Hewlett Packard Enterprise

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Use Virtualized VMware Storage

Ed Tittel

- Explore HPE ProLiant servers powered by Intel Xeon Scalable processors pre-configured to work as VMware vSAN ReadyNodes
- Understand the benefits of Express Storage Architecture (ESA) for performance, capacity, and cost
- Focus on all-flash based storage arrays and supporting technologies for future-proofing

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IN THIS PAPER

Learn how HPE enables enterprises to extract added value, capacity, and performance from their VMware environments through specialized, tailored VSAN ESA configurations for HPE ProLiant servers powered by Intel Xeon Scalable processors. This includes:

- Explanation of VMware market size and value
- Overview of the VMware Compatibility Guide (VCG) with special emphasis on HPE ProLiant VMware vSAN ReadyNodes
- Explanation of the many cost, efficiency, and performance benefits in using ReadyNodes with vSphere ESA

CONTENTS

Certain platforms and environments have become firmly entrenched in enterprise computing. Founded in 1998 by a handful of bold entrepreneur-technologists in Palo Alto, California, VMware upended computing technologies with its innovative virtualization technology. Its flagship product at the time, VMware Workstation, allowed users to run multiple operating system instances independently and in parallel on a single physical server. This led to massive proliferation and ultimately to today's era of cloud-forward, cloud-first, and cloud-native computing.

In that progression, VMware has become a major player in the technology marketplace. The global VMware market is estimated to exceed $94B in 2024. With a projected CAGR of nearly 10% going forward, that market size is expected to approach $150B by 2029. This puts its overall annual global market size in the same league as that for database management systems and AI. Indeed, for 2024 it's somewhat ahead of both of them.

Many benefits of vSAN ReadyNodes come from these turnkey solutions to help businesses accelerate their journey to implement software-defined storage (SDS).

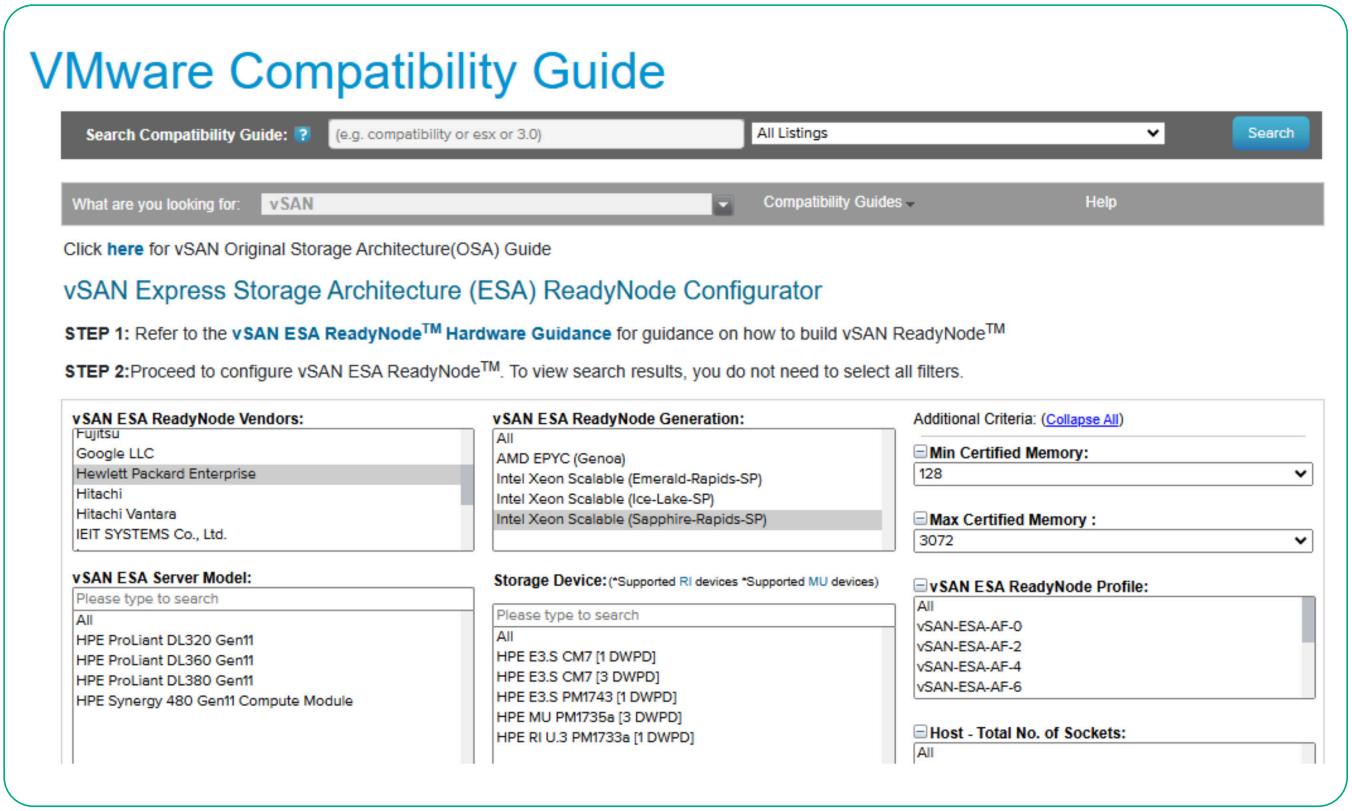

Figure 1: *Relevant HPE ProLiant Gen11 model numbers for VMware vSAN include DL320, DL360, and DL380, as shown*

