon the proven Mellanox ConnectX-4 adapter. ConnectX-4 adapter cards with VPI that support EDR 100 Gbps InfiniBand and 100 Gbps Ethernet connectivity, provide the highest performance and most flexible solution for high-performance, Web 2.0, Cloud, data analytics, database, and storage platforms—enabling today's corporations to meet the demands of the data explosion, providing high-performance networking for high-performance storage.

- Highest performing silicon for applications requiring high bandwidth, low latency and high message rate
- World-class cluster, network, and storage performance
- Smart interconnect for x86, Power, ARM®, and GPU-based compute and storage platforms
- Cutting-edge performance in virtualized overlay networks (VLXAN, NVGRE, and Geneve)
- Efficient I/O consolidation, lowering data center costs and complexity
- Virtualization acceleration
- Power efficiency
- Scalability to tens of thousands of nodes

Learn more at [**Implementing Microsoft Windows Server 2016 using HPE ProLiant Servers, Storage, and Options**](#)

[**Implementing Microsoft Windows Server 2016 Software Defined Storage using HPE ProLiant Servers, Storage, and Options**](#)

[**HPE Windows Server Software Defined Homepage**](#)

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