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# We need software-concealed storage

*Software-defined storage? Not for me.  
I think we need less software with our storage.*

**I HEAR** the [term software-defined storage](#) one more time, I'm going to jump out of a plane without a parachute, surf down Niagara Falls without a board and then stand in front of a speeding freight train.

Am I just a wee bit frustrated with the way the phrase *software-defined storage* is tossed around these days? Uh-huh. And tossed seems to be an understatement, as we're getting peppered with that nasty phrase from all angles these days.

I nearly went off the rails railing about this in [a previous editorial](#) less than a year ago, and here I am ready to poke holes in the whole software-defined storage thing once again. In fact, you're probably wondering what I find so particularly nettling about this latest adventure ride into the wonderland called storage marketing.

First, I defy anyone to show me storage that's *not*

defined by software. (That is unless you're talking about the shoebox, shipping crate and Tupperware kind of storage.) All storage needs software—gobs of it usually—from the lowest levels nestled on chips inside drives up to the servers and other clients that access the storage. And it's always been that way. What has happened, though, is that storage systems, especially when they became shared resources, ended up with lots of very complicated and arcane software plastered all over them. Then, with each and every new generation of systems, we got more and more software—from snapshots to replication to thin provisioning and beyond. Arrays became so encrusted with software that it was hard to remember there was actually some hardware underneath.

With all those features, and the software to dial 'em up and down, the process of owning and using storage

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became complex enough to require storage jockeys with special expertise to configure and maintain the systems.

To herald a new world order for data storage with the phrase *software-defined storage* is missing the point, because that expression is far too broad, and probably even misleading, in today's environment. There's really no uniform or useful definition of software-defined storage. That makes it a non-issue for most storage managers and it's the main reason why storage marketers have so fondly [embraced it as the buzzword du jour](#) heading into 2014.

Actually, software might be doing too *much* defining of storage. If users are frustrated, it could be because they're getting tired of having to push and pull so many levers to get stuff done before the virtual server they're configuring storage for flits off to some other virtual realm. Software isn't the solution to whatever storage problems you're running into, it's part of the cause of those problems.

Rather than something called software-defined storage, maybe what we're actually looking for is software-concealed storage. We don't need, or have time for, so many controls and exposed bells and whistles. The less we have to fiddle with, the better. A couple of recent Read/Write columns in *Storage* magazine did a terrific job of describing how storage needs to evolve: Arun Taneja wrote about how [antiquated LUN technology](#) is becoming, and Taneja Group senior analyst Mike Matchett opined that storage will have to [move up the stack](#).

It's an obvious but no less apt analogy to compare today's storage systems with early personal computing endeavors. You may be too young to recall, but once upon a time when you turned a PC on all you got was a mostly blank screen with a C: in the upper-left corner and a blinking cursor. You had to know what to do: the DOS commands and proper syntax to execute those commands. There were no windows, just blank space and you. There was plenty of software between you and the bits and pieces of hardware sitting on the desk, but you had to know how to get those things to do something.

Today, we don't even type. We touch, tap and swipe, and the software under the covers does our bidding. We know there's software there, but we don't see it. Or care.

That's what we need with storage—software-concealed storage. Put all that great plumbing and exceptional functionality under the covers and let's get back to basics.

It's not a far-fetched idea at all. Some upstart storage vendors are already on the road to software-concealed storage, but the laggards are—as usual—the big storage dudes. They dragged their heels with thin provisioning, are still dragging their heels with primary dedupe and now they give a lot of lip service to this new storage paradigm [without really delivering anything very new](#). We don't need to see more software, we need to see less. ■

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# Storage clouds and what we can learn from Nirvanix

*The demise of Nirvanix drives home the need for an “exit strategy” when using cloud storage services.*

**B**Y THE TIME you read this, the Nirvanix Cloud Storage Network will likely be a fading memory despite its one-time membership in the exclusive club of economically successful cloud storage startups. In late September 2013, the cloud storage service provider told customers they had two or three weeks to [clear their data off the Nirvanix cloud](#), leveraging high bandwidth LANs and/or the Internet to make their data transfers.

That’s rich. At T-1 speeds, moving 10 TB of data takes more than a year; at OC-193 speeds, the same transfer takes approximately four hours under ideal conditions. Nirvanix had been around for six or seven years, so some of its users have stored data considerably in excess of that volume in the vendor’s cloud. One cloud on-ramp vendor

reported that there was simply not enough bandwidth available to move all that data out in the time allotted.

As of this writing, some of Nirvanix’s managed hosting services users (80% of cloud storage is sold to other [cloud service providers](#) rather than end users) are trying to dig up the money to buy Nirvanix’s assets or to operate it as a private cloud until they can get their data out. That might work, but direct and indirect [users of the service](#), including Fox News, National Geographic, General Electric and the FBI, don’t seem very happy with that solution.

Nirvanix showed a lot of promise that even had SearchStorage characterizing the firm as a data storage [startup to watch](#). Funding came in at a good clip; from \$33 million to \$70 million in its first couple of years, with another \$25 million expected in the days just before the shutdown. But analysts say the firm couldn’t compete

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with Amazon or Microsoft, although the details of the post-mortem have yet to be disclosed.

Someone will ultimately report on the factors that contributed to the demise of Nirvanix, but for now, the key takeaway ought to be this: Make sure your cloud storage service provider (if you use one, and I'm not recommending that you should) has a viable way to return your data to you when (and not if) the need arises. When the economic non-viability of the service finally rears its head (a real concern with disk-based cloud storage services), or you decide to move your data somewhere else, you're going to need an efficient and cost-effective [way to get your data back](#). This goes for pure-play storage clouds and backup clouds that provide a disk drive in the sky for storing an off-site copy of your mission-critical data.

Last April, Nirvanix was touting its Cloud Sideloader [technology](#) that, the firm claimed, would expedite the movement of data from other storage clouds onto its platform. Company representatives even told the press they were considering making the service bidirectional. That might have helped with its current customer data rescue efforts—if it had actually happened and if other vendors were using some sort of standards-based method for data exchange instead of the proprietary API-based access that most currently employ as a consequence of embracing a proprietary server hypervisor stack or a single storage vendor's hardware.

If I were thinking about using cloud storage, I would

take a long look at Permivault from Fujifilm. Launched in April 2012 by a leading storage technology vendor with very deep pockets, the service builds on an established active archive offering currently provided in the healthcare community. Permivault [leverages LTFS tape to store your data](#) and transport it to you if the need arises. Your data safely resides on a physical set of tapes, unique to you and owned by you, and shippable by FedEx. Nirvanix users can only wish they had those kinds of choices now.

My other takeaway from the Nirvanix affair was that yesterday's hype purveyor is tomorrow's critic. Some of the best reporting on the failure of Nirvanix, and the great disservice done to its customers, came from a former industry analyst who hyped the data explosion in widely distributed reports and briefings, and who used the data explosion hype to justify the sometimes flawed business-value case for cloud storage. Now, from his perch in the trade press, the same fellow is lecturing everyone who was foolish enough to believe what they read in analyst projections back when he was the analyst and storage clouds were "new."

Anyway, according to its website, Permivault offers a free 5 TB trial program. As I always recommend, try before you buy. ■

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# HOT STORAGE TECHNOLOGIES FOR 2014

These six storage technologies are ready to take their place—and have an impact—in your data center in 2014.

- NEXT-GENERATION SOLID-STATE STORAGE
- PRIMARY STORAGE DATA DEDUPLICATION
- HYPER-CONVERGED STORAGE
- BACKUP APPLIANCES
- OPENSTACK STORAGE
- CLOUD-INTEGRATED STORAGE



**IF YOU'VE READ** one of our technology prognostications before, you know the drill: we don't pick pie-in-the-sky projects as our hot data storage technologies. Rather we focus on the new, and newish, storage techs that we think are poised to have an impact on your shops in the coming year.

