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STORAGE

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2011 Products of the Year

18 new or enhanced data storage products that our experts think will make storage a lot easier to manage this year

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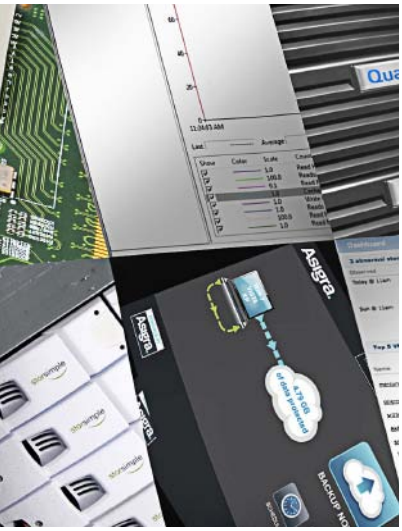

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Helluva lot of data

All data isn't big data, and dealing with it requires a variety of storage technologies and disciplines.

FOR A LONG TIME, I felt like I was the only person who was confused about this "big data" thing. I thought it meant dealing with large files, but the term also seemed to be tossed around in equal doses to refer to lots and lots of pieces of unstructured data. I think I get it now. It means both things, but it doesn't refer to everything in between, which is probably 90% of the data stored in most data centers. But, to be fair, the 10% that's some form of big data can be pretty important stuff.

If you manage to parse these things out, they start to make some sense. Not the kind of sense storage marketers are trying to hypnotize us with by relentlessly pairing big data with "the cloud," "virtualization," "solid-state storage" and whatever buzzword du jour they think (or hope) describes their product lines. That's nonsense. But if you put the 90% of data aside for a moment and look at the two big data constituencies, there's something of substance to talk about.

It might seem like big data has been reverberating in our ears forever, but it's only been around for only a few years. When it first emerged, "big data" was a fairly straightforward and succinct description of data that came in the form of large files, like video and medical images and some scientific data. The groups that had to deal with those files—video post-production facilities, all kinds of health care organizations and research labs—needed special tools on the storage side to use their jumbo-sized data effectively.

Isilon Systems Inc. (now owned by EMC Corp.) and a number of other storage vendors answered the call for storage system architectures that were more adept than traditional arrays at handling these large files. Snagging a few celebrity customers like *Sports Illustrated*, which used Isilon's systems for its Beijing Olympics coverage, didn't hurt and certainly helped "big data" find a permanent place in our storage technology lingo. Over the years, a number of storage vendors—like Active Storage Inc., Dot Hill Systems Corp., Omneon (part of Harmonic Inc.), Pivot3 Inc. and Sonnet Technologies Inc.—have built a solid niche catering to these specific needs with purpose-built storage systems.

It's not big at all, but rather a helluva lot of something—in this case, vast numbers of discrete pieces of information in the form of disconnected files.

The other "big"—the one that deals with massive amounts of small bits of data—has a completely different genesis. In fact, everything about this "big" is different from the other "big." Even the word "big," borrowed from the other use case and liberally redefined, doesn't seem right. It's not big at all, but rather a helluva lot of something—in this case, vast numbers of discrete pieces of information in the form of disconnected files. So systems built for the original big data probably wouldn't be all that useful.

For the sake of clarity, let's not even call the second group of stuff big data anymore; let's call it "helluva lot of data." Helluva lot of data means working with lots of files that may (or may not) be related to try to turn seemingly disparate tidbits of data into something that might be useful. That doesn't strike me as a storage issue even though you need a place to stash away those zillions of morsels that has the horsepower to serve 'em up fast enough when they're needed.

So it seems that scale-out network-attached storage (NAS) or object storage systems should suit helluva lot of data applications just fine. For helluva lot of data, it's really a software story, but not a storage management software story. It's based on the premise that if we can put all those dissimilar fragments together in just the right way, we'll unearth (or maybe even create) valuable new information. And we need specialized software to do that kind of thing, which really doesn't have much to do with the underlying storage.

In essence, it turns into an exercise of creating a value proposition to go out and buy technology that will help you find value in all the stuff you've been collecting. Interestingly, it's often not a given that there's any value buried in the bits and bytes. I guess the "big" question is, "How far do you go in pursuit of that hidden intelligence?" And how much do you spend trying to determine if there's some real intelligence to be sorted out or if it's all, well, a helluva lot of junk?

Of course, in most companies the answer to that is "We wouldn't be collecting all this data if it wasn't valuable, right?" Um . . . maybe. Now, if you could only dump the junk before you start trying to fit the pieces together to reveal that inner truth . . .

You'll also probably need some kind of specialized storage hardware that works effectively with software that's smart enough to discard the pieces that don't fit before trying to complete the puzzle. And most storage managers would be only too happy to get their hands on some kind of superintelligent archiver/cataloger that might provide some relief for overextended file data systems. Now that would be a helluva solution. ⊙

Rich Castagna is editorial director of the Storage Media Group.

* Click here for a sneak peek at what's coming up in the March 2012 issue.

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Poor performance? Maybe it's the app and not the storage

When applications get bogged down, all eyes typically focus on the storage; but maybe we should take another look at the application itself.

AT AN IBM CONFERENCE a while back, I participated in a panel discussion and one of the questions tossed my way was one I seem to get all the time: "What do I need to do to my storage infrastructure to make my applications perform faster?"

It seems like everyone points at the storage infrastructure to find the culprit for slow performing applications, which is logical given all the money EMC has spent over the years to lock in the notion that storage is where information lives. But I'm finding that storage itself is rarely the source of the problem.

Yes, there are ways to speed up IOPS on a storage rig. As mentioned in last month's column, one approach to expediting storage responsiveness is to use a variant of sub-LUN tiering that leverages flash solid-state storage, or memory generally, to service data requests. When data is written to a hard disk, and then exposed to frequent and/or concurrent requests for retrieval, temporarily copying that data into silicon and servicing requests from that source can make things faster. XIO does this on its rigs using a patented approach called "hot sheets," which I'm told refers to the engineer who came up with the scheme and thought he was "hot sheet."

As for expediting writes, storage solutioneering gives us a couple of options: parallelization or spoofing. The first one, parallelization, is commonly called "short stroking" and involves allocating a bunch of spindles to the task of writing data. Getting more read/write

heads involved in the write process can increase overall write performance, but it does so at a cost in terms of power (more disks, more BTUs and more watts) and space (massive arrays consume a lot of raised floor).

Spoofing is the other approach. Some network-attached storage (NAS) vendors use it to compensate for the slow performance of back-end RAID. Basically, you put a big memory cache in front of the storage array that's directly attached to the NAS head (a thin server) and acknowledge application writes as received and recorded, but before data is actually recorded to the disk (hence the term "spoofing"). In the old days of mainframe channel extension, we used to say this strategy prevented the channel from "being held high"—in other words, we fooled the app into believing its data had been received and written so it could go on about its business.

There's nothing wrong with spoofing, except for the steep cost a NAS vendor charges for the memory modules used in its spoofing approach.

There's nothing wrong with spoofing, except for the steep cost a NAS vendor charges for the memory modules used in its spoofing approach. Another implementation that I find to be less costly is to use DataCore Software's SANsymphony-V storage hypervisor, which applies inexpensive server DRAM to do the same thing other vendors do with proprietary and pricey caching controllers or flash solid-state drives (SSDs). Basically the cache writes are placed into queues, unbeknownst to the application, where they wait their turn to be written to disk.

So, yes, Virginia, there are things you can do to improve storage performance. But that doesn't necessarily translate into faster application performance. Like it or not, application performance may have very little to do with storage at all.

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Sometimes an application is hosted improperly. Not long ago, I was brought in to troubleshoot a database that was taking more than 90 minutes to load into production. The database, originally hosted on a mainframe, contained more than 100 years of commodity exchange transactions and had grown from its original design into a multiheaded hydra held together by spit and baling wire. It seemed Oracle had charmed the CIO into migrating off a mainframe and onto a RAC hosting platform—a deal sealed by a promise that doing so would score the CIO a cover photo in *Oracle Magazine*. Chicks would dig him and guys would want to be him, I suppose. The actual outcome of the strategy, a database with significantly reduced performance, changed that cover page into a poster for stupid.

The hosting platform does count for something in the determination of the root cause of slow performing apps.

The hosting platform does count for something in the determination of the root cause of slow performing apps. Another example comes from a conversation I had last year with the former boss of VMware's European operations, who left the company for a startup because he wasn't seeing the coin from sales anticipated by the hypervisor vendor. "People are reusing their retired servers after consolidating their apps with ESX and vSphere as hosts for more guest machines," he complained. The result was that server hardware, with fewer cores and sockets and less memory than is suited for guest hosting, was being placed into service, producing, among other things, abysmally slow application performance and a lot of disgruntled users.

Server hypervisors like VMware's can introduce a lot of performance impediments as well. The LSI Logic controller emulation used in VMware's strange brew of microkernels is a big I/O chokepoint they've sought to address by requiring hosting platforms with

more sockets and memory (a hardware-centric brute force effort to improve performance that requires a big Capex spend on new server hardware) and by introducing non-standard SCSI commands in a desperate effort to offload "up to 20%" of I/O workload to "intelligent" (aka pricier) arrays beneath. Now, they're trying to write yet another microkernel to take over storage entirely. Good luck with that.

Finally, it's worth mentioning that sometimes application performance sucks because of, well, the application itself. One outfit I know about is using an interesting scheme to protect its Exchange environment that leverages CA Technologies' ARCserve Replication (formerly known as CA XOsoft Replication) to fail over a clustered email hosting setup that stores its mailboxes on a back-end Fibre Channel fabric to a 1U rack-mounted server running VMware at an ISP a couple of hundred miles away. The solution works pretty well to safeguard 40,000 mailboxes against a potential hurricane or other disaster. The operators say users don't notice the difference when the platform fails over to the virtual host, mainly because Exchange isn't the best performing application in any case!

This was my response to the folks at the IBM event, a couple hundred CIOs from Global 2000 companies. Their response was an ovation.

Seems like some folks get it. ⊙

Jon William Toigo is a 30-year IT veteran and is CEO and managing principal of Toigo Partners International and chairman of the Data Management Institute.

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2011 Storage Products of the Year

These 18 storage products rank as the best of 2011 and stand out because of their innovation, practicality and good value.

BY ANDREW BURTON, RICH CASTAGNA, TODD ERICKSON, SONIA LELII, DAVE RAFFO, FRAN SALES, CAROL SLIWA, SUE TROY

AS STODGY AND SLOW moving as data storage might seem at times, there's a remarkable amount of innovation going on at a near non-stop pace. The *Storage* magazine/SearchStorage.com 2011 Storage Products of the Year bear that out, as storage vendors once again demonstrated that cutting-edge technology doesn't have to be some kind of science project but can effectively and practically fit into current environments and make short shrift of existing problems.

From hundreds of very impressive product entries, our judging panel selected an exceptional group of 48 finalists. In turn, our 18 winners were then selected from among the finalists based on innovation, performance, ease of integration, ease of use and manageability, functionality and value.

With a mix of veteran storage vendors and relative upstarts represented, it's obvious the data storage market is as vibrant and healthy as ever, with innovation coming from expected and somewhat unexpected sources. The constant infusion of "new blood" enhances the market's DNA and helps account for the number of products that have been singled out for accolades. Our winners also represent all the hot storage industry trends, including solid-state storage, cloud storage, object storage, scale-out systems and more.

The Products of the Year competition recognizes the best new or updated storage products in six categories: backup and disaster recovery (DR) software and services, backup hardware, networking equipment, storage management tools, storage systems and storage system software.

Congratulations to all the winning vendors!

