Simplifying Storage the Right Way — Starboard Storage Unifies Storage for the SME

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Management Summary

Multi-function gadgets have become a way of life, consolidating all of our needs, whether you are in the woods, camping, or on a business trip. For the outdoorsman, when it comes to multifunction pocket tools, nothing beats the *Original Swiss Army Knife*. Whatever you want to do, it's in there. It has a screwdriver, scissors, and a file. If you're hungry, it has a can opener and a fish scaler. If you're thirsty, it has a bottle opener for beer and a corkscrew, if you have a thirst for a finer beverage. *It even has a complete set of blades if you want to use it as ... a knife!* For the modern businessperson, nothing beats a multi-function *iPhone* in your pocket (or pocketbook) to keep you in touch. With an iPhone, you can satisfy just about any communications requirement. You have a wireless connection (or two) for email, Skype, or simply web browsing. You can record a video or play a game. You have thousands of Apps from which to choose. You can find out where you are via the built-in GPS or ask a natural language question to *Siri*. *And, yes, you can even make a phone call!* We can thank the Swiss for their knife and we can thank Steve Jobs and his minions for everything else. Hold that all-in-one thought but now focus on the enterprise data center, where performance, consolidation, and virtualization are also required.

The typical data center, whether large enterprise or SME, has an urgent need for all three. Server virtualization has been addressed by microprocessor developers, such as Intel, AMD, IBM, and Oracle (née Sun), with multi-core processors to virtualize multiple applications onto a single server. Unfortunately, when you deploy multiple, disparate applications onto a single platform, you cannot help but add complexity to the I/O subsystem, when each application independently is issuing read and write commands to different files on different devices. The opportunities to take advantage of sequential access are overwhelmed by the increase in the frequency of random I/Os. Not only that, but the typical data center faces the sprawl of multiple silos of storage in support of different storage access methods – DAS, NAS, and SAN – and different storage connectivity protocols, such as Fibre Channel TCP/IP (Ethernet) and iSCSI. Furthermore, the data center faces the complexity brought about by managing multiple tiers of data that exist throughout the data center to address everything from mission-critical data to archived documents and objects. The management of all of these options usually becomes very complex. *How can storage become less complex and simpler to deploy, in order to reduce the total cost of ownership of the IT infrastructure?*

One answer for that is a *unified storage architecture*, bringing DAS, NAS, and SAN storage all onto a single platform, while at the same time taking advantages of multiple tiers of storage (each delivering different "bang for the buck"). By adopting many of the technologies applied to servers, the data center can virtualize all of its storage, simplifying storage access. One company who may just have a better solution to this problem has come out of stealth mode with the announcement of its own storage consolidation and virtualization platform: Starboard Storage. Starboard's *AC72 Storage System* provides such a platform, specifically aimed at the SME data centers. To learn more about Starboard Storage, please read on.

The SME Data Center Enigma

The large enterprise data center is not the only data center that requires scalable mission- and business-critical storage capacity that can be deployed and managed without the complexity, and price tag, of older, legacy storage solutions. Unfortunately, the data center at a small or medium enterprise (SME) usually does not have either the necessary staff head count or the experience level to deploy and support 2012 requirements for multi-protocol and multi-tiered storage. They are having enough trouble working with segregated siloes of storage that are directly attached to servers (DAS), attached to servers via a storage area network (SAN), and/or network-attached storage (NAS). Because of this hodgepodge, the SME data center has a greater need to remove complexity from the IT infrastructure (without affecting performance) and to simplify the storage environment (in order to control costs).

A traditional Fibre Channel (FC) storage area network (SAN), holding the structured data from assorted application databases, may have all of the functionality and resiliency that the IT staff could ever want, but it may be too complicated for the average storage administrator within an SME. The same can be said for the network attached storage (NAS), although this usually is simpler than dealing with a SAN. However, many servers still have their own internal storage, which also has to be managed.

Many factors make this challenging – a plethora of devices and arrays, different types of storage with different access times and costs, multiple connection methods, and different management tools to administer to each. Additionally, in order to get the most economic value out of each silo of storage, the administrator needs to assign the most critical data to the fastest devices, and so on. While managing one silo of storage may be challenging due to the complexities of each isolated collection, managing many different siloes of storage and networks usually becomes complicated, i.e., overwhelming, especially when staff resources are scarce and/or inadequately trained.

Unfortunately for the SME, data typically is growing between 40% and 75% per year, and wasteful storage management practices (i.e., over-provisioning) tends to accelerate the amount of storage that is needed incrementally. And, this is before considering the compounding effects of dealing with data protection and disaster recovery. This kind of unconstrained growth cannot be supported by the limited data center staff or the stagnating IT budget at most SME data centers. As a result, SME data center decision makers must change their storage paradigm, and possibly their 10-year-old storage environment, to avoid hitting the wall in one or even many dimensions.