That said, some of [our predictions are about storage technologies](#) that have only recently emerged from R&D labs, but they bear so much promise that we think they will weigh in immediately. That's the nature of the storage market today: Technologies that used to take years to evolve and gain a following are topping the charts in short order these days. Case in point: solid-state storage's meteoric rise.

In fact, the ever-developing flash storage is featured in this year's predictions, with two solid-state techs—Non-Volatile Memory Express (NVMe) and 3D flash—about to spring into prominence. Rounding out our 2014

By Storage magazine Staff

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predictions are the arrival (finally!) of dedupe to primary storage, hyper-converged storage-plus-everything-else systems, plug-and-play backup appliances, the rise of Open-Stack storage, and hybrid technologies that blur the line between cloud and on-premises storage.



## NEXT-GENERATION SOLID-STATE STORAGE

[Solid-state storage](#) has taken the industry by storm. Startup companies and legacy system vendors alike offer hybrid solid-state/disk-based systems, all-solid-state drive (SSD) arrays and server-based flash. But despite its promising start, obstacles to continued solid-state development are popping up, including a lack of industry standards for network interoperability and the physical [limitations of current NAND flash technology](#).

The NVMe Work Group, an [industry consortium](#) of more than 80 technology companies, is developing an industry-standard PCI Express (PCIe) host controller interface to optimize how PCIe flash devices interact in storage systems.

“It standardizes how PCI flash adapters ... the cards you stick in stuff ... how they communicate with the CPU, the applications and the operating system,” explained Brian Garrett, vice president of ESG Labs in Milford, Mass.

Without the [NVMe standard](#), each vendor’s PCIe adapter requires its own driver, so [PCIe flash card maintenance and configuration](#) is a major hassle. The NVMe specification standardizes the host controller interface and provides support for multicore architectures, end-to-end data protection, encryption and security.

The NVMe 1.0 specification was announced in March 2011 and the 1.1 spec was released in November 2012. But according to Garrett, [NVMe adoption](#) is following a typical industry pattern because of standard development and OEM product lifecycles. “Once the spec is finalized, and the devices become available, we need to wait for the systems’ OEMs to pick them up, qualify them, drop them into solutions and get them to work,” he said.

The University of New Hampshire InterOperability Laboratory in Durham has posted a list of devices and platforms that have successfully completed interoperability tests. These include NVMe flash controllers from PMC-Sierra Inc., the Samsung XS1715 NVMe PCIe SSD and a Western Digital Technologies Inc. PCIe NVMe SSD. Expect to see many more NVMe-compatible devices available in 2014.

Chip and storage device vendors are developing [3D flash memory](#) vertical stacking technology to overcome the impending physical limitations and disadvantages of reducing flash’s planar die size. The smaller the die, the less performant and reliable the flash memory is due to cell-to-cell interference.

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Samsung Electronics Co. Ltd., which recently announced that it has begun mass production of its [3D Vertical NAND \(V-NAND\) flash memory](#), says the idea behind 3D stacking is that by placing cell layers on top of each other, write performance can be doubled and reliability increased by 10 times compared to current processes.

“If you look at the broader category of storage-class memory, 3D NAND is the next evolutionary step along that path,” Garrett commented. “It’s going to happen.”

## Several irreversible storage trends indicate primary dedupe is about to become a common feature.

Devices utilizing 3D flash stacking will not be available as soon as NVMe-compatible devices because the technology isn’t as advanced as NVMe. Garrett expects 3D stacking devices to appear in 2014, with a bigger push likely in 2015. But he said that if flash manufacturers hit the physical “density wall” sooner than expected, [3D stacking development](#) will ramp up more quickly.

Another factor that may hasten 3D stacking progress is that consumer devices will also benefit from the technology, so enterprise-device manufacturers won’t be the only groups putting resources into its development.



## PRIMARY STORAGE DATA DEDUPLICATION

Ever since data deduplication became a staple for backup products, storage managers have wondered when the technology could be applied to primary storage.

But [adding dedupe to existing primary storage systems](#) proved far more difficult than it was on the backup side.

A decade or so later, primary dedupe is ready. Yes, we did prematurely declare it a hot data storage technology in 2011, but the stars are now aligned correctly for 2014. Several irreversible storage trends indicate primary dedupe is about to become a common feature.

The emergence of flash storage is one of those trends. Dedupe helps extend the usable capacity for expensive solid-state drives, while the speed of SSD makes inline dedupe work well enough to be viable in a production environment. The [cloud is another dedupe driver](#) because data has to be shrunk if it’s to be moved efficiently over the network to public clouds. [Virtualization also plays a role in pushing dedupe](#) because virtual machines (VMs) tend to have a high level of redundancy and dedupe.

In 2013, we saw the big vendors offer primary deduplication. Dell finally got technology it acquired from Ocarina Networks in 2010 to work with its Compellent storage arrays. Hitachi Data Systems (HDS) added dedupe code from an OEM deal with Permabit to its

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## Report card: Grading our predictions from last year

Each year, in addition to making new predictions about what storage technologies will have an impact in data centers in the coming year, we also hold our own feet to the fire and grade our previous prognostications.

- B** **All-flash storage arrays:** We said “a bevy of startups offering lower prices have made all-flash arrays a reality,” but there hasn’t been a bevy of customers yet. Solid interest, some implementation, lots of upside.
- B-** **Cloud-based disaster recovery:** We called cloud disaster recovery “an ideal disaster-proofing option” last year and still believe that; but cloud storage jitters still deter some companies.
- C+** **Snapshot-based backups:** We saw more integration of snapshots into backup operations, but not as much as expected. Guess we forgot that changing backup ops is a s-l-o-w process.
- A** **Server-based flash cache:** Solid-state storage is hot, hot, hot—and probably hottest nestled into servers’ PCI Express slots where flash cache wrings up big performance gains. A solid “A” for us.
- B-** **Storage systems for virtual environments:** We might have called this one a tad too soon. These systems are making inroads, but traditional storage vendors are holding their own with tighter hypervisor integration.
- A** **Cloud-based file sharing and sync services:** What’s bigger than sync and share these days? Nothing, except maybe the nightmare of protecting all that corporate data. Issues aside, we nailed this one.

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*(Continued from page 9)*

Hitachi NAS (HNAS), and EMC added fixed-block post-process primary deduplication to its overhauled VNX unified storage platform.

Now users are [looking for primary dedupe](#) when they buy storage.

Jeremy DeHart, IT manager at law firm Hedrick Gardner Kincheloe & Garofalo LLP, said built-in deduplication was an important part of his decision-making when he bought Tegile Zebi hybrid flash arrays. DeHart's firm replicates data between two identical arrays from its headquarters in Charlotte, N.C., and an office in another part of the state. Having built-in dedupe extends his usable capacity and makes the replication process faster.

"Deduplication and replication were huge for us, along with the flash in the system," DeHart said. "Dedupe was something I had to have because everything is virtualized for us. It also gives you the ability to replicate that data a lot quicker."

EMC customer Ed Ricks, chief information officer at Beaufort Memorial Hospital in South Carolina, said the combination of dedupe and flash made the new VNX arrays more interesting for him.

"I'm intrigued by it," he said. "Not only do you get flash, but they also put dedupe in it. You can buy a 7 TB entry-level array model and you might get 25 TB to 35 TB usable out of it, plus take advantage of flash speed."