In what may seem like a somewhat circumscribed use case really isn't—as explained in the preceding paragraphs, some organizations and businesses may want to make use of HPE ProLiant Servers for VMware vSAN ReadyNodes. If they're already on the VMware bandwagon, and looking for high-performance, high-quality, and high-reliability solutions, they can run on HPE ProLiant servers powered by Intel Xeon Scalable processors. These operate as a trusted, high-performance platform, using the vSAN storage kernel. Together with 10 and 25 GbE-based networking (options up to 100 GbE are available) these servers have the speed and connectivity to handle the high levels of network traffic necessary to support vSAN. Configurations built around ProLiant Gen11 servers powered by Intel are already listed in the VMware Compatibility Guide aka VCG. All such HPE ProLiant servers work through the new VMware vSphere foundation or the VMware Cloud Foundation. **Figure 1** shows the relevant ProLiant Server models, based on the latest Intel Xeon Scalable processors (appears as "Sapphire-Rapids-SP").

All these various units also include new DDR5 RAM, which offers higher speeds and more concurrent memory channels for access to further boost server performance and speed I/O along. Host Bus Adapter (HBA) options for these servers use all-flash SAS or SATA drives for those who want them in vSAN Original Storage Architecture (OSA). Other options are available for all-NVMe builds to design newer-technology VMware vSAN Express Storage Architecture (ESA) ReadyNodes. Better yet, ESA ReadyNodes from HPE meet compliance for storage and platform compatibility performance standards for operation in VMware vSAN. The VMware Compatibility Guide is the best tool to steer you to the exact configurations that are pre-vetted for such use.

Benefits of VMware vSAN ReadyNodes

Many benefits of vSAN ReadyNodes come from these turnkey solutions to help businesses accelerate their journey to implement software-defined storage (SDS). Buyers who choose the HPE ProLiant Gen11 servers powered by Intel Xeon Scalable processors will understand they can benefit from certain characteristics, including:

- Easy to order and faster time to market (HPE is a single-source vendor and controls server builds from inception through delivery, choosing from prescribed configurations speeds time to market and deployment).
- These HPE ProLiant Gen11 servers powered by Intel Xeon Scalable processors are designed to be simple to install, set up, and manage, with a single coherent and consistent management UI for physical and virtual environments.
- Lower costs come from highly efficient HPE ProLiant servers powered by Intel Xeon Scalable processors that deliver high energy efficiency and industry-leading performance.
- Solid security from HPE ProLiant Gen11 servers powered by Intel Xeon Scalable processors deliver a 99.8% detection rate for attacks and exposures, with 100% malware protection across all apps, clouds, and devices. Such design boosts network security sufficiently to require 60% fewer traditional firewalls for equivalent protection.

Bottom line: the VMware Compatibility Guide's validated HPE server configurations get a joint recommendation from HPE, Intel, and VMware to run vSAN ESA with no hitches, glitches, or gotchas.

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Maximizing VMware vSAN Original Storage Architecture

Also known as OSA, the vSAN Original Storage Architecture offers a dramatically simplified system for hypervisor-converged storage, as shown in **Figure 2**. This diagram depicts how VMware VMs can interact with one or more different storage facilities, through a shared, virtualized vSAN shared datastore with access to multiple and various storage arrays.

