

Server Management with XIOtech's Virtualized Storage Architecture

*Reducing server management from hours to
minutes (sometimes even seconds)*

Server-attached storage poses a number of challenges to storage administrators, most notably the extensive time consumed by common server management tasks. Removing storage from individual servers and placing it on a storage area network from XIOtech eases the administrative burden. This white paper provides a detailed view of how XIOtech's virtualized storage architecture gives administrators their lives back while providing a significant return on investment.

This paper is intended for IT managers, system administrators, and other IT professionals who are familiar with enterprise storage technology.

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Christopher Arnold
XIOtech National Manager of Professional Services
Master CNE, MCSE, CXE

Introduction

Managing servers with attached storage can be a nightmare for server administrators—particularly in enterprise environments where there are multiple servers dispersed throughout the organization.

Inflexibility of the server-attached system often leads to extensive server downtime to perform common but necessary maintenance tasks. This means that administrators usually have to work on server maintenance at night or on weekends so user access to data and applications is not interrupted. Of course, for companies that function 24x7, there is no good time to take servers offline.

XIOtech Corporation's virtualized storage architecture—comprised of the MAGNITUDE™ storage area network (SAN) hardware platform and REDI™ software family—provides the ultimate server management platform. No other solution can perform so many of the needed administrative functions—**easily . . . without downtime to servers . . . in the middle of the day**. XIOtech's virtualized storage architecture gives administrators their time back, allowing them to focus on more important projects. What's more, XIOtech's storage solution provides a greater return on investment, allowing you to think of servers as a commodity rather than a data storage device.

This white paper compares—from an administrator's point of view—server management between environments with server-attached storage and environments that capitalize on the benefits of XIOtech's virtualized storage architecture.

Server Management Functions

Changing configurations with server-attached storage is time consuming and wrought with challenges, causing some administrators to repeatedly avoid performing necessary server maintenance tasks. XIOtech's virtualized storage architecture alleviates storage administrative nightmares and gives administrators their lives back. The following examples highlight the impact of XIOtech's virtualized storage architecture on typical server management functions.

Booting from the SAN

XIOtech's virtualized storage architecture provides the unique ability to allow multiple servers running different operating systems to boot directly from the SAN. The limitations to booting are simple: there must be a bootable fibre channel card, a logical unit number (LUN) 0 must be presented to the server, and the server must be able to recognize the fibre channel card as a bootable device.

XIOtech's MAGNITUDE hardware platform is currently able to boot NetWare, Windows NT, Windows 2000, Linux, HP-UX, Solaris, and most other UNIX systems. When IBM modifies AIX to enable a fibre channel adapter to present a bootable device, then the MAGNITUDE will be able to boot AIX from the SAN.

The MAGNITUDE hardware platform is able to present a LUN 0 to up to 192 servers simultaneously, thereby allowing that many servers to boot from the SAN. Because of the MAGNITUDE hardware platform's unique LUN masking capabilities, multiple operating systems

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can operate on the same SAN at the same time. Many of the server management functions available today from XIOtech are made possible because of this booting ability.

Applying Server Patches

Have you ever had a server patch blow up and you had to rebuild a server because of it? When was the last time you applied a server patch and a backup was performed up to the point in time before that patch was installed? Be honest.

The reality is, most administrators do not complete a backup before applying a patch. They just rely on the backup from the night before in the event that a patch does not go well. But what is it that you are upgrading? It is not the data volumes, it is the OS volumes—the same volumes that will have to be rebuilt from scratch if all does not go well.

XIOtech's virtualized storage architecture has the ability to perform a block-level copy of the OS volume at the rate of 1 GB/minute. This means an 8GB OS volume can be backed up in only 8 minutes! In the event that the patch does not go smoothly, the server can be repointed to the copy that was made earlier. Once the server is rebooted, it will be back up and running, fully functional, in the state it was prior to the patch attempt. It only takes a few minutes. Without this capability, you would have to reinstall the OS and the backup software, and then restore from tape, taking several hours to recover.

The MAGNITUDE does this in minutes, not hours. No reinstalling the OS, no installation of backup software, no restoring the OS files and configuration from tape. Just repoint and reboot.

Upgrading Server Operating Systems

Do you ever think about why upgrades have to be done on the weekend? And why are server OS upgrades so painful?