As with their larger brethren, the SME data center needs to continue to find ways to improve productivity and lower IT costs; not just acquisition costs, but all aspects of the IT infrastructure that increase the total cost of ownership (TCO) of the smaller data center, especially the management costs that are incurred in a siloed infrastructure. Many SMEs have already faced the problem of utilization of servers, which had been seriously underutilized, with server virtualization, which has its own consequences and now has led to new challenges.

Thus, the SME IT staff has effectively reduced server sprawl and lowered the TCO of the server environment by deploying virtualization hypervisors, such as VMware's *vSphere* and Microsoft's *Hyper-V*, in order to better utilize the compute resources, increasing processor utilization from under 20% to over 75%. Unfortunately, by adding additional applications via virtual machines on a single server, the IT staff has placed an additional burden on their storage platforms, especially considering that each application may have its own storage I/O requirements.

Traditional storage systems (DAS, SAN, and NAS) were not designed to solve the problems presented by these mixed workloads. They are not capable of understanding different applications using different tiers of storage and different storage paradigms at the same time.

Additionally, the applications that have been virtualized now may have moved to the top of the storage sensitivity list, with the need to consider the data requirements for applications in a way that is different from managing traditional storage arrays. By putting many applications onto a single virtualized server, the storage access patterns become virtualized and, collectively on each virtualized server, this changes the way that storage is used and protected. Multiply that times many virtualized servers, and the complexity can be overwhelming.

Therefore, the SME needs to find a single platform that is scalable, easy-to-use, and can replace the existing multiple storage environments. The IT staff is now looking to reduce storage sprawl with a virtualized storage architecture that has high performance and resiliency, as well as being easy-to-use, scalable, and, most importantly, automated. **Now it is time to consider the deployment of application storage, which**

Exhibit 1 — Starboard's MAST Architecture

Source: Starboard Storage Systems
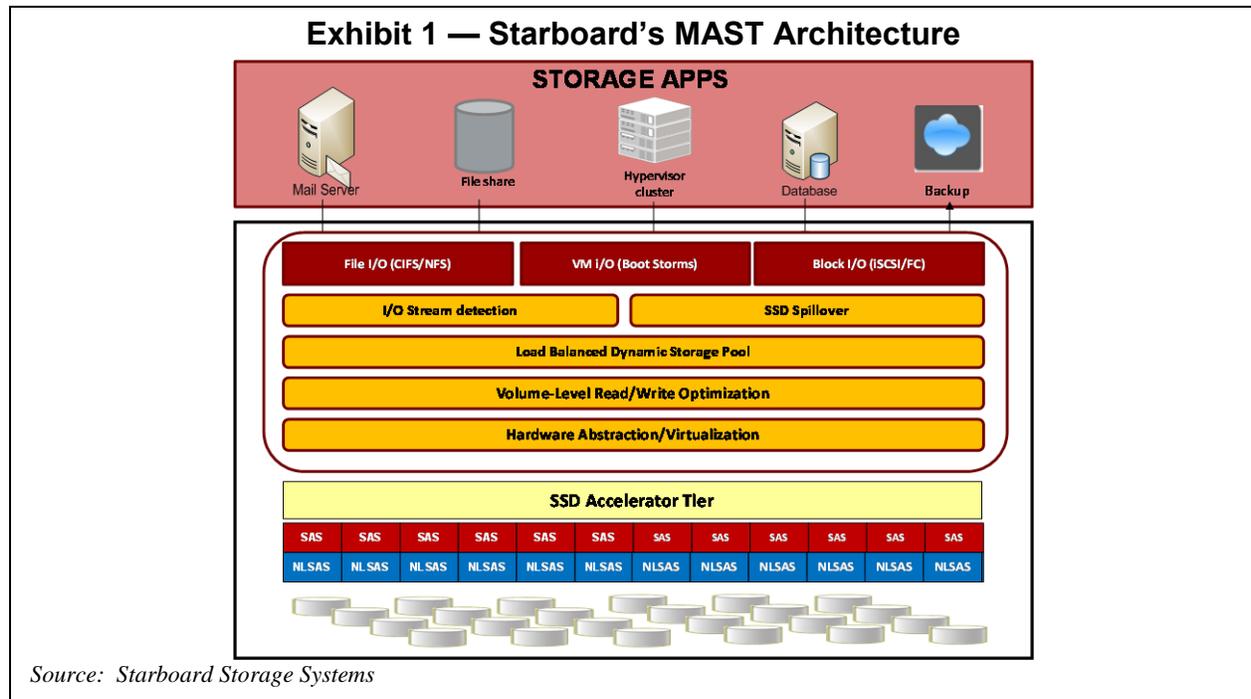
puts all of the complexities beyond the handling and tinkering of the storage administrators, thus changing the storage paradigm.