How the *Storage* magazine/SearchStorage.com Products of the Year works

Storage magazine and SearchStorage.com invited enterprise data storage product companies to nominate new or enhanced products for the 2011 Products of the Year awards. For previously available products, the upgrade must have incorporated significant new features.

Products could be entered in six categories: backup and disaster recovery (DR) software and services, backup hardware, networking equipment, storage management tools, storage systems and storage system software.

Products were judged by a panel of users, analysts, consultants, and *Storage* magazine and SearchStorage.com editors. Products were rated based on innovation, performance, ease of integration into environment, ease of use and manageability, functionality and value.

Backup and Disaster Recovery (DR) Software and Services

gold: Asigra Inc. Cloud Backup v11

Asigra Cloud Backup v11 is designed to protect storage, servers, desktops, laptops, tablets and smartphones—a range of functionality that reduces if not eliminates the need for backup point products. Asigra's approach is unique: It's the first backup software provider to offer a product with the ability to back up all data-carrying devices throughout an enterprise.

Many analysts agree that endpoint backup is an underserved area of the data protection market. Extending data protection to laptops and smartphones is a timely innovation, as the workforce becomes more mobile.

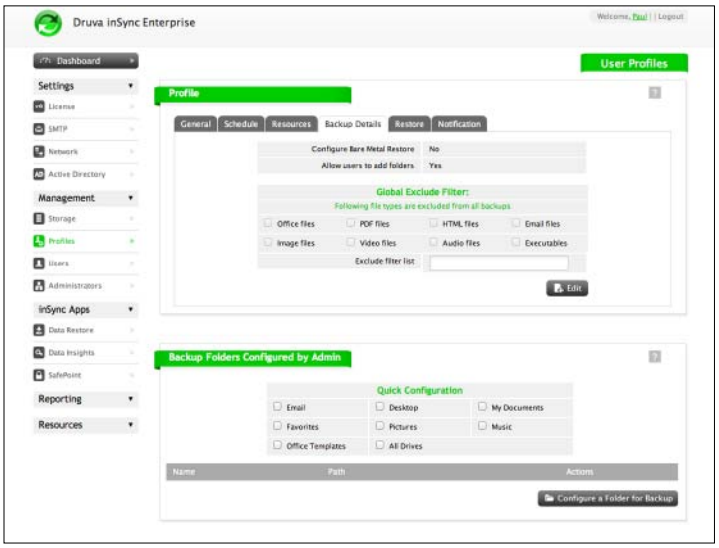
Asigra Cloud Backup v11 can be deployed as an on-premises private cloud backup solution, a hybrid cloud backup solution for local and offsite backup, or as a pure public cloud backup app. It's hardware agnostic and can be installed as a virtual machine. The release offers a number of performance enhancements, including a 400% performance improvement over v10, according to Asigra. It supports 10 Gbps local-area network (LAN) interfaces, and internal processes have been improved for faster data read/writes with multithreaded data dedupe, parallel processing for read I/O and data throughput, multiple overlapped I/O and delta differencing.

V11 also offers a new Web management portal and an automated licensing scheme. The portal, called DS-NOC (Network Operations Center) monitors Asigra's DS-Client, DS-System and Asigra Backup Lifecycle Manager (BLM) Archiver components. Cloud License Server allows managed service providers (MSPs) to remotely authenticate and update users' licenses. One of our judges said "there's nothing like it in the market for enabling backup and recovery as a service."

Pricing for Asigra Cloud Backup v11 starts at $2,000.

Backup and Disaster Recovery (DR) Software and Services

silver: Druva Inc. inSync 4.1 Enterprise



Druva inSync Enterprise also targets endpoint backup, and our judges gave it high marks for addressing the laptop data protection issue effectively. One judge said the product is "really innovative and solves a major problem."

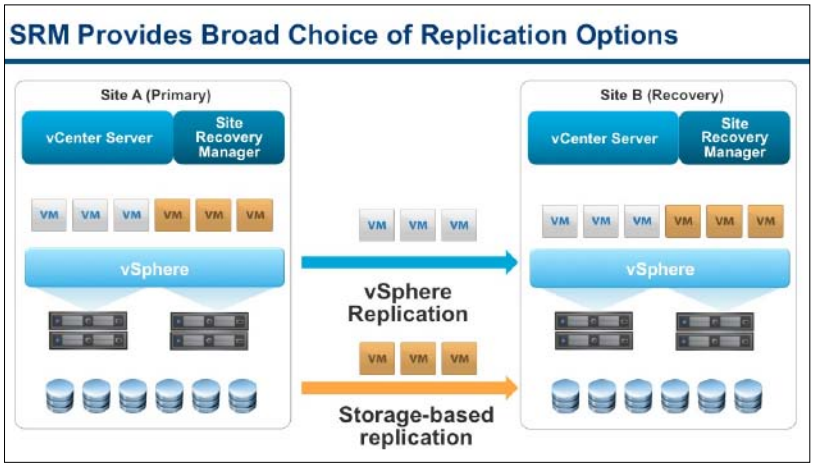
Version 4.1 offers a number of upgrades, including secure access to backup data with multiple restore points from Druva's client application, a Web browser or a mobile device. It also offers multi-admin support with profile-level quotas; user profile administration can be delegated to several administrators. Also new is Active Directory integration.

A server-side deduplication subsystem called HyperCache is yet another enhancement. Druva claims this reduces disk I/O by up to 80% using an algorithm based on probability and frequency of block access, and that the improved deduplication performance allows inSync server to handle up to 200 parallel backups. The company says optimization for solid-state drives (SSDs) further improves backup concurrency and performance by 5x. In a recent test by Enterprise Strategy Group Lab, Druva inSync achieved 96% reduction (a 26-1 ratio) for backup files and demonstrated low resource consumption on the server and client.

Pricing starts at $40 per inSync client. A single inSync server license supports up to 2,000 users.

Backup and Disaster Recovery (DR) Software and Services

bronze: VMware Inc. vCenter Site Recovery Manager 5



vCenter Site Recovery Manager (SRM) is a disaster recovery solution designed by VMware for vSphere. Version 5 offers a number of important new features.

First up is vSphere Replication, VMware's hypervisor-based replication application, which allows for the replication of virtual machines (VMs) at the virtualization layer and eliminates the need for replicating storage arrays or third-party replication software products. It's the first hypervisor-level replication product on the market. Built-in replication has the potential to allow smaller companies that don't have the budget for storage-area network (SAN)-based replication to deploy SRM. Also, because vSphere Replication works independently of storage devices, it allows for replication between heterogeneous storage systems. vSphere Replication also offers Microsoft Volume Shadow Copy Service (VSS) compatibility and uses Changed Block Tracking (CBT) to copy only changed blocks to the recovery site.

Another new feature of SRM is automated failover. The product can automatically move VMs back to a primary site after a failover, and it coordinates operations across storage and vSphere layers.

"This is a major step forward for server virtualization DR," said a judge. "It allows any-to-any storage DR; it's simple, elegant, fast and effective."

VMware vCenter Site Recovery Manager 5 is priced at $195 per virtual machine.

Backup Hardware

gold: Quantum Corp. vmPRO 4000 appliance

After buying Pancetera for $12 million in mid-2011, Quantum quickly turned the acquired technology into its vmPRO family to provide data storage managers with a way to protect VMware-based virtual machines (VMs) for backup, disaster recovery and data retention. One of the first VMware backup and deduplication appliances, one judge described the vmPRO family as a "nice VMware-only backup that operates as both a virtual and physical appliance."

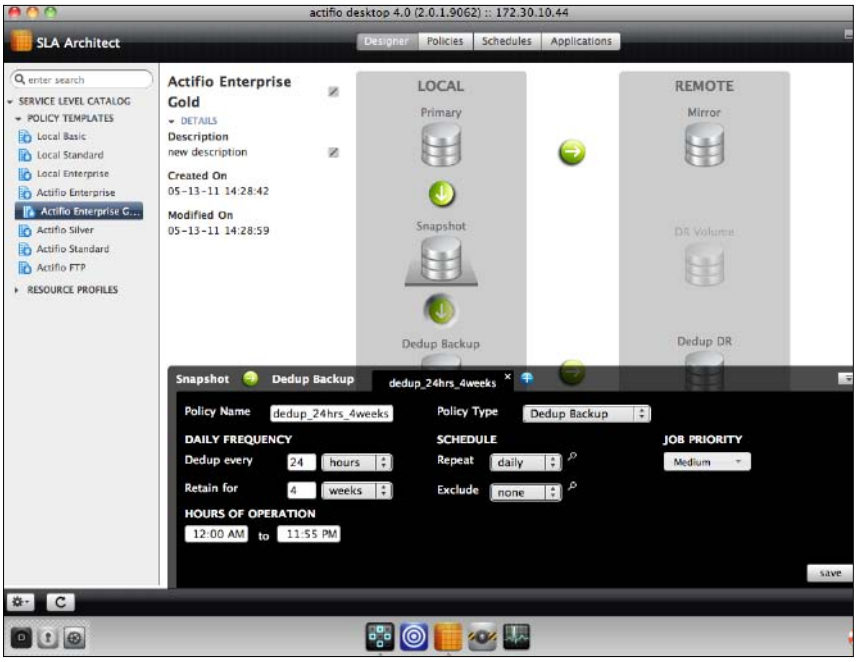
The product line consists of the vmPRO standalone software that's the basis of a set of appliances: the vmPRO 4510 and 4601 disk deduplication appliances. The software works with third-party backup apps, while the vmPRO 4000 family provides backup software and storage in one appliance that's based on Quantum's DXi deduplication and replication devices. Both products create backup copies in a native, file-system view to allow for single-stage recovery for whole VMs or single files.

The vmPRO software operates as a virtual appliance integrated into VMware vCenter. It treats VMs as files in a single virtual file system and presents them in directories, instead of the VMs residing on different ESX hosts and different types of storage. It features a progressive optimization capability to filter out inactive, expired and random data in VMs as it's read so that initial backup volumes are reduced by up to 75%.

The vmPRO 4601 ingests at 1.7 TB an hour, with up to 12 TB of usable capacity in a 2U rackmount appliance. Capacity can be expanded on demand with a license upgrade. The vmPRO 4510 has 2 TB of usable capacity. Pricing starts at $13,750, including all software.

Backup Hardware

silver: Actifio Inc. Protection and Availability Storage (PAS) platform



Copies of data are proliferating at a rapid pace, with data copies created and managed by different applications and kept in separate systems for backup, snapshots, virtual machines and physical systems. Actifio's Protection and Availability Storage (PAS) appliance targets this problem with a single application that solves the problem of managing these multiple silos and data protection functions.

"It's an innovative rethinking of secondary data," said one judge. "It's a flip on deduplication—instead of eliminating duplicate copies of secondary data, it takes one actual copy of the data and makes multiple disciplines believe they have their own unique copies."

Actifio PAS runs on an x86 server and can scale up to eight servers to support 8 PB of capacity. PAS uses Actifio's Virtual Data Pipeline (VDP) technology, which is a distributed object file system that binds business apps and service-level agreements (SLAs) to each unique block of stored data so that data can be reused for multiple applications. This eliminates redundant silos of data and applications while providing a single virtualized platform that can be used by any business application. Pricing for an Actifio PAS appliance starts at approximately $25,000.

Backup Hardware

bronze: Symantec Corp. NetBackup 5220 appliance

With server virtualization continuing to make inroads in most data centers, backup administrators often need to manage backup and recovery for both physical and virtual servers. Symantec's NetBackup 5220 appliance is integrated with Symantec's Virtualization Ray (V-Ray) capability, which allows for more consistent policies and reduced deduplication processing. It's a scalable disk backup appliance for organizations that want both client and target deduplication for backups in physical and virtual systems.