Unlike applying a patch, you know that you must make a full backup before performing the upgrade. A typical scenario is to wait until 6:00 p.m. on a Friday, then start a full tape backup of the server in case you have to restore from tape. If you truly are careful, you perform two backups, just in case one of the tapes is bad. This may take several hours. Being optimistic, all tape backups might be done by 10:00 p.m. Now you begin the server upgrade. If the upgrade takes an hour and everything goes well, then you can go home—the upgrade took only five hours to accomplish. If it does not go well, then you get to wipe the OS volume clean, reinstall the OS, reinstall backup software, and restore from tape. Now it is pushing 1:00 or 2:00 a.m. and the objective is to return to where the server was before the upgrade, rather than actually performing the upgrade. The process will have to be repeated tomorrow, on Saturday. Meanwhile the server has been unavailable for over eight hours!

The XIOtech solution allows administrators to perform the functions they were hired to perform. XIOtech's virtualized storage architecture can perform a block-level copy of the OS volume at the rate of 1 GB/minute. This reduces backup time from hours to minutes. Instead of upgrading at 10:00 p.m., the upgrade is now performed at 6:08 p.m. If the upgrade takes an hour, then you are done by 7:15 and have the choice of either upgrading another server, or going home at a decent hour. Total upgrade time is 75 minutes, opposed to five hours as described above.

So what happens if the upgrade does not go well? All you do is point to the copy, boot the server, make another block-level copy, and 8 minutes later, start the upgrade again. There are no backups to tape, no reinstallation of the OS, no reinstallation of backup software, no restoring from tapes in the event of a bad upgrade. Just copy and upgrade. Focus your time on what you need to do, not on the supporting functions.

Upgrading Applications

If you can copy internally to protect against OS patches or OS upgrades, do not forget to use the process for when you upgrade your applications. After all, application upgrades can destroy a boot partition as well as any patch or server OS upgrade.

Installing Operating Systems

How long does an OS installation usually take? What happens when something goes wrong or when someone clicks the wrong button? Do you really want to start all over from the beginning? What if you could just take one step back and restart the installation from the last completed step? With XIOtech's virtualized storage architecture, it's not only possible, but it's very simple to do.

First, create a VDisk, identify it to the server, and begin the installation process to that VDisk. While the server OS is being installed, create several more VDIs of the same size and mirror the install VDisk to each of the other VDIs you just created. When you complete the first step in the installation, shut down the server and break the mirror to the first VDisk. After you complete each subsequent step, shut down the server and break the mirror to the next VDisk.

You will end up with multiple VDIs, with each stage of the installation complete. If one of the stages fails, the installation process can be stopped, and the VDisk with the latest successful step can be copied over the install VDisk. Then mirroring on the next VDisk can be started again, and in a few minutes, you are again performing the step that failed before—but you are not starting from the very beginning.

A Practical Example

This is complicated to get across in a few words, so we will step through this in a more detailed fashion. Say you are installing Windows 2000 with SQL Server. You have the OS, the OS patch, SQL, and the SQL patch to install. Something is bound to go wrong during the install; let's face it, it almost always does. So, you create five VDIs that are all the same size. You create an 8GB volume for the OS partition; this is VDisk 1. While you start the installation to VDisk 1, you mirror VDisk 1 to the other four VDIs: VDIs 2, 3, 4, and 5.

When the Windows 2000 part of the installation is complete—but before the Windows 2000 patch is applied—shut down the server and break the mirror to VDisk 2, then bring the server back up. VDIs 2, 3, 4, and 5 are complete copies of the install to that point. Because the mirror from VDisk 1 to VDisk 2 was broken, VDisk 2 remains a point-in-time copy of the installation. VDisk 1 continues to be mirrored to the other VDIs, which will be updated as the installation continues.

Now, apply the Windows 2000 patch to the server. This is replicated to VDIs 3, 4, and 5 while the patch is being applied. Shut down the server and break the mirror to VDisk 3. VDisk 2 is Windows 2000, while VDisk 3 is Windows 2000 with the patch applied.