One such platform has recently been announced by a brand new player in the storage arena; one, however, with an experienced staff of storage professionals who have been around this block before. That company is Starboard Storage Systems of Broomfield, Colorado.

Who Is Starboard Storage?

Starboard Storage Systems is an innovator in storage for mixed workloads for SMEs. With its *Application-Crafted Storage Systems*, Starboard Storage provides a simple, virtualized solution to optimize storage deployment for applications that are being deployed on virtualized servers, as well as meeting traditional storage needs. Founded by a team of storage professionals from the leading storage vendors, Starboard Storage is a start-up targeting SMEs who are facing an increase of up to 100% in annual storage requirements. Many SMEs are being overwhelmed with the task of managing the growth of both unstructured and virtualized data. Many legacy storage systems are, in effect, a segregated silo, because they were not designed to support mixed workloads within the structure of a single, scalable system. Furthermore, these systems required complex upgrades to go from one storage array to a replacement array. *How can you avoid these pitfalls?*

Well, there is an expression that applies to many enterprises, both large and small: "The left hand does not know what the right is doing." This rubric can apply to vendors, also. Starboard Storage has assembled an executive team with history at many of the same companies with whom they now compete. In this case, the right hand[1] does know what the Lefthand is doing, as well as Compellent, HP, NetApp, Oracle, and many other storage vendors.

Starboard Storage has implemented a design that enables the IT staff to manage their applications rather than their storage. This design, called *Application-Crafted Storage for Mixed Workloads*, enables the data center to simplify the deployment of a unified storage system and lower the TCO for the storage infrastructure. Starboard Storage is working with a network of resellers to serve SMEs with these mixed workloads.

As a first step in fulfilling their vision, Starboard Storage has introduced the *AC72 Storage System*, positioning it as a replacement for NAS and SAN architectures and as an alternative to other newly-announced specialized storage systems, many of which can be viewed as "new siloes".

The AC72 Storage System

The AC72 Storage System is a protocol-agnostic storage platform that supports your back-

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[1] For those of you unfamiliar with nautical terms, starboard is the right side of any sailing vessel, when facing forward.

Exhibit 2 — Starboard AC72 Models

AC72	Capacity	Expandable Capacity	Performance	Expandable Performance
Starting Capacity	24TB		7.2TB	
Standard Drives	12 X 2TB Nearline 7200 RPM SAS		12 X 15K RPM SAS	
SSD Accelerator Tier	2 X 100GB Mirrored Write Cache, 1 X 200 GB Spillover Read Cache			
Controller	Dual redundant hot swappable nodes			
Software	Starboard OS with Thin provisioning, replication, snapshots and clones			
Processor per Node	Single Intel Xeon™ 5600	Dual Intel Xeon™ 5600	Single Intel Xeon™ 5600	Dual Intel Xeon™ 5600
Memory per Node	24GB DDR3 ECC registered	48GB DDR3 ECC registered	24GB DDR3 ECC registered	48GB DDR3 ECC registered
I/O Interfaces per Node	Two PCIe x4 and one PCIe x8 ; Dual 1GbE ports for management Dual 10GbE interconnect (Internal); IPMI with KVM over LAN support			
Expansion Cards	1 and 10Gb Ethernet, 8Gb Fibre Channel, 6Gb SAS			
Capacity Expansion	2 ES16 or 1 ES45 Expansion shelves	6 ES16 or 5 ES45 Expansion shelves	2 ES16 or 1 ES45 Expansion shelves	6 ES16 or 5 ES45 Expansion shelves
MSRP	$59,995	$79,995	$69,995	$89,995

Source: Starboard Storage Systems

bone[2] of choice. It has the potential to offer remarkable cost savings to the SME data center, as compared to existing deployments, by consolidating multiple groups of structured, unstructured, and virtualized data, usually on several-to-many storage systems or within servers, onto a single, simplified array. By consolidating the data from their older legacy systems onto an AC72 storage platform, the data center can lower costs because a new AC72 usually is less expensive than the maintenance costs of older platforms. With AC72, the SME data center also should be able to improve the utilization and management of their storage resources and achieve significant improvements in performance, all while lowering the footprint and power requirements, which will reduce the TCO of their IT infrastructure even further. In fact, Starboard Storage boasts of doubling the performance of traditional NAS and SAN systems. With 30 customers deployed at announcement, Starboard Storage appears to be making good on its claims.

