

VMware vSphere + vSAN: An HCI Platform for Mid-Market Companies

A discussion on how VMware HCI addresses the requirements of the mid-market data center today and the coming needs of a hybrid, multi-cloud environment

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Most mid-market organizations have virtualized their server environments, usually with VMware. The benefits of consolidating physical servers onto a pair of hosts are well known, as are the advantages of consolidating storage onto a network-attached array. But there are significant benefits to virtualizing storage in conjunction with virtualizing servers to create a hyperconverged infrastructure (HCI). This technology has been widely adopted and continues to grow as enterprises and mid-size companies address the current need to consolidate, moving applications from bare-metal servers to VMs and moving data from SAN-based arrays to an HCI cluster.

This paper will discuss how VMware's HCI solution makes sense as an infrastructure that can better handle those current needs of mid-market companies, particularly when compared with traditional storage solutions, but can also provide a platform to support the changes these companies face, moving forward. To that end, VMware vSAN can lay the foundation in the corporate data center for IT to undergo a digital transformation and embrace a cloud-native, hybrid and multi-cloud environment.

Highlights

- vSAN addresses the Current Needs of the midmarket with a storage platform that is integrated into the hypervisor and leverages existing VMware investments and ecosystem
- vSAN addresses the Future Needs of the midmarket. Combined with vSphere 7 and NSX, vSAN is the only HCI solution offering full Kubernetes support and a path to a software-defined hybrid cloud, either on-prem or off-prem with VMware Cloud Foundation
- vSAN is the number one HCI solution in the market today, based on Evaluator Group HCI Study ¹
- HCI has become the standard compute platform, one that can support almost any use case from VDI to databases, hybrid cloud and infrastructure consolidation.

Understanding Mid-market Segment

The term "mid-market" in this report refers to companies that have more than 100 but fewer than 1000 employees and between 5 and 25 IT personnel. In terms of infrastructure, mid-sized companies have from 25 to 100 physical servers and 100 or more VMs deployed. These organizations often have a lack of skilled IT staff and of course, limited IT budgets, and so, need a flexible, cost-effective infrastructure strategy that can scale without increasing complexity.

But mid-market companies also share some of the challenges that face enterprise-level companies around business continuity and managing growth, while staying abreast of business and technology changes. The following sections discuss these challenges in the context of current and future needs of midmarket companies.

vSAN for Current Mid-market Needs

Whether it's running databases, VDI or supporting IT consolidation, most companies have decided that a hyperconverged infrastructure will be a growing part of their data center. HCI has become a standard compute platform, one that can be configured to support almost any use case. And, the HCI most often deployed is vSAN. In fact, an HCI solution based on vSAN has been the top choice in the Evaluator Group study for the last four years².

A vSAN-based HCI incorporates the storage into the vSphere hosts, using the same CPUs and memory. With vSAN as part of the VMware offering the transition to a hyperconverged infrastructure is a simple process. This allows IT organizations to use their familiarity with VMware's operational tools to take advantage of the benefits that HCI technologies bring. Compared to a vSphere environment running with an all-flash storage array, using vSAN provides the following benefits:

Simple - As a single, comprehensive system for compute and storage, HCIs offer a fundamentally simpler environment than the traditional server-SAN model. vSAN is managed in vCenter, enabling VMware admins to perform all the storage and VM management functions on the same dashboard. This simplicity reduces administrative tasks and frees up IT personnel to tackle other projects. As the IT Director of a large energy company said:

"We deploy that [traditional infrastructure] and now we've got a storage guy doing his thing, a backup guy, a server guy, coordinating or not coordinating and causing problems, but HCI makes that operational overhead easier, more seamless in the end"

Flexible - By adding drives to existing nodes or adding nodes, a scale-out architecture offers more granular expansion than traditional 'scale-up' storage arrays, which grow capacity by adding drive shelves and eventually replacing the storage controller. This drive-level or node-level expansion is non-disruptive, providing a pay-as-you-grow costing model. The IT administrator at a state educational organization put it this way:

"You buy new controllers and new disk shelves every 3-5 years when your disks got old - it was a huge expense. With vSAN it grows as our storage needs grow. The cluster grows and we phase [disks] out so there's a gradual replacement instead of a forklift upgrade"

Efficient - vSAN creates a virtual pool of storage capacity that can be easily provisioned to VMs as needed. Arrays must be carved up into logical volumes and expanded well ahead of demand, resulting in overprovisioned capacity. vSAN's Storage Policy-Based Management (SPBM) allows storage requirements to be defined for each VM, based on policies, such as data resiliency, availability, performance, etc., reducing capacity consumed, management overhead and operational costs.

