

# vSAN Direct Configuration Hardware Recommendation

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## Introduction

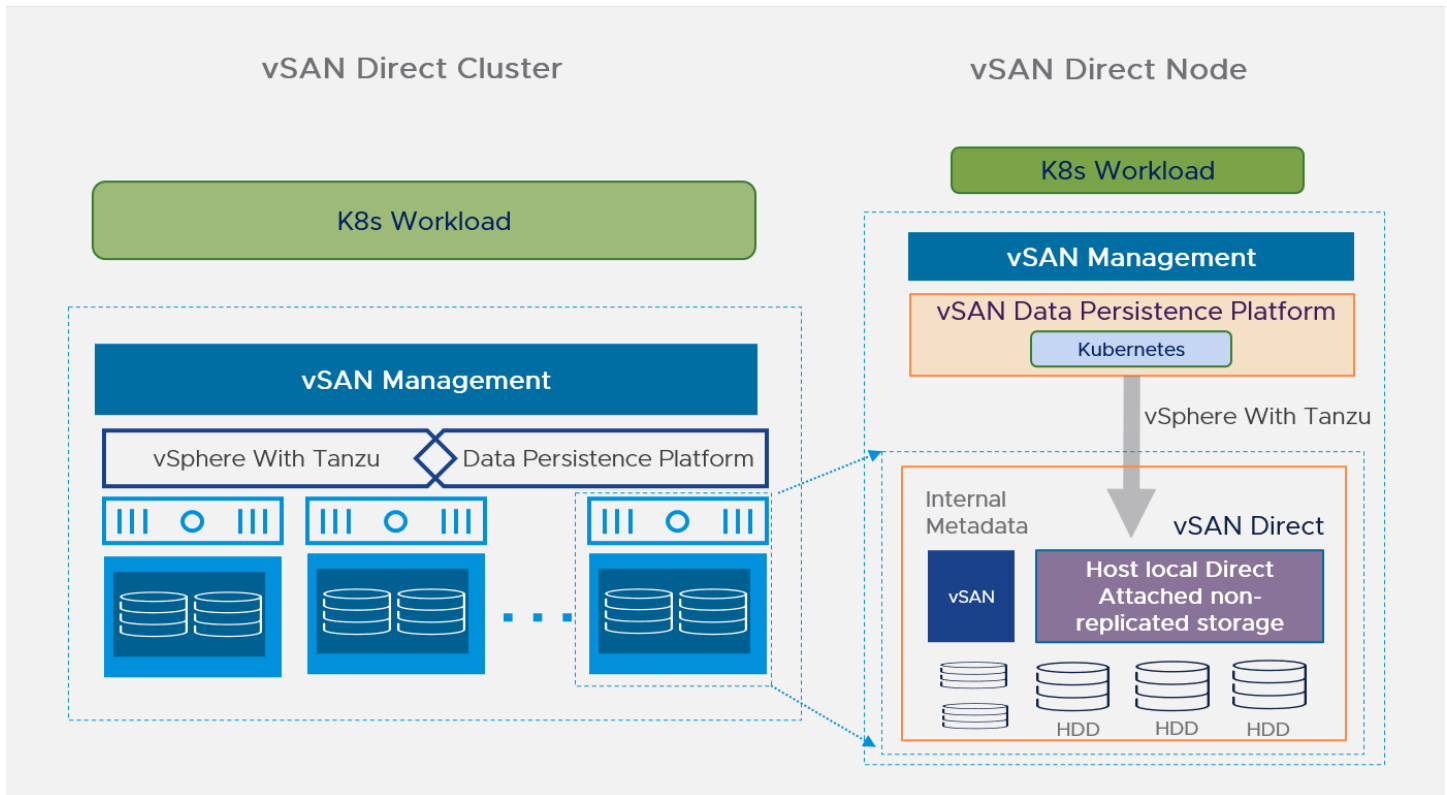
VMware vSAN Direct Configuration™, launched in VMware vSAN™ 7.0 U1, can be used by modern stateful services supported by the vSAN Data Persistence platform (DPP) on VMware Cloud Foundation™ with VMware Tanzu™. Applications hosted on vSAN Direct Configuration interface directly with the underlying direct attached storage for optimized I/O and storage efficiency. vSAN Direct Configuration provides integrated management and monitoring capabilities for the disk drives.

This paper presents an architectural overview and hardware recommendations for vSAN Direct Configuration.

