

# VMware vSAN

The market-leading hyperconverged infrastructure software<sup>1</sup> and your first step to hybrid cloud

## AT A GLANCE

Hyperconverged infrastructure (HCI) converges compute, storage and storage networking resources on industry-standard x86 servers, and uses software to abstract and pool cluster resources with unified management software. It transforms data centers by increasing agility, future-proofing infrastructure and reducing costs.

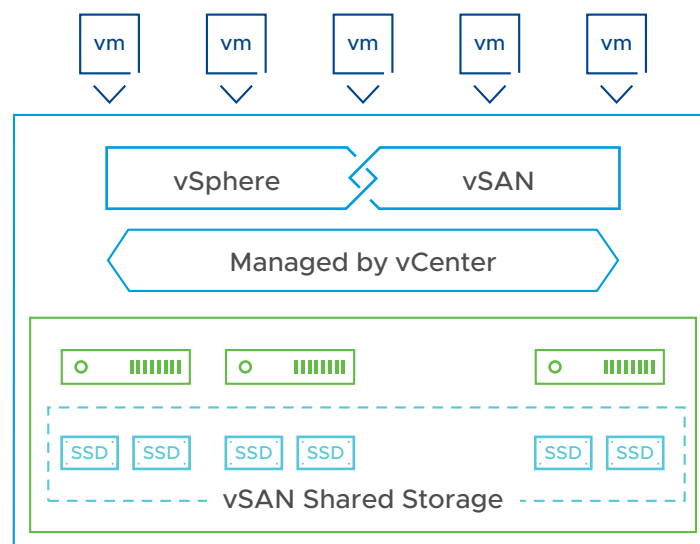
With HCI, you can increase business agility with automation, greatly reducing the need for manual intervention for common tasks, monitoring, troubleshooting and more. Converge teams to eliminate silos and accelerate decision-making. You can also increase the performance of business-critical applications because HCI supports the latest storage technologies.

HCI future-proofs your infrastructure investments. Providing a common operational model for managing compute and storage by abstracting the underlying infrastructure, HCI can extend beyond the core data center to the edge and the public cloud. Its capabilities make HCI the ideal platform for managing traditional virtual machines (VMs) and next-generation application deployments.

Leveraging industry-standard x86 servers for compute and storage, HCI reduces costs by avoiding expensive, purpose-built storage and storage networking investments. As HCI scales linearly, your organization can avoid large, upfront purchases and scale incrementally as additional resources are needed.

## Why VMware vSAN?

Across industries, organizations look to IT to help them stay competitive in a constantly evolving marketplace. To meet growing business needs, IT needs to move toward a cloud operating model to gain the speed, agility and cost advantages of the public cloud within their data center. The first step for many organizations is to adopt hyperconverged infrastructure, extending the benefits of a cloud operational model to storage while using existing tools and processes. HCI increases agility, future-proofs infrastructure and lowers storage costs.



The industry-leading HCI software stack from VMware consists of VMware vSphere® for compute virtualization, VMware vSAN™ for storage integrated with vSphere, and VMware vCenter® for virtual infrastructure management. VMware HCI is configurable and seamlessly integrates with VMware NSX® to provide secure network virtualization and/or VMware vRealize® Suite for advanced hybrid cloud management capabilities. HCI can be extended to the public cloud as vSAN has native services with six of the top cloud providers: Amazon, Microsoft, Google, IBM, Alibaba and Oracle.

vSAN enables you to prime your business for growth through:

- Seamless evolution – vSAN is integrated with vSphere and requires no new tools.
- Industry-leading flexibility – The vSAN ecosystem empowers you to run HCI on certified solutions with your preferred vendor.
- Multi-cloud capabilities – vSAN provides you with consistent operations from edge to core to cloud, with intrinsic security throughout.