Again, start the server and continue the process with SQL and then the SQL patch. When you are done, you will have the following VDIs:

VDisk 1	Server attached, with Windows 2000, Windows 2000 patch, SQL, SQL Patch
VDisk 2	Windows 2000
VDisk 3	Windows 2000, Windows 2000 patch
VDisk 4	Windows 2000, Windows 2000 patch, SQL
VDisk 5	Windows 2000, Windows 2000 patch, SQL, SQL Patch

What happens if part of the installation fails? Imagine that you get all the way through the Windows 2000, Windows 2000 patch, and SQL installation, and everything goes smoothly. However, when

you get to the SQL patch part of the installation, you click Yes instead of No (or No instead of Yes). In any case, the SQL patch part of the installation does not go the way you want it to. In a normal installation, you are 1.5 hours in and you have to start all over again. Not so with the MAGNITUDE.

With XIOtech's virtualized storage architecture, you only have to take one step back. Because VDisk 4 was successfully completed (Windows 2000, Windows 2000 patch, SQL), this is your good copy. Break the mirror to VDisk 5, and copy VDisk 4 over VDisk 1. This replaces the installation VDisk that was failed with one that is good up through the SQL installation. Once this is complete, turn the server on. The server will be up and running through the end of the SQL installation, ready to start over again.

Before you start, however, remirror VDisk 1 over VDisk 5. Because this is the last step it may seem unnecessary, but who knows what you may decide to do after you get the patch installed. Now, install the patch, which hopefully goes in smoothly, and break the mirror when you are done. VDisk 1 is the fully installed server OS with applications installed; VDIsks 2, 3, 4, and 5 are copies at various stages of the installation. These VDIsks can either be kept as "gold" copies of installations at various states for use at a later date, or may be deleted to reclaim disk space.

Take It to the Next Level

What do you do with all these extra VDIsks? Save them! When you deploy another SQL server, you already have an image that you can deploy in less than 8 minutes.

If the physical server is different than the server the VDisk was built on, you can use SYSPREP with Microsoft operating systems to prepare the server to bring the image up on another physical configuration. NetWare and Linux make it much easier as they almost do not care that the physical hardware has changed. NetWare only notices if you change the network adapter card, and Linux tells you what you need to delete or add to make the new configuration work.

Protect Your Installations

How often has this happened to you? You build servers for a vendor to install his or her product on, only when the vendor installs the application, he or she destroys the OS installation. With server-attached storage systems, you have a lot of work ahead of you to rebuild the OS.

XIOtech's virtualized storage architecture provides a quick and easy option to protect your OS from unintentional corruption. You can use XIOtech's REDI Copy software to make a copy of the OS within the MAGNITUDE before the vendor arrives. If the installation goes well, you can delete the copy. If the vendor makes a mistake, then copy the recently made OS copy over the original VDisk and let the vendor start again. This enables quick recovery of failed installations—just like when you apply your own patches and upgrades.

Adding Disk Space to a Server

How fast can you add space to a server? How long does it take to back up the server, take the server down, add some drives, restripe the data, and bring the server back online? It probably takes at least a couple of hours.

With the MAGNITUDE hardware platform, you can create up to a 2TB, RAID 10 virtual disk (VDisk) in about 7 seconds. That is right . . . *seconds*. Note that RAID10 is mirroring, so that is actually 4TB of physical disk. Because of XIOtech's true virtualization capabilities, all data is striped across all spindles, thereby using all actuator arms to put smaller amounts of data across all the drives at the same time. This tremendously increases I/O capabilities of the system. And this is all without any downtime to the server!

Changing RAID Types

What possible reason could someone have for changing the RAID configuration on a server? There are several good reasons.

- Perhaps an existing server is underutilized and is configured with RAID 5. You want to install SQL on the server but are concerned about performance because it is RAID 5, where RAID 1 (or RAID 10) would perform better.
- Perhaps you have a server that is running an application, such as Oracle, that requires high performance. You did not build the server but are now responsible for it, but it is RAID 5. Changing the RAID configuration to RAID 10 would dramatically improve performance.
- Perhaps the server was configured with RAID 10, but the server is being used for long-term storage. You could better utilize disk space by changing the configuration to RAID 5.