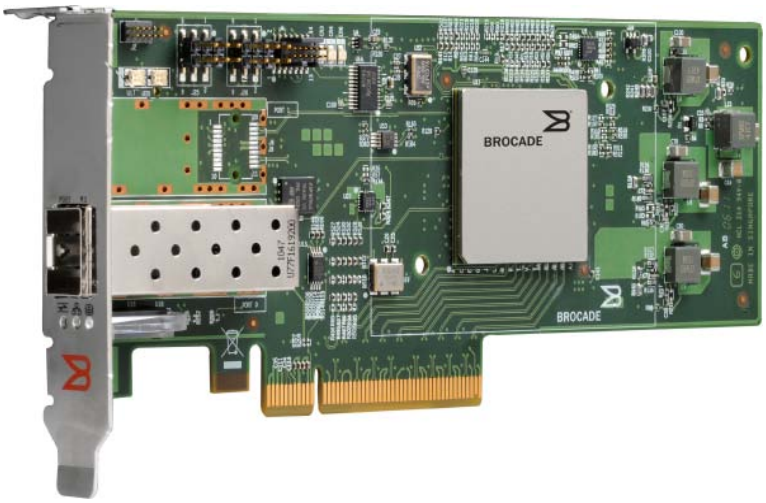
"One of the better dedupe target appliances" declared one judge, because "it's an exceptional combination of a backup media and target dedupe appliance."

The NetBackup 5220 can be partitioned as deduplicating or non-deduplicating storage partitions, or a combination of the two. When it's in a combination configuration, the non-deduplicating partition is used as a staging area for faster backups while the deduplicating partition runs during off-peak hours for optimal performance. It has built-in replication, so it can share backup data among data centers, remote sites or DR sites.

The 2U device starts at 4 TB, but can scale to 36 TB with an optional storage shelf. It has two quad-core Intel E5630 CPUs, up to 48 GB of RAM, and SATA disks configured for RAID 1 or SAS disks with RAID 6. It supports 1 Gigabit Ethernet, 10 Gigabit Ethernet and Fibre Channel. An entry-level system has a MSRP of $32,899 (including one year of maintenance).

Networking Equipment

gold: Brocade Communications Systems Inc. 1860 Fabric Adapter



Brocade's 1860 Fabric Adapter got the Gold because of its ability to support full duplex, line-rate native 16 Gbps Fibre Channel (FC) or 10 Gbps Ethernet, TCP/IP, Fibre Channel over Ethernet (FCoE) or iSCSI on a user configurable, port-by-port basis.

The 1860's single- or dual-port architecture combines an FC host bus adapter (HBA), a converged network adapter and a network interface card (NIC) in a single product. The adapter installs into a PCI Express (PCIe) slot. It supports 2 Gbps, 4 Gbps, 8 Gbps and 16 Gbps Fibre Channel, and has a dual-port design to allow data center Ethernet traffic and storage networking traffic selection per port.

Administrators can not only configure individual ports but, using Brocade's virtual fabric link technology, can partition individual physical adapters into as many as 16 virtual HBAs or virtual NICs with flexible bandwidth allocation for quality of service (QoS) service-level agreement compliance.

The 1860 creates virtual adapters in hardware by using multiple physical functions at the PCIe bus level, so the adapters appear as separate physical devices at the operating system level. Bandwidth can be allocated to virtual adapters in 100 Mbps increments.

The 1860 supports more than 500,000 IOPS per port, and more than 1 million IOPS per adapter card.

MSRP for a single-port 1860 Fabric Adapter is $1,038 or $1,457 for a dual-port model (both prices are for bulk packs of 20 pieces).

Networking Equipment

silver: Brocade Communications Systems Inc. 6510 SAN Switch

The Brocade 6510 SAN switch stands out because of its industry-first 16 Gbps Fibre Channel (FC) support, its flexible port configuration and its full-duplex 768 Gbps aggregate port throughput. This midmarket enterprise switch garnered comments from our judges about Brocade's 16 Gbps FC leadership and high scores for the switch's performance.

The 6510's list of features is impressive. It includes in-flight compression and encryption, dedicated diagnostic ports for quick identification and isolation of optics and cable problems, and exchange-based Dynamic Path Selection (DPS) for optimized fabric-wide performance and load balancing. For extended private or hybrid cloud environments, it includes optional 10 Gbps FC over Dense Wavelength Division Multiplexing (DWDM) and dark fiber for secure metro-area extensions.

This 1U switch is less than 18 inches deep, and designed for flexibility and investment protection. It auto senses 2 Gbps, 4 Gbps, 8 Gbps and 16 Gbps FC port speeds, or you can program fixed port speeds. It's configurable in 24, 36 or 48 ports for a pay-as-you-grow strategy. The switch's energy footprint is small: 0.14 watts per Gbps and 2.3 watts per port.

List prices for the 6510 SAN Switch start at $20,950.

Networking Equipment

bronze: Infineta Systems Inc. Data Mobility Switch (DMS)

The Data Mobility Switch (DMS), Infineta Systems Inc.'s first product release, is a wide-area network (WAN) optimization system that improves throughput on multigigabit WAN links for high-speed replication, remote backup, storage and server virtualization, and remote virtual desktop infrastructure (VDI) implementations. The DMS accelerates inter-data center traffic at up to 10 Gbps; it can handle intensive, bursty traffic by supporting 1 Gbps speeds per flow, and reduces WAN traffic footprint by 5x to 10x.

Our judges gave it high scores for performance, with one calling it the "highest performing WAN optimizer currently on [the] market."

Its hardware-based deduplication engine also optimizes WAN links by reducing the amount of data passing through the pipe. Because the DMS deduplication processing is hardware based, its algorithm examines 4 KB data chunks without performance degradation. One judge called the DMS dedupe technology a "significant innovation."

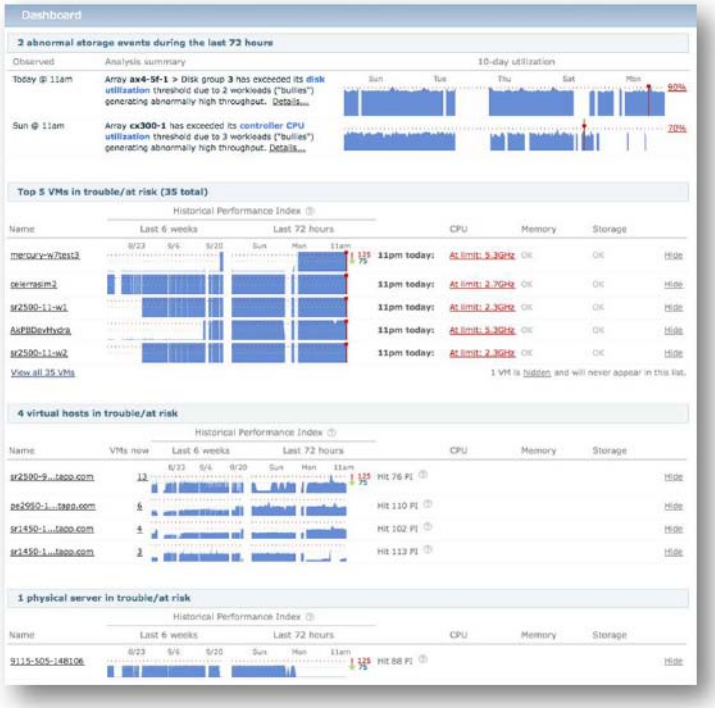
The DMS's QoS tools guarantee WAN bandwidth availability for latency-sensitive applications. Administrators can carve out minimum data rates for individual classes of service.

The DMS is built around a non-blocking, high-capacity switch plane, so it can be deployed inline for less network disruption during implementation. The DMS offers a pay-as-you-grow model; administrators can initially purchase a 2 Gbps or 5 Gbps model, and upgrade to 5 Gbps or 10 Gbps through a software upgrade.

Pricing starts at $68,000.

Storage Management Tools

gold: NetApp Inc. OnCommand Insight Balance



NetApp's OnCommand Insight Balance has what an architect would call "good bones"—its heritage is the two-time gold winner BalancePoint that NetApp picked up with its acquisition of Akorri Networks Inc. Insight Balance collects performance-related data all the way from an application to the storage it uses. With the data it collects, the app models application and component behaviors, and analyzes the app-to-storage route for potential performance bottlenecks. Insight Balance also works within virtualized environments—no small feat given the difficulties of keeping track of dynamic virtual machine environments.

NetApp has beefed up Insight Balance's interfaces and reporting capabilities. Its Health Panels provide a quick look at how performance and capacity are faring, and a Predictor and Abnormality Index sounds an alarm when it senses that storage or an app is acting up.

One judge noted Insight Balance's "actionable management, deeper storage analysis, deeper VM performance analysis and app contention analysis."

NetApp quotes a $12,000 base price for OnCommand Insight Balance supporting a heterogeneous storage environment. For NetApp systems, "value pricing" begins at $1,400 per controller.

Storage Management Tools

silver: Emulex Corp. OneCommand Vision 2.0

Storage network I/O has always been an issue, but proliferating virtual servers are making it a bigger problem. Emulex, with its long and successful run in the HBA, NIC and now the converged network adapter (CNA) markets, is in a unique position to monitor network performance from the inside out. Its OneCommand Vision 2.0 software is a fully featured storage I/O system monitoring product that works in virtually any environment—whether connections are provided by Emulex products or not.

Tracking I/O from the application and into the storage network, OneCommand Vision 2.0 can pinpoint bottlenecks in the network. Emulex claims it can unearth I/O issues that traditional storage resource managers are likely to miss.

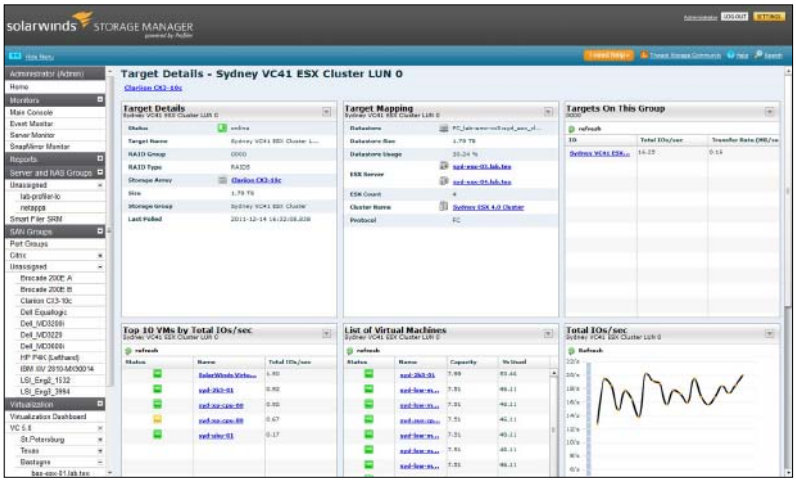
Version 2.0 is highlighted by easier deployment in VMware vCenter environments and with Active Directory. The product is now more scalable and can support more than 2,000 servers, according to Emulex. The list of supported environments has grown too, adding Hyper-V and Solaris 10, among others. More customizable alerts and dashboards are included, as well as integration of alerts with HP OpenView and Microsoft System Center Operations Manager.

One judge called OneCommand a "very useful analytical performance tool that requires no additional hardware," and noted that it looks "at performance problems the way users do—from the server out, end-to-end."

A basic OneCommand Vision 2.0 configuration, including 10 monitoring points, has an MSRP of $28,000.

Storage Management Tools

bronze: SolarWinds Inc. Storage Manager 5.0.1



SolarWinds Storage Manager 5.0.1 monitors storage and virtualization systems, identifies performance bottlenecks and reports on storage performance across the infrastructure—within a host, switch or array from multiple vendors. It also eases the job of storage capacity planning at any level—from the virtual machine to the virtual server to the logical unit number (LUN) to the storage array—and maps virtual machines to spindles to identify the physical host of a particular app's data.

