StorMagic

WHITE PAPER

BUILD YOUR OWN SERVER SAN
A GUIDE TO DEPLOYMENT

Synopsis

The following white paper explores how the combination of industry-standard servers and software-defined storage can enable the creation of an advanced storage array at a fraction of the cost of traditional storage products, whilst delivering increased flexibility for future demands. Many organizations have already deployed server SANs with great success and this white paper will demonstrate why today is the perfect time for every IT professional to evaluate this approach against the traditional for their next storage requirement.

Overview

Gone are the days when an organization should simply decide which storage array will meet their needs and then purchase an off-the-shelf product from one of the traditional storage vendors. We are now in the perfect storm of three forces – server commoditization, low-cost tiered storage and software-defined storage driving unprecedented choice and flexibility.

Today, IT professionals can build their own server SAN at a fraction of the cost of a traditional off-the-shelf storage solution. Additionally, this approach means the storage requirement can be designed for the exact needs whilst being future proofed for tomorrow's demands.

Software-defined storage (SDS) is described as *"policy-based provisioning and management of data storage independent of the underlying hardware"*. The key component of an SDS solution is a storage appliance that would typically operate within a virtual machine as a virtual storage appliance (VSA). The combination of a VSA, CPU, and memory of an industry standard server is analogous to the storage controller within a traditional storage array. The VSA simply utilizes this CPU and memory to expose the storage capacity of the server as shared storage while delivering storage features such as synchronous replication of the data to additional servers for redundancy and scale.

Every year servers become cheaper, more powerful and with greater storage capacity. Today, this continual progress has resulted in tremendous performance and capacity for IT professionals to take advantage of SDS. This progress has meant SDS is now entering the mainstream with solutions available from long established and emerging hardware and software vendors. This has led to SDS to be deployed as the key enabler for both hyperconverged infrastructure (HCI) and at the core of server SANs (Fig. 1 and 2).

This white paper is focused on server SANs, though it is worth spending a little time describing SDS in the context of HCI to better

understand the choices available in the market today.

SDS is the core component that enables HCI, where compute, storage and management are unified through a hypervisor onto the same server, rather than having separate compute and storage infrastructure.

HCI solutions have been primarily deployed within remote and branch office environments where simplicity, high availability and a reduction in the hardware footprint are the primary drivers. They are now also being used in larger data center deployments where simplicity of scale and increased performance are key requirements. HCI can be consumed as a pre-configured appliance from the likes of Nutanix or as a build-your-own approach through products such as StorMagic SvSAN.

HCI provides benefits in terms of scale, performance and simplified management, though HCI appliances and certain HCI software products can prove inflexible when additional compute or storage capacity is required.

HCI appliances are typically a fixed node configuration, which means it is not possible to scale compute and storage independently of one another. Adding nodes to a cluster increases both compute and storage capacity, whether it is required or not. Additionally, these HCI solutions tend to require each node to have the exact same specification (CPU, memory, and storage) to avoid imbalances and incompatibility. This can inevitably lead to HCI appliances being overprovisioned from the outset or in the future when additional compute or storage is required.

It should be noted StorMagic SvSAN's architecture enables the independent scaling of compute and storage.

The ability to build your own server SAN using commodity servers through products such StorMagic SvSAN presents another option for IT professionals. Leveraging tiered disk, flash, and memory for the perfect balance of performance and capacity ensures the solution can be sized to the exact requirements to compliment an HCI deployment or simply deployed as an alternative
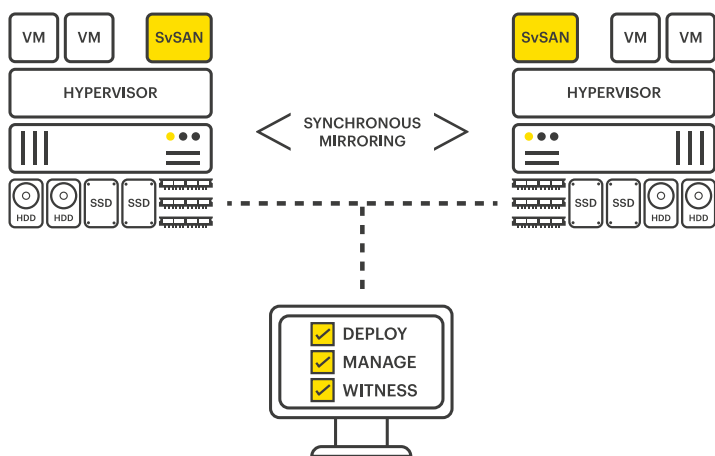