What makes dedupe more likely to catch on now is

that it's usually free—built into flash storage, cloud gateways and operating systems of the top-selling arrays.

"Data deduplication is now mainstream and should be treated that way," said Arun Taneja, consulting analyst at Hopkinton, Mass.-based Taneja Group. "Why go back to 20th century technologies now?"



## HYPER-CONVERGED STORAGE

It's no secret that storage complexity and management are two of the biggest challenges confronting administrators of virtual server environments. As user frustration with traditional storage systems grows, mounting interest in [storage built for virtual machines](#) has spurred a breed of [hyper-converged storage systems](#)—all-in-one products evolving from converged systems that include storage, networking and compute, but also pack in a hypervisor.

Currently, hyper-converged systems are only offered by a few startups. [Nutanix](#) was the first with its Complete Cluster (now called the Virtual Computing Platform), [SimpliVity](#) debuted its OmniCube last year and [Scale Computing](#) launched its HC3 shortly after. But [VMware](#) is getting into the game with its Virtual SAN (vSAN) entry, which is in beta but will likely serve to heighten interest in and attention to hyper-converged storage.

Because virtual environments typically require servers and storage to be managed separately, infrastructures can

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become complicated and finding the root cause of performance-crippling bottlenecks can be frustrating. “When the administrator actually has to go and figure out what’s happening, it’s very difficult,” explained Jeff Byrne, a

senior analyst at Taneja Group. “You’re trying to map this virtualization construct on top of a traditional storage construct, and the two just don’t blend very well.”

Hyper-converged systems deal with the issue in a

## Not quite hot: Five storage techs on the verge

### Networking server-based storage

We’ve been Caringo-ed and Hadoop-ed, but it looks like any major move toward networking direct-attached storage is still a ways off.

### Cloud-to-cloud backup

Backupify essentially defined the idea of backing up storage held in one cloud to another; now maybe the Nirvanix debacle will give it a boost.

### Amazon APIs for cloud storage

SNIA says it has cloud standards, but even its members ignore them. Amazon is cloud storage’s 900-pound gorilla and that kind of heft tends to create standards.

### 40 Gigabit Ethernet

While not exclusively a storage technology, 40 GigE will put some zoom into iSCSI and NAS storage. But not this year.

### Write caching

Write caching is about as old as ... well, read caching, but it’s harder to do, so it doesn’t show up nearly as much. With an emphasis on flash cache, we’ll see more write caching solutions popping up ... in 2015.

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couple of ways: Provisioning storage can be done directly through a management portal, so the need to map LUNs and volumes is eliminated. And by bringing all the components of the environment together, management is done behind a single pane of glass and pinpointing problems is streamlined.

Simplified infrastructure and management is the driving force behind the popularity of hyper-converged options with small to medium-sized businesses. The SimpliVity OmniCube, for example, comes complete with servers, software, hard drives and SSDs, and increasing capacity is as simple as inserting an additional unit. And the VMware vSAN allows customers to create pools from existing hard drives and SSDs while incorporating management capabilities into the hypervisor.

One shortcoming of [hyper-converged products](#) is the lack of variation in hypervisor support. With VMware as the most widely adopted hypervisor, it makes sense that it would be the first virtualization platform that hyper-converged vendors would turn to.

Nutanix, Scale Computing and SimpliVity all support VMware, while Nutanix and Scale Computing also support the open source KVM platform. But according to industry analysts, support for additional hypervisors needs to be added for hyper-converged systems to thrive.

“Because more companies run multiple hypervisors than not, I think [supporting more than VMware] is going to be critical to advancements,” said Terri McClure,

a senior analyst at ESG.

All three vendors have expressed interest in [adding support for additional hypervisors](#) in upcoming versions of their products, but no definite plans have been confirmed.



## BACKUP APPLIANCES

Interest in [all-in-one backup appliances](#) has grown in recent years, and the product category is poised to become a significant part of the data protection market.

All-in-one backup appliances, which combine hardware, software, media server and target with “drop and go implementation,” offer two key advantages: initial implementation is much easier than products that require an additional backup app to use, and you get ongoing, single-vendor support for both backup software and hardware.

[Backup app vendor Symantec](#) has had demonstrable success with its Backup Exec- and NetBackup-based appliances. Other vendors, including Asigra, StorServer, Unitrends and others, now also offer pre-integrated, turn-key backup solutions.

“For some organizations that are growing in size and need more capabilities for backup or data protection than what they had in the past, an appliance makes sense,” said Greg Schulz founder of Stillwater, Minn.-based analyst firm StorageIO. “And, for other organizations,

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instead of essentially assembling the hardware, software and networking pieces, creating their own backup server and appliances, there is the opportunity to do more with the same resources [people, time, budgets] by leveraging an appliance.”

Rachel Dines, a senior analyst at Forrester Research in Cambridge, Mass., sees backup appliances playing an essential role in coping with nonstop capacity growth. “With the volume of data we’re seeing right now in backup, secondary and tertiary storage is one of the fastest-growing areas of storage right now, even faster than file storage, according to our data,” Dines said. “Backup and archive is growing even faster than file storage. With the explosion of data plus the need for very quick recoveries, organizations are looking for something quick and easy to deploy and straightforward to manage.”

In the coming year we see the [backup appliance market](#) continuing to grow—and branching into virtual realms—for these three key reasons:

- **Remote office/branch office is a fast growing market.**

While “companies large and small, in industries from government to financial services to manufacturing to retail” are using backup appliances, Dines said, the growing market appears to be remote offices/branch offices.

- **Software-defined data center will impact backup appliances.** One potential hindrance to continued growth of

the backup appliance trend in the coming year is “the advancement of scale and reliability of software-only solutions,” Dines said. “The biggest products on the horizon may very well be along the lines of the software-defined data center concept. In 2013, we saw some announcements of disk libraries offered as virtual appliances from HP StoreOnce and Quantum. In 2014, we may see more virtual appliance offerings from hardware vendors.”

- **VM integration should play a role.** StorageIO’s Schulz agreed and said that “virtual machine integration, along with additional application support, should be a given roadmap, either adding new and more apps, or extending current capabilities including rapid restore of a virtual machine from a backup, snapshot or where it’s protected.”



## OPENSTACK STORAGE

[Open source OpenStack storage](#) continues to attract attention and is gaining adoption as more commercial vendors back it, more supported distributions become available and more case studies surface as proof points.

OpenStack supports object storage and block storage as part of its open source cloud operating system that also aims to control pools of compute and networking resources. Rackspace Hosting originally developed the OpenStack technology and co-founded, with NASA, the

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community that maintains the open source software.

Vendors contributing to the OpenStack Object Storage project, [code-named Swift](#), include Hewlett-Packard (HP), IBM, Rackspace, Red Hat and SwiftStack. HP, IBM and Red Hat also work on the OpenStack Block Storage project, [code-named Cinder](#), as do other vendors, such as Intel, Mirantis, SolidFire and SUSE.

[OpenStack Block Storage provides](#) software to provision and manage persistent block-based storage and deliver it as an on-demand service. [OpenStack Object Storage](#) facilitates the storage of petabytes of static data on commodity servers and ensures data replication across the server cluster. It is best suited to backups, archives and content repositories.

IT shops hesitant to use unsupported open source software can opt for commercial variants, available from Canonical, Cloudscaling, HP, Piston Cloud Computing, Rackspace, Red Hat, StackOps, SUSE and SwiftStack.

“OpenStack Swift is not a ready-to-deploy system that you can just download and install and then you’re up and running,” said Ashish Nadkarni, a storage systems research director at International Data Corp. in Framingham, Mass. “It’s still very new and requires a fair bit of customization, programming and tweaking. Some people have the resources to do it in-house, and the rest go with the commercial variants.”