SolarWinds touts the product's ability to deliver visibility in a virtual environment from the hypervisor all the way through to the disks in the storage array.

Storage Manager 5.0.1 added a per-disk pricing model, support for thin provisioning on VMware servers and storage arrays, and support for EMC's VNX and IBM's Storwize V7000 storage systems. The product also gained integration with SolarWinds' network and virtualization monitoring tools, Orion Network Performance Monitor and SolarWinds Virtualization Manager, respectively.

Our judges gave Storage Manager 5.0.1 high marks for ease of use/management and value. One judge lauded Storage Manager by saying it's based on the "same idea as other products, but with a much lower price point and no attempt at vendor lock-in."

SolarWinds Storage Manager pricing starts at $2,995, including maintenance for one year.

Storage Systems

gold: StorSimple Inc. 5010, 7010

StorSimple's 1010 iSCSI cloud storage gateway won the Silver award in this category last year, and StorSimple moves up to Gold this year on the strength of a beefed up platform with larger arrays and more features in 2011.

StorSimple made the 5010 and 7010 bigger—they're 2U boxes vs. the 1U 1010 appliance—and added high availability with fully redundant hot-swappable components. They also support 100 TB volumes, twice the size of the 1010. The 5010 can be licensed from 20 TB to 100 TB, while the 7010 licensing ranges from 40 TB to 200 TB. Both appliances include solid-state drives (SSDs) and SAS drives with automated application-aware tiering and primary data dedupe.

The appliances use SSDs to speed local performance for primary storage, and treat the cloud as a storage tier. Data can be moved from the local array to the cloud based on performance requirements.

The StorSimple appliances send data to AT&T Synaptic, Amazon Simple Storage Service (Amazon S3), EMC Atmos or Microsoft Windows Azure cloud storage. For data protection, they use StorSimple's Cloud Snapshot and Cloud Clones features to move data off site. The appliances are on the Microsoft Windows Server Hardware Compatibility and VMware Ready lists.

Our judges gave StorSimple high scores for innovation, ease of use, functionality and value. "Its key advantage is automated tiering to cloud storage with built-in dedupe/compression reducing cloud storage usage fees," one judge said. Another called the appliances a "good way to splice in cloud storage capacity without tremendous disruption or effort."

Pricing for the StorSimple 5010 starts at $30,000, plus $4,500 to $10,000 in annual costs.

Storage Systems

silver: Nutanix Complete Cluster

Newcomer Nutanix designed its scale-out storage system to support virtual servers, and its Complete Cluster integrates compute, networking and hypervisors with storage. The Complete Cluster is a series of 2U Complete Blocks. Each block has four server nodes running a standard hypervisor, complete with processors (a total of eight CPUs with 48 cores), memory (from 193 GB to 768 GB of RAM) and local storage (1 TB SSD and 20 TB SATA). The storage includes PCIe solid-state Fusion-io ioDrives to optimize performance.

Each additional node can become part of the Complete Cluster. Nutanix claims it has tested up to 50 nodes in a cluster for a performance of 375,000 random IOPS and 28 GBps in 26U of rack space.

The system supports live virtual machine (VM) migration and high availability. Its architecture reserves solid-state drives (SSDs) for I/O-intensive functions, bypassing SSDs for low-priority virtual machines and automatically moving infrequently used data to hard drives. A virtual machine can write data anywhere in the cluster.

Nutanix said the system design was inspired by scale-out storage used by companies such as Google. Our judges scored the Complete Cluster high on innovation and functionality.

"As VM workloads become a bigger part of environments, a purpose-built architecture that delivers high value quickly becomes more important and more viable," one judge said of the Nutanix system. The Nutanix Complete Cluster Starter Kit is $75,000.

Storage Systems

bronze: Gridstore Inc. GS-1000 Scale-out NAS Storage System

The GS-1000 is the second generation of Gridstore's scale-out NAS for small- and medium-sized businesses (SMBs) and small- and medium-sized enterprises (SMEs). The system consists of 1 TB or 2 TB 1U boxes that let customers scale incrementally and grow into a large storage pool.

Gridstore uses what it calls a Virtualized Storage Controller (VSC) architecture that distributes a virtual controller to each client connecting to the storage. The virtualized controllers offload processing workloads from the server nodes over the network to the client. Gridstore breaks files into slices and writes the slices in parallel to the storage nodes so each node performs only a small part of the combined workload.

By striping data across nodes, Gridstore's RAIDg provides fault tolerance by allowing for any storage node to fail. Failed nodes are replaced by attaching new nodes, and the system can run without data loss if multiple nodes fail simultaneously.

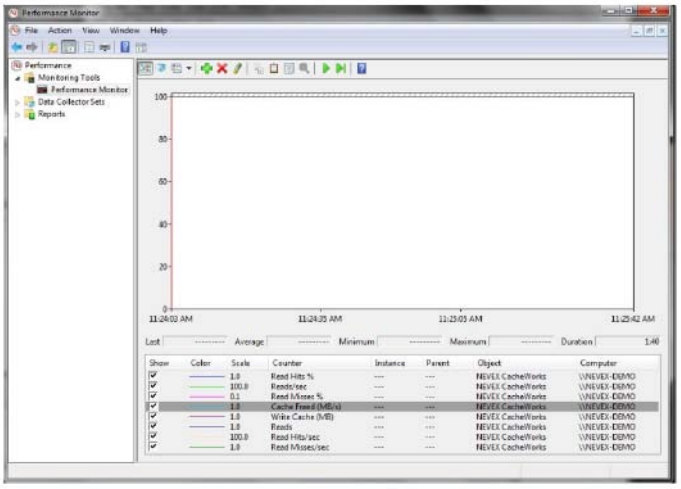
Gridstore storage can be managed from the Microsoft Management Console (MMC), allowing network administrators to manage it.

The GS-1000 received high marks from our judges in ease of use and value, which are key attributes for an SMB system. One judge called it "a nice, compact, low-TCO, scale-out SMB-to-SME NAS system" with "unique clever features such as RAIDg and non-expert implementation and management."

A Gridstore GS-1000 10 TB system has a suggested price of $5,495.

Storage System Software

gold: Nevex Virtual Technologies Inc. CacheWorks 1.0



Our judges gave newcomer Nevex Virtual Technologies high marks for its CacheWorks 1.0, citing its innovative file-based cache and its ability to selectively accelerate I/O by app, file type and location with administrator-controlled policies.

"Unlike other flash cache software solutions, this one is unique in that it works at the file vs. block layer, integrating seamlessly with Microsoft Windows L1, L2, L3 cache," commented one judge.

The Nevex software installs on the Windows Server operating system, on a physical or virtual server. CacheWorks runs in the Windows kernel and provides control over the Windows Server memory to create a multilevel cache that aims to make the most effective use of the system memory.

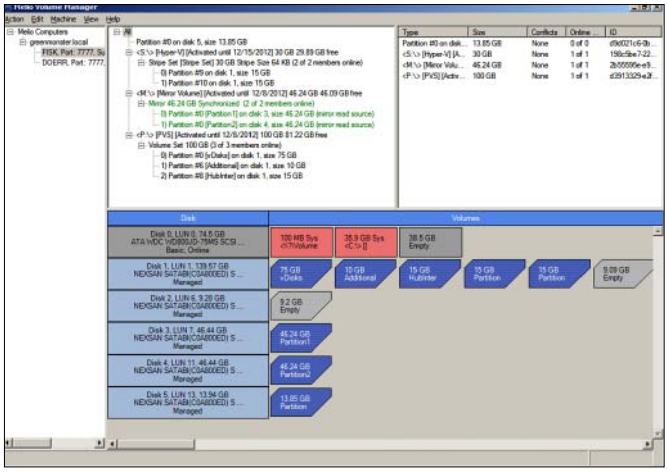
CacheWorks requires a Windows-supported NAND flash device or solid-state drive—with a SAS, SATA, PCI Express or Fibre Channel interface—to "intelligently" cache data from I/O-intensive Window applications, including databases, mail servers and Web servers.

All data writes go synchronously to primary storage and the Nevex cache. For the initial read, the system retrieves the data from primary storage and places a copy in the Nevex cache. The second read shifts the data to system memory. Subsequent reads return at RAM or flash speeds, according to Nevex.

CacheWorks sells for $2,495 per physical server.

Storage System Software

silver: Sanbolic Inc. Melio v3.5



Sanbolic's Melio Version 3.5 virtual clustered file system and volume management suite earned high scores for ease of use, manageability and integration.

Melio serves as an abstraction layer between the hardware and the data, decoupling applications from the storage to give servers improved access to shared storage, logical unit numbers (LUNs) and volumes. In a virtual environment, Melio installs on each physical host and enables multiple virtual machines to access one storage volume and point to the same data set in a high-availability configuration. Capacity can be added to the common storage pool as needed, without disruption to users.

Melio 3.5 adds support for a broader range of hypervisors beyond Microsoft's Hyper-V. The product now supports Citrix's XenServer, Kernel-based Virtual Machine (KVM) for Linux servers and VMware's vSphere.

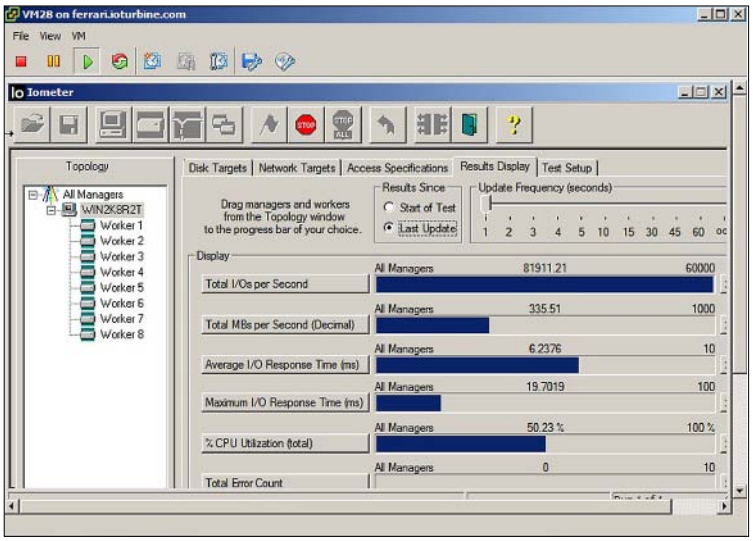
Other new features in Melio 3.5 include synchronous and asynchronous mirroring and replication, increased scalability, an open API and local server storage sharing, whereby a user can create a shared storage pool using internal storage from existing servers.

"Melio is a better file system for Windows than Microsoft's own NTFS," one judge said. "It eliminates [many] Windows file system issues, provides much better performance, increases data resilience, simplifies storage management and scales well beyond anything Microsoft has with dramatically simpler management."

Pricing starts at $999 for the private cloud edition. Sanbolic also sells enterprise and virtual desktop editions.

Storage System Software

bronze: Fusion-io Inc. ioTurbine



Fusion-io's ioTurbine caching software targets virtual server environments, redirecting the I/O to enable virtual machines (VMs) running on a VMware server to efficiently share flash storage.

Fusion-io's product aims to accelerate the performance of applications such as Microsoft's Exchange, SharePoint and SQL Server, increase the number of virtual machines per physical host server and ease I/O demands on external storage systems.

One judge said ioTurbine "solves a big problem with large virtualization installations." Another described the product as "solid," with no scale limitations and "nice" features. "It works best with Fusion-io PCIe flash, but it's not limited to it," he noted.

The ioTurbine software runs in the background as a component in the hypervisor and in the guest operating system of a virtualized server. Its tight coupling with the guest operating system's I/O routines enables it to redirect read requests to the server-based flash.