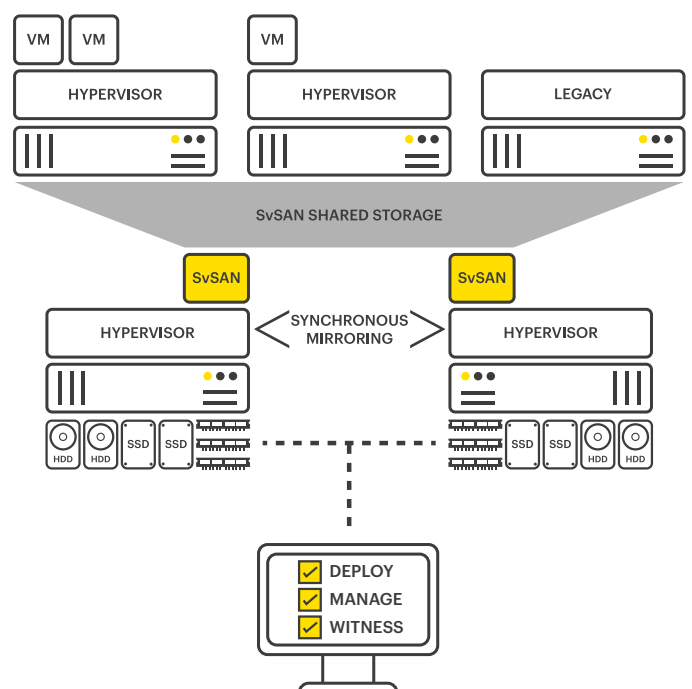**Fig. 1:** Hyperconverged deployment model

Fig. 2: Server SAN deployment model

to a traditional storage array where a three-tiered architecture is preferred.

The server SAN
What is a server SAN?

The three key components of a server SAN are; an industry standard server, storage capacity and a storage appliance. The storage appliance would typically operate within a virtual machine as a virtual storage appliance (VSA) and presents the disk, flash and memory as shared storage to the network (Fig. 2).

IT professionals can now build a server SAN as an alternative to a traditional storage array with little compromise and at a fraction of the cost.

StorMagic uses the term "server SAN" but other terms that are used include; "server-based storage array", "software-defined storage array", "disaggregated", "storage-only" or "software-defined storage target".

What are the benefits of server SANs?

A server SAN is a direct alternative to a traditional storage array and performs fundamentally the same functionality with little compromise, the primary benefits being two-fold:

Benefit 1: lower cost
The continual cost reduction and increased power of an industry-standard server combined with larger, faster and cheaper tiered capacity means that a server SAN can significantly reduce CAPEX and OPEX spend. More specifically, lower costs can be driven through the following:

* Lower cost industry-standard hardware removes the additional cost of proprietary components from traditional storage vendors.
* De-commissioned servers can be repurposed to present shared storage to the network.
* Simplified infrastructure reduces the need for additional components such as network switches, which are often delivered in pairs for redundancy.
* Advanced caching across flash and memory is possible with standard components.

Benefit 2: flexibility
How about starting small and growing as your business demands? This can be costly with traditional storage. A server SAN on the other hand allows you to provision a low-cost server with a VSA and minimal storage, CPU and memory then grow performance and capacity as you need it. Add more memory and flash now or in the future for caching, add disk or flash in the future for capacity and add CPU if the bottleneck becomes processor bound - the choice is yours. More specifically enjoy the following flexibility:

* Provision a small footprint within a server chassis that has capacity to scale-up with additional compute and storage in the future.
* Deploy as a single server SAN or as a highly available active/active synchronous mirror in the same data center or across sites.
* Avoid vendor and hardware lock-in by separating storage management from the hardware enabling the choice of any industry standard server, now or in the future.

