No Compromise, Cost Effective, VMware Storage for the SMB

Designing a highly available, highly affordable, virtualized server environment for small business

A joint white paper between Drobo and Storage Switzerland
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Executive Summary

VMware can bring tremendous operational flexibility to organizations of all sizes. Once thought of as a large data center technology, the value of virtualization to the small to medium-sized business (SMB) should not be overlooked. These businesses typically grow to a point at which they need four or five servers running functions such as Exchange and SQL Server and applications such as financial packages and file serving. And often, they find that a single physical host running these applications in virtual machines can replace all their physical servers. Other than the clear hardware savings that this level of virtualization delivers there will also be efficiency gains in the areas of management, application availability, and disaster recovery.

The problem is that putting all these functions onto one physical host means that 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 virtual machines in the data center. vMotion lets virtual machines be transparently moved between physical systems without interrupting users or applications. VMware also provides Site Recovery Manager (SRM), which extends the concept of machine migration and availability between locations.

The challenge for SMB IT Managers is that a shared storage system is required to enable vMotion and SRM. Until recently the cost and complexity of a shared storage system placed the entire project out of reach for most SMBs; and if not completely out of reach, at least the ability to fully realize the benefits of server virtualization. For this reason, many IT managers at these businesses look for a low-cost storage option that integrates seamlessly into VMware as a potential solution—making vMotion and SRM a reality for the SMB.

The Need for Shared Storage

vMotion removes concerns around a single point of failure associated with loading up one physical server with virtual machines (VMs), 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 in real time (live) to another physical system. When supported by a shared storage infrastructure, server virtualization allows IT to get work done during office hours instead of during the midnight shift. And, unlike older standby solutions the second physical system doesn’t need to be sitting idle all day waiting for failure. It can be used by VMs in the environment, balancing the load to some extent.

Shared storage at both locations is also required for Site Recovery Manager (SRM). SRM removes concerns around a site failure due to power loss, fire, or flood by replicating data in near real time to a storage system in a remote location, attached to secondary virtual hosts. In the event of a site failure, the remote site can start workflows that bring VMs and their applications online in the second location—either automatically or with an IT “go-ahead.”

VMware SRM used to require that the storage system provide the replication function. This meant deploying higher-end storage systems with that functionality and similar hardware at both locations further adding to the expense. As a result SRM was put out of reach of the average SMB. VMware has addressed this in vSphere 5 SRM functionality, which adds its own VM-level replication capability, which enables the use of more mainstream storage systems and systems no longer need to be identical.

Virtual machine migration and SRM require that 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 already has access to the latest copy of the server images it was hosting and merely needs to mount those images to be ready for production. With live migration, assuming that the primary host didn’t ‘hard fail,’ failover can be accomplished without users even noticing.
VMware High Availability (HA) leverages vMotion to provide the capability to move virtual machines from a failed server. This again requires shared storage so that in the case of a failed server host, the virtual machines are 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 SMB, since it integrates directly into vCenter and provides a wizard-driven workflow to create, configure, and schedule backup jobs. It also automatically tracks virtual machines and their virtual images when they are 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 deduplication, so that backups are space optimized during the backup to minimize the use of network and disk backup capacities.

Data protection functionality can be further extended through the use of backup applications such as Veeam Backup, Acronis vmProtect, and Symantec BackupExec. These applications vary in capability, but many can shrink the size of the data transmitted across the network and some can start a VM directly from the backup file, instead of first having to recover it.

What makes this compelling to SMB is that all of these capabilities are available in a very cost-effective package. VMware has a perfect bundle for the small business "VMware vSphere Essentials Plus Kit for 3 hosts" which starts at $5,439 with 192 GB vRAM entitlement + Basic (12x5) 1 Year Support. Now the only SMB roadblock to effective use of all of these tools is the cost of acquiring the shared storage infrastructure to make it all work.

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

While iSCSI, especially in SMB environments, is relatively simple to set up and manage, iSCSI storage systems are not. Many have attractive user interfaces but they fall short and become a challenge for SMBs when it comes to the actual management of that storage. It takes too much effort just to configure data protection (RAID) and deal with storage provisioning and expansion.

Finally, most of these entry-level systems are loaded with features that add to their complexity, features most SMBs simply don’t need. Typically SMBs want to connect two or three physical servers to a shared storage pool and leverage the capabilities in VMware to manage that storage and they want the storage hardware to stay out of the way.

Larger SMBs may have already invested in a storage system at the primary site but paying for that storage system at a second location to enable Site Recovery Manager (SRM) may be beyond the budget. This is another situation for which low cost but feature capable storage can be an ideal solution. As stated earlier VMware no longer requires that the storage at both locations be the same. Leveraging VMware or third-party tools such as Veeam Replication enable the use of the lower-cost solutions as a perfect complement to the primary system and make important initiatives such as DR possible.
The SMB Answer: Drobo

As shown in our testing, Drobo® may be an ideal answer for SMBs looking for their first shared storage system to complement a VMware environment so that they can take full advantage of features such as vMotion, HA, and Data Recovery. First, Drobo SAN Storage for Business solutions leverage iSCSI, and the shared storage connects via simple 1 gigabit Ethernet (GbE). It’s very cost effective to build a redundant storage network using this topology. While it’s true that dedicated switches or VLANs are a best practice for an iSCSI SANs, many SMBs don’t have that level of redundant infrastructure investment at this point, so they can leverage an existing LAN.

Simple Infrastructure

It’s very straightforward to set up two small 1 GbE switches and to connect one to each of the ports on Drobo. While almost any 1 GbE switch will do, it’s advisable to select a switch that can sustain the total bandwidth of the ports. Selecting a switch with support for jumbo frames also enables better throughput. For example, a 24-port switch should have 48 Gigabits per second (Gbps) of total bandwidth. Also if the switch is going to share storage and standard network traffic, it would 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 you can install two 1 GbE 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 put together inexpensively, as shown in Figure 1.

