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Executive Summary

VMware can bring tremendous operational flexibility to organizations of all sizes. While it is often thought of as a large data center technology its value to the small to medium sized business should not be overlooked. These businesses typically have grown to a point where they have a need for four to five servers running functions like Exchange, SQL, applications like financial packages, and file serving. And often, they find that a single physical host running those functions within virtual machines can replace all these servers. The problem is that putting all these functions onto one physical host means a single hardware failure could impact all of them.

VMware has the solution with vMotion, which is managed by VMware's centralized management console vCenter. vCenter provides a single pane of glass for all of the host servers and the virtual machines in the data center. The challenge is that the shared storage requirements and costs of vMotion put it out reach for most SMBs. This has caused many of the IT managers within these businesses to look for a low cost storage option that integrates seamlessly into VMware as a potential solution for this environment to make vMotion a reality for the SMB.

The Need for Shared Storage

vMotion removes the single point of failure concern that surrounds loading up one physical server with virtual machines (VM), by allowing the movement of virtual servers from one physical host to another. In the case of a hardware failure or the need for maintenance, virtual machines can be transitioned, live, to another physical system. The second physical system doesn't need to be sitting idle all day waiting for failure either. It can be used by a portion of the VMs in the environment, balancing the load to some extent.

Virtual machine migration does require that the physical hosts be able to access each other's storage. The easiest way to accomplish this is to share storage between the two (or more) systems, typically with a network made up of either Ethernet or Fibre Channel switches that connect physical servers to a common storage pool. If a server fails or needs maintenance the other host(s) already has access to the latest copy of the server images it was hosting and merely needs to mount those images and it's ready for production. With live migration, assuming the primary host didn't 'hard fail', this failover can be done without the users even noticing.

VMware High Availability leverages vMotion to provide the capability to move virtual machines from a downed server. This again requires shared storage so that in the case of a failed server host, the virtual machines will be shifted to the remaining physical hosts and restarted. Without shared storage there would be no way to get to the virtual machine images on the locally attached storage.

VMware Data Recovery can be used to provide effective backups of the environment. This is an ideal backup solution for the SMB since it integrates directly into vCenter and provides a wizard driven workflow to create, configure and schedule backup jobs. It also automatically monitors when virtual machines or their virtual images have been moved via vMotion or Storage vMotion to make sure that those virtual machines are still protected. In addition VMware Data Recovery has built in data de-duplication, so that backups are space optimized as the backup occurs to minimize the use of network and disk backup capacities.

What makes this compelling to the SMB is that all of these capabilities are available in a very cost effective packaging. VMware has a perfect bundle for the small business "VMware vSphere 4.1 Essentials Plus Kit for 3 hosts" which starts at \$4,229 of basic support and maintenance. The real SMB roadblock to effective use of all of these tools has been the cost of acquiring the foundational shared storage to make it all work.

The Shared Storage Dilemma for the SMB

Creating the shared storage network can become a problem for the SMB. Even the 'inexpensive' iSCSI shared storage systems can quickly get into the double digit thousands and require a "buy it full" upfront capacity purchase that includes small capacity drives that don't provide a cost effective price point. That also means that if the SMB needs more capacity they have to buy a second complete system. In reality, as they enter into the world of server virtualization most SMBs simply need the ability to share two or three hosts, and typically need less initial capacity than these entry level shared storage systems require them to purchase initially but they need the ability to add capacity as the environment grows.

While iSCSI, especially in the SMB environment, is relatively simple to set up and manage, the storage systems that leverage that protocol are not. Many have nice user interfaces but where they fall short and become a challenge for the SMB is in the actual management of that storage. Too much effort has to be expended just configuring the data protection (RAID) and dealing with storage provisioning and expansion.