With OpenStack Block Storage, the physical hard disk or SSDs can be located within or directly attached

to Cinder server nodes, or they can be part of external storage systems that third-party vendors have integrated. Available plug-ins include open source Ceph RBD and Red Hat’s GlusterFS, and select systems from Coraid, EMC, HP, Huawei, IBM, Mellanox, Microsoft (Windows Server 2012), NetApp, Nexenta, Scality, SolidFire and Zadara.

Nadkarni said OpenStack Block Storage can be viewed as next-generation, hardware-agnostic storage virtualization, providing an abstraction layer to pool storage resources and permit the integration of third-party arrays.

“The core principle of OpenStack is to use commodity-based storage to create a full-service platform,” he said. “If you start using commercial platforms with OpenStack, what are you getting? You’re not getting much.”

The San Diego Supercomputer Center (SDSC) at the University of California is investigating Cinder and Ceph to provide persistent block storage for its OpenStack compute resources. Matthew Kullberg, SDSC’s technical project and services manager, said the open source options could provide greater flexibility and expansion capabilities, in support of applications such as databases, than SDSC’s current block storage does.

[SDSC has used OpenStack Swift](#) since 2011 for a private cloud storage service that replaced its tape-based data archives. Object storage options were sparse at the time, and SDSC chose OpenStack to hold down costs, eliminate vendor lock-in and tap into the large, accessible

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development community. Kullberg said the team would make the same decision today.

“OpenStack has proven to be a great resource for researchers at SDSC and the university community,” he said.



## CLOUD-INTEGRATED STORAGE

It might be tempting to dismiss [cloud-integrated storage \(CIS\)](#) as just another marketing term, but if you did, you’d be overlooking the best fit for cloud storage in enterprise environments. The reality is that it’s become part of the cloud lexicon to describe cloud storage that’s used either in a hybrid mode, tiering fashion or any other way to expand on-premises capacity as seamlessly as possible.

The key [technologies behind CIS](#) are gaining acceptance. Gateways have evolved into [cloud controllers](#) that play a pivotal role in extending storage capacity beyond data centers. [Hybrid appliances](#) have become standard tools in many data centers. Interest in [software-defined storage appliances](#) and object storage is also growing.

“Hybrid storage is an escalating use case,” said James Bagley, senior analyst at Austin, Texas-based Storage Strategies Now. “We talk about where the company has its own infrastructure and uses cloud via a policy for doing archiving and disaster recovery. Not a lot of companies are using a cloud tier as frontline storage unless they

are operating entirely in the cloud. In those cases, all their applications are operating in the cloud.”

Nicos Vekiarides, CEO at TwinStrata, said CIS is synonymous with hybrid storage, where cloud storage is combined with local storage in cache. It’s also used for separate storage tiers, with some local and some in the cloud.

“The cloud can be a second data center without all the capital costs,” Vekiarides said. “It’s a cost-effective way for off-site data protection and data recovery.”

The most common use cases are for capacity expansion or cloud-based disaster recovery, Vekiarides said.

“We work with companies that produce data growing at 40% to 50% per year,” he added. “This is difficult to put that all in local storage. By storing it in [a controller] you get a local copy and it’s protected with a snapshot in the cloud.”

Storage Strategies Now’s Bagley said you don’t necessarily [need an appliance as an onramp for CIS](#) but you do need more applications that work with clouds such as Amazon S3 or Microsoft Azure. There are also vendors like StorageCraft, which targets smaller companies with its ShadowProtect Cloud Services product that backs up data to its own cloud.

“Short of having apps specific to backup and archiving, that’s where an appliance is handy,” Bagley said. ■

**CONTRIBUTORS** to this feature included Rich Castagna, Todd Erickson, Ed Hannan, Sonia Lelii, Dave Raffo, Carol Sliwa and Sarah Wilson.

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# TOOLS TO MANAGE STORAGE FOR VIRTUAL SERVERS

Virtual servers threw a monkey wrench into the works of managing storage, but a well-assembled toolkit can restore comprehensive management.

**CONFIGURING AND MAINTAINING** storage at its most efficient level isn't an easy task, and it becomes an even bigger [challenge in virtual server environments](#). With storage arrays attached to physical servers (hosts), and hypervisors virtualizing and orchestrating the allocation of physical resources to virtual machines (VM), the ability to correlate virtualized storage resources used by VMs to physical storage components has become more complex.

While it's a relatively simple task to troubleshoot and identify the root cause of a storage performance problem for a specific application running on a physical machine with directly attached storage without using special tools, that's simply not the case in virtualized environments. It takes the help of effective management tools to resolve a comparable challenge in an application running within a VM on a host with other VMs that access the same storage pool on a SAN that's likely shared with other similar servers hosting even more hypervisors. The main culprit

By Jacob Gsoedl

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of [VM storage management](#) complexity is a combination of a large number of virtualized servers and applications accessing abstracted and shared physical resources, as well as other numerous moving parts, from multi-pathing that provides several paths to the attached storage to dynamic storage tiering where blocks of data are shuffled between different storage tiers on the fly.

### VM STORAGE MANAGEMENT TOOLKIT

Effective management tools that provide insight into and monitor storage from virtual machine to spindle, and that also enable system administrators to overcome this intertwined complexity are a critical component of [virtualized server environments](#).

Varying in capabilities and management granularity, VM storage management can be accomplished with the help of three categories of tools:

- Management tools provided by the hypervisor
- Element managers and tools provided by storage system vendors
- Third-party storage management tools and applications

Hypervisor APIs that enable interaction with storage systems and storage APIs, such the Storage Networking Industry Association's [Storage Management Initiative Specification \(SMI-S\)](#) that describes how tools and

applications can interact with storage systems, are blurring the boundaries between these three categories and making it more challenging to compare capabilities and features of the numerous storage management options and products available. For instance, the degree to which a storage array vendor supports SMI-S directly impacts the abilities of a third-party management tool that relies on SMI-S to manage storage resources. Likewise, the level of support of hypervisor APIs by a storage array determines the level and granularity at which VM storage can be managed. In other words, [managing virtual server storage](#) requires analyzing the combination of hypervisor, storage system and management tool, and it's very specific to and dependent on a given environment.

### HYPERVERSOR STORAGE MANAGEMENT TOOLS

Even without the added integration with a storage array, hypervisors are able to perform storage management tasks to some degree. Once a volume or [LUN is provisioned to the hypervisor](#), it takes over managing the assigned datastore, such as provisioning storage from the datastore to virtual machines. Without further integration between the underlying storage array and the hypervisor, the ability to correlate virtualized resources to the physical storage array is at the assigned datastore level. If multiple VMs reside in the datastore, it's not easy to [correlate storage used by VMs to physical storage components](#), such as disks and controllers. One way around

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this limitation has been to provision many small LUNs or volumes, but this spawns a new set of challenges. Besides burdening the storage team, hypervisor features, especially from VMware, promote large storage pools that are shared by VMs and multiple VMware hosts. The [VMware Virtual Machine File System](#) (VMware's clustered file system) to store virtual machine disk files and snapshots, [Storage vMotion](#) to migrate VMs from one datastore to another without incurring downtime, and [Storage Distributed Resource Scheduler](#) to load balance storage resources, all live up to their full potential in configurations with large datastores that hold many virtual machines and are shared by multiple vSphere hosts.

