Storage Strategies for vSphere

5.5 users

Silverton Consulting, Inc. StorInt™ Briefing
Introduction

VMware vSphere® is the number one hypervisor solution in the world with more than 500,000 customers worldwide. With more than 14,000 customers, VMware vSAN™ is probably the top hyper-converged infrastructure (HCI) solution in the world today. Both vSphere and vSAN have had many releases over the years, and occasionally older versions become obsolete. With many customers still using the older VMware vSphere 5.5 and vSAN 5.5 releases, the upcoming end of general support (EOGS), which happens on September 19, 2018, is providing users a perfect motivation to refresh their vSphere environment with HCI powered by vSAN.

VMware vSphere 5.5/vSAN 5.5 EOGS

VMware released vSphere 5.5 in September 2013 and vSAN 5.5 in March 2014. On September 19, 2018, service and support for these two software systems will no longer be widely available.

Customers running these 5.5 software versions will need to upgrade to vSphere 6.5, which will also upgrade vSAN to version vSAN 6.5 or later, to continue general support. The only other viable option is to contract with VMware for special support. VMware has extended vSphere 6.5 and vSAN 6.5 general support for five years up through 2021.

Customers that upgrade vSphere may also elect to upgrade their servers to newer technology. As we discuss below, a key advantage of vSphere 6.7, is that customers can run more VMs per host and per cluster than with vSphere 5.5. By moving to more powerful servers at the same time as upgrading VMware vSphere software, customers can achieve considerable server consolidation, possibly by a factor of two or more.

Further, customers that use traditional storage array infrastructure may want to introduce vSphere Virtual Volumes (VVols) into their environment. VVols is a new industry-wide capability supported by most if not all major storage vendors. VVols provide support for vSphere storage policy-based management (SPBM) that simplifies VM provisioning.

With VVols in place, vSAN storage can be easily added to a data center environment. With both vSAN and traditional storage VVols operating together in a data center, vSphere SPBM can match functionality and capabilities defined for each datastore against VM storage requirements and select the best storage for new VM provisioning.

Alternatively, customers may elect to replace traditional storage with vSAN altogether. With Storage vMotion, admins can move work from old storage arrays to
vSAN and at the same time use SPBM to provision new VMs to vSAN. Storage array hardware can then be retired or devoted to non-business-critical activities.

Upgrading VMware vSphere 5.5 to vSphere 6.7

Here, we discuss some advantages to upgrade from VMware vSphere 5.5 to 6.7. (vSphere 6.5 offers many of the same consolidation benefits as 6.7. However, vSphere 6.7, offers some newer capabilities that may be of interest to most vSphere customers.)

Select vSphere innovations since 5.5

To support server consolidation efforts, vSphere 6.7 allows for the following:

- **vSphere 6.7 supports more vCPUs per VM** than vSphere 5.5;
- **vSphere 6.7 supports more VMs per host** than vSphere 5.5; and
- **vSphere 6.7 supports more hosts per cluster** than vSphere 5.5.

As discussed earlier, during their vSphere upgrade, customers could use this time to introduce **VMware vSAN** into their environment. VMware vSAN 6.7 supports vSphere SPBM. With SPBM, storage administrators need only specify vSAN datastore capabilities and performance levels. and VI admins can then identify new VM storage requirements, allowing SPBM to automatically select the best vSAN storage to provision that VM.

Similarly, VMware vSphere 6.7 also offers **VVols** that can simplify and reduce operational requirements for VM provisioning through SPBM. However, VVol support may require a storage array upgrade, and not all storage arrays support VVols. When vSAN and traditional storage VVols operate together in a vSphere cluster, SPBM always selects the optimal storage from all VVol and vSAN storage available to provision VMs.

VMware vSphere 6.7 **APIs provide full UI equivalence**, enabling IT to automate more administration activities than under vSphere 5.5. As a result, customers
should more easily be able to scale up their data center environment to support more VMs, hosts and clusters without adding admins.

VMware has made a number of security enhancements to vSphere since 5.5. These include VM encryption, vMotion encryption, secure VM boot and enhanced/more comprehensive audit logging. All this was implemented at the vSphere hypervisor level to provide more consistent and comprehensive security for VMs running under vSphere 6.5 or later.

VMware also implemented vSphere Integrated Containers (VIC) to bring new, cloud native application development paradigms to the vSphere environment. Customers can elect to run their container apps under native VIC, or a number of standalone systems ranging from Docker VM, Kubernetes VM and all the way up to the Pivotal Container System.