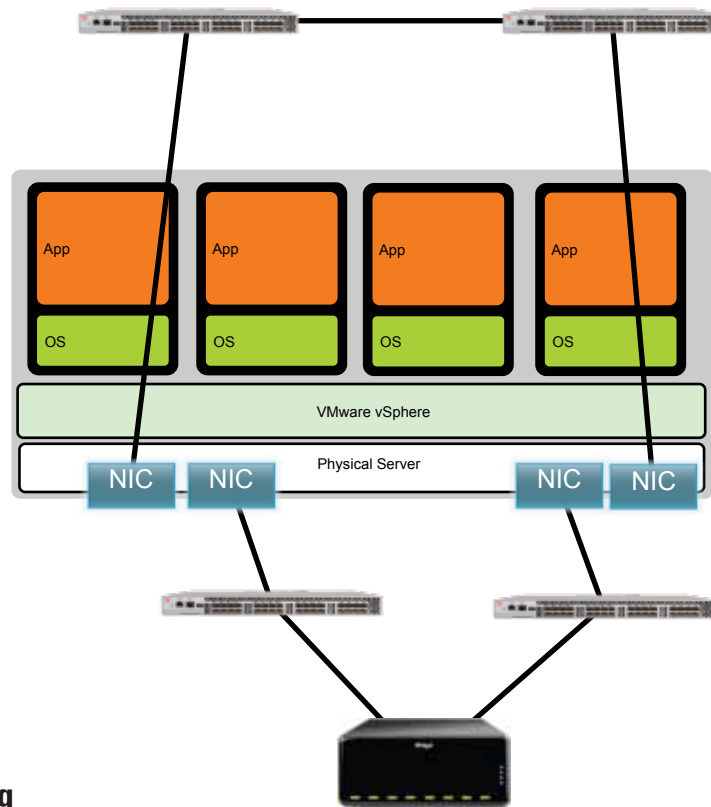
Finally, most of these entry-level systems are laden with features that add to their complexity, features most SMBs simply don't need. The typical SMB wants to connect two or three physical servers to a shared storage pool, leverage the capabilities within VMware to manage that storage and have the storage hardware 'stay out of the way'.

The SMB Answer - DroboElite

As we showed in our testing the Data Robotics' DroboElite may be an ideal answer for the SMB looking for their first shared storage system to compliment a VMware environment and to be able to take full advantage of features like vMotion, HA, and Data Recovery. First, the DroboElite leverages iSCSI, meaning that the shared storage connects via simple 1Gb Ethernet. It's very cost effective to build a redundant storage network using this topology, and while an existing LAN can be leveraged, many SMBs don't have that level of redundant infrastructure investment at this point.

Simple Infrastructure

It is very straightforward to setup two small 1GbE switches, connect one to each of the ports on the DroboElite. While almost any 1GbE switch will do it is advisable to use it is advisable to select a switch that can sustain the total bandwidth of the ports. For example a 24 port switch should have 48 Gbps of total bandwidth. Also if the switch is going to share storage and standard network traffic it may be ideal to use a managed switch so that port traffic can be isolated for a given function. After the switches are in place then install two 1GbE NICs (assuming they're not already there) in each of the physical servers, with each card connecting to a different switch. Within minutes a completely redundant storage network can be inexpensively put together.



Simple Capacity Planning

The DroboElite solves the capacity growth problem mentioned earlier that other systems place on the business. Using the DroboElite BeyondRAID technology, disk drives of varying sizes can be installed in the system. Initially three or four 1 or 2 TB drives may be more than enough capacity for most small business. These are standard off-the-shelf drives that can be purchased at any local computer store for a low cost. As a result of this economy, it's an easy decision to leverage the DroboElite's dual-drive redundancy feature, meaning that even a two-drive failure won't result in data loss.

Simple Capacity Planning - cont'd

This drive flexibility not only keeps costs down, it also simplifies expansion by allowing storage to be bought as it's needed. BeyondRAID technology allows for the addition of more capacity by simply inserting additional drives into the DroboElite chassis when needed and, within seconds, that capacity is fully protected and available for use. This is an ideal use case for the SMB. Since storage will become higher capacity and less expensive as drive sizes increase, purchasing less today means more value for what's acquired tomorrow; traditional storage vendors have the opposite situation, where drives remain the same size and can increase in price over time.

Data Robotics focuses their investment in their BeyondRAID software so that storage management tasks are simplified or eliminated; then, they leverage the capabilities of VMware to round out the solution. In other words, the storage is controlled from where the SMB IT administrator is going to be spending most of their day - at the VMware vCenter console. From within this console snapshots can be taken, backups triggered and VMs copied to other storage pools.