Many administrators will not change the RAID level because of the pain involved. Changing the RAID configuration involves a destructive rebuild of the server. To change a RAID type, you have to do the following:

- Back up all the data on the drives
- (Potentially) back up all the data a second time
- Wipe the drive configuration clean
- Rebuild the RAID array
- Reinstall the OS
- Reinstall backup software
- Restore from tape

This could take hours. Not to mention that it puts your data at significant risk!

With XIOtech's virtualized storage architecture, you can perform online RAID configuration changes while the server is running, with end users actively working, without any downtime.

Upgrading Hardware

New server hardware is available roughly every 18 months. If your business depends on efficiency of your servers, why not upgrade every 18 months to the latest server hardware?

Hardware upgrades can be time-consuming activities and often are performed alongside a server OS upgrade. Changing hardware requires downtime and many hours of backup and restore functions. A typical hardware upgrade requires you to:

- Back up the original server
- Configure the new hardware
- Install the OS on the new server
- Install the backup software on the new server
- Restore the data from tape to the new server
- Verify that all data is intact

What is the real reason hardware upgrades are so painful? Your disk is inside your server! If the disk was not tied to the server, then all you would have to do is move your disk to a different server.

On typical server platforms, you cannot just move a RAID controller from one server to another; the configuration will typically be lost and you will have to rebuild from scratch.

XIOtech's virtualized storage architecture allows you to separate storage from servers, allowing upgrades to server hardware to take place with very little downtime. All you have to do is unplug the old server, plug in the new one, point the new server to the same MAGNITUDE VDisk, and in a couple of minutes you have a server operating with new hardware. Once again, minutes instead of hours!

Let's look at how the ability to quickly and easily upgrade server hardware might impact your organization and your job.

Server Sparing

If you have servers without disk in them, your servers boot from their assigned VDIs, and you can upgrade the physical server in minutes.

How could you better address server failure? Keep a spare server on hand. If a server fails, instead of trying to fix it while the server is down, point your spare server at the same VDisk, turn the server on, and the new server takes over the job of the failed unit. You now can try to figure out what happened to the other server. Once fixed, this can become your spare. You have effectively reduced your downtime from several hours to a few minutes.

- *Multiple-OS Support:* Because the MAGNITUDE hardware platform supports multiple operating systems simultaneously, you can keep one server on hand as a spare for any server running an Intel-based OS. That includes NetWare, Windows NT/2000, Linux, and others.
- *Server Maintenance Agreement Savings:* What good is a 24x7, 4-hour server maintenance agreement if you have to wait around for the replacement part to be delivered? If there is something wrong with a server, your server is down while you wait for a technician—that could mean four hours or more that end users cannot access data and applications.

If you have a spare server on hand, you can point the spare server to the disk and have the server up and running in the time that it takes to make the phone call to support. You can save money by having only a 9x5 maintenance agreement. You can swap the problem server out with your spare and address the issue during normal business hours because end users continue to have access to data and applications through the new server.

- *Remote Server Sparing:* What happens if your server goes down on the weekend and you live an hour away? Do you really want to drive into the office to fix the problem?

With the remote management capabilities of XIOtech's virtualized storage architecture, you can monitor and configure storage from remote locations through a modem, LAN, or VPN connection. If a server fails, just point your spare server to the VDisk and have someone at the data center turn on the server. The server is back up and running, and you never had to leave home. If your server has remote-boot capabilities, you do not even have to call anyone; just tell the server to reboot, and your work is complete.

Lease Replacements

If you have servers on a lease program, how do you return a server when the lease is over, especially when there is data on it? If the server boots from the MAGNITUDE hardware platform and all the data is on the SAN, you simply unplug the old server and replace it with a new unit.

Now that the pain of replacing servers is eliminated, you can move to a shorter lease cycle—perhaps two years instead of three. Your company can keep up with server technology and reduce lease costs because residual value is higher at the end of the shorter lease term.

Another unexpected cost that companies incur is at the end of the lease cycle. If the leased equipment is not returned on time, then additional, unbudgeted lease payments have to be made. Many times, the reason for delinquent equipment return is the pain and time associated with migrating the data to new equipment. With the XIOtech's virtualized storage architecture, replacing servers is quick and easy, making it more likely that leased equipment is returned on time.