1. IDC. Worldwide Quarterly Converged Systems Tracker. December 12, 2019.

## KEY BENEFITS

- Seamless evolution – Extend virtualization to storage with a secure, integrated hyperconverged solution that simply works with your VMware environment:
  - Is integrated with your hypervisor and leading public clouds
  - Use existing tools for compute and storage
  - Protect and optimize current investments
- Leading flexibility – Deploy software-defined infrastructure across your data center with the industry's largest HCI ecosystem:
  - Extend to full-stack HCI and build a digital foundation
  - Use certified solutions with your preferred vendor
  - Unify resources under policy-based management
- Multi-cloud ready – Evolve to a common control plane, from your core data center to public cloud and the edge, built on HCI:
  - Consistent operations across your environment
  - Intrinsic security for data at rest and in flight
  - Hundreds of public cloud providers

## Seamless evolution

Seamlessly evolve to HCI with the only storage integrated with vSphere that also integrates with your overall VMware environment. vSAN simplifies your infrastructure modernization by leveraging existing tools, skillsets and software solutions. With native services to leading public cloud providers, vSAN further simplifies the extension from on premises to the public cloud. Extend virtualization beyond compute and storage with integrated, hypervisor-based networking virtualization and advanced management capabilities. Protect current storage infrastructure investments with the only HCI solution built on policy-based management that extends per-VM policies and automated provisioning to modern SAN and NAS systems.

## Broadest flexibility

vSAN has the largest HCI ecosystem and works with your existing server vendor. vSAN has more than 500 jointly certified servers with over 15 server OEMs, as well as a jointly engineered turnkey appliance, Dell EMC VxRail. vSAN provides investment protection by supporting traditional and next-generation storage technologies, such as NVMe. vSAN is a critical component of VMware Cloud Foundation™, an integrated infrastructure control plane from edge to data center to public cloud.

## Multi-cloud ready

vSAN is an integral component of VMware Cloud Foundation, which enables consistent processes in a true hybrid cloud architecture—no application replatforming required. Admins can use the same tools and processes used on premises to eliminate training requirements and siloed teams, and expedite time to value. The leading cloud provider network for vSAN provides access to hundreds of public clouds, so you can build a hybrid cloud with a vendor that meets your specific needs. Intrinsic security encrypts data at rest and at motion with a FIPS 140-2 validated encryption module, which meets stringent U.S. federal government requirements.

## Key features and capabilities

Tightly integrated with vSphere – vSAN is integrated with vSphere, optimizing the data I/O path to provide the highest levels of performance with minimal impact on CPU and memory.

VM-centric policy-based management – vSAN is part of the larger VMware Cloud Foundation stack that uniquely delivers consistent, VM-centric operations through policy-based management. Using simple policies, common tasks are automated and storage resources are balanced to reduce management time and optimize HCI efficiency.

Unified management – vSAN natively integrates with the VMware Cloud Foundation stack, removing the need for training and operating specialized storage interfaces. vSAN uses a modern HTML5-based web client. VMware vRealize Operations™ within vCenter enables rapid visibility into a vSAN deployment with broad monitoring and deep analytics for rapid troubleshooting and remediation, all from vCenter.

Flash optimized – vSAN minimizes storage latency with built-in caching on server-side flash devices, delivering up to 50 percent more IOPS than previously possible. vSAN all-flash can be deployed for less than \$1 per GB of usable capacity—more than 50 percent less than the cost of competing hybrid hyperconverged solutions.

Granular, nondisruptive scale-up or scale-out – Nondisruptively expand capacity and performance by adding hosts to a cluster (scale-out) or just grow capacity by adding disks to a host (scale-up).

VMware HCI Mesh™ – VMware HCI Mesh is a unique, software-based approach for disaggregation of compute and storage resources. It brings together multiple independent vSAN clusters for a native, cross-cluster architecture that disaggregates resources and enables utilization of capacity across clusters. It also allows vSAN clusters to share storage capacity with compute clusters or non-HCI vSphere clusters. You can now adopt HCI without needing to replace existing servers, scale compute and storage independently and precisely to meet application needs, and optimize resource utilization across clusters—all while maintaining the operational simplicity of HCI. VMware HCI Mesh requires no specialized hardware. Use any ReadyNode to share capacity. VMware HCI Mesh is scalable and can support up to 128 hosts across clusters in a mesh. A client cluster can mount up to five remote datastores.