Deployment models
*What deployment options are available for server SANs?*

Server SANs can be deployed as a single server, a local mirrored cluster or as a stretched cluster.

Single server deployment
The single server deployment model enables server SANs to be created that deliver shared storage, using the minimal amount of hardware, making this the lowest-cost deployment model (Fig. 3).

Features such as write-back and read-ahead caching can be used to deliver additional performance benefits.

As only a single server is used, this model offers no protection against storage server failure. However, this deployment could be used for non-critical environments, including testing and development, proof of concept, or training.
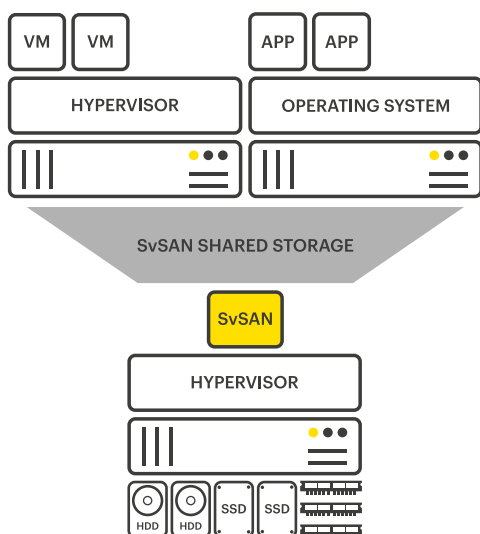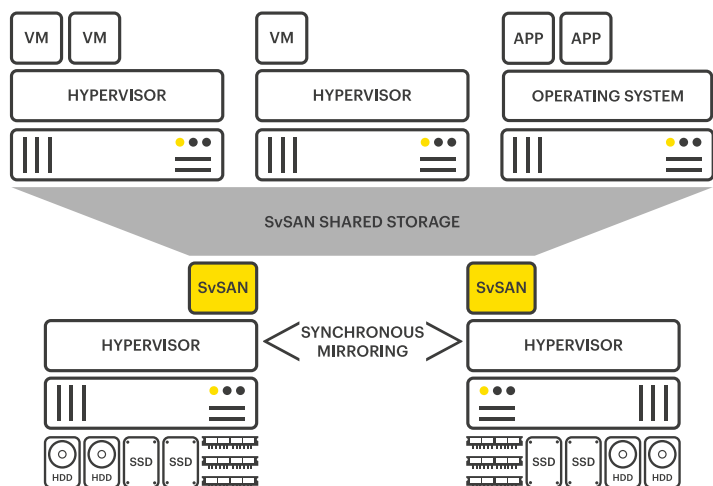

Fig. 3: Single server deployment model

Local mirrored cluster deployment
Adding a second storage server to the previous deployment model creates a highly available cluster, providing protection against a server failure. Data is synchronously mirrored between the storage nodes ensuring it is always available and targeted for business-critical applications and valuable data requiring protection (Fig. 4). Again, caching features can be used to deliver additional performance benefits.

All storage nodes within the server SAN can service I/O requests, increasing performance.

Fig. 4: Local mirrored cluster deployment model

Stretched cluster deployment
This takes the previous local mirrored cluster model a step further. The storage nodes are geographically separated - this can mean being in different server racks, at opposite ends of a data center, between buildings on a campus or across a city.

Stretched clusters provide the added resiliency against disasters that affect a building such as power loss, fire, flood, theft or other natural disasters and are ideal for environments with two or more datacenters as well as campuses with multiple buildings.