Consolidating Servers and Migrating Data

Server consolidation is a time-consuming process. How do you move gigabytes of data efficiently? The most used method is backup and restore. XIOtech asks, "Why?" If your data is already on the MAGNITUDE hardware platform and you want to consolidate servers, point your data volume to the server you want to move it to, have your server rescan for disks, and all of a sudden, you've moved potentially huge amounts of data with minimal effort—all in less than a minute.

This is a big enough issue to expound on it a little more. If you have a Windows NT server and you want to migrate to Windows 2000, how would you do this today? You probably would buy another server, install Windows 2000, and then spend hours either using a utility to copy data from one server to the other or possibly using the tried and true back-up-one-server-and-restore-to-another method (assuming the tape drives in both servers are compatible). What if your data volume is 100GB, 200GB, or more? How do you move so much data?

XIOtech has a simple answer: You don't! After all, the fastest way to move data is to not move it at all. XIOtech's solution for this migration nightmare is easy. If an existing Windows NT server has data volumes on the MAGNITUDE, all you have to do to move your data is change the pointers. For instance, if you want to migrate your data to a new Windows 2000 installation, simply change the pointer for the data volumes from the Windows NT server to the Windows 2000 server. That's all—you have just migrated your data . . . in seconds. You could even use the same server. XIOtech's virtualized storage architecture simplifies the management of data to where terabytes can be dismounted on one server and mounted on another server in seconds.

Supporting Heterogeneous Networks

As a company grows, the need for more complex systems increases. Every day, companies are moving from mainframe and mid-frame computers to more manageable (and less expensive) systems. Some of the popular choices include Solaris, HP-UX, AIX, and other UNIX platforms. With many companies already running NetWare, there has been a natural addition of Windows NT, Windows 2000, and Linux.

Many SAN subsystems do not have the ability to work with more than a couple of operating systems. If a system works well with Windows and Linux, it generally does not work well with UNIX platforms. If it works well with UNIX platforms, it does not work well with Intel systems. Almost no SAN works well with NetWare. But then there's XIOtech's MAGNITUDE—it works with them all. It also natively works with Macintosh.

Why can the MAGNITUDE work with them all, but others cannot? XIOtech designed the MAGNITUDE to isolate each VDisk to the worldwide name (WWN) of the server's fibre channel adapter. This is a very simple process: a couple of keystrokes can make a VDisk available or unavailable to a server—in just seconds. Additionally, the LUN presented to the server can be changed in a few seconds.

Because of the ability to isolate a VDisk to a WWN, multiple operating systems can be on the same SAN, and they never see disks assigned to other servers. This is what allows NetWare, Windows NT, Windows 2000, Linux, MacOS, HP-UX, AIX, Solaris, and most other UNIX operating systems to coexist on the same MAGNITUDE hardware platform, at the same time, without any concern about servers seeing each other's disks.

Server Clustering

In the same way that you can isolate MAGNITUDE VDIs to only be seen by one server, you also can allow multiple servers to see the same VDisk. Again, this is a simple process—a couple of keystrokes and a couple of seconds.

XIOtech's virtualized storage architecture has been integral in the development of Novell's and Microsoft's server clustering solutions. Why? Because changes can be made so fast that it significantly reduces the development time of these companies' products. The MAGNITUDE also supports VERITAS clustering on Solaris and HP-UX.

Deploying Servers Remotely

You need to deploy a new server, but you are not onsite and you do not have anyone onsite who can perform the installation. Does that sound familiar? Do you have someone that can hook up a server and plug it in? Probably. So have them do that. Using the remote management capabilities of XIOtech's virtualized storage architecture, you can create VDIs, copy VDIs, and point them at servers. Internal to the system, you can take a copy of an already installed OS (such as from the extra VDIs created above) and assign it to the server. Have someone reboot the server, and you are off and running. Better yet, if you have a remote management board in the server, once the server is hooked up and plugged in, you can do everything remotely!

Centralized OS Rollout

XIOtech's virtualized storage architecture even has the ability to copy a server image from one location to another across long distances. If you have multiple sites, you can build a standard server and deploy it to each remote location and, using the techniques mentioned immediately above, deploy servers remotely.

Building a Test Lab

Everyone wants a great test lab, but usually cannot afford to buy the equipment to duplicate their server configuration. XIOtech's virtualized storage architecture offers extreme flexibility and allows you to build a truly useful test lab configuration.