Cost-effective - As a software-only solution, vSAN supports any appropriate servers and storage devices, lowering total cost compared with traditional arrays or HCI solutions that include

hardware. There is no array controller or drive shelves to buy, no hardware lock-in and no proprietary components (see Appendix for a detailed comparison of the costs of vSAN and an all-flash array).

Embracing vSAN for Future Needs

Virtualized, server-based storage, that is embedded with vSphere is more than just a better way to build infrastructure, it also gives IT a framework to support the business as it grows and as it changes, as the world changes and as information technology as a result.

Companies Grow and Change

Companies acquire or merge with other companies, they enter new markets and leave old ones. They define and redefine their focus to stay ahead of the competition. They are changing all the time, and these changes drive the need for IT flexibility, but also simplification. HCI scales more easily and is more flexible than any other type of infrastructure. The smooth (non-disruptive) process of adding nodes to an HCI cluster is preferable to the stepwise growth of replacing storage arrays.

Companies also need to stand up new application stacks to exploit their competitive advantage, but don't have months or weeks to do it, or even days in some cases. An HCI cluster, which can commonly be deployed in less than an hour, is an ideal platform to run a proof-of-concept or evaluation system, and then to roll into production when it's ready. vSAN is integrated with vSphere, making that entire process faster and easier.

The World is Changing

The Covid-19 experience is a powerful (and painful) example of this change. As employees started working at home, IT organizations in many mid-size and larger companies were faced with a need for effective and secure desktop infrastructure, in a short period of time. Virtual Desktop Infrastructure (VDI) can provide a secure, efficient platform for remote workers, but can be a demanding workload to put on the primary storage system, creating spikes in storage IO and compute that can disrupt other applications. In these situations, an HCI cluster can be deployed as a separate VDI platform, isolating this application from existing workloads. HCI has been a strong solution for VDI and one that companies have deployed to support their new at-home workforce.

Evaluator Group Comment:

IT needs to evolve, in order to deliver the core services needed by an organization in the face of constant change. This requires an infrastructure like an HCI that can expand in multiple vectors, seamlessly, with enterprise-level data services; one that supports cloud-native development and can itself be incorporated into a hybrid, multi-cloud solution when the time is right.

Hybrid, Multi-cloud

A few years ago, the public cloud was seen as the solution for almost anything that ailed the IT organization, from scalability, to management, to the need for a service delivery model. Since then, most companies have pulled back from that original posture due to cost, security and performance issues, among others. Most companies have now accepted the hybrid cloud as the best way to incorporate the benefits of the cloud. This requires an on-site infrastructure that can support a range of workloads and is connected to the public cloud and managed by a common control plane.

While HCI clusters make an ideal on-site infrastructure, more is needed to create a hybrid cloud environment. VMware vSAN and vSphere are the fundamental building blocks to VMware's hybrid cloud platform – VMware Cloud Foundation (VCF). VCF integrates vSphere and vSAN with software defined networking (NSX), cloud management (vRealize) and lifecycle management (SDDC Manager), to provide a complete hybrid cloud platform for deploying both traditional and modern containerized applications.

That deployment can be anywhere, in the private data center, at the edge or in public clouds like Amazon, Microsoft, Google and IBM. VCF provides a standardized architecture with simplified Day 1 and Day 2 operations, intrinsic security and a common management plane across multiple clouds.

Cloud-native Development

Software development is evolving as well, using a distributed, "elastic", open model, where developers can collaborate on a project from multiple locations. Software isn't tied to any specific infrastructure, and indeed, is often designed to be run in the public cloud. This development model requires a new platform that can run on multiple infrastructures, including the cloud, and be easily moved between them. This means supporting containers and the Kubernetes container orchestration platform, in addition to traditional VMs. VMware's new VMware Cloud Foundation 4, which includes vSphere 7 with Kubernetes, is designed to do just that, to give companies running an HCI, as an example, a way to support these evolving development technologies.

Summary

When they came out many years ago, SAN-attached storage arrays eliminated the inflexible and inefficient method of direct-attached storage. Later, VMware provided server consolidation by abstracting multiple physical servers into fewer hosts and running server instances in the virtual space. Like server virtualization, storage virtualization has provided the benefits of efficiency and flexibility by replacing the dedicated storage array with software and storage devices running on each VMware host. This software-defined storage technology was used to create the HCI product category.

HCIs offer a solution that is more efficient, more flexible and simpler to deploy and manage than a traditional server-SAN infrastructure. And, with vSAN, this HCI can cost less than a storage array, due to the use of non-proprietary storage media the elimination of dedicated array hardware. Running in VMware, vSAN creates a simpler solution than other HCIs as well by incorporating the familiar VMware

management tools, plus Storage Policy-Based Management reducing admin time and effort which drives down the cost of operations.