As with the previous deployment models, performance-enhancing caching features can be applied to stretched clusters.
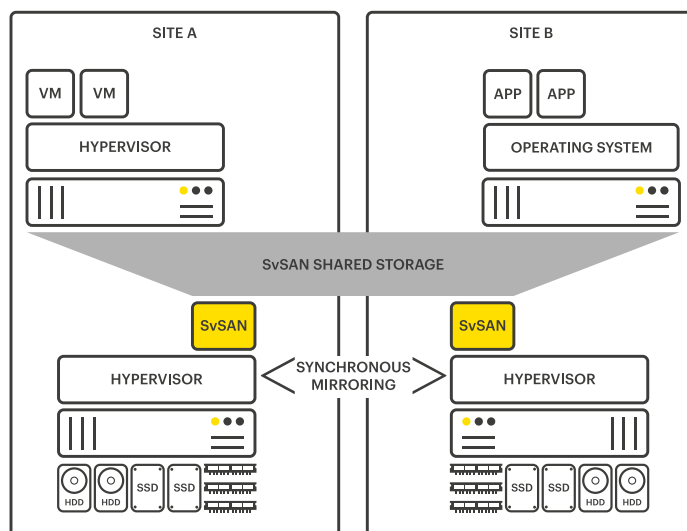
Fig. 5: Stretched cluster deployment model

Leveraging caching features
Advanced caching features can be applied to all the above deployment models to boost performance. These allow memory, SSD and hard disk to be combined to build all-flash, hybrid or hard disk only storage solutions.

In this scenario, all I/O requests are monitored and analyzed over time.

StorMagic has its own suite of caching features within SvSAN, known as **Predictive Storage Caching**. Frequently accessed or "hot" data is promoted to the lowest latency storage medium enabling data to be quickly accessed e.g. memory or SSD. Infrequently accessed or

"cold" data remains on the lowest cost, high capacity storage medium e.g. hard disk (fig. 6).

Getting started
What are the minimum requirements to build your own server SAN?

Start today by downloading a free, fully supported trial of SvSAN from the StorMagic website: **stormagic.com/trial**

The minimum requirements to build your own server SAN are:

Industry-standard x86 server
Any server that has x86 processors can be used to build a server SAN. These can be from any well-known server vendor, for example, Cisco, Lenovo, Dell, HPE or SuperMicro, or from a white box server manufacturer.

Hypervisor
The hypervisor virtualizes the physical server hardware for the guest virtual machines. SvSAN deploys as a Virtual Storage Appliance and is supported on VMware vSphere and Microsoft Hyper-V.

Disk storage
A server SAN can utilize any storage that is connected to it through the hypervisor. These drives could be internal or DAS. And can be made up of SATA, 10K and 15K SAS, SSD and JBOD. Multiple storage pools can be created with different types of drives.

The ability to use and mix any type of disk storage, coupled

with server memory acting as a cache delivers the flexibility to create high capacity disk-only, ultra-performance all-flash or hybrid (SSD + HDD) server SANs, which can be tailored to any performance or capacity requirement.

IP networking
Networking is required for mirroring the storage between the VSAs and presenting the storage over iSCSI. The storage traffic can be on the same network or separated. In a synchronously mirrored environment the two hosts can communicate over cross over cables without the requirement for a switch for the mirror traffic.

A single 1GB interface is all that is required but as best practice we recommend using multiple NICs for redundancy and improved network throughput. 10Gbe and 40Gbe are also supported.

Install StorMagic SvSAN
Deploy your server SAN today with StorMagic SvSAN. With the intuitive install wizard and easy configuration you can be up and running in half an hour.