The product allows system administrators to control how flash storage is shared by each VM and assign priority to the virtualized applications that need it most. It can rebalance I/O and adjust the cache size as administrators create new virtual machines, shut down old VMs or migrate VMs between different hosts.

Licenses for the ioTurbine software are $3,900 per physical server.

Product of the Year Finalists

Backup and Disaster Recovery (DR) Software and Services

Asigra Inc. Cloud Backup v11

Druva Inc. inSync 4.1 Enterprise

FalconStor Software Inc. Continuous Data Protector (CDP) with RecoverTrac Version 7

StorageCraft Technology Corp. ShadowProtect Virtual

Symantec Corp. Enterprise Vault 10

Symantec NetBackup 7.1

VMware Inc. vCenter Site Recovery Manager 5

Backup Hardware

Actifio Inc. Protection and Availability Storage (PAS) platform

EMC Corp. Data Domain Archiver (DD Archiver)

ExaGrid Systems Inc. EX13000E

Hewlett-Packard (HP) Co. StoreOnce D2D4324 Backup System

Quantum Corp. DXi6701 and DXi6702

Quantum vmPRO 4000 appliance

Riverbed Technology Inc. Whitewater cloud storage gateway

Sepaton Inc. S2100-ES2 Series 2910 with Version 6.0 software

Sepaton S2100-DS3 Series 2000

Symantec Corp. NetBackup 5220 appliance

Networking Equipment

Brocade Communications Systems Inc. DCX 8510 Backbone

Brocade 1860 Fabric Adapter

Brocade 6510 SAN Switch

Infineta Systems Inc. Data Mobility Switch (DMS)

Intel Corp. 10 Gigabit Ethernet (10 GbE) Server Adapter X520 family and 82599 10 Gigabit Ethernet Controller

QLogic Corp. 8200 Series Converged Network Adapters (CNAs)

Storage Management Tools

Emulex Corp. OneCommand Vision 2.0

NetApp Inc. OnCommand Insight Balance

SolarWinds Inc. Storage Manager 5.0.1

Symantec Corp. Data Insight for Storage 2.5

Virtual Instruments Corp. VirtualWisdom SAN Performance Probe

Storage Systems

Amplidata AmpliStor Optimized Object Storage (OOS) system

EMC Symmetrix VMAXe Storage System

EMC VNX, VNXe Series Unified Storage Systems

Fusion-io Inc.'s ioDrive2, ioDrive2 Duo PCIe

Gridstore Inc. GS-1000 Scale-out NAS Storage System

Kaminario Inc. K2-F (all flash) and K2-H (hybrid) storage systems

Nutanix Complete Cluster

SolidFire SF3010

StorSimple Inc. 5010, 7010

Violin Memory Inc. 6000 Flash Memory array

XIO Hyper ISE

Storage System Software

DataCore Software Corp. SANsymphony-V R8.0 Storage Hypervisor

FlashSoft Corp. SE 2.0

Fusion-io Inc. ioTurbine

Microsoft Corp. Windows Storage Server (WSS) 2008 R2 Essentials

Nevex Virtual Technologies Inc. CacheWorks 1.0

Oxygen Cloud Inc. Oxygen 2.0

Red Hat Inc. GlusterFS 3.2

Sanbolic Inc. Melio v3.5

Virsto Software Corp. VDI 3.2; Virsto for VDI, Hyper-V Edition

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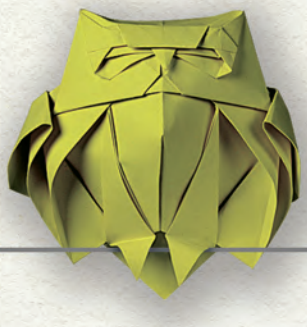

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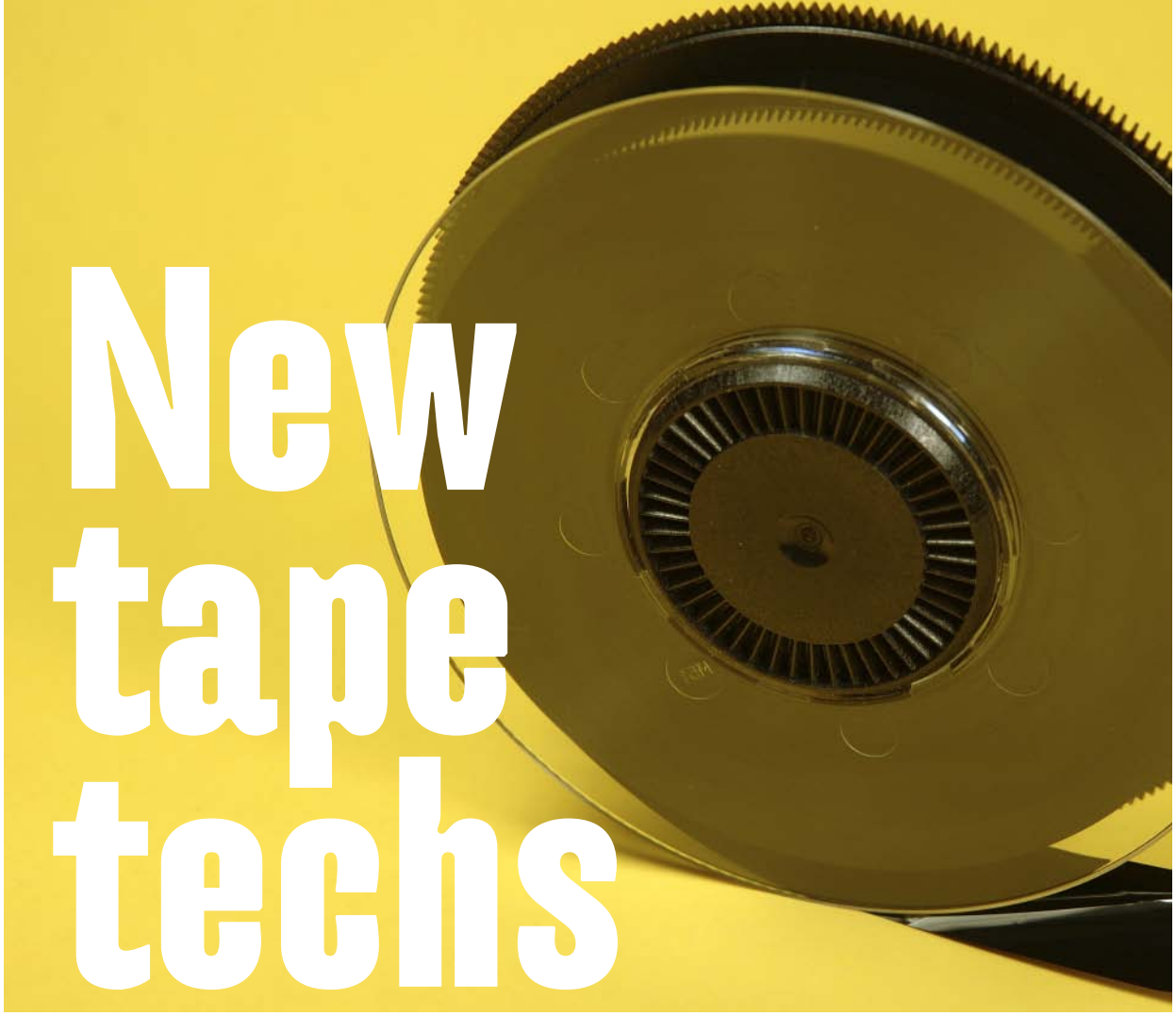

New tape techs

New developments in tape technologies and applications will help breathe new life into this venerable, and still very useful, storage medium.

BY PHIL GOODWIN

YOU MAY THINK tape has gone away—and maybe some disk-backup vendors wish it was so—but tape is actually thriving these days with steady advancements in bread-and-butter specifications like capacity and speed, plus new technologies that will expand tape into new applications.

The fundamental use cases and value propositions for magnetic tape haven't changed much over the past five decades. Tape remains the primary media for backup and recovery (B/R), offsite archive and, by extension, disaster recovery (DR). Despite the occasional claim to the contrary, tape still offers the cheapest method for storing data for long periods of time. Even spin-down disk drives

can't match tape's low total cost of storage. Of course, tape can't match the data access time of even the slowest disk, so IT organizations still need to use both in the same environment. Recent developments in tape technology make this easier and even more attractive than ever.

TAPE'S FATE TIED TO DISK

There's no denying that disk-based backup has had a huge impact on the tape market. Small- to medium-sized companies may find backing up to disk and subsequent transfer to an offsite cloud much simpler and more cost-effective than using tape as an offsite media. Backup appliances that deduplicate and compress data can reduce the total amount of data replicated to a manageable size. In many cases, the recovery time is shortened as well.

Small- to medium-sized companies may find backing up to disk and subsequent transfer to an offsite cloud much simpler and more cost-effective than using tape as an offsite media.

Additionally, tape stackers and small robots have been problematic for remote-office backup for a long time. Having non-IT office staff manage tape changes and rotations has resulted in non-recoverable data far too often. Automatically transferring the data from the remote office to a professionally managed data center has allowed many organizations to eliminate remote-site tape altogether.

Larger organizations, in contrast, still use tape extensively. They may have implemented and expanded the use of disk-based backup to enable faster B/R times, but the sheer volume of data (think hundreds of TBs or even PBs) make network transfers impractical,

even with deduplication. Moreover, even with cloud storage prices as low as $.10/GB per month, it's still many times more than the one-time $.03/GB to store data on tape (the cost to vault a tape is negligible). Cloud storage has its place, but tape isn't about to yield its low-cost value proposition for the foreseeable future.

TAPE TECHNOLOGY IMPROVEMENTS

The areal density of disk continues to follow Moore's Law, but tape is keeping pace. LTO-5, the current generation of the Ultrium LTO tape format, boasts 3 TB of capacity (compressed) per cartridge and a data transfer rate of 280 MBps (also compressed). Tape media reliability has improved 700x since 1999.

Although other tape technologies persist (e.g., Hewlett-Packard [HP] Co.'s DDS and Oracle Corp.'s StorageTek T10000), LTO is the dominant tape format for open systems computing environments. To date, more than 4 million LTO drives have been shipped and 100 million LTO tapes have been written. Many large organizations have tens of thousands of media elements under active management, giving tape a significant critical mass. And it's growing: LTO experienced double-digit revenue growth in 2010.

LTO-6 is expected sometime in 2012 and has announced specs of 8 TB capacity (with 2.5:1 compression) and 525 MBps transfer rate (compressed).

The roadmap for LTO continues its historical improvement curve. LTO-6 is expected sometime in 2012 and has announced specs of 8 TB capacity (with 2.5:1 compression) and a 525 MBps transfer rate (compressed). The LTO roadmap currently extends out to generation 8 with planned specifications of 32 TB of capacity and a 1,180 MBps transfer rate.

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For large organizations, automation products are as important as the tape technology itself; the drives are rarely used outside of an automated tape library. So advances in automation are equally as important to a robust tape solution. In many ways, tape automation is following the same path as storage arrays. That is, relatively commoditized components surrounded by sophisticated management and application software.

Overcoming tape's limitations

LIMITATION	SOLUTION
Media degradation	Media reliability has improved 700x since 1999. In addition, some hardware and software solutions can periodically check media integrity and initiate fault correction.
System compatibility	LTFS offers a common file system that will allow any LTFS-enabled system to read any LTFS-enabled tape.
Proprietary tape formats/ interoperability	Backup and recovery applications write in a proprietary format, limiting data restores to like software. LTFS eliminates the dependence on third-party software.
Resiliency	Tape products, both hardware and software, are adding resilience improvements and self-healing capabilities to proactively detect and correct faults.
Lack of integration	Tape systems have historically been distinctly separate from other storage tiers. The Active Archive applications integrate all tiers of storage into a seamless logical volume to match cost with access requirements.