Enhancing your VMware Environment

Utilizing features of VMware like Storage vMotion can maximize your ability to use more affordable storage options like the DroboElite. While vMotion is used to move virtual machines between physical server hardware, to move virtual machines between storage devices VMware provides a functionality called Storage vMotion. Storage vMotion allows a virtual machine to still be using the resources of the current physical host but to have its image migrated while the VM is active to a second storage device. This provides both an ideal data availability mechanism as well as an I/O load

Sidebar: The Importance of Using Enterprise Drives

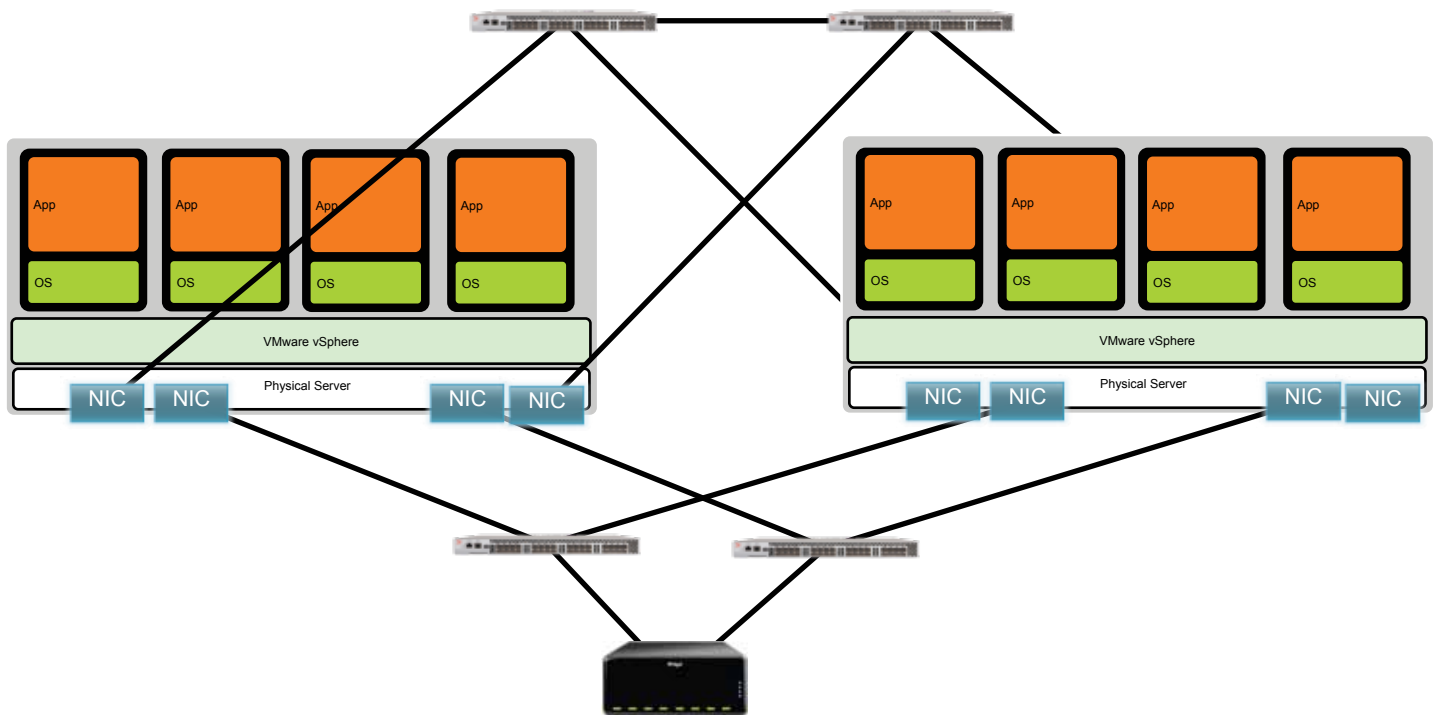
One of the advantages of the DROBO product line is its ability to accept virtually any type of hard drive. That said when using the DroboElite in a business environment especially with an application like VMware it is important to be more selective in which drives are installed in the system. Using the cheapest available disk drives is not recommended for this type of environment. Also the DroboElite is only as fast as its slowest component. If a high capacity but low performance drive is mixed with high performance drive the DroboElite will only perform as good as the low performance drive. Considering the savings that comes with the DroboElite platform in the VMware environment, spending the extra ~\$150 per drive or so for a better performing technology is a wise investment.