To overcome this disconnect between hypervisors and the physical storage, hypervisor vendors have contrived APIs that allow for the interaction of the hypervisor and physical storage. To start, the VMware vStorage APIs for Array Integration ([VAAI](#)) enable certain storage tasks, such as copying and moving of data and thin provisioning, to be offloaded from the VMware hypervisor to the storage array. VMware vStorage APIs for Storage Awareness ([VASA](#)) permit storage arrays to integrate with VMware vCenter for management functionality, giving vSphere administrators insight into storage capabilities via plug-ins (called providers) through which vCenter can receive information about capabilities, health status, configuration and capacity from the underlying array and display it in the vCenter user interface.

Similar to VMware VAAI, [Microsoft introduced Offloaded Data Transfer](#) in Windows Server 2012 to enable the offloading of copy and move operations to storage arrays. To enable management and deep integration of third-party storage, the new Windows Storage Management API in Windows Server 2012 and System Center Virtual Machine Manager (SCVMM) 2012 now support

### To enable management and deep integration of third-party storage, the Windows Storage Management API in Windows Server 2012 and System Center Virtual Machine Manager 2012 now support both SMI-S and Storage Management Packs (SMP).

both SMI-S and Storage Management Packs (SMP). As a result, SCVMM 2012 can now manage both SMP- and SMI-S-compliant arrays and SAN storage. Microsoft's espousal of SMI-S not only elevates a standard whose support has progressed somewhat slowly, but makes the large number of storage systems that support SMI-S manageable from within [SCVMM 2012](#), without requiring storage system vendors to support yet another proprietary API as is the case with all the VMware APIs.

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## ELEMENT MANAGERS AND TOOLS FROM STORAGE SYSTEM VENDORS

All storage system vendors [offer element managers](#) and other management tools to manage configurations, capacity and performance. Their management tools address all configuration aspects of a storage system, and even if some configuration tasks such as provisioning are delegated to a third-party storage management tool or hypervisor management console, element managers are usually

required for very specific and less frequently performed tasks such as configuring system parameters, compression, deduplication and thin provisioning, as well as management tasks that aren't exposed via integration APIs such as SMI-S. In general, element managers and other tools that come with storage arrays are the most versatile configuration tools, but they're designed for a specific storage system and are usually intended to be used by storage specialists.

### Key APIs for managing storage for virtual servers

- The **Storage Management Initiative Specification** is the most significant storage management API. Developed by the Storage Networking Industry Association, it's intended to facilitate the management of storage devices from multiple vendors in SANs.
- **Microsoft Storage Management Packs** enable Microsoft System Center to interact with applications and services. Many storage vendors have developed management packs for their storage systems.
- **Microsoft Offloaded Data Transfer** enables Microsoft Hyper-V to offload copy and move operations from the hypervisor to a storage array.
- The **VMware vStorage APIs for Storage Awareness** enable VMware vSphere to query storage system capabilities via providers developed by storage system vendors.
- The **VMware vStorage APIs for Array Integration** enable certain storage tasks, such as copying and moving of data, to be offloaded from VMware vSphere to storage arrays.

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To overcome these limitations and [extend certain storage management tasks](#) to hypervisor consoles and third-party management tools that provide additional capabilities and heterogeneous storage system support, storage vendors offer plug-ins and providers for their arrays to support the various APIs, such as SMI-S, SMP, VAAI and VASA. Although all storage vendors realize the importance of tight integration with VMware and increasingly with Hyper-V as well, they differ in what storage management capabilities their providers expose and what hypervisors they support.

EMC provides a range of integration and automation options for VMware environments and offers SMI-S providers to integrate with SCVMM 2012 for tasks such as storage discovery. NetApp, with its Virtual Storage Console for VMware and the OnCommand plug-in for Microsoft to integrate with System Center 2012, extends storage management tasks such as provisioning, cloning, resizing and monitoring to virtual server administrators. With the HP Insight Control Storage Module for vCenter plug-in, Hewlett-Packard enables VMware administrators to manage and monitor the physical/virtual relationship between VMs, VMware ESX Servers and HP storage, and like everyone else, HP's integration with SCVMM 2012 is accomplished via an SMI-S provider. IBM doesn't yet have a VASA plug-in that enables managing its storage systems from within vCenter; however, "a VASA plug-in will be available in near-time to provision storage and

monitor performance and capacity within vCenter," said Justin Youngblood, IBM's director of storage development. Dell supports both VAAI and VASA, although its VASA provider currently lacks automation support, and provides integration into SCVMM via SMP.

### THIRD-PARTY STORAGE MANAGEMENT TOOLS

To some extent, third-party storage management tools and storage resource management (SRM) applications compete with hypervisor management tools, but they also have much in common:

- Both are able to manage heterogeneous storage resources
- They depend on APIs and integration with storage systems
- Both work toward a single-pane-of-glass management paradigm

"Our biggest competitors are Microsoft System Center Virtual Machine Manager and VMware vCenter," said Sanjay Castelino, vice president at IT management software provider SolarWinds. One of the big differentiators is the target audience. While hypervisor management tools are targeted toward the IT group that manages servers, SRM tools target storage administrators. Furthermore, while storage management capabilities in hypervisor management tools are usually limited to tasks relevant

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to VMs of a specific hypervisor, [SRM tools manage storage of virtualized](#) and physical servers; they also provide a richer and more complete storage management feature set.

Without a doubt, server virtualization has complicated storage management tasks, but by now most SRM tools are able to correlate storage tasks within VMs to physical storage resources. For instance, HP Storage Essentials is able to discover VMware hypervisors, VMs and VM storage dependencies without the need for agents; it also enables users to see VM storage topology maps, manage and report capacity of hypervisors/VMs, and provision storage to hypervisors. Similar integration and capabilities can be found in IBM Tivoli Storage Productivity Center and other contemporary SRM tools.

## **SOME CLARITY FOR COMPLEX ENVIRONMENTS**

Server virtualization has contributed to the complexity of storage management and had an impact on how storage is managed. On one hand, the ability to [manage storage within hypervisors](#) has become more relevant, and many companies simply opt for a combination of hypervisor-based storage management and element managers. But SRM tools still have their place in heterogeneous environments with a mix of storage systems and physical and virtual servers; furthermore, those SRM tools usually provide added features and capabilities that aren't yet available with hypervisor-based storage management. ■

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# HP TAPES TOP MIDRANGE, ENTERPRISE GROUPS

HP has often been close to the top in our Quality Awards for tape libraries, but this time it breaks through in a big way—outdistancing the field in both the midrange and enterprise classes.



**HEWLETT-PACKARD (HP) CO.** has long been a mainstay and key player in the [tape library world](#), and has finished respectably in both the midrange and enterprise classes of our Quality Awards for [tape libraries](#) for the past eight years. But in our latest survey, HP breaks from the ranks of respectable to charge into the winner's circle—twice.

Among its enterprise rivals, HP notched the fourth-best winning score ever, while nudging out Quantum Corp. by a narrow margin. HP triumphed in the midrange group by improving on last year's third-place finish—previously HP's best showing—to top Dell Inc. and IBM.

The double win by HP isn't all that surprising, as it's been a strong contender over the years, often earning high enough marks to prevail in specific rating categories.

Spectra Logic Corp., a double winner in [last year's Quality Awards for tape storage systems](#), didn't receive a sufficient number of responses to earn a place among the finalists this year.