Example configurations
Example configurations from major vendors that you can purchase today are shown in fig. 7.
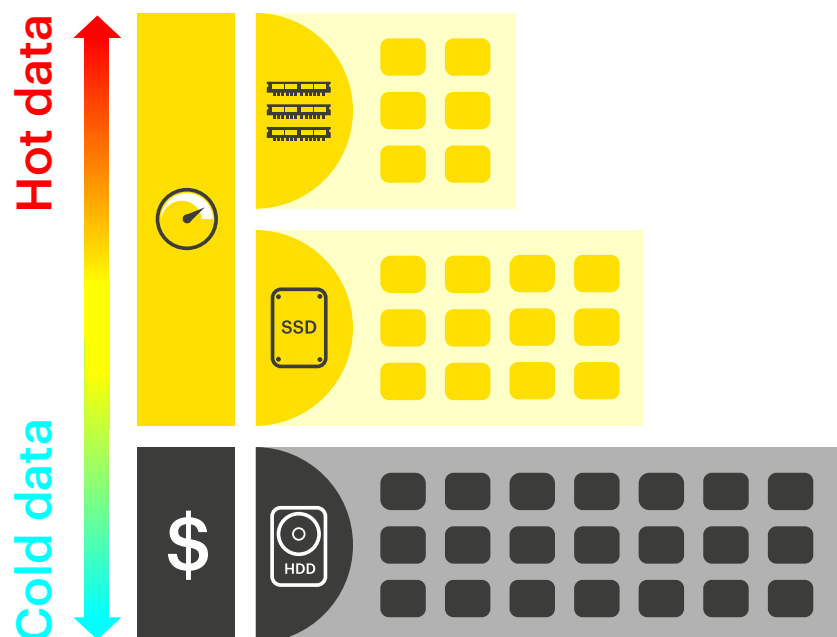
Fig. 6: Hot and cold data spread across storage types

Or why not repurpose exiting hardware you have? It doesn't need to have huge specification, just a single vCPU and 1GB RAM is required for SvSAN.

CISCO	C220	SFF up to 16TB RAW capacity LFF up to 40TB RAW capacity
	C240	SFF up to 48TB RAW capacity LFF up to 120TB RAW capacity
	S3260	LFF up to 600TB RAW capacity
Lenovo	x3550	Up to 46TB RAW capacity SAS SSD
	x3650	SFF up to 107TB RAW capacity SAS SSD LFF up to 147TB RAW capacity
DELL EMC	R630	USFF up to 23TB RAW capacity 1.8" SATA SSD SFF up to 18TB RAW capacity
	R730	SFF up to 29TB RAW capacity LFF up to 64TB RAW capacity
		LFF up to 672TB RAW capacity
Hewlett Packard Enterprise	DL160	SFF up to 30TB RAW capacity LFF up to 40TB RAW capacity
	DL380	SFF up to 52TB RAW capacity LFF up to 150TB RAW capacity
Legacy server		Intel Xeon E5 2.40GHz 32GB DDR3 (4x 8GB) RAID controller with 2GB cache 10x 600GB SAS 10K drives 4.8TB RAW capacity

Fig. 7: Example configurations

Summary

The storage industry is evolving and shifting away from traditional storage arrays. Server commoditization, low-cost tiered storage and software-defined storage are driving unprecedented choice and flexibility, creating the perfect storm and making this the right time to adopt server SANs.

This white paper has defined what server SANs are, their benefits, and described the various deployment models, from a single node solution, to a local or stretch cluster, all having the ability to include advanced caching features, using commodity servers from any server vendor.

Further Reading

There is a wealth of documentation and resources to continue your research into StorMagic SvSAN, some of which is outlined below:

Additional details on SvSAN are available in the **SvSAN Data Sheet** which summarizes system requirements, compatibility and support levels, while the **Technical Overview** provides configuration details and deployment options.

Dive deeper into the individual features of SvSAN, such as **Predictive Storage Caching**, the **remote witness** or **Data Encryption.** These features and more can be accessed through the **extensive collection of white papers** on the StorMagic website.

Furthermore, explore how SvSAN integrates with third party software and hardware with solutions briefs on everything from **Cisco UCS E-Series servers** to **Fornetix Key Orchestration encryption software.** Access all of the solution briefs on **the StorMagic website.**

Learn how others have made use of SvSAN in a wide range of environments and applications **with case studies and configurations** covering many industries and locations around the world.

Finally, why not evaluate SvSAN with a free trial license, available to download immediately from the StorMagic website. Simply complete the form and begin testing the software in your own environment, with StorMagic support available if required. **Start your free trial now.**

StorMagic
Unit 4, Eastgate
Office Centre
Eastgate Road
Bristol
BS5 6XX
United Kingdom
+44 (0) 117 952 7396
sales@stormagic.com
www.stormagic.com