Deduplication and compression – Software-based deduplication and compression optimizes all-flash storage capacity, providing as much as 7x data reduction with minimal CPU and memory overhead. You now have the option to turn on only compression for those environments where space efficiency must be balanced with performance requirements. The compression-only option reduces the failure domain from the disk group to an individual disk.

Erasure coding – Increase usable storage capacity by up to 100 percent while keeping data resiliency unchanged. It is capable of tolerating one or two failures with single parity or double parity protection.

vSAN Encryption – Native to vSAN, vSAN Encryption provides data-at-rest and data-in-transit security at the cluster level and supports all vSAN features, including space efficiency features such as deduplication and compression. Data-in-transit encryption delivers over-the-wire encryption for data between vSAN nodes. Enabled with a few clicks, vSAN Encryption is built for compliance requirements and offers simple key management with support for all KMIP compliant key managers, such as CloudLink, Hytrust, SafeNet, Thales and Vormetric. Unlike data-at-rest encryption, data-in-transit encryption will manage keys internally; no key management system required. vSAN Encryption is FIPS 140-2 validated, meeting stringent U.S. federal government standards.

Stretched clusters with local protection – Create a robust stretched cluster with site and local protection between two geographically separate sites, synchronously replicating data between sites. It enables enterprise-level availability where an entire site failure can be tolerated as well as local component failures, with no data loss and near zero downtime. Users can set granular protection on a per-VM basis and nondisruptively change policies—all for 50 percent lower costs than the leading traditional solution.

Integrated file services – Easily provision a file share with a single workflow, and use vSAN as a unified storage control plane for both block and file storage. vSAN file services integrate Active Directory and support Kerberos network authentication. vSAN also supports file services for cloud native applications orchestrated by Kubernetes. vSAN supports the most common protocols: NFS v4.1 and v3, and SMB v3 and v2.1. vSAN file services can be used in two-node deployments and stretched cluster deployments. API integration with backup software simplifies backup of vSAN file shares by enabling backup software to perform incremental backups after the initial full backup.

Quality of service (QoS) – Available in all editions of vSAN, QoS controls, limits and monitors the IOPS consumed by specific VMs, eliminating noisy neighbor issues.

vSAN over RDMA – Remote Direct Memory Access (RDMA) is a technology that allows computers in a network to exchange data in main memory without involving the processor, cache or operating system of either computer. RDMA improves

throughput and performance by freeing up resources. RDMA also facilitates a faster data transfer rate and low-latency networking. It can be implemented for networking and storage applications. vSAN over RDMA may increase application performance and obtain better VM consolidation ratios.

VMware Skyline™ Health – This provides integrated hardware compatibility checks, performance monitoring, storage capacity reporting and diagnostics directly from VMware vCenter Server®.

iSCSI access – New to vSAN 6.7, vSAN can now support Windows Server Failover Cluster (WSFC) technology, reducing data center silos by managing more business-critical applications through a single HCI solution. vSAN storage can be presented as an iSCSI target for physical workloads. All core functionality continues to be available and managed through vCenter.

vSAN Support Insight – This helps keep vSAN running in an optimal state, saving monitoring and troubleshooting time, by providing real-time support notifications and actionable recommendations. The analytics tool can also optimize performance for certain scenarios with recommended settings.

Two-node direct connect – Save up to 20 percent per site by eliminating the need for any switches between servers in a two-node deployment. Use crossover cables to simply and reliably connect the servers directly.

Full-featured PowerCLI – vSAN provides the ease and scalability of enterprise-class automation with a set of full-featured PowerCLI cmdlets. New SDK and API updates enable more enterprise-class automation by supporting REST APIs.