By Rich Castagna

## Overall Ratings

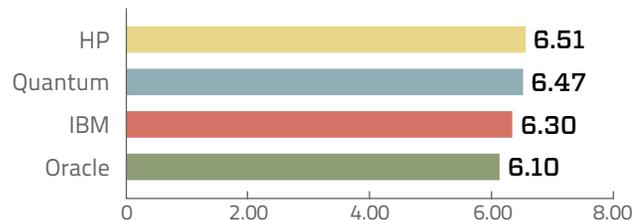
**Enterprise.** HP scored the highest marks in four of the five rating categories—by slim margins in some cases—but its cumulative effort netted an overall score of 6.51, which was just enough to hold off second-place Quantum (6.47). Quantum was a consistent competitor, earning the

**KEY STAT:** The average overall rating of **6.35** for all four enterprise products was the third best ever.

top mark in one category, second in three others and third in the final category. IBM followed the two leaders and came in third (6.30), adding to its incredible string of finishing in the top three among enterprise tape libraries in every Quality Awards survey to date. IBM came in second

or third in every rating category. Oracle rode its Sun/StorageTek tape library heritage into fourth, with a solid 6.10 overall score; its best results were in the initial product quality and product features categories.

### ENTERPRISE TAPE LIBRARIES: OVERALL RATINGS



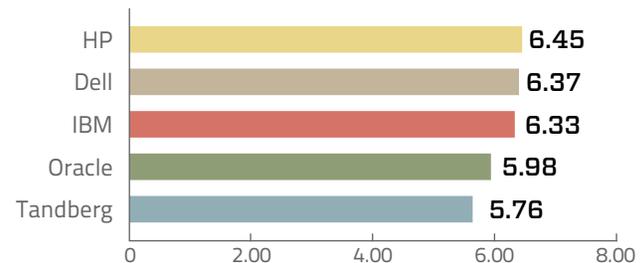
**Midrange.** HP's winning margin in the midrange group was a bit wider, as it rolled up a 6.45 overall rating to outdistance Dell (6.37) and IBM (6.33). Still, the gap between HP, Dell and IBM isn't very big, reflecting just how hard-fought

**KEY STAT:** The overall average rating for the mid-range group was a middling **6.18**, despite the heated competition in each rating category.

this competition was, with HP prevailing in two ratings categories, Dell taking two and IBM racking up the last category. In fact, those three vendors accounted for the top three finishers in all categories. And each category was hotly contested, with the gaps between first and second on the order of 0.02,

0.05 (in two categories) and 0.06 points. Given the nip-and-tuck nature of this competition, HP can attribute its overall ratings to its wider lead in the sales-force competence category. Oracle (5.98) and Tandberg (5.76) rounded out the midrange tape library field.

### MIDRANGE TAPE LIBRARIES: OVERALL RATINGS



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## Sales-Force Competence

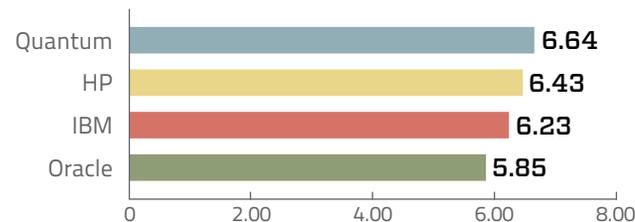
**Enterprise.** Quantum scored highest (6.64) in this important category that rates how well vendors and their resellers interact with users before any equipment hits the floor. And Quantum won impressively, with top ratings for five of the six statements in the category and barely “losing”

**KEY STAT:** Quantum’s sales-force competence score of **6.64** was the third highest ever for this category.

on the sixth by 0.01, the smallest possible margin. HP had its share of honors, edging out Quantum (6.70 to 6.69) for the statement “The vendor’s sales support team is knowledgeable” and tying Quantum for having sales reps who

understand customers’ businesses. Quantum was consistently strong, with a 6.73 for having knowledgeable sales reps, and posting 6.69s for three other statements, including for being flexible and easy to negotiate with. IBM had a steady showing, highlighted by a 6.51 for a knowledgeable sales support team; Oracle also earned its best score (6.24) for that statement.

### ENTERPRISE TAPE LIBRARIES: SALES-FORCE COMPETENCE



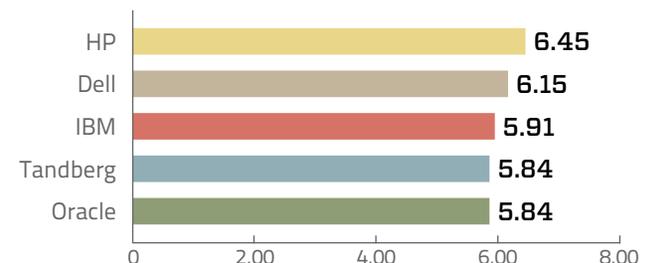
**Midrange.** Sales-force competence was one of HP’s two winning categories as it bested Dell 6.45 to 6.15 and scored highest on all six category statements, including a tie with Dell for having knowledgeable sales support teams (6.42). HP was the only company to net 6.00-plus marks for all statements, highlighted by a 6.56 for being easy to negotiate with, a 6.54 for having flexible sales reps and a 6.50 for

**KEY STAT:** The mid-range group’s overall average score of **6.04** in the sales-force competence category was the lowest we’ve seen in five years.

“My sales rep is knowledgeable about my industry.” Dell’s strong points were for keeping customers’ interests foremost (6.24) and flexibility (6.20). IBM also did well on the knowledgeable support

statement (6.20) and being easy to negotiate with (5.93). Overall, the midrange group’s sales-force competence scores were lower, suggesting buyers may need—and expect—a little more assistance than larger companies.

### MIDRANGE TAPE LIBRARIES: SALES-FORCE COMPETENCE



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## Initial Product Quality

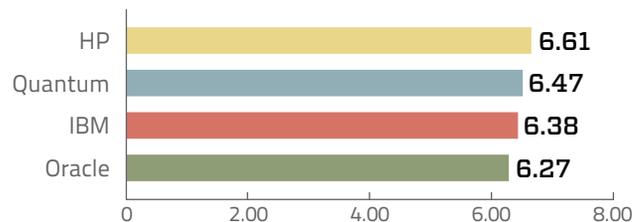
**Enterprise.** HP achieved its first enterprise win in the initial product quality category by collecting a 6.61 to lead a strong showing by the whole field. Quantum (6.47), IBM (6.38) and Oracle (6.27) were bunched up behind leader HP with impressive scores of their own. HP ranked highest on

**KEY STAT:** For 4 years, all the enterprise tape library product lines have averaged scores of 6.00-plus for initial product quality.

four of the six category statements, with exceptional ease-of-use scores: easy to install (6.70), easy to configure (6.65) and requires very little daily intervention (6.60). Quantum snared the other two statements, with a 6.65 for "This

product delivers good value for the money," and a 6.59 for being easy to use. IBM also scored above 6.00 on all statements, with a high of 6.47 for "I am satisfied with the level of professional services this product requires." Oracle fell below 6.00 on only one statement and registered its highest mark for the professional services statement (6.56).

### ENTERPRISE TAPE LIBRARIES: INITIAL PRODUCT QUALITY



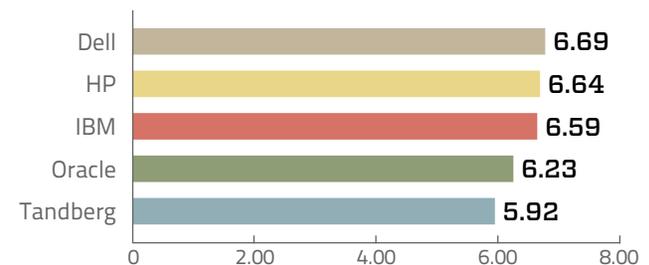
**Midrange.** Dell (6.69) ranked No. 1 for initial product quality among midrange products in a very close race with HP (6.64) and IBM (6.59). With just one-tenth of a point separating the three, it's no surprise that they also split the statement honors. Dell and HP each scored best on three of the six statements, with IBM tying HP on one. Dell's

**KEY STAT:** Dell placed second or third in 3 previous surveys before winning the category this year.

highest statement grade (6.84) was for "This product delivers good value for the money," a key statement in this category. IBM wasn't far off that mark, turning in its best grade (6.82) on the same statement. Dell's other leading scores came for "This product was easy to

configure" (6.74) and "The product requires very little daily intervention" (6.63). HP led the group for being easy to use (6.77) and ease of installation (6.69), and tied with IBM for requiring an acceptable level of professional services (6.60).