One of the key architectural features of the AC72 is the Starboard *MAST Architecture*[3], consisting of a *Dynamic Storage Pool* and a built-in *SSD Accelerator Tier* designed to simplify and optimize application consolidation. The AC72 has a *Dynamic Storage Pool* for FC, iSCSI, and virtualized workloads to be consolidated into the environment, all in order to simplify storage growth and optimize volumes for each application, by eliminating the need for RAID groups and simplifying storage management. The Dynamic Storage Pool takes physical storage devices on one side and provides virtual LUNs with the required size, redundancy, and storage class characteristics on the other.

In addition, Starboard's "second-generation" tiered architecture, the *SSD Accelerator Tier*, removes the onus of performance optimization from IT administrators by automatically routing I/O requests through the fastest path and by enhancing read/write performance via an I/O monitoring technology that moves blocks and files to the appropriate tier storage, as required. The SSD Accelerator Tier includes a mirrored write-back cache, consisting of two mirrored SSDs and a persistent spillover read cache with a single SSD. The AC72 understands the I/O characteristics of each application workload and specifically addresses fast-changing performance needs. For example, if the AC72 sees a large file, it automatically writes it to nearline SAS drives. However, if it detects frequently accessed online data, it retains that data on SSD dynamically, without having to pre-establish the policies required by others to determine tier placement. The net result is a significant improvement in performance predictability over existing policies that can keep hot data outside of SSD for a number of days while tracking the

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[2] A backbone is the network that interconnects various components (like servers and storage systems), thus providing a path for the exchange of data.

[3] Mixed-workload, Application-crafted Tiered Storage. See Exhibit 1 at the top of Page 3.

Exhibit 3 — Starboard AC72 Expansion Shelves

ES16　　　　　　　　　　　**ES45**

(rear view)

16 Drive Bays	45 Drive Bays
Dual hot plugable SAS expanders	Dual SAS Expanders
16 front drive bays 600GB SAS, 2TB Midline SAS	25 front drive bays, 600 TB SAS, 2TB Nearline SAS
	21 back drive bays 2TB Nearline SAS
3U Rackspace	4U Rackspace

Source: *Starboard Storage Systems*

frequency of data access. These features enable IT generalists to manage the storage environment as a whole via one administrative interface, rather than needing more specialized (and usually more expensive) storage specialists that likely are required for many siloed storage systems, each with a different administrative paradigm.

The AC72 Storage System is fully redundant, with no single point of failure. It can be configured with two different starting points, *optimized for performance* or *optimized for storage capacity*. (See Exhibit 2 at the top of Page 4.) The performance-optimized version is configured with twelve 15K-RPM SAS drives of up to 600GB each, while the capacity version has twelve 2TB 7,200-rpm SAS hard drives. Either system can be configured with one or two Intel *Xeon 5600* processors and 24GB of DDR3 ECC memory for a single CPU system and 48GB of DDR3 ECC memory for a dual CPU configuration. The AC72 also includes GbE and 10GbE ports, along with an 8Gb FC and 6Gb SAS ports.

Both models can be expanded by the addition of one of two expansion drawers. (See Exhibit 3, above.) The *ES16* is a 3U shelf with capacity for up to 16 hot-swappable 600GB SAS or 2TB nearline SAS drives. The *ES45* is a 4U drawer with 45 drive bays that can contain up to 21 hot-swappable 600GB SAS drives or 2TB nearline SAS drives in the front of the shelf and up to 25 2TB drives in the rear. A single AC72 can be configured with up to six ES16 drawers, for a total capacity of 224TB, or up to five ES45 drawers, for up to 474TB, all SAS.

With three SSD drives totaling 40GBs includ-

ed in the SSD Accelerator Tier, the AC72's entry price is only $59,995 for 24TB of SAS storage and the Starboard operating system with thin provisioning, replication, and snapshots. The AC72 is only available through a reseller network that has been trained to deliver solutions that maximize SME's storage investment.

Conclusion

The small- and medium-sized enterprise data center presents unique challenges with regard to the storage of mission- and business-critical data within a mixed workload environment. With the AC72 Storage System, the SME can reduce the complexity of the IT infrastructure, driving down both capital and operational expenses. At the same time, the AC72 can increase performance across the entire application hardware stack.

Starboard Storage has blended, quite effectively, the silo technology prevalent in many competing systems into a unified storage system, providing a viable alternative to the storage solutions from legacy suppliers. The AC72 provides the ideal platform for the SME requiring automatic load balancing, mixed workload storage pools and dynamic pooling.

It is incumbent upon the SME to be able to separate the chaff from the wheat in the storage market. Starboard Storage may well be the wheat that you really need.

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