Deliver Business Insights Faster with Microsoft SQL Server 2019 and VMware vSAN™

In collaboration with: intel

Tech Note by

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Summary

This joint paper outlines a brief discussion on the key hardware considerations when planning and configuring a VMware vSAN™server configuration. Including sample PowerEdge server configurations for a starting deployment and quoting process.

Today's enterprises need to move fast to stay competitive. For example, high-speed transactional processing solutions accelerate insights for financial trading or wholesale supply. High-speed analytics solutions enable users to quickly identify patterns in customer behavior or resource usage to inform better predictions and forecasts.
IT professionals are on point to deliver this high-performance data while reducing infrastructure costs. That is why IT pros choose Microsoft SQL Server 2019 running on VMware vSAN™.

They also choose Dell EMC™ PowerEdge™ rack servers configured with the latest generation of Intel® technologies. What are the benefits?

1) Selecting SQL Server 2019 enables IT pros to deliver industry leading performance[i].
2) Adopting hyperconverged infrastructure (HCI) powered by vSAN, combined with VMware vSphere®, enables IT pros to manage compute and storage with a single platform that lowers infrastructure costs when compared to traditional three-tier architectures[ii].
3) Dell EMC PowerEdge servers running vSphere boost the orders per minute (OPM) of transactional databases more than 1.9 times[iii], and they allow users to complete 8x the analytics in 39 percent less time[iv], when compared to previous-generation servers.

Key Considerations

To get started, available server configurations for SQL server 2019 are shown in the "Available Configurations" section below. Key considerations include the following:

1) **CPU:** High-frequency 3rd Generation Intel® Xeon® Scalable processors with 2.8 GHz clock speeds help optimize performance by enabling SQL Server 2019 locks to be released more quickly so multiple processes can access data faster. Additionally, Dell Technologies recommends using multiples of 24 CPU cores to make it easier to segment vSAN clusters and match the licensing structure of SQL Server 2019 Standard edition.

2) **Memory and Storage**: The Base configuration can be set up with two storage groups and up to eight capacity drives, while the Plus configuration can be equipped with up to four storage groups and up to 12 capacity drives. In general, using more storage groups provides better write performance.

   Dell Technologies recommends 1 TB of Intel® Optane™ persistent memory (PMem) 200 series per node. Intel Optane PMem creates a larger memory pool that enables SQL Server 2019 to run faster because data can be read from logical, in-memory storage, as opposed to a physical disk. For storage, Dell recommends using Intel Optane Solid State Drives (SSDs) for caching frequently accessed data. The Intel Optane SSD P5800X is the world's fastest data center SSD[v]. PCIe® Gen4 NAND SSDs are recommended for the capacity tier.

3) **Networking**: The configuration specifies Intel® Ethernet 800 Series network interface controllers (NICs) with Remote Direct Memory Access (RDMA), a hardware-acceleration feature that reduces the load on the CPU. Intel Ethernet 800 Series NICs start at 10 gigabit Ethernet (GbE) and scale up to 100 GbE. With Intel Ethernet 800 Series NICs, you will notice faster data speed between vSAN clusters, which becomes more important as node counts grow.

Available Configurations

The Plus configuration includes more cores, memory, and storage to support more or larger SQL Server 2019 instances and provide better performance.