### MIDRANGE TAPE LIBRARIES: INITIAL PRODUCT QUALITY



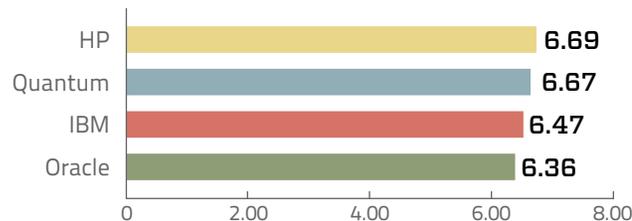
## Product Features

**Enterprise.** We saw our tightest finish among [enterprise tape storage systems](#) in the features category, which bodes well for the tape library market in general. HP nipped Quantum, 6.69 to 6.67, with IBM (6.47) and Oracle (6.36) in hot pursuit. In previous years, HP had two third-place finishes in this category; this time, it split the statements with Quantum, with each leading the field on four. HP earned a pair of 6.86s for “Overall, this product’s features meet my needs” and for loading and ejecting tape efficiently.

**KEY STAT:** For all four vendors, on all eight statements in this category, there was only **1** sub-6.00 score.

Its other high tallies were for being well designed (6.74) and management (6.65). Quantum’s best mark (6.88) was earned for “This product scales well”; it also garnered a 6.81 for interoperability, 6.76 for operational performance and 6.65 for user interface. IBM and Oracle were hardly slouches, with IBM’s best showing for scaling well (6.63) and Oracle’s on the loading/ejecting statement (6.83).

ENTERPRISE TAPE LIBRARIES: PRODUCT FEATURE



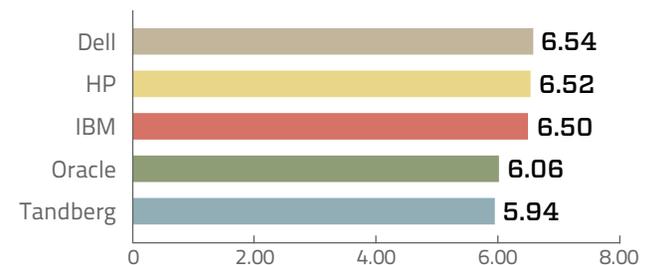
**Midrange.** Dell (6.54) earned its second category victory by just barely outdistancing HP (6.52) and IBM (6.50) in one of the closest one-two-three finishes we’ve ever seen. The three vendors split the category statements, with Dell taking four, and HP and IBM two each. Dell built its win on

**KEY STAT:** Click! Whirr! The group’s best average statement score was **6.48** for loading and ejecting tape efficiently.

a 6.72 for “Overall, this product’s features meet my needs,” a 6.67 for performance, a 6.60 for being well designed and a 6.47 for scaling well. HP’s statement wins were for loading/ejecting tape efficiently (6.78) and management features (6.63); IBM’s winning scores were

for interoperability (6.52) and its user interface (6.37). Oracle’s overall category score of 6.06 wasn’t that far behind the leaders, and Tandberg trailed by just a bit at 5.94. The group’s 6.31 overall average for the category is the third highest ever and not far off the best mark of 6.39.

MIDRANGE TAPE LIBRARIES: PRODUCT FEATURES



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## Product Reliability

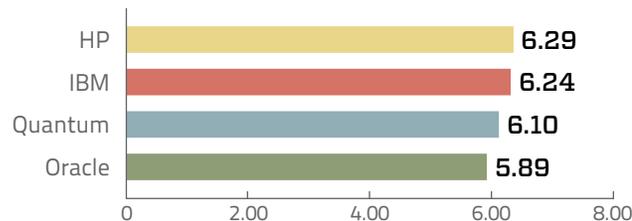
**Enterprise.** HP had another skin-of-its-teeth victory in the reliability category, outpacing IBM 6.29 to 6.24. HP led the pack on four statements and tied IBM on another; IBM and Quantum each had the top score on one statement. HP's

**KEY STAT:** IBM and Oracle have finished in the top three in the product reliability rating category in 7 of eight Quality Awards surveys for tape

best showing—and the highest single category score—was a 6.60 for meeting service levels. All the products did well on the service-level statement, with an overall average of 6.39. HP also scored well for non-disruptive patches/upgrades (6.42) and

finished in a near dead heat with IBM for providing good upgrade guidance (6.30 to IBM's 6.29). HP and IBM tied for products that had few bugs (6.19). IBM had the top score for "This product is rarely the cause of backup failures," and Quantum was first for requiring very few unplanned patches/updates (6.35). On the "This product's error handling is easy and intuitive" statement, HP won with a 6.17.

### ENTERPRISE TAPE LIBRARIES: PRODUCT RELIABILITY



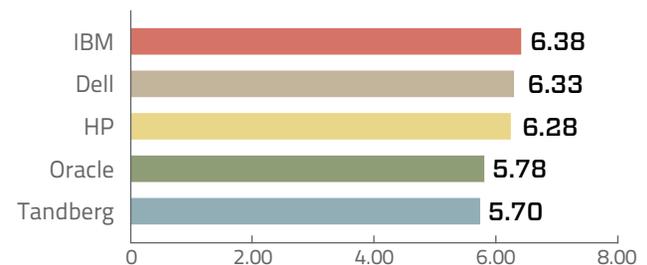
**Midrange.** For the second year in a row, IBM led the way in the product reliability ratings, posting a 6.38 to just slip by Dell (6.33) and HP (6.28). IBM has seen considerable success in this category, finishing in the top three in seven of eight surveys. Once again, top scores on individual

**KEY STAT:** The group's highest statement average was 6.34 for "This product requires very few unplanned patches/updates."

statements were divvied up by IBM, which led on four, Dell (two statements) and HP (one). IBM's best scores were for products with very few bugs (6.55) and for providing comprehensive upgrade guidance (6.50); it also

led for good error handling and rarely being the cause of backup failures. Dell picked up the highest score in the category—6.67—for meeting service-level requirements, and squeezed by IBM for requiring few unplanned patches or upgrades (6.50 to IBM's 6.49). HP's lone statement win was for "Patches/updates can be applied non-disruptively."

### MIDRANGE TAPE LIBRARIES: PRODUCT RELIABILITY



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## Technical Support

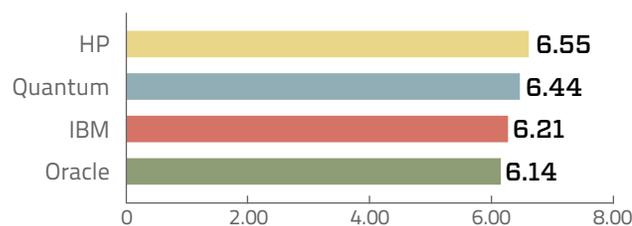
**Enterprise.** All four finalists earned high marks for their tech support, but HP (6.55) landed on top again by outscoring the field on five of eight category statements; Quantum (6.44) was in second and scored highest on the other three

**KEY STAT:** The enterprise group's highest across-the-board average was a **6.54** for the statement "Vendor supplies support as contractually specified."

statements. HP's best grades were for delivering support as promised (6.72), having their own knowledgeable support personnel (6.67) and knowledgeable third-party partners (6.65), and for products that are easy to service (6.64). Quantum notched a couple of 6.53s for

rarely having to escalate support issues and for resolving problems in a timely manner, along with a 6.76 for taking ownership of problems. Quantum has been among the top three in this category five times; IBM has finished in the top three for tech support on all eight surveys fielded.