"We sometimes joke that our libraries are 90% software," commented Molly Rector, vice president (VP) of marketing at tape library manufacturer Spectra Logic Corp. Given that most libraries today use LTO drives, other capabilities are needed to differentiate products to compete in the market. "Specsmanship around robot speed and arm movements are minor in the scheme of total job execution," Rector explained. "A library's ability to proactively detect errors, automatically fail over components and notify administrators of pending errors is far more important." Spectra Logic libraries are also able to periodically verify the integrity of the managed media.

OVERCOMING TAPE'S LIMITATIONS

Reliability improvements are a "must" if tape is going to continue to be a key recovery technology in the face of ever more stringent recovery time objectives (RTOs) and recovery point objectives (RPOs). The use cases for magnetic tape have remained constant for nearly 50 years largely because its limitations have also remained constant. To appreciate the magnitude of new tape technologies, it's important to understand these limitations.

- **Media degradation.** Although tape media reliability has improved dramatically, best practice still dictates that media should be periodically tested and rewritten. That's a daunting task when tens of thousands of media elements are archived. The failure of a critical data block, such as the index block, can render the entire tape unreadable.
- **Drive compatibility.** Although LTO maintains backwards-read compatibility, the archive requirement for the media may exceed the supported life of the drive and media. Occasionally, a tape written on one drive can't be read on another drive. Recovering this data years later can be time consuming and costly.
- **Lack of interoperability.** LTO media can't be read in non-LTO

drives and vice versa. This has stymied many a data transfer effort.

- **Proprietary tape formats.** Although tar and cpio are industry-standard tape formats, they're rarely used in their pure and interchangeable forms. B/R vendors use their own formats for efficiency reasons. Consequently, the tapes can only be read by that B/R application unless specifically written in tar or cpio.
- **Backwards compatibility.** Many IT users have a mix of media types in the vault due to technology and product generational changes. Being able to read all the various media types means maintaining not only legacy tape drives, but legacy servers, operating systems, drivers, interfaces and B/R versions. The possible permutations needed to read a seven-year-old tape makes recovery problematic at best, and very expensive and time consuming if even possible.

In addition to the low cost of storage, tape has the advantage of very high transfer rates. With LTO-5 streaming at 280 MBps, or roughly 2.2 Gbps, a single 10-drive library requires multiple 10 Gigabit Ethernet (GbE) pipes to keep up. This may not be a big deal within a data center, but it's a serious issue for rapid recovery of large data repositories over a wide-area network (WAN). When restoring terabytes of data, tape libraries are the hands-down choice over the typical 1 Gbps link, or even multiple Gbps links.

LINEAR TAPE FILE SYSTEM (LTFS)

You don't often find the words "tape" and "exciting" in the same sentence. But if there were an occasion sufficient to run those two words together, it would be the advent of LTFS. LTFS, originally developed by IBM and adopted by the LTO Consortium, is a self-describing file system that makes files on tape directly host-readable. The file system metadata tracks the media element, location of the tape and data location on tape. LTFS-enabled apps can request a tape load from a library, provided the library supports LTFS.

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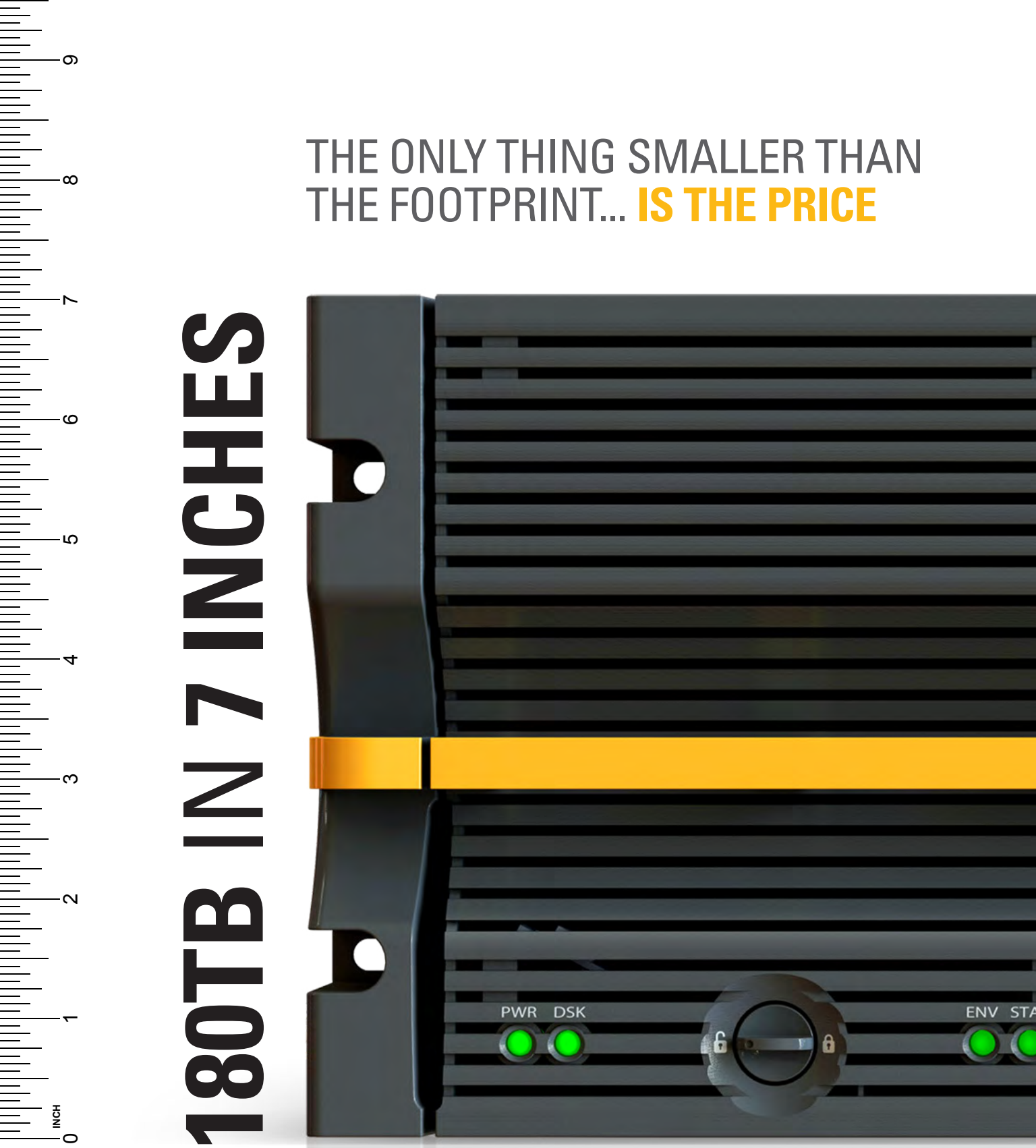

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LTFS is arguably the most exciting tape development since the advent of cartridges and robots. LTFS and related device drivers are available as free downloads from numerous vendors. Because it's a file system, its directory structure is directly readable. Users are no longer dependent upon third-party software to read the tape. They can use standard file operations on the files even though they reside on tape. For example, HP offers both StoreOpen Standalone for standalone tape drives in a MAC OS X environment as well as StoreOpen Automation. StoreOpen Automation presents the tape library and cartridges as a collection of folders; media movement is handled automatically by the application.

LTFS is targeted primarily at unstructured data, especially files that are unlikely to change. Files on disk may be modified, even when a contiguous block isn't available, simply by using pointers. The notion of pointers skipping from one tape block to another to retrieve a complete record is currently antithetical to tape. Even if one were able to span media elements with a single file (which can't be done), loading multiple tapes to retrieve a single file might not yield acceptable performance.

On the road with LTO

The Ultrium LTO product roadmap currently extends through the eighth generation of the tape media spec.

LTO GENERATION	MAXIMUM CAPACITY (COMPRESSED)	MAXIMUM THROUGHPUT (COMPRESSED)
LTO-5	3 TB	280 MBps
LTO-6	8 TB	525 MBps
LTO-7	16 TB	788 MBps
LTO-8	32 TB	1,180 MBps

Because files are host accessible, LTFS does provide nearline storage. Examples of ideal candidates for LTFS are medical images and video files. Medical images, in particular, are never modified. Storing these large files benefits from the low cost of tape, yet they can be found and accessed directly by users. The time needed to load the file from tape will be longer than with disk, but shorter than if the file were stored offline.

LTFS IN ACTION

The ecosystem around LTFS is growing rapidly and to the point of ensuring its adoption. One organization helping to enable this ecosystem is the Active Archive Alliance. This vendor consortium is dedicated to developing open standards that allow LTFS to be deployed across multiple storage tiers. In essence, it lets LTFS create a single logical volume across both disk and tape subsystems.

Of course, having a volume that spans media types isn't enough. Applications are needed to place the data on the appropriate tier and to move it based on user policies or usage profiles. Organizations that make storage management applications using Active Archive methodologies include Atempo Inc., FileTek Inc., Grau Data AG and QStar Technologies.

Top tape specs

FORMAT	NATIVE CAPACITY	NATIVE THROUGHPUT	LTFS SUPPORT
Oracle StorageTek T10000C	5 TB	240 MBps	Yes
IBM TS1140 Tape Drive	4 TB	250 MBps	No
LTO-5	1.5 TB	140 MBps	Yes

Oracle also offers solutions based on LTFS. “The idea of a 5 TB thumb drive is pretty cool,” quipped Tom Wultich, Oracle’s director of product management for tape. He’s referring to the StorageTek T10000C tape drive that’s LTFS-enabled and has a 5 TB capacity. “Users can easily move a tape from one LTFS system to another. An example would be the need to move a large media file from one system to another for editing,” Wultich said. “Transferring a multiterabyte file over the network may not be practical. Instead, one user can simply drag and drop the file to the tape and give it to the other user, who can then mount it just like a share or thumb drive.”

Crossroads System Inc.’s StrongBox product is all-in when it comes to leveraging LTFS for long-term storage archive. Robert Sims, Crossroads’ president and CEO, describes StrongBox as “a NAS head for tape.” The StrongBox appliance uses disk as front-end cache and supports multivendor tape connectivity on the back end. The product supports both CIFS and NFS.

"Transferring a multi-terabyte file over the network may not be practical. Instead, one user can simply drag and drop the file to the tape and give it to the other user, who can then mount it just like a share or thumb drive."

—TOM WULTICH, director of product management for tape, Oracle

StrongBox features are designed to provide the reliability necessary to ensure data recoverability for the long haul. Sims characterizes StrongBox as self-healing. By that, he means it supports dual copy to two different tapes, replication of tapes and failing over to a secondary copy if the first can’t be read. StrongBox monitors both drive and media error rates to detect degrading media. In the event of a media hard error, StrongBox will initiate a tape copy to create a replacement.

One issue for online file access using tape is the latency of a data read. CIFS and NFS will usually time out before the data can be mounted, accessed and retrieved from tape. StrongBox maintains a 512 KB buffer on disk to satisfy the latency while it retrieves the whole file from tape. StrongBox doesn't presently support data modify or delete, although support for data delete is expected in 2012.

LTFS might also enable lower cost methods for common uses. For example, using tape as a write target in a dual-write scenario would effectively offer continuous data protection (CDP). Moreover, having two copies in different locations would assure data safety and a very granular RPO. It wouldn't eliminate the need for B/R applications, which can facilitate point-in-time restores and the most recent version of the whole file system. However, for user self-service and the ability to retrieve specific file versions, LTFS may be just the solution.