Built-in failure tolerance and advanced availability – vSAN leverages distributed RAID and cache mirroring to ensure that data is never lost if a disk, host, network or rack fails. It seamlessly supports vSphere availability features, such as vSphere Fault Tolerance and vSphere High Availability. vSphere Replication™ for vSAN provides asynchronous VM replication with recovery point objectives (RPOs) of up to five minutes. New always-on features deliver a highly available management stack, independent of vCenter, and intelligent rebuilds accelerate recovery.

Cloud native storage – Containers require a modern storage infrastructure approach: Storage needs to be policy driven for scalability, portable across clouds to follow the container, and operationally consistent for efficiency. With cloud native storage, developers seamlessly consume storage. vSAN cloud native storage supports all key storage API objects within Kubernetes. With minimal effort, developers can choose a policy-driven storage class for their pods and automatically mount the volume. vSAN supports block and the most common file protocols—including NFS v4.1 and v3, and SMB v3 and 2.1—powering both block-centric and file-centric microservice-based applications. vSAN has native services with six of the largest public cloud providers. vSAN provides admins with a unified management plane for both VM- and container-based workloads. With granular visibility into container volumes, admins can quickly and easily control and monitor health and compliance information per volume. Admins can also rapidly troubleshoot and remediate activities; this faster support helps DevOps teams implement container-based apps even faster.

vSAN Data Persistence platform<sup>2</sup> – Modernize your data infrastructure with the Data Persistence platform and partner services. The Data Persistence platform provides a framework for VMware partners that offers modern stateful services, such as object storage and NoSQL databases, to integrate with the underlying virtual infrastructure.

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2. The vSAN Data Persistence platform provides a framework for software technology partners to integrate with VMware infrastructure. Each partner must develop their own plug-in for VMware customers to receive the benefits of the Data Persistence platform. The platform is not operational until the partner solution running on top is operational.

## LEARN MORE

Learn how others are using vSAN:  
[Customer Stories](#).

Try online for free: [vSAN Hands-on Labs](#).

Request a free [vSAN Assessment](#)  
for your data center.

For more information or to purchase  
VMware products, call 877-4-VMWARE  
(outside North America, +1-650-427-5000),  
visit [vmware.com/products](#), or search  
online for an authorized reseller.

For detailed product specifications  
and system requirements, refer  
to the vSphere documentation.

The integration allows you to run stateful services with high-velocity scaling, simplified IT operations, and optimized TCO. Developers can provision and scale services on demand with Kubernetes APIs. Admins can rapidly deploy services and monitor the health and capacity of services from vCenter, while easily keeping the services up and running during infrastructure maintenance and upgrades. You can deploy a stateful service alongside traditional applications on a regular vSAN cluster with vSAN support for shared nothing architecture (vSAN-SNA), or deploy it on a dedicated vSAN cluster with vSAN Direct Configuration™, a technology that enables direct access to the underlying direct-attached hardware that can be optimized for the application needs. Both options benefit from optimal storage efficiency for modern stateful services by leveraging service-level replication, as well as unified management of services in vCenter.

Object storage – You can now run Amazon S3-compatible object storage with the Data Persistence platform and integrated partner solutions, including Cloudian HyperStore and MinIO Object Storage.<sup>3</sup>

## System requirements

### Hardware host

- 1GB NIC; 10GB or larger NIC recommended
- SATA/SAS HBA or RAID controller
- At least one flash caching device and one persistent storage disk (flash or HDD) for each capacity-contributing node

### Cluster size

- Min. 2 hosts; max. 64 hosts

### vSAN Ready Nodes and hardware compatibility list

Available at [vmware.com/resources/compatibility](#).

### Software

- VMware vSphere 7.0
- VMware vSphere with Operations Management™ 6.1 (any edition)
- VMware vCloud Suite® 6.0 (any edition updated with 6.5)
- VMware vCenter Server 7.0

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3. Cloudian HyperStore and MinIO Object Storage need to be acquired separately.