But midmarket IT managers need more than just a better storage solution to support today's workloads. They need an infrastructure that can help them address the myriad changes that their companies will face tomorrow, including the steady evolution of technology. Change causes uncertainty, which makes decisions harder and puts a premium on flexibility. A vSAN HCI provides that flexibility in a solution that incorporates VMware's Cloud Platform with its common management plane.

Integrated into vSphere 7, a vSAN HCI can fully support a cloud-native, Kubernetes-based development environment, all managed by vCenter. And, as part of the VMware Cloud Foundation, this HCI can provide the networking, security and multi-cloud data management features that are required to build a hybrid cloud. HCIs made data center infrastructure better. vSAN makes HCI better, and enables it to support the latest technologies in digital transformation, cloud-native software development and hybrid, multi-cloud architectures.

¹"Converged and Hyperconverged Infrastructure in the Enterprise 2019", Evaluator Group, 2019

² Evaluator Group HCI Studies - 2016-2019

Appendix

Cost Comparison - vSAN versus an All-Flash Array

The graph below shows the costs of two storage options for supporting a vSphere server virtualization environment. One uses a traditional iSCSI-attached array and the other, vSAN software running on each vSphere host and internal storage devices (solid-state drives). The following assumptions were made for this comparison:

1. Initial capacity of 100 VMs and 60 TB storage (before data reduction), with a minimum of three vSphere hosts
2. 30% growth per year in storage capacity, 20% growth per year in VMs
3. Each VMware host can support up to 40 VMs
4. Hardware prices were taken from manufacturer's direct-sale website and from on-line resellers
5. Software prices include 50% discount off VMware vSphere and vSAN published list prices
6. Management overhead and facilities costs overhead were omitted, since both environments have a similar amount of hardware (although managing the storage array would require more admin time than managing vSAN).

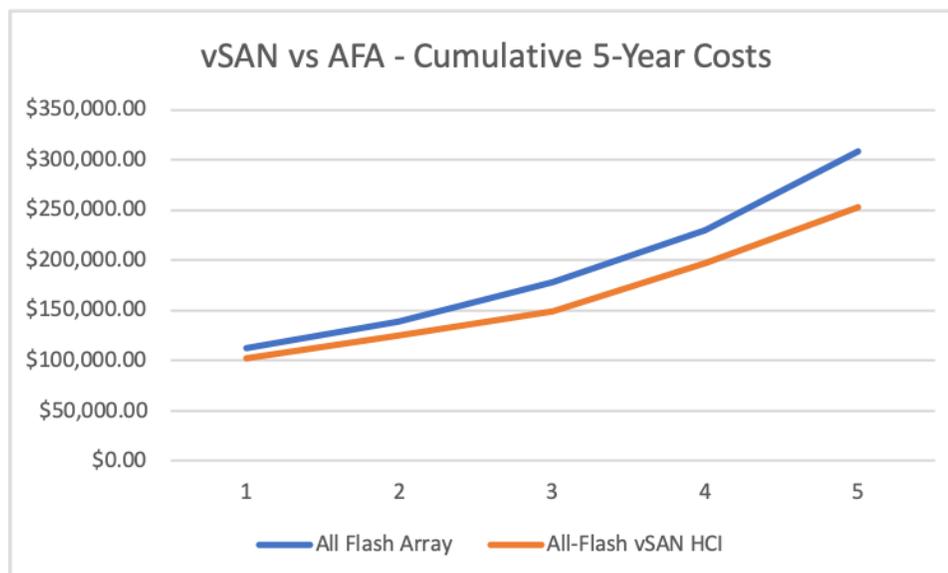
iSCSI Array Environment

This is a 3U, full-featured iSCSI-attached storage array with 30 x 3.84TB, 12Gb SAS SSDs per controller. This array has 24 drives per expansion shelf plus 4-hour on-site maintenance. The VMware hosts have dual 16-core, 2.3GHz CPUs, 192GB RAM, a dual port 10Gb Ethernet HBA, one boot drive and 4-hour on-site maintenance. There is a 33% data reduction from array deduplication, which increases the effective capacity by 1/3.

vSAN Environment

This environment starts with a 4-node cluster using the same servers as above. Each node contains up to 8 SSDs (4TB NVMe SSDs plus one 400GB write-intensive cache SSD per disk group). This configuration includes VMware vSphere and vSAN software, plus 4-hour on-site maintenance. There is no data reduction from deduplication in the vSAN configuration.

While one could use existing server hardware for the vSphere nodes, this cost comparison is made with all new servers for both the vSAN/vSphere nodes and the vSphere hosts in the array environment. Starting with new hardware makes the comparison simpler and more accurate. The graph below shows the cumulative costs for these two environments over a 5 year timeframe. The difference between the vSAN and all-flash array solutions is due to the more than 4x cost per TB differential between the array drives and those bought off-the-shelf for the vSAN nodes.



5 Year Comparison of All-Flash Array and vSAN in vSphere Environment

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