## Architectural Overview

vSAN 7.0 P02 and newer versions support dedicated vSAN Direct Configuration cluster deployments. A dedicated vSAN Direct Configuration cluster must have a minimum of 4 nodes. All the nodes in the cluster must have the same hardware configuration.

Disk drives on each node may be claimed to create a vSAN Direct Configuration datastore on which modern stateful services create persistent volumes and store data.



vSAN Direct Configuration datastore has a single storage layer i.e., capacity tier (vSAN Direct Configuration does not have a cache tier).

In addition to vSAN Direct Configuration datastore, vSAN Direct Configuration requires a standard vSAN datastore to store its internal metadata. This vSAN datastore must have one cache and at least one capacity drive.

vSAN Direct Configuration does not support the following in vSAN 7.0 P02 release

1. Traditional VM workloads.
2. Kubernetes applications not supported by the vSAN Data Persistence platform.
3. Kubernetes application (including applications supported by the vSAN Data Persistence platform) deployment on vSAN datastore of vSAN Direct Configuration.

## vSAN Direct Configuration Hardware

### Required Hardware for vSAN Direct Configuration

vSAN Direct Configuration only supports hardware components from the vSAN [Hardware Compatibility List](#). Below are additional requirements for vSAN Direct Configuration cluster.

Category	Requirements per Node
<b>Servers</b>	Dell and HPE Servers Only
<b>Disk Drives</b>	<p><b>vSAN Direct Configuration Datastore</b></p> <ul style="list-style-type: none"> <li>◆ SAS HDDs/ SAS SSDs/ SATA SSDs are supported Disk types for vSAN Direct Configuration datastore (4kn HDDs are not supported)</li> <li>◆ Drives must be of the same disk type on the host and across all hosts in the cluster</li> </ul> <p><b>vSAN Datastore (for metadata)</b></p> <ul style="list-style-type: none"> <li>◆ One/ SAS/SATA SSD for cache layer /SAS/SATA SSD for cache layer</li> <li>◆ one or more NVMe/SAS/SATA SSD or HDD for capacity (approx. 1.6 TB)</li> </ul>
<b>I/O Controller</b>	<p>I/O depth &gt;= 512 configured in passthrough mode</p> <p>vSAN Direct Configuration datastore and standard vSAN datastore must be configured on separate I/O controllers</p> <p>When using single I/O controller, vSAN Direct Configuration datastores must be configured on the I/O controller and standard vSAN datastore must be configured on NVMe devices.</p>
<b>Network</b>	1* 10 Gbps or higher data transfer rate.
<b>CPU</b>	1 * 16C CPU per node
<b>Memory</b>	Min 64 GB per node
<b>Nodes per cluster</b>	Min 4 nodes per cluster

## Recommended Hardware for vSAN Direct Configuration

Object stores are a popular category of modern stateful services, primarily used to store unstructured data. Some common examples of unstructured data are images, videos, and logs.

### Use case 1: Capacity Optimized Object Storage

Cost efficiencies can be attained for object storage applications by using storage dense nodes with high-capacity HDD drives. Below is the recommended hardware configuration for capacity optimized object storage.

#### Dell Server:

<b>Server</b>	<b>PowerEdge Dell 740xd</b>
<b>No of Nodes in the Cluster</b>	4 (min)

	<b>Per Node</b>
<b>vSAN Direct Configuration Datastore</b>	Disk type: SAS-3 HDD No of disks: 12 Per disk size: 8 TB or larger
<b>vSAN Datastore</b>	Cache: <ul style="list-style-type: none"> <li>• Size: 300 GB (Min)</li> <li>• Disk type: NVMe</li> </ul> Capacity: <ul style="list-style-type: none"> <li>• Size: 1.6 TB (min)</li> <li>• Disk type: NVMe</li> </ul>
<b>CPU</b>	2 * 16C
<b>Memory</b>	128 GB (Min)
<b>Network</b>	2 * 25Gbps
<b>I/O Controllers</b>	1* HBA-330
<b>Boot Device</b>	BOSS – Redundant (2X M.2 RAID 1)

HPE Server**HP DL380 Gen10**

<b>Server</b>	<b>HPE ProLiant DL380 Gen10 12 LFF</b>
<b>No of Nodes in the Cluster</b>	4 (Min)

