Dell EMC Ready Solutions for VDI

VDI on Dell EMC PowerEdge Infrastructure with 3rd Generation Intel Xeon Scalable Processors

This solution brief provides updates for Dell EMC Ready Solutions for VDI Designs for VMware Horizon that are based on Dell EMC PowerEdge and vSAN Ready Node infrastructures. Based on the newest generation of Dell EMC PowerEdge servers, this update introduces PowerEdge R750 servers with 3rd Generation Intel® Xeon® Scalable Processors and the Intel® Optane™ Persistent Memory 200 Series.

Dell EMC PowerEdge Server improvements for VDI

Dell Technologies has validated that the PowerEdge R750 server with 3rd Generation Intel Xeon Scalable Processors delivers a 34 percent density increase compared to the equivalent previous-generation platform.

This platform is based on the latest 10 nm technology from Intel to provide more CPU cores and better performance per core to improve overall scalability and performance for a variety of workloads, including virtual desktop infrastructure (VDI).

Some of the platform enhancements that are especially relevant to VDI workloads are:

- **CPU** – Up to 42 percent more cores with up to 40 cores per socket, allowing VDI virtual machine (VM) per-node density increases and better VDI VM performance.

- **Memory** – 33 percent more memory channels, allowing greater memory capacity to support richer VDI desktop VM configurations for applications that require increased memory.

- **Optane Persistent Memory** – Intel Optane Persistent Memory (PMem) with Memory Mode provides a reduced total cost of ownership (TCO) and VDI desktops with larger memory configurations.

- **I/O** – PCIe Gen4 with twice the bandwidth and 33 percent more lanes, allowing for high speed and low latency NVMe drives, NICs, and GPU accelerators.

- **Multi Vector Cooling** – Advanced thermal design that streamlines the airflow pathways within the server, directing the optimal volume of air to where it is needed inside the chassis to keep CPUs, high performance NICs, and GPUs cool and performing optimally.

- **Boot Optimized Storage** – The 2nd generation Boot Optimized Storage Solution (BOSS-S2) has been enhanced with full hot-plug support for Enterprise class M.2 SATA SSDs. Additionally, the design is integrated into the server, eliminating the need to dedicate a PCIe slot and giving customers more flexibility with their choice of I/O slots and peripherals.

VMware vSAN and vSphere improvements for VDI

At the same time as Dell Technologies and Intel have improved server performance and capabilities in PowerEdge R750 servers, VMware has made improvements in VMware vSphere 7.0 to take advantage of these hardware improvements. The vSphere 7.0 improvements include performance enhancements related to vSAN and Remote Direct Memory Access (RDMA). Figure 1 shows how RDMA can be dynamically enabled within a VMware vSAN environment with the properly supported NICs and switches.
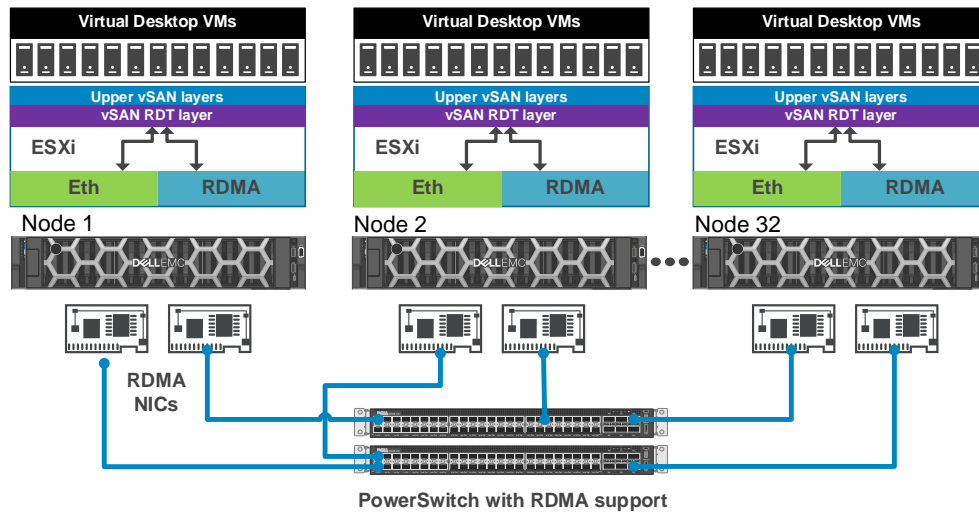
Figure 1 - VMware vSAN with RDMA support

Performance details

This solution takes advantage of the following new components to deliver higher performance and lower latency:

- Intel Optane PMem in memory mode, which delivers greater memory capacity and lower TCO compared to traditional RDIMMs.
- Intel Optane NVMe drives for the vSAN caching tier, which delivers lower latency I/O and higher storage IOPS.
- RDMA at the network layer using Mellanox NICs and Dell EMC PowerSwitch switches, delivering lower latency and reduced CPU utilization.

Using standardized testing methodologies, the Dell Technologies VDI solutions team achieved 262 Login VSI knowledge worker users per node with a Login VSI baseline score of 621 on the PowerEdge R750 server. This compares to 195 knowledge worker users per node with a Login VSI baseline score of 793 on the previous generation PowerEdge R740 server. That represents a **34 percent improvement in density and a 22 percent improvement in latency** on the latest PowerEdge servers when compared to the previous generation with Intel Xeon Scalable Processors.

The following tables show the configuration and versions that we used in the lab testing and validation:

Table 1: Server hardware design components

Platform	CPU	Memory	Storage controller	Disks	Network
3 x R750	Intel Xeon Gold 6348	16 x 32 GB RDIMMs 16 x 128 GB Intel Optane PMem	PERC HBA 355i	2 x 750 GB Intel Optane NVMe 6 x 1.92 TB MU SAS SSD	2 x Mellanox ConnectX-5 DP 25 GbE
3 x R740	Intel Xeon Gold 6248R	12 x 32 GB RDIMMs 12 x 128 GB Intel Optane PMem	PERC HBA 330	2 x 800 GB WI SAS SSD 4 x 1.92 TB MU SAS SSD	1 x Broadcom 57414 DP 25 GbE

Note: It is possible to substitute the Intel Xeon Gold 6354 CPU in the configuration shown in Table 1 for applications that require a virtual workstation configuration with clock speed processors of 3 GHz and above.

Table 2: Software design components

Hypervisor	Broker	Desktop operating system
VMware vSphere 7.0 update 2	VMware Horizon 8 version 2103	Windows 10 version 20h2

To learn more, please visit Dell EMC Solutions for VDI and the Dell Technologies Info Hub for VDI.

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