For more specific details, Data Robotics offers additional information on using DroboElite for VMware @ <http://www.drobo.com/vmware/index.php>, including a complete detailed best practices guide on using the DroboElite in VMware environments @ http://www.drobo.com/pdf/DroboElite_VMware_Best_Practices.pdf

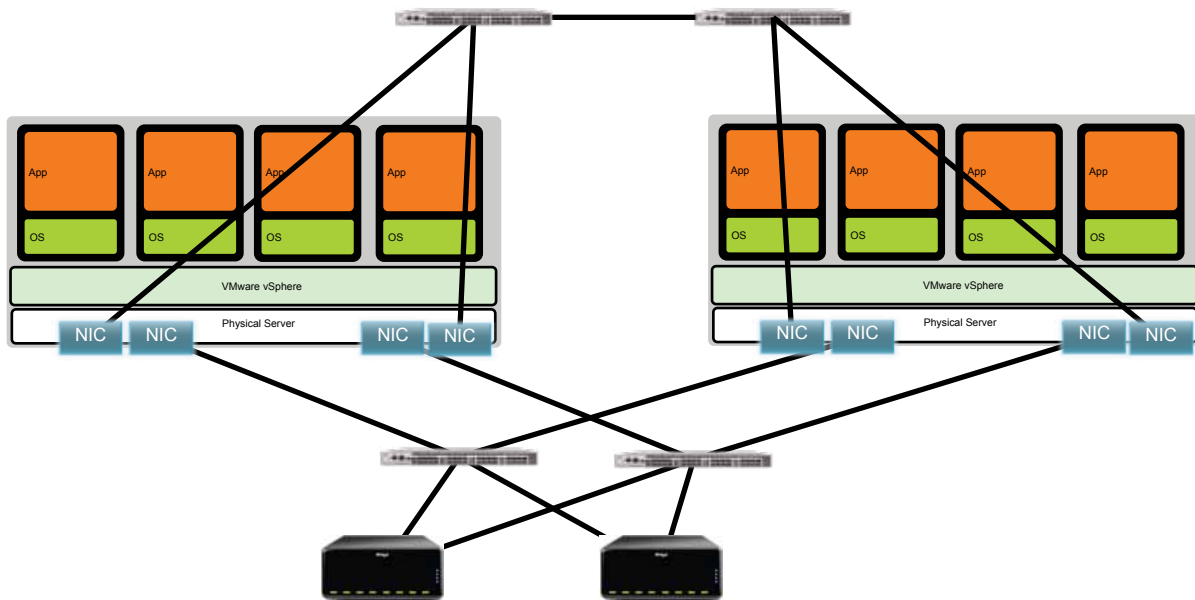
Enhancing your VMware Environment - cont'd

balancing. It brings availability features to almost any storage system. As it the case with vMotion, shared storage is a must for Storage vMotion as VMware's vCenter console needs to be able to see both storage systems.