Server/Application Upgrade Testing

What is the real reason companies do not upgrade to the latest OS or the latest application or the latest patch when it first comes out? Because they have to test it. Building servers to test the patch/upgrade/application takes a lot of time. Furthermore, when you build that test server from scratch, it is a clean system with no skeletons in the directories, so your test is not totally accurate.

XIOtech gives you that time back, and makes your tests realistic. Because you have the ability to copy MAGNITUDE VDIs internally, you can make a VDisk that is an exact copy of your OS, including data, initialization files, overall configuration, applications, everything. This VDisk can be loaded on a test lab server, and the patch/upgrade/application can be tested on an exact copy of the server to get a realistic idea of how the actual production system will perform.

“Playing” in Your Test Lab

If you have a typical test lab, you have three servers and have to be particular about what you put on each one in order to have a variety of platforms to support your needs. Why? Why be so particular about what you put on each of your servers?

With those same servers booting from the MAGNITUDE hardware platform, you can go from having three servers with everything installed on them to having as many three-server configurations as your system can support. With XIOtech's virtualized storage architecture, you can build a VDisk for each of the three servers to house the base configuration. You can copy those

three VDisks and load one application on the servers. When you need to play around and test a different application (or a different OS), you just point to different VDisks and reboot the servers.

Imagine that you start with three NetWare servers in a single NDS tree. You can point the servers to different VDisks, reboot them, and be running Windows NT. You can do it again for Windows 2000 or Linux. Or you might have a NetWare server, a Windows 2000 server, and a Linux server. It comes down to what you want to have set up and functioning. When you need one OS, just fire it up and have fun.

Accelerating Time to Market

Are you developing an application? Do you want to test it on multiple OSs? What better way than to utilize the MAGNITUDE hardware platform's capabilities to boot different OSs? All you have to do is pull up a clean copy of the OS on a server and install the latest version of the application, or you can test upgrading an application from a previous version. XIOtech's virtualized storage architecture makes it easy.

Improving Backups

Backups present a constant challenge for every network administrator. In reality, it is not the backups, but the restores that cause most of the problems.

Alternative to Tape

We are not saying that going to disk is the best way to back up your data. However, using disk as a temporary location before going to tape is a unique and beneficial practice.

Imagine that you have 10 remote sites and need to back up one server at each site. The way most administrators do that today is to run the backup software to a tape drive that is local to each server. This is an expensive proposition when you consider that local tape drives (and tapes) cost as much or more than servers do. Additionally, how often is the tape actually replaced by the person designated to do that? Usually, the tape is left in and is overwritten every night.

Using available backup software, consider backing up your servers directly to disk across the WAN to a central site. At this point, the servers are actually backed up, as their data is at another location. Then when you are at work the next day, during normal hours, you can control the backup process and make sure that the tapes are changed. When a restore is actually needed, it is probably because the server is not functional. The restore of that system can be performed at your main location—where you happen to be most of the time—and only deliver it to the remote site when the restored server is ready to be put in place.

Adding Drive Capacity

How do you add more capacity to a server? If you have direct-attached storage, you would have to back up the server and take it offline. Then you would have to add disks and restripe the data. This is very risky, not to mention all the downtime associated with the procedure. It could take several hours.

XIOtech's virtualized storage architecture eliminates the hassles of increasing capacity for a server. However with the MAGNITUDE, you're not limited to adding physical capacity; you also can add logical capacity.

Adding Logical Capacity

You can create MAGNITUDE VDisks and assign them to a server in a matter of seconds. When a server needs more capacity, you can add the space right away with no downtime (depending on the server OS). If additional space is needed on the same volume, the VDisk can be expanded on the fly, and again depending on the OS, it can be done with no downtime to the server.

Even if a server has to be rebooted to see the new capacity, it is only a reboot and not a total reconfiguration of the system. At the server level, the whole idea of physical disk configuration is no longer an issue.

Adding Physical Capacity

When more physical disk space is needed in the system, you can add physical capacity to the MAGNITUDE without the servers being aware, without a reboot to the system or the servers, and without users knowing it happened.