R.I.P. TAPE? NOT SO FAST

During the last five decades, the death of tape has been declared in at least four of them. Although tape wasn't really threatened as an archive solution, LTFS brings a new dynamic to the needs of long-term data archive and access. With Active Archive, it also makes tape a viable tier 4 repository in the data center. Seamless access and low cost should extend tape's lease on life for at least another decade. ⊙

Phil Goodwin is a storage consultant and freelance writer.

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HOW STORAGE STACKS STACK UP

Storage stacks, or converged stacks, bundle storage, servers and networking in a single pretested product that often comes with server virtualization loaded and configured. While the parts may not be best of breed, a stack may be the best bet for your company. BY ERIC SLACK

CONVERGED STACKS—or storage stacks—are preconfigured, pretested bundles of storage, servers, networking and virtualization software that are sold, implemented and supported by one vendor. Another approach is to use a dedicated server and storage module that combines in a clustered architecture with virtualization software to create the "stack." These stacks are designed to provide a turnkey virtualized infrastructure for a variety of environments that require minimal integration and testing effort to get up and running. They also provide a standard configuration that

customers can use to achieve higher asset utilization and efficiency in less time, with less infrastructure tuning.

STACK OPTIONS

Virtually all the major data storage vendors offer stack packages. Most storage vendors have teamed with other hardware and software vendors to some degree for various components of their stacks. How the stacks are sold varies depending on the product. These are the major stack packages available from the leading storage vendors:

Dell vStart. Dell Inc.'s vStart bundles include Dell servers, storage and switches, and come with VMware or Hyper-V software. The vStart series currently has three models that come in two configurations—"v" for VMware equipped and "m" for Hyper-V. The vStart 50 is the smallest configuration and it's designed to support 50 virtual machines (VMs); the midsize vStart 100 accommodates 100 VMs and the largest, the vStart 200, supports 200 VMs. Currently all configurations use PowerEdge servers, EqualLogic storage and PowerConnect switches, but Dell has said it will incorporate Compellent storage and Force10 switches in future configurations.

Hewlett-Packard VirtualSystem. Hewlett-Packard (HP) Co. offers several VirtualSystem packages that include HP servers and storage, and HP or Brocade networking gear bundled with VMware or Hyper-V. The packages vary in size and are designated VS1, VS2 and VS3. The small VS1 configuration uses HP P4500 G2 LeftHand storage, ProLiant servers and VirtualConnect switches. The VS2 is a midsize configuration that has HP BladeSystem servers and HP P4800 LeftHand storage, while the large VS3 configuration features HP 3PAR Inserv F400 storage, BladeSystem servers and Brocade OEM switches.

NetApp FlexPods. FlexPods include some of the same components as Vblocks—Cisco Nexus switches and Cisco Unified Com-

puting System servers—and are anchored by NetApp FAS storage systems. FlexPods are available from NetApp resellers who integrate and configure the components. NetApp does allow the use of already installed NetApp storage and provides APIs to integrate existing management tools. NetApp offers several "validated" FlexPod application packages, including offerings for Citrix XenDesktop, Microsoft SharePoint and SAP. It also offers a Microsoft Hyper-V configuration, although it's not officially called a FlexPod.

Oracle Exadata Database Machine. Oracle Corp. uses the converged products concept to produce a different type of stack product; rather than building a stack to support a virtual server infrastructure, Exadata is essentially a set of components dedicated to

A stack reshuffled

Nutanix Inc. has taken a completely different approach with its stack offering. The Nutanix Complete Cluster is essentially a scale-out infrastructure comprising multiple nodes, each with storage, compute power and virtualization software included. These purpose-built blocks leverage commodity hardware and a clustered architecture to maintain performance as they scale.

This approach seems more similar to the infrastructures that some of the largest cloud and Internet companies have created, rather than to a stack of high-end components. These enterprises have designed grid-like configurations of smaller-scale hardware to provide the extreme performance and uptime they need at a reasonable cost. In a similar fashion, Nutanix is trying to provide the required performance at a lower cost than what the other converged stack vendors are charging, while simplifying expansion and management.

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running big Oracle databases. The Database Machine includes Oracle servers, storage and InfiniBand networking; Oracle Database 11g RAC is pre-installed.

Virtual Computing Environment (VCE) Company Vblocks. VCE Company LLC is a joint venture of Cisco Systems Inc., EMC Corp. and VMware Inc., and Vblocks are converged stacks of EMC storage, Cisco switches, Cisco's Unified Computing System (server) and VMware. Vblocks support a range of use cases from a virtualized server environment in a typical midsize company up to a very large private cloud deployment or an entire public cloud infrastructure. Vblocks preconfigured for specific applications are also available, including Microsoft Exchange, SAP and VMware View virtual desktop environments.

STACKS APPEAL

Why a company might be interested in a stack bundle rather than assembling individual components depends on whom you ask. The logical reason behind these products—integrated essentially by the same companies that are already selling the component parts—is that users need implementation, management and support help for these large and increasingly complex compute infrastructures. Expanding on that theme, some reasonable value propositions for stacks may also include one or more of the following.

Big virtualization. Server virtualization penetration is well into tier 1 applications at many large companies. These high-density VM environments are harder to implement than the phase 1 projects most companies were likely used to doing, and with tier 1 there's more risk since production applications are involved. Given these circumstances, some companies may need some help getting their large server virtualization infrastructure projects done right.

Lack of integration expertise. IT talent to handle complex implementations is becoming scarcer. Value-added resellers (VARs)

seem to be less interested in integration projects and users are less likely to pay for them. Companies that do have the talent in-house are usually resource-strapped with key staff tied up with keeping the environment running in a climate of tight budgets, and working on application delivery or other revenue-generating activities.

Accelerating the learning curve. An IT director recently told me he was interested in integrated stacks as a way to reduce the time required to dial in new clusters of virtualization hosts. His company provides services to large telcos and has approximately 900 VMs, with new VMs being created regularly. The company has developed a reference architecture it tweaks to get optimal resource utilization and performance. This iterative process can take weeks (or longer) and consume precious time, so if a preconfigured infrastructure stack can start them half way up the learning curve, it's money well spent.

Instant gratification. Return on investment (ROI) expectations are now often in the 12-month range. What may once have been a three- to five-year plan is now ridiculously short, so projects, especially expensive and high-profile ones like virtualization, need to "hit the ground running" to have any hope of meeting such stringent ROI timetables. Waiting three months or even three weeks longer than absolutely necessary is unacceptable in this climate.

Instant need vs. best of breed. One concern about any bundling strategy is giving up solution quality to get simplicity. In the case of converged stacks, the components are essentially the same ones a company or VAR would use to put together a comparable system, but there are fewer combinations available. On the plus side, a single supplier eliminates finger pointing and most of the stack configurations are actually pretested by the vendors.

Vendor lock-in. Buying a stack typically equates to vendor lock-in, but it's usually not very different from an alternative scenario in which the company sets up its own infrastructure, often

using many of these same vendor components. If a company builds its infrastructure around a single vendor's stacks, it could still change hardware vendors down the road, but it won't be as easy as just plugging another storage appliance into the network.

Let's make a deal. Buying a turnkey integrated stack could be a good option if the above value propositions apply. Unknowns are unpleasant for business managers and integration projects are notorious for taking longer than promised. Paying a premium to get an "instant virtualization environment" or to eliminate the potential of a drawn-out integration experience could be a good investment for many companies.

For vendors, these solutions may be a way to address the pains of integration, short ROIs and complicated infrastructure tuning their customers are now facing. With turnkey stacks, the manufacturers have to do the integration and testing required to certify each stack, but the bundles require less on the development side than new hardware or software products.

HOW THEY STACK UP

The Dell, HP, NetApp and VCE stacks are similar in that they're essentially bundling existing hardware and software. The real differentiation may be in the integration and support experience each vendor offers. Nutanix Inc.'s Complete Cluster is very different and may offer significant advantages, but Nutanix doesn't have the history the other vendors and their product components have (see "A stack reshuffled").

Dell's marketing is somewhat unique in that it emphasizes the number of VMs each configuration could support. Like buying hardware to support the requirements of the software you're running, buying a converged solution based on how many VMs you need to support seems logical.

NetApp's offerings may be the least restrictive because they allow the use of existing storage and management tools. FlexPod

has been called a “reference architecture” as well as a product, but that could be a difference in semantics. VCE’s Vblocks may be a little more restrictive than some of the others because they don’t offer anything but VMware.

The overall appeal for converged stacks would seem to be greatest for existing customers of these vendors or those considering them. Most stacks customers are likely to be larger companies, with the exception of Nutanix, which will also appeal to midmarket companies and those that don’t have strong existing relationships with the other players. In the end, all the stacks vendors offer similar value propositions of reduced complexity, accelerated implementation and one-call support. ⊙

Eric Slack is a senior analyst at Storage Switzerland.

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Does cloud-based file syncing qualify as backup?

Mobile device use is growing, and companies need to take steps to support access to corporate data on-premises and in the cloud.

MY IT GUY sent out a corporate-wide email reminding employees to copy files to their Dropbox folder. In addition to Dropbox serving as a collaboration tool and enabling accessibility to files from any endpoint device, our IT group sees Dropbox as a form of endpoint file protection. We're not alone. In a *2011 Cloud Adoption Trends* survey of more than 300 IT professionals, Enterprise Strategy Group (ESG) found collaboration and file sharing ranked third in use or planned use of Software-as-a-Service (SaaS) applications, behind customer resource management (CRM) and email, and ahead of fifth-ranked backup/recovery. That prompts an interesting question for storage decision makers: Do new cloud-based file syncing tools qualify as backup? Let's investigate the possible answers.

FILE SYNCHRONIZATION vs. FILE BACKUP

As backup SaaS, file synchronization, sharing and collaboration services take hold, the proverbial lines are beginning to blur. Back-up SaaS vendors like Mozy offer capabilities to access files stored in the Mozy cloud from multiple types of endpoint devices, enabling syncing. File sharing and collaboration services, such as Insync, SugarSync and Syncplicity (among others), also promote their backup capabilities.

Backup is any process or technology that automatically makes a secondary copy of data, and makes it available for recovery in the event the primary copy of data is lost. Typically, backup solutions provide versioning (automatically retaining multiple versions of any file), allowing data to be recovered from multiple, previous points in time.

Using file synchronization and collaboration solutions involves setting up a cloud-based folder and copying files into that folder. The files are immediately available for access via a Web interface from any Internet-connected device. In some solutions, like SugarSync, a user's sync workspace on one device is automatically synchronized with sync folders on other devices.

Back to the question of what qualifies as backup. Using the aforementioned backup definition, file syncing could be considered backup. If the primary copy of the file is lost or corrupted, the copy maintained in the cloud-based sync folder can be retrieved. From a versioning perspective, Dropbox actually does create copies of the files saved to a cloud folder, including deleted and prior versions of files, and saves them for a 30-day period or longer with advanced features. Solutions like Box and SugarSync have a similar versioning feature with the ability to restore previous versions of files stored in the cloud repository. However, not all cloud-based collaboration tools have automation for backup. However, a few do have automated synchronization where new and changed files are automatically synchronized with cloud folders.

THE OTHER SIDE OF THE CLOUD

We haven't even talked about the biggest challenge in relying on these synchronization tools as backup. While leveraging file syncing solutions as a form of backup takes care of one pesky problem for IT, making endpoint users happy and productive, it presents another. In many cases, it allows employees to adopt consumer-grade file syncing solutions haphazardly, leaving

organizations more susceptible to risk.

Consider this: Endpoint devices have typically been the most underprotected business asset. In a 2010 survey of more than 500 IT professionals, ESG research found that less than 50% of respondents back up 100% of desktops, less than 40% of organizations back up 100% of laptops, and less than 25% of those surveyed back up 100% of handhelds. Today, there are several forces at work in elevating file syncing and backup to the fore: increased worker mobility, growing interest in and use of cloud services, and the consumerization of IT. Today, IT professionals are challenged to embrace certain consumer technologies in the workplace while maintaining IT standards to minimize risk and meet corporate and/or regulatory requirements. Clearly, enabling file synchronization for both personal and professional mobile devices with centralized IT services and cloud storage services will be a high priority to facilitate user productivity.