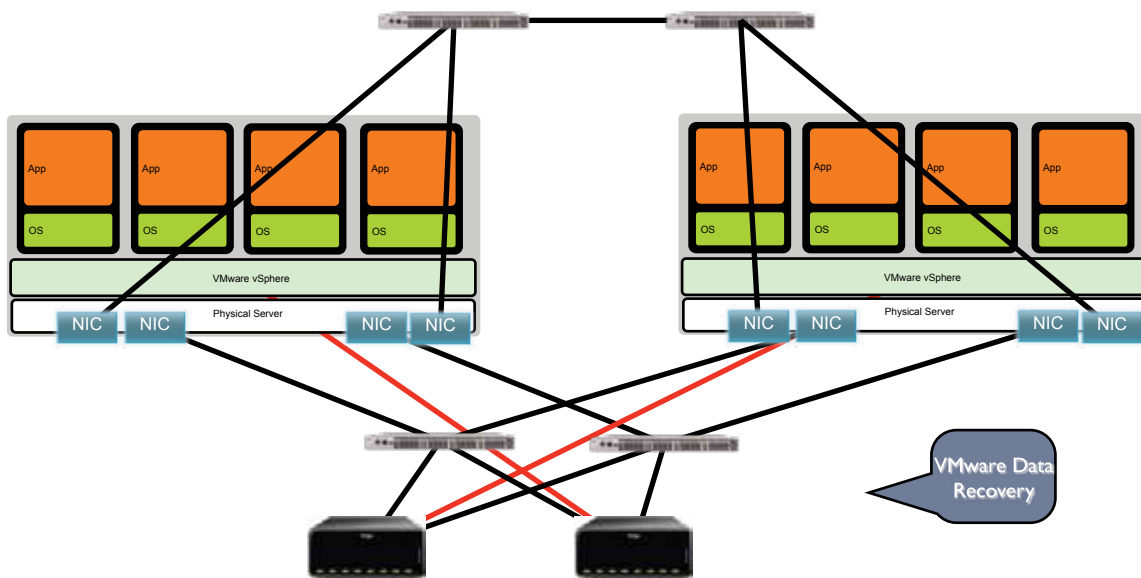
Configuring VMware servers to use a multi-path IO scheme with multiple switches and a combination of vMotion and Storage vMotion provides an almost bulletproof infrastructure that can overcome the perceived limitations of any component in the setup.



For complete redundancy, implementing Storage vMotion and adding a second DroboElite, which can still be done for significantly less than other shared storage systems, provides potentially the ultimate in resiliency from failure. The result is most storage system failures can be overcome by ensuring that VM images can migrate between storage systems. As stated earlier Storage vMotion enables live migration of virtual machine disk files across storage arrays and lets you relocate virtual machine disk files between and across shared storage locations while maintaining continuous service availability and complete transaction integrity.



Another advantage of this configuration is that while the storage systems are 100% operational, the more common state, the VM workload can be balanced across them for improved performance. VMware and its tools allow the second DroboElite to be fully utilized not just sit waiting for failure. The SMB cannot afford to have assets sitting on the sideline, and vSphere Essentials Plus enables SMBs to achieve higher utilization. In the case of a storage system failure prior to being able to leverage a storage migration, VMware’s Data Recovery features should be used to make sure backup copies of physical hosts are safely stored on secondary volumes.



The DroboElite allows its volumes to be seen by any system on the network. This allows the DroboElite to share its storage amongst many systems on the network. Every volume defined on the unit is available to all the servers until that volume is locked into and mounted by a particular host. Security for mounting the volumes is provided by CHAP, which provides a password authentication process for volume access.

The DroboElite provides a simple to use, feature simple storage platform that integrates seamlessly into a VMware environment. Features that other higher priced storage systems include are already included with VMware, like snapshots and those that VMware does not include directly, like clones and continuous data protection can be addressed by cost effective, third party add-ons.

For protection from a site failure there are several third party applications that provide cost effective, bandwidth-efficient replication, including Double-Take Availability, Neverfail, Veeam Backup & Replication, and CA ARCserve High Availability (formerly known as CA XOsoft) Some of these replication solutions even leverage cloud-hosting providers to address another SMB need, lack of a second site to hold the DR data. In these situations, the entire VM can be replicated to one of these providers and, if there's a failure of the entire building, they can restart the entire application in the provider's facility with the user accessing remotely. This gives the SMB the same abilities of the 'big guys'.

Ideal for Virtualized SMB

The DroboElite may be the ideal solution for the SMB that's making the first step to server virtualization. These SMBs are large enough to justify virtualizing servers but not large enough to justify the traditional underlying shared storage solutions to be able to get the most out of the virtual investment. DroboElite fills that gap by offering a cost effective, simplified alternative that allows the SMB to get back to work without having to become a storage expert.