Mixing and Matching Drives: What happens when you want to add more physical space to a server? Assuming this is easy (which it usually is not), you have to match the size and spindle speed of the drive in order to add it to your array. If you don't, then you lose disk space. For example, if you have a typical RAID 5 array with three 9GB drives and you want to add more disk space, all you have to do is add another 9GB drive. The problem is, no one sells 9GB drives anymore. You have to buy an 18GB or 36GB drive and add that to the array, but you can only use 9GB of the drive because of array firmware limitations. Your other option is to replace all your 9GB drives with larger capacity units and lose your original drive investment. What a waste!

With the MAGNITUDE hardware platform, you can mix drive sizes and spindle speeds within the same cabinet and efficiently use all the space on all the drives. The system works with 4GB, 9GB, 18GB, 36GB, 50GB, 73GB, 180GB, and whatever is coming next. It also works with 7,200 RPM, 10,000 RPM, and 15,000 RPM drives. Mixed and matched. This is investment protection at its best! If you fill a cabinet half full with 9GB drives and a year later want to add space, you can add 180GB drives right next to the 9GB drives; they can even be different spindle speeds. You do not lose disk space on the 180GB drives; you use it all, yet you do not have to get rid of your 9GB drives. Just leave them in there.

Scripting

Everything you can do manually on the MAGNITUDE, you can script to do automatically!

Other IT Considerations

The following are some of the added benefits XIOtech's virtualized storage architecture provides to an IT department.

Data Center Footprint

With data center space becoming more and more valuable, the more efficient use of space, the better. XIOtech's virtualized storage architecture allows you to maximize floor space by deploying thin servers. Today, up to 42 thin servers can be mounted in a single rack, all booting from the same MAGNITUDE hardware platform (new technologies such as bladed servers allow up to 180 servers in a single rack). This reduces the footprint in a data center dramatically to the equivalent of two racks for 42 servers and terabytes of flexible storage capacity on the MAGNITUDE hardware platform.

Standards Management

Because of the capabilities of XIOtech's virtualized storage architecture, the ability to standardize on a specific server platform becomes easier. As you replace servers, you can purchase a standard server platform. Because diskless servers are less expensive and no longer tied to storage, they may be replaced more often, hastening deployment of a unified platform throughout your organization.

Capacity Planning

Many companies staff a position specifically to estimate future storage needs so they can acquire the capacity in advance, before their capacity runs out.

XIOtech's virtualized storage architecture practically eliminates the need for capacity planning because you only have to purchase what you need today. If you need more later, additional drives can be ordered and added to the MAGNITUDE without any downtime to the system or the servers, and without affecting end users.

Reallocation of Unused Space

When a server no longer needs some of the space allocated to it, the VDisk can be deleted. This immediately places the deleted space back into the pool of available storage to then be assigned to another server. With most other storage arrays, you must reconfigure, and/or reboot the array to recover and reuse the deleted space. With XIOtech's virtualized storage architecture, recovery and reuse are immediate.

Disaster Recovery

XIOtech's REDI SAN Links Replicator software allows operating systems, applications, and data to be copied or mirrored from one MAGNITUDE hardware platform (source) to another (target). The target MAGNITUDE may be local or in a remote location. When combined with booting an operating system from the SAN, if a system or site goes down, the servers can easily be repointed to the disaster recovery system and brought back online. And administrators will appreciate how easy it is to set up this effective data protection solution.

Summary

XIOtech's virtualized storage architecture incorporates capabilities that make normal administrative tasks tremendously easier. These functions help administrators reduce downtime to end users, while reducing weekend and night-time work. With its MAGNITUDE hardware platform and REDI software, XIOtech reduces administrative effort from hours to minutes . . . and saves your organization money in the process.

A companion solution brief, *Easing Server Management Challenges with XIOtech's Virtualized Storage Architecture* is available from XIOtech. This document provides a high-level overview of how XIOtech's virtualized storage architecture alleviates the headaches of server administration.

To learn more about how XIOtech's products and services can help relieve your server management and other storage-related challenges, contact your local XIOtech account executive, visit www.xiotech.com, or call XIOtech's corporate headquarters at 866.472.6764 (toll free).



6455 Flying Cloud Drive
Eden Prairie, MN 55344-3305
phone: 952.983.3000 fax: 952.983.2320
www.xiotech.com

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