VMware vSphere 6.5 also implemented an HTML5 web client or vSphere Client. The HTML5 client supports live refresh, enabling admins to see real-time updates of inventory current status, including power states and tasks for all users. In addition, the HTML5 client optimizes many typical workflows to reduce operator/admin interaction, especially for adding and managing hosts, distributed switches, VMs and clusters.

**Upgrading VMware vSAN 5.5 to vSAN 6.7**

Customers upgrading from vSAN 5.5 to 6.7 should also be able to consolidate their storage environment. Here, we discuss some advantages to upgrade from VMware vSAN 5.5 to 6.7.

VMware vSAN 6.7 enhancements include the following:
vSAN 6.7 supports more VMs/host than vSAN 5.5;
• vSAN 6.7 supports more virtual disk capacity per VM than vSAN 5.5; and
• vSAN 6.7 supports all-flash arrays (AFAs) with NVMe solid-state drives (SSDs), whereas vSAN 5.5 only offered hybrid storage.

Even with the same hybrid storage media as VMware vSAN 5.5, vSAN 6.7 will perform better because VMware has **optimized vSAN code paths** to support faster storage like NVMe SSDs. Faster code paths should also speed up vSAN hybrid caching tier IO and so, even without changing media, hybrid customers will likely see an immediate **increase in caching tier IO performance** just by upgrading to vSAN 6.7.

VMware added data **deduplication and compression** in vSAN 6.2. Deduplication occurs at the block level during cache-to-capacity tier destaging. Compression also occurs during destaging and reduces redundant data within a block. Both vSAN dedupe and compression reduce customer effective cost ($/GB) for flash storage by eliminating the need to save redundant data within and across blocks in the system.

vSAN 6.7 supports **stretched clusters**. Stretched clusters extend a vSphere cluster beyond a single site to two sites across a campus or metropolitan area. Stretched clusters can support a higher level of availability and load balancing across sites. Stretched clusters enhance data center availability for a storage or site failures.

VMware vSAN 6.1 introduced enhanced support for **remote office/branch office (ROBO)** environments. For ROBO customers, vSAN can be configured to use only two ESXi hosts, with a third witness host (VM) running elsewhere (such as at a central site). Moreover, vSAN 6.5 introduced **2-node direct connect**, which uses a crossover cable between two ROBO vSAN nodes rather than requiring 10GbE links.

When using VMware vSphere Replication™ together with vSAN 6.7, vSphere supports a **five-minute recovery point objective (RPO)**. Customers using vSAN and vSphere replication can limit any data loss at a secondary site to, at most, five minutes of IO activity during a primary site outage.

VMware vSAN 6.7 also offers **adaptive resync** whenever vSAN VM components need to be resynchronized. Non-client, vSAN resync IO normally takes resources away from and potentially slows down, application IO, when it has to occur. With adaptive resync, vSAN limits resources so as to not harm normal VM IO performance.

In addition, VMware vSAN 6.7 has implemented **host pinning** to maintain only a single copy of data to better support non-traditional workloads like big data analytics that use Hadoop, Spark or NoSQL databases.
In vSAN 6.6, VMware introduced Configuration Assist, which simplifies vSAN setup and updates. When using VMware’s vSAN Setup Wizard there were always other tasks needed to complete vSAN deployment. Admins can now use vSAN Configuration Assist to perform these other functions.

In combination with VMware vRealize® Operations™, vSAN 6.7 now offers more intelligent operations. Moreover, vSAN 6.6 introduced Cloud Analytics for customers enrolled in the Customer Experience Improvement Program (CEIP). Cloud Analytics customers benefit from VMware’s service experience across a wide range of vSAN customer deployments. As a result, those customers should see improved support and less service downtime.

Using traditional storage with VMware vSAN 6.7
As discussed earlier, customers can easily use both VVols and vSAN in their environment. With VMware vSphere, admins need only specify VM storage service-level prerequisites, and SPBM automatically provisions the storage that best meets those requirements without further VI or storage admin activity.

With both traditional and vSAN storage deployed, customers can readily use Storage vMotion to move current VM work from traditional arrays to vSAN storage or vice versa without application downtime.

Moreover, customers that use Storage vMotion can relegate older, traditional storage arrays to non-critical work, reserving newer vSAN storage for more business-critical applications. Using vSphere SPBM automation, vSAN and VVol storage together with vMotion, customers can sculpt their application storage environment to optimize storage economics and IO performance.