	<b>Nodes</b>
<b>vSAN Direct Configuration Datastore</b>	Disk type: SAS HDD (12 x 3.5") No of disks: 12 Disk size: 8 TB or larger
<b>vSAN Datastore</b>	Cache: <ul style="list-style-type: none"> <li>• Size: 300 GB</li> <li>• Disk type: NVMe/SAS/SATA (NOTE: Additional controller required with SAS/SATA drives)</li> </ul> Capacity: <ul style="list-style-type: none"> <li>• Size: 2 TB (min)</li> <li>• Disk type: NVMe/SAS/SATA (NOTE: Additional controller required with SAS/SATA drives)</li> </ul>
<b>CPU</b>	2 * 16C
<b>Memory</b>	192GB (Quantity: 12; 16GB DIMMs)
<b>Network</b>	2 * 25Gbps
<b>I/O Controller</b>	HPE Smart Array E208i-a SR Gen10 Controller 804326-B21 (Supports up to 8 drives) OR HPE Smart Array E208i-p SR Gen10 Controller 804394-B21 (Supports up to 8 drives) OR HPE Smart Array P816i-a SR Gen10 804338-B21 (Supports up to 16 drives. Can use for configs with > 8 drives)
<b>Boot Device</b>	HPE 240GB SATA 6G Mixed Use M.2 2280 SSD P19888-B21 OR HPE NS204i-p x2 Lanes NVMe PCIe3 x8 OS Boot Device P12965-B21

## Use case 2: Performance Optimized Object Storage

Using high performance drives such as SSDs with scale out cluster provides better performance for object storage workloads.

Below is the recommended hardware configuration for performance optimized object storage.

Dell Server

<b>Server</b>	<b>PowerEdge Dell 740xd</b>
<b>No of Nodes in the Cluster</b>	4 (Min)

	<b>Per Node</b>
<b>vSAN Direct Configuration Datastore</b>	Disk type: SAS-3 SSD 2.5" No of Disks: 12 + 12 SAS SSD No of disks per controller: Up to 12 disks per I/O controller Per disk size: up to 7.6 TB
<b>vSAN Datastore</b>	Cache: <ul style="list-style-type: none"> <li>• Size: 300 GB (Min)</li> <li>• Disk type: NVMe</li> </ul> Capacity: <ul style="list-style-type: none"> <li>• Size: 1.6 TB (min)</li> <li>• Disk type: NVMe</li> </ul>
<b>CPU</b>	2 * 16C
<b>Memory</b>	128 GB
<b>Network</b>	2* 25 Gbps
<b>I/O Controllers</b>	2 * HBA-330
<b>Boot Device</b>	BOSS – Redundant (2X M.2 RAID 1)

HPE Server

<b>Server</b>	<b>HPE ProLiant DL380 Gen10 24 SFF</b>
<b>No of Nodes in the Cluster</b>	4 (Min)

	<b>Per Node</b>
<b>vSAN Direct Configuration Datastore</b>	Disk type: SAS-3 SSD Up to 24 SAS SSD Up to 8 disks per I/O Controller
<b>vSAN Datastore</b>	Cache: <ul style="list-style-type: none"> <li>• Size: 300 GB (Min)</li> <li>• Disk type: NVMe/SAS/SATA (NOTE: Additional controller required with SAS/SATA drives)</li> </ul> Capacity: <ul style="list-style-type: none"> <li>• Size: 2 TB (min)</li> <li>• Disk type: NVMe/SAS/SATA (NOTE: Additional controller required with SAS/SATA drives)</li> </ul>
<b>CPU</b>	2 * 16C
<b>Memory</b>	192GB (Quantity: 12; 16GB DIMMs)
<b>Network</b>	2 * 25 Gbps
<b>I/O Controllers</b>	HPE Smart Array P408i-a SR Gen10 Controller 804331-B21 (Supports up to 8 drives) OR HPE Smart Array P408i-p SR Gen10 Controller 830824-B21 (Supports up to 8 drives) OR HPE Smart Array E208i-a SR Gen10 Controller 804326-B21 (Supports up to 8 drives) OR HPE Smart Array E208i-p SR Gen10 Controller 804394-B21 (Supports up to 8 drives)
<b>Boot Device</b>	HPE 240GB SATA 6G Mixed Use M.2 2280 SSD P19888-B21 OR HPE NS204i-p x2 Lanes NVMe PCIe3 x8 OS Boot Device P12965-B21



## Glossary

NVMe	Non-Volatile Memory Express
SCSI	Small Computer System Interface
SAS	Serial Attached SCSI