Configurations[vi]	**Base Configuration** **Dell EMC™ PowerEdge™ R650 Rack Server, up to 10 NVMe® Drives, 1 RU**	**Plus Configuration** **Dell EMC PowerEdge R750 Rack Server, up to 16 NVMe Drives, 2 RU**
Platform	Dell EMC™ PowerEdge™ R650 rack server supporting up to 10 NVMe drives (direct connection with no Dell™ PowerEdge RAID Controller [PERC])	Dell EMC PowerEdge R750 rack server supporting up to16 NVMe drives (direct connection with no Dell PERC)
CPU[vii]	2 x Intel® Xeon® Gold 6342 processor (24 cores at 2.8 GHz)	2 x Intel® Xeon® Platinum 8362 processor (32 cores at 2.8 GHz) or Intel Xeon Platinum 8358 processor (32 cores at 2.6 GHz)
DRAM	256 GB (16 x 16 GB DDR4-3200)	
Persistent memory[viii]	*1 TB (8 x 128 GB Intel® Optane™ PMem 200 series)*	
Boot device	Dell EMC™ Boot Optimized Server Storage (BOSS)-S2 with 2 x 480 GB Intel® SSD S4510 M.2 Serial ATA (SATA) (RAID1)	Dell EMC™ Boot Optimized Server Storage (BOSS)-S2 with 2 x 480 GB Intel® SSD S4510 M.2 Serial ATA (SATA) (RAID1)
Storage adapter	*Not required for an all-NVMe configuration*	
Cache tier drives[ix]	2 x 400 GB Intel Optane SSD P5800X (PCIe® Gen4) or 2 x 375 GB Intel Optane SSD DC P4800X (PCIe Gen3)	3 x 400 GB Intel Optane SSD P5800X (PCIe Gen4) or 3 x 375 GB Intel Optane SSD DC P4800X (PCIe Gen3)
Capacity tier drives	4 x (up to 8 x) 3.84 TB Intel SSD P5500 (PCIe Gen4, read-intensive)	6 x (up to 12 x) 3.84 TB Intel SSD P5500 (PCIe Gen4, read-intensive)
NIC	Intel® Ethernet Network Adapter E810-XXV for OCP3 (dual-port 25 Gb)	Intel Ethernet Network Adapter E810-XXV for OCP3 (dual-port 25 Gb) or Intel Ethernet Network Adapter E810-CQDA2 PCIe add-in card (dual-port 100 Gb)

Learn More

Contact your Dell or Intel account team for a customized quote 1-877-289+-3355

Visit the Dell vSAN Configuration Options Getting Started

Download "Dell EMC vSAN Ready Nodes." to learn about hyperconverged building blocks for VMware vSAN™ environments.

Download "Microsoft SQL 2019 on Intel Optane Persistent Memory (PMem) Using Dell EMC PowerEdge Servers" to learn about advantages of using Intel Optane PMem with SQL Server 2019.

[i] TPC. TPC-E webpage. http://tpc.org/tpce/default5.asp.
[ii] Forrester Consulting. "The Total Economic Impact™ of VMware vSAN." Commissioned by VMware. July 2019. www.vmware.com/learn/345149_REG.html.
[iii] Principled Technologies. "Dell EMC PowerEdge R650 servers running VMware vSphere 7.0 Update 2 can boost transactional database performance to help you become future ready." Commissioned by Dell Technologies. June 2021. http://facts.pt/MbQ1xCy.
[iv] Principled Technologies. "Analyze more data, faster, by upgrading to latest-generation Dell EMC PowerEdge R750 servers." Commissioned by Dell Technologies. June 2021. http://facts.pt/poJUNRK.
[v] Source: 14 at: Intel. "Intel® Optane™ SSD P5800X Series - Performance Index." https://edc.intel.com/content/www/us/en/products/performance/benchmarks/intel-optane-ssd-p5800x-series/.
[vi] The "Plus" configuration supports more or larger Microsoft SQL Server 2019 instances with higher core count CPUs and additional disk groups that deliver higher performance.
[vii] Plus configuration: the Intel Xeon Platinum 8362 processor is recommended, but the Intel Xeon Platinum 8358 processor can be used instead if the Intel Xeon Platinum 8362 processor is not yet available.
[viii] Base and Plus configurations: Intel Optane PMem in Memory Mode provides more memory at lower cost.
[ix] Base and Plus configurations: The Intel Optane SSD P5800X is recommended, but the previous-generation Intel Optane SSD DC P4800X can be used instead if the Intel Optane SSD P5800X is not yet available.