Simple Capacity Planning

Drobo solves the capacity growth problem that other systems place on the business, mentioned earlier. Using Drobo 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, which can be purchased at any local computer store inexpensively. The Drobo B1200i ships with 6 x 2TB 7200RPM SAS drives, with flexibility to add additional drives. As a result of this economy, it’s an easy decision to leverage the Drobo’s dual-drive redundancy feature, meaning that even a two-drive failure won’t result in data loss.

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 Drobo chassis when needed. Within seconds that capacity is fully protected and available for use. This is an ideal use case for SMBs. Since storage will feature higher capacity and be less expensive as drive sizes increase, purchasing less today means more...
value for what’s acquired tomorrow. Traditional storage vendors have the opposite situation—drives remain the same size and can increase in price over time.

Drobo continues to invest in BeyondRAID technology so that storage management tasks are simplified or eliminated; then they leverage the capabilities of VMware to round out the solution. In other words, storage can be managed from where the IT administrator is going to be spending most of the day—at the VMware vCenter console. From the vCenter console snapshots can be taken, backups triggered, and VMs copied to other storage pools

**Enhancing Your VMware Environment**

Utilizing features of VMware such as Storage vMotion and Site Recovery Manager can maximize your ability to use more affordable storage options such as Drobo. While vMotion moves virtual machines between physical server hardware, to move virtual machines between storage devices VMware has Storage vMotion. Storage vMotion allows a virtual machine, while it is active and still using the resources of the current physical host, to have its image migrated to a second storage device.

This provides both an ideal data availability mechanism and I/O load balancing. It brings availability features to almost any storage system. As is the case with vMotion, shared storage is a must for Storage vMotion, as VMware vCenter console needs to be able to see both storage systems. Enterprise licensing is required for VMware to use Storage vMotion. If the cost of the licensing is not in your budget, several other software solutions, which can be used to achieve similar results, are recommended in this paper.

Site Recovery Manager (SRM) may be a more valuable tool for the SMB than vMotion. As stated earlier with the release of vSphere 5 VMware included SRM 5 with a special focus of addressing the disaster recovery needs of the SMB. SRM 5 no longer needs storage-enabled replication. SRM 5 includes vSphere Replication, which performs replication at the virtual-machine level continuously, for a recovery point as low as 15 minutes. This enables product such as the Drobo B12000i to be used at a significantly lower cost. Either in both locations or as a complement to an existing storage system in the primary location, SRM is not yet available for VMware Essentials or Essentials Plus kits, so Standard edition licensing is required.

![Shared storage deployed with VMware Storage vMotion](image)

**Figure 2:**

Shared storage deployed with VMware Storage vMotion
Configuring VMware servers to use a multipath I/O scheme with multiple switches and a combination of vMotion and the B1200i multi-path and redundant power supplies, provides an almost bulletproof infrastructure that can overcome the perceived limitations of any component in the setup. With its redundant hardware architecture, Drobo B1200i is used as primary storage in the figures in this paper. The Drobo B800i has a single power supply but can be used in the architecture, also taking advantage of multi-pathing and providing primary storage capacity for lower-tier VMs, which may not require the same high availability.

While the configuration in Figure 2 represents complete redundancy, implementing replication between storage devices creates an almost unbreakable infrastructure still costing significantly less than other shared storage systems. This architecture provides resiliency from failure as well as the ability to balance storage I/O workloads. 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.

A configuration such as the one pictured in Figure 3 allows the use of the Drobo B800i for environments that don’t need the other capabilities of the B1200i. Alternatively the B1200i and B800i could be teamed together with the B800 serving as the backup device or for less important workloads.

Another advantage of this configuration is that while storage systems are 100% operational (the common state), the VM workload can be balanced across them for improved performance. VMware and its tools allow the second Drobo to be fully utilized and not sitting unused, waiting for a system failure. Using either replication software or backup and recovery software, copies of all VMs can be affordably placed on both units. It is important to note that with the redundancy built into the Drobo B1200i, this is a “belts and suspenders” storage strategy.

The Drobo B1200i with its redundant power suppliers can sustain any component failure and still maintain access to storage. In the case of a storage system failure prior to a storage migration, use VMware Data Recovery features to ensure that backup copies of physical hosts are safely stored on secondary volumes.
Drobo allows its volumes to be seen by any system on the network, which allows Drobo 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 an industry-standard security protocol, CHAP, which provides a password authentication process for volume access.

Drobo provides a simple, straightforward storage platform, which integrates seamlessly into a VMware environment. Features that other higher-priced storage systems include are already present in VMware, such as snapshots. Those that VMware does not include directly, such as clones and continuous data protection, can be addressed by cost-effective, third-party add-ons such as those available from Veeam and others.

For protection from site failure, VMware Site Recovery Manager is the go-to product for SMBs, because it not only handles the replication of data, it also handles the entire site recovery workflow. For SMBs who don’t need that level of site recovery automation or who cannot afford the minimum licensing from VMware, several third-party applications provide cost-effective, bandwidth-efficient replication. These include 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 in the event of a building-wide failure, the entire application can be restarted in the provider’s facility with the user accessing data remotely. This gives SMBs the same backup advantages as the “big guys.”

**Ideal for Virtualized SMB**

Drobo may be the ideal solution for SMBs taking the first step toward server virtualization. These SMBs are large enough to justify virtualizing servers but not large enough to justify traditional underlying shared storage solutions to get the most out of the virtual investment. Drobo fills that gap by offering a cost-effective and simple alternative that allows SMBs to get back to work without having to become a storage expert.