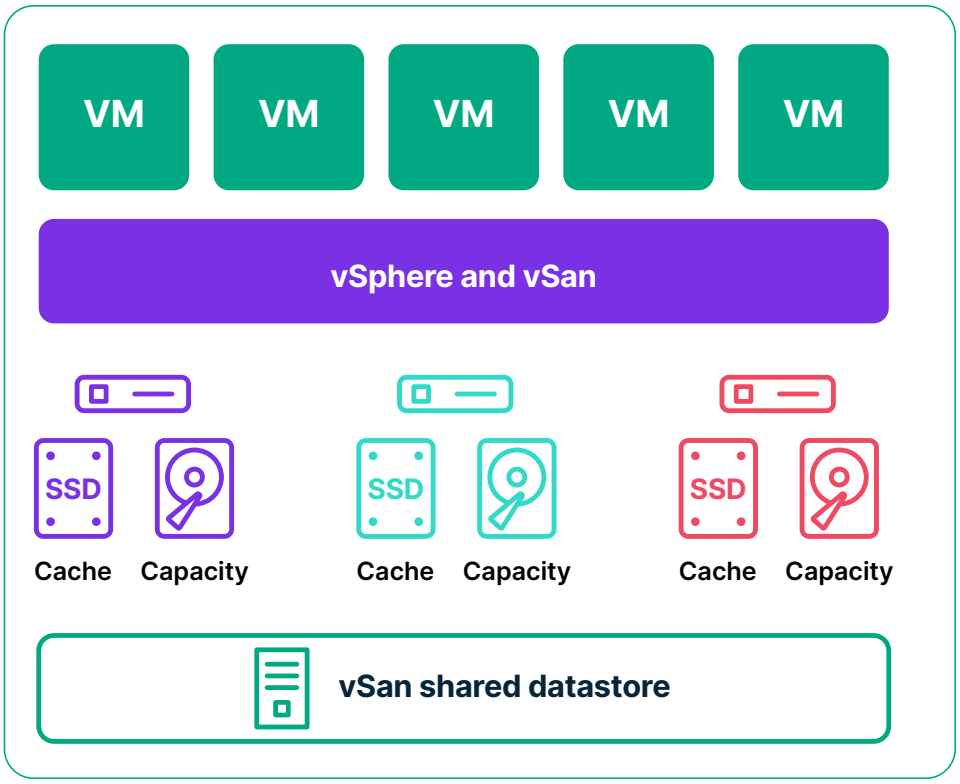

Figure 2: *vSAN Original Storage Architecture goes from shared datastore, through storage arrays, into vSphere and vSAN to service VMs*

Drawing on the simplified diagram, basic OSA characteristics and features grant vSAN storage many valuable and useful characteristics, including:

- Software-defined storage is embedded in VMware vSphere. It's been thoroughly proven for eight years, and an SDS market leader for even longer than that.
- Works on both vSphere 7.x and 8.x versions to cover the vast majority of use cases and business needs.
- Network shared storage is available through both cache and capacity tiered drives, so that applications or services can choose to emphasize performance or capacity depending on user requirements and SLAs.
- Operated through a storage policy-based management (SPBM) framework, OSA lets businesses draw upon security, access controls, retention, protection, and other data management and governance practices and policies.
- OSA works with both hybrid (SSD/HDD) and all-flash (SAS and NVMe) storage devices, so businesses can match storage types to meet application and service requirements.
- HPE ProLiant Gen11 servers powered by Intel Xeon CPUs are certified VMware vSAN ReadyNode servers. Buyers may elect to DIY VMware vSAN with their own components, but this approach saves time and is guaranteed to work.
- Works with Intel-based HPE ProLiant Gen 10, Gen10 Plus, and Gen11 servers, where HPE ProLiant Gen11 servers support both 4th and 5th Gen Intel Xeon Scalable processors.

The primary reason businesses and organizations use VMware vSAN to deliver enterprise-class, high-performance storage to virtualized applications is because OSA (and its successor, ESA) brings seamless vSphere integration along with the full VMware stack. For those who use VMware vSphere this brings numerous benefits to such an implementation approach, including:

- No other storage products get embedded within the vSphere kernel.
- vSphere is the only software needed.
- Enabling vSAN only requires turning on vSphere DRS or vSphere HA.
- All vSAN storage gets managed (along with everything else) via vCenter or the vSphere web client.

The key takeaway is that vSAN ESA delivers better performance and the same capacity as OSA, but with significantly fewer hosts that are required for an equivalent OSA configuration.

Advancing to Express Storage Architecture (ESA)

Validated, Intel-powered preconfigured server options are defined in the VMware Virtual SAN Compatibility Guide. The newest vSAN Express Storage Architecture aka ESA—the one shown in the **Figure 2** snippet from the VCG—requires VMware vSphere 8.x, and only works with vSAN ReadyNodes (or emulated counterparts). ReadyNodes use only single-tier NVMe with no cache or capacity storage segments. They bring buyers better TCO than OSA and no performance loss using RAID 5 vs. RAID 1 at higher storage utilizations. Indeed, ESA offers the exact same vSAN experience as OSA. For many organizations, VMware vSAN works best on HPE ProLiant Gen11 servers using the latest Intel Xeon Scalable processors (note that Models DL320, DL360, and DL380 all appear in **Figure 2** as well).

When comparing vSAN OSA to ESA the following observations are worth considering:

- ESA switches from capacity and cache arrays to all-NVMe storage (see **Figure 3**)
- ESA TCO can be up to 40% lower than OSA.