Clearly, enabling file synchronization for both personal and professional mobile devices with centralized IT services and cloud storage services will be a high priority to facilitate user productivity.

Many cloud-based file synchronization and backup services have a "freemium" business model that offers some cloud storage capacity at no charge. This has created a "Wild West" scenario, with corporate endpoint users subscribing to cloud-based services and copying files—both personal and corporate—to cloud repositories without regard for privacy, regulatory or corporate policies. The lack of awareness of cloud-based corporate data copies creates vulnerability for IT, and the absence of administration features for the centralized IT function creates management headaches.

ON-PREMISES ENDPOINT BACKUP AND BACKUP SaaS

It's very clear that the landscape of endpoint backup solutions is evolving. On-premises, purpose-built endpoint backup/recovery solutions are catering to the needs of both the endpoint user (nondisruptive and enables self-service recovery) and IT administrator (automated, optimized and centrally controlled), and starting to eclipse more traditional client/server backup approaches. Solutions like those from Copiun and Druva are mobile worker-friendly, supporting different endpoint device types, as well as file access from endpoint devices like smartphones and tablets. They also ensure data privacy with features such as role-based access control and encryption, and optimized data transfer with features like block-level incremental backups, deduplication and compression that minimize the impact of data transfer on the network and reduce storage capacity requirements. The solutions enable self-service recovery and don't interfere with endpoint user productivity. They also centralize administration of policies (retention, deletion), scheduling, alert conditions and error handling.

Solutions like those from Copiun and Druva are mobile worker-friendly, supporting different endpoint device types, as well as file access from endpoint devices like smartphones and tablets.

Corporate cloud-based backup services, such as those from Axcient, EVault, Hewlett-Packard (which acquired Iron Mountain's backup services portfolio via its Autonomy acquisition) and Symantec, have furnished companies with commercial-grade backup SaaS solutions; however, not all have met the requirements of the mobile and alternative endpoint device user by supporting nontraditional devices or file access/synchronization capabilities.

On the other hand, solutions from Carbonite, Code 42 Software (CrashPlan), EMC (Mozy) and KineticD, which have traditionally catered to consumer and small business audiences, are appealing for corporate customers who need to support mobile workforce and/or file sharing and syncing requirements.

HEADED INTO 2012

H.G. Wells' call to "adapt or perish" is apropos when it comes to the megatrends of mobility, cloud and consumerization. Taking proactive steps to support access to corporate data—retained on-premises or in the cloud—on a myriad of devices should be a top priority for IT organizations. Otherwise, companies risk employees "going rogue" and making the company susceptible to privacy/security breaches or noncompliance fines. If endpoint backup is in place, pressuring vendors to provide file sharing and synchronization features (especially from handheld devices) may make sense. For organizations already using a file sharing/synchronization solution, instituting policies and guidelines for backup/recovery (based on what's available with your chosen vendor) should be a priority for 2012.

Lauren Whitehouse is a senior analyst focusing on backup and recovery software and replication solutions at Enterprise Strategy Group, Milford, Mass.

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Three key VDI storage challenges

Virtual desktops offer some attractive benefits, but storage systems that aren't up to the task can make it hard to realize those benefits.

ORGANIZATIONS ARE INCREASINGLY adopting virtual desktop infrastructures (VDIs) to extend the benefits of virtualization from servers to user desktops. With VDI, each desktop is created as a virtual machine (VM) that's centrally stored and managed in a consolidated server and storage infrastructure. VDI can provide IT managers with increased security and control, while users gain improved and more flexible access to their data and workloads.

Other promised benefits—such as better application performance, improved data protection, and simplified provisioning and management—have proven more elusive. By far the biggest obstacle to these benefits has been inefficient storage.

Challenge 1: POOR PERFORMANCE

One of the biggest VDI storage pain points is performance, which can be compromised when multiple VMs on the same server access shared physical resources at the same time. This can happen during "boot storms" when a large number of users attempt to log on simultaneously. Concurrent desktop antivirus scans (or "AV storms") can also be a culprit because they can completely saturate shared compute and storage I/O resources.

One way to remedy the situation is to overprovision storage, but this is an expensive and at best temporary solution, as bottlenecks tend to recur as a virtual desktop infrastructure grows.

Some innovative vendors are addressing these issues with offerings tailored to the storage needs of a VDI. Nimble Storage's CS-Series array family is one example. Nimble's "secret sauce" is its Cache Accelerated Sequential Layout (CASL) architecture, which features inline data compression, integrated flash cache for performance, low-cost hard disk drives (HDDs) for capacity and sequential writes. A large adaptive flash cache prevents boot storms by absorbing the heavy, read-intensive I/O load, with cache reads that are some 50 times faster than disk reads. Nimble addresses AV storms through its sequential layout of writes. By coalescing random writes into a full stripe, Nimble enables write operations that are on the order of 100 times speedier than those on conventional arrays, which employ fixed layout methods.

Hewlett-Packard (HP) also has storage systems designed to meet the rigors of VDIs. The HP VirtualSystem CV2 for VMware View is built specifically for client virtualization, combining P4800 iSCSI storage-area network (SAN) storage with HP high-density BladeSystem compute nodes to create a complete VDI solution. The HP VirtualSystem CV2's high-performance shared backplane, scale-out clustered storage technology and performance-enhancing solid-state drive (SSD) layer help mitigate boot and AV storms, even as an installation scales up to 1,000-plus users.

Challenge 2: INEFFICIENT DATA PROTECTION

A second VDI storage challenge is data protection. Traditional arrays are notoriously inefficient in how they address backup, recovery and disaster recovery (DR) in a virtual desktop infrastructure, and outmoded data protection practices can exacerbate the situation. For example, many VDI users continue to back up using agent-based, third-party backup software running on VMs. Those backups are time consuming and resource intensive, and limit the number that can be done concurrently.

While some vendors have introduced copy-on-write VM snapshot capabilities to address these issues, many of the snapshot

methods are constrained in terms of the space they consume and the length of time the snapshots can be retained. These limitations can compromise recovery point objectives (RPOs) and require manual management.

A handful of suppliers have developed solutions that provide efficient, rigorous and nondisruptive data protection for virtual desktops. These products share an important attribute: space efficiency. Nimble and HP both deliver VDI data protection capabilities that overcome the issues found in traditional methods. The vendors' space economies are rooted in primary data storage optimization technologies such as thin provisioning and zero-copy clones, whose effects trickle down to secondary storage. Nimble's in-line compression helps shrink this baseline even further.

Both Nimble and HP then enable highly efficient, point-in-time snapshots that internally share unchanged blocks. These thin snapshot technologies reduce capacity needs by upwards of 90% over traditional backup methods, and allow users to retain hundreds, and even thousands, of snapshots concurrently; in addition, backup windows can be reduced to a matter of seconds. The lightweight snapshots can easily and efficiently be wide-area network (WAN)-replicated to a remote site for DR purposes. Recovery is streamlined from hours to minutes because the restore can be based on a recent thin snapshot.

Challenge 3: COMPLEX DEPLOYMENT AND MANAGEMENT

A third VDI storage problem area stems from complexity of deployment and management. Many vendors simply repurpose existing management tools and interfaces, rather than adapting them to the particular needs of a virtual desktop infrastructure. In our conversations with VDI and storage administrators, we hear many of the same complaints, such as slow and manual provisioning, limited visibility and difficulty in troubleshooting storage inefficiencies.

While these issues are often addressed as an afterthought, a few vendors have designed their products with the VDI user expe-

rience in mind. Nimble focuses on ease of evaluation and deployment, providing pre-configured and tested proof-of-concept solutions, including profiles that can be customized for whatever set of virtual desktop applications a user plans to run. The result is a single SKU purchase and a wizard-based installation process. The environment can be managed from the Nimble control console or using the VMware vCenter plug-in.

HP's VirtualSystem CV2 is designed to streamline VDI deployment and management in Citrix, Microsoft and VMware environments. For example, HP Insight Control for VMware vCenter Server enables a single administrator to manage storage, server and network infrastructure, with visibility into all virtual desktop storage volumes; a storage wizard helps with tasks such as creating and cloning new VMs, and adding or expanding datastores.

Both vendors provide converged primary, backup and DR storage for VDIs in a single array solution, reducing Capex and simplifying management.

WHAT THIS MEANS FOR YOU

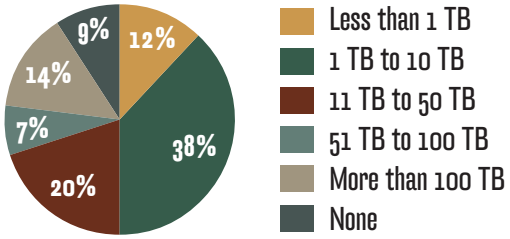
The latest generation of VDI storage products will help unlock some of the benefits that have eluded users so far. Look for solutions that have been designed to meet the specific requirements of VDI storage. And remember that the VDI market is still in its early stages, so tread carefully by evaluating and qualifying a full VDI solution—including compute, virtualization, networking, storage and management—before you buy. ⊙

Jeff Byrne is a senior analyst and consultant at Taneja Group.

Backup not getting much easier

Everyone knows backup is a pain in the #@&*%!, so a little relief would be more than welcome. A year and a half ago when we first asked, 46% of respondents said backups just take too darned long. If this is a good news/bad news story, that was the good news, because today a whopping 61% cite the same issue as their biggest backup problem. Fifty-eight percent say rapidly growing capacity is a big contributor, while 52% point a finger at backing up virtual servers. Nearly three-quarters (72%) are backing up virtual servers and/or desktops, and they give themselves only a passing grade for their efforts. On a scale of 1 to 5, where 1 is "terrible" and 5 is "great," 50% rated their virtual machine (VM) backup processes at a so-so 3. Our respondents hope dedupe will be a remedy, with 58% saying they've implemented it or plan to. But before you say hooray for technology, note that the same percentage plans to just throw more disk at the problem: Our respondents plan to purchase an average of 35 TB of disk storage just for backup this year. *—Rich Castagna*

How much disk capacity will you add this year specifically for backup use?

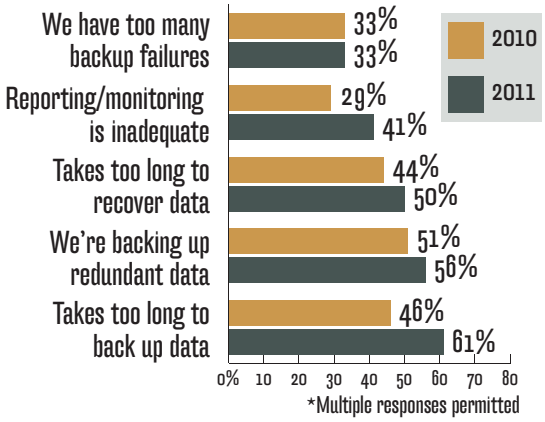


What are the biggest backup and recovery issues you're facing today?*

58%	Rapidly growing capacity
52%	Backing up virtual servers
42%	Multiple application/business requirements
38%	Too expensive to back everything up
37%	Backups for remote/branch offices
27%	Securing backup data
13%	Vendor support/licensing issues
8%	Other
5%	Backup window

**Multiple responses permitted*

What backup and recovery problems do you most often experience?*



58%

Currently using or planning to use data deduplication in their backup processes (vs. 38% a year ago)

> **"Our primary pain point is the VMware integration. VMware snapshot technology is causing us lots of grief—sometimes causing data corruption."**
>
> *—Survey respondent*

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