Replacing traditional storage with VMware vSAN 6.7
Many customers running vSphere 5.5 use traditional storage arrays to host VMs. When vSphere 5.5 first came out, vSAN was not available. Later, when vSAN 5.5 came out in vSphere 5.5 Update 1, vSAN, or Virtual SAN as it was called then, lacked the sophisticated functionality it has today. Running traditional storage made sense then. It’s harder to understand its use now, however, especially with vSAN 6.7 advanced storage functionality.

Compared to traditional storage, Hyper-converged infrastructure (HCI) customers can leverage all the compute capability and storage functionality that already exists in their servers to run their application stack. HCI eliminates the need to purchase, deploy or upgrade traditional storage arrays, SAN fabrics or host bus adapters (HBAs). With HCI, all vSAN storage functionality executes on servers, so storage and server hardware are updated at the same time. Similarly, with HCI vSAN software can be updated at the same time as vSphere software and automatically...
retains compatibility across releases. As such, updating vSAN storage is much simpler when it operates together in servers rather than as separate, distinct units.

Scaling vSAN storage up or out is much easier than traditional storage arrays. First, in order to scale up vSAN storage, customers need only add a single SSD/disk drive to a current vSAN node rather than purchasing a new storage shelf or a whole storage array. Second, if vSAN customers need more performance, they can easily add one or more compute-storage nodes to their cluster rather than being buying another traditional storage array.

As with other storage array software, VMware vSAN software comes at an added cost. However, another benefit of vSAN storage media is that it is sold at customer server vendor pricing rather than at storage vendor markups. Moreover, vSAN purchases involve less Capex than traditional arrays, because vSAN costs are split between licensing and storage media rather than a traditional storage array that has storage software, compute, racks and storage all bundled together into one capital purchase.

Finally, vSAN storage is the platform of choice for future vSphere environments. Below, we discuss vSphere in the public cloud where vSAN is the only storage offered. But future versions of vSphere that operate outside the data center, will also likely feature vSAN as the lone storage option.

**Investment protection for hybrid cloud**

With vSphere 6.5, VMware introduced VMware Cloud (VMC) on AWS. VMC is a fully functional vSphere/vSAN/NSX software stack that works exactly the same on prem as it does in large public clouds (AWS and IBM public cloud) and in many private cloud environments.
VMC customers can easily vMotion their data center VM work to the cloud. If they later determine that the cloud doesn’t fit well for that workload, they can simply vMotion it back again.

VMC also eliminates the need to re-implement or refactor current enterprise applications for cloud execution. Instead, customers can lift and shift their applications by using VMC vMotion to run those applications in the public cloud without coding, scripting or making any operational changes whatsoever.

In this fashion, VMC customers are not locked into on-prem or public cloud solutions, enabling them to experiment with the cloud using as many or as few of their applications as desired. Admins can readily move work from one environment to another, all within the standard VMware software and operational stack.

Summary
For customers upgrading to vSphere 6.5 and beyond:

- Consider introducing vSAN for SPBM benefits
- Add VVol Support to traditional storage
- Leverage SPBM to anticipate the cloud.

Customers running VMware vSphere 5.5 and vSAN 5.5 must upgrade their software to version 6.5 or later by September 19, 2018, in order to retain general support. Many customers will take the opportunity to upgrade their server hardware at the
same time. More powerful servers and new VMware software will give customers an opportunity to consolidate down to larger VMs, fewer hosts and larger clusters.

IT staff may also consider replacing traditional storage with VMware vSAN HCI. HCI environments are easier to deploy, manage and upgrade than non-HCI, traditional array storage data centers.

For customers who want to continue with traditional storage, upgrading that storage to VVols is the first step to a software-defined data center with vSphere SPBM automated VM provisioning. Because vSAN and VVol-managed storage offer a common operational model, introducing vSAN into a VVol environment is simple to tap into the storage flexibility beyond traditional array VVols alone.

Finally, VMC provides an excellent opportunity to adopt the cloud with minimal applications or operations disruption. Indeed, with the vSphere/vSAN/NSX stack operating as VMC under multiple public and private clouds, admins can try out their applications across multiple cloud options. In this way, IT staff can see which cloud option works best or use all of them in conjunction with data center resources. With VMC and VMware vSphere, the choice is left up to the customer.

In sum, given the need to update to retain support, customer options include upgrading VMware software, updating traditional storage to VVols, adding vSAN storage and upgrading old servers. Doing all this in combination should result in a significantly consolidated data center environment.