- ESA architecture provides RAID 5/6 capacity with better performance than OSA RAID 1 (usually positioned as the "fastest" form of disk mirroring).
- ESA RAID 6 vs. OSA RAID 1 increases usable storage capacity (same number of drives), or can reduce costs by requiring fewer NVMes for the same capacity (smaller number of drives).
- ESA performance boost combined with capacity increase supports more VMs in the same hypervisor space.

The key takeaway is that vSAN ESA delivers better performance and the same capacity as OSA, but with significantly fewer hosts that are required for an equivalent OSA configuration. This reduces costs for power, space, hardware, and licensing. Furthermore, ESA delivers 4 times better compression, triples buffer capacity, and handles more and heavier workloads over time. ESA architecture is identical to OSA, except for the all-NVMe layer at the middle shown in **Figure 3**.

Indeed, this explains why all the items shown in the VMware Compatibility Guide in **Figure 1** are ESA compliant. There's simply no reason to buy anything else today, especially given that ESA is backward-compatible with OSA for environments where the two storage architectures must interoperate.

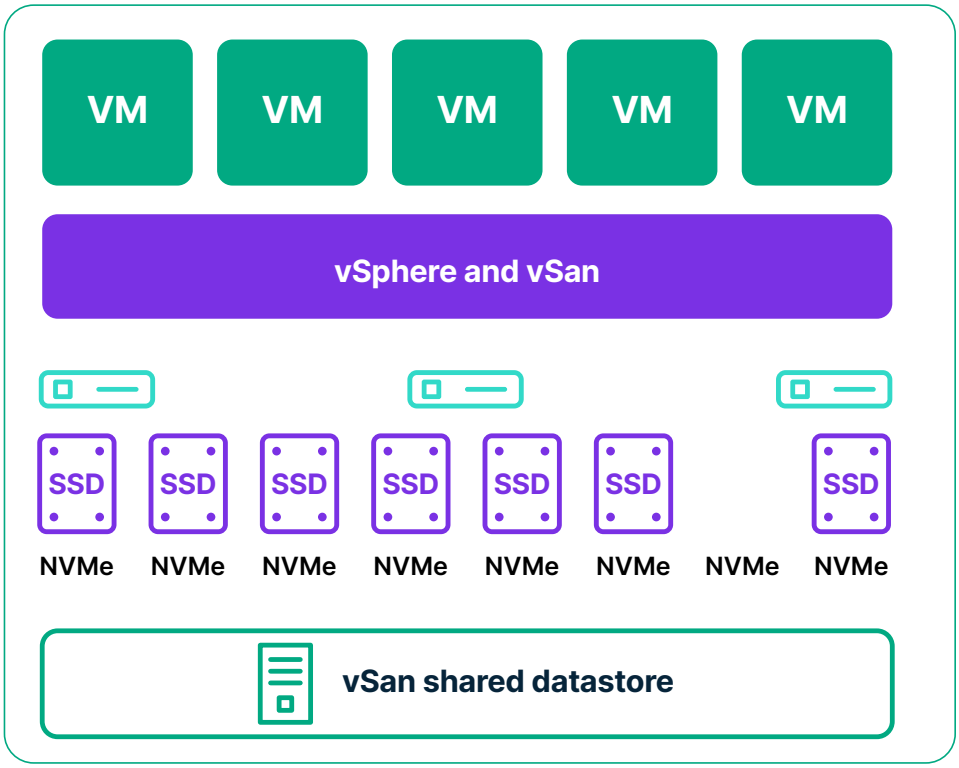

Figure 3: *The ESA architecture switches out OSA's capacity and cache arrays for an all-NVMe approach*

LEARN MORE

Now you know that HPE ProLiant servers powered by Intel Xeon Scalable processors can support speedy, resource-intensive, enterprise-wide virtualized storage through VMware. Interested readers can further draw on additional materials to enhance that knowledge and understanding. Within the VMware Virtual SAN Compatibility Guide you will see additional information from VMware about ESA ReadyNode configurations, customizations, node sizing tools, news and updates, and a great deal more. From the HPE side, the Reference Architecture document Implementing VMware VSAN on HPE ProLiant Servers with VMware vSphere is another great source of information.

Further, consider this: HPE in collaboration with Intel builds technologies designed to reshape and accelerate your business. How? By helping you connect, protect, analyze, and act on all your data and applications wherever they live so you can turn analytics and data into outcomes, fast (see HPE's Our Purpose statement in particular). Intel plays an important role in this story, too: The company is an industry leader, creating world-changing technology that enables global progress and enriches lives. Inspired by Moore's Law, Intel ceaselessly seeks to advance semiconductor design and manufacturing to address customers' challenges. By embedding intelligence in the cloud, network, edge and every kind of computing device, Intel unleashes the potential of data to transform business and society for the better. Visit Intel.com to learn more about its ongoing innovations (see also HPE ProLiant Gen 11 servers with Intel).

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