### ENTERPRISE TAPE LIBRARIES: TECHNICAL SUPPORT



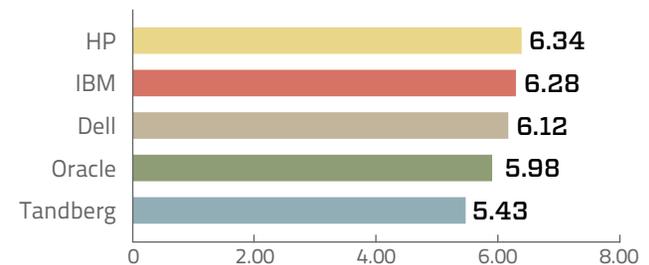
**Midrange.** HP was back in the midrange winner's circle for technical support, garnering a 6.34 to edge out IBM (6.28) and Dell (6.12). Overall, midrange tech support scores were lower than the enterprise group's, likely because midrange users rely on the vendors' tech staffs more. Still, there

**KEY STAT:** The midrange group's lowest overall rating category was a **6.03** for technical support.

were some standout performances among midrange libraries, including HP's 6.55 for products that are easy to service. HP also led on three other statements: knowledgeable support personnel (6.48), issues rarely needing escalation (6.40) and resolving problems in a timely way (6.23). IBM

ran first for taking ownership of problems (6.35), knowledgeable third-party partners (6.30) and providing adequate training (6.17). Oracle netted a 6.53 to lead the group for providing support as contractually specified.

### MIDRANGE TAPE LIBRARIES: TECHNICAL SUPPORT



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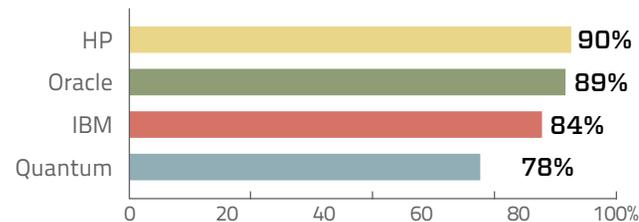
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## Given what you know now, would you buy this library again?

The final question for our survey participants is whether they would consider buying the product they're rating again, given what they've [experienced with the tape storage system](#) thus far. Sometimes, the "buy again" results seem to run counter to the responses on the rest of the survey—which can indicate that users develop some sense of loyalty even if they've had some rocky times with a particular product. This time, the numbers jibe more closely with the category rating results.

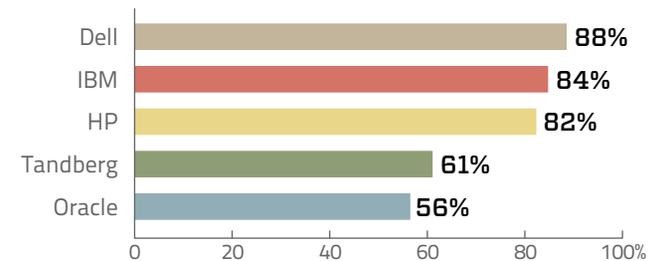
**Enterprise.** Hewlett-Packard turned in the best score with 90% of its users saying they'd repeat their HP tape library purchases. Oracle did well enough in the category ratings, but obviously boasts significant user loyalty as 89% checked "yes" for buy again.

### ENTERPRISE TAPE LIBRARIES: WOULD YOU BUY THIS PRODUCT AGAIN?



**Midrange.** The vendors that occupied the top three spots in all five ratings categories also held those positions for the buy again question. Dell's midrange users exhibited the strongest loyalty, as 88% said they'd plunk down their money for the same product again. And with faithful followers of their own, IBM (84%) and HP (82%) weren't far behind.

### MIDRANGE TAPE LIBRARIES: WOULD YOU BUY THIS PRODUCT AGAIN?



**RICH CASTAGNA** is editorial director of TechTarget's Storage Media Group.

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## About the survey

The *Storage* magazine/SearchStorage.com Quality Awards are designed to identify and recognize products that have proven their quality and reliability in actual use. Results are derived from a survey of qualified readers who assess products in five main categories: sales-force competence, initial product quality, product features, product reliability and technical support. Our methodology incorporates statistically valid polling that eliminates market share as a factor. Indeed, our objective is to identify the most reliable products on the market regardless of vendor name, reputation or size. Products are rated on a scale of 1.00 to 8.00, where 8.00 is the best score. A total of 388 respondents provided 451 tape library evaluations.

**Products in the survey:** The following vendors/model lines of enterprise-class and midrange tape libraries were included in this Quality Awards survey. The total number of responses for each finalist is shown in parentheses.

### ENTERPRISE

Hewlett-Packard ESL/EML Series (60)  
 IBM TS3400/TS3500 (64)  
 Oracle StorageTek SL3000/SL8500 (37)  
 Overland Storage NEO 8000 Series\*  
 Qualstar XLS Series\*  
 Quantum Scalar i500/i2000/i6000 (18)  
 Spectra Logic T950 or T-Finity\*

### MIDRANGE

Dell PowerVault Tape Backup 124T, TL4000/TL2000 or ML6000 Series (83)  
 Hewlett-Packard MSL Series (62)  
 IBM TS3100/TS3200/TS3310 (49)  
 Oracle StorageTek SL150 (16)  
 Overland Storage NEO 200s/400s or NEO 2000e Series/NEO 4000e Series\*  
 Qualstar RLS Series\*  
 Quantum Scalar i40/i80\*  
 Spectra Logic T50/T120/T200/T380/T680\*  
 Tandberg Data StorageLibrary T24/T40/T80/T120/T160 or StorageLoader Series (18)

\* RECEIVED TOO FEW RESPONSES TO BE INCLUDED AMONG THE FINALISTS



# Preparedness as a part of production

*Data protection must be considered part of the IT and corporate culture for business continuity/disaster recovery plans to succeed.*

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**T**HE WAY A company does its information technology—systems, support and strategy—is part of its culture. One could even argue that anything ingrained in an organization’s culture gets done and the rest doesn’t.

Backup tasks often don’t affect corporate culture. They probably should, but they typically don’t. Instead, backup is often seen simply as a bunch of after-production tasks to make one or more (often a lot more) copies of what’s in production. That explains why so many [business continuity and disaster recovery \(BC/DR\) plans](#) suffer atrophy—they’re often developed within the vacuum that is IT, and therefore don’t affect the ongoing organic culture of the organization.

BC/DR preparedness has to affect corporate culture.

Why? Because if you developed a BC/DR plan that hasn’t affected corporate culture, that plan became out of date the day after you published it. You need to recognize that production environments continually change: new servers are added, machines get moved and the critical nature of services changes. If you haven’t [made preparedness part of production](#), then when the changes happen in production, they won’t be organically reflected in your preparedness plan. And when it comes time to actually fail them over, you won’t know about them because your documentation effort stopped the day your plan was published.

BC/DR planning has to affect corporate culture so that as production evolves, [your BC/DR plan evolves](#) as well. For example, whenever IT decides to stand up a server or a new service, the first questions its operations person should ask are: “What do we need to do to update

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our BC/DR plan accordingly? Should we start replicating that virtual machine? How often should that server's data be protected? How long should the data on the server be retained?"

Answering those questions takes more than the backup admin's opinion, which is just one of the many reasons why [BC/DR planning requires a wider effort](#). In the broader sense, the initial BC/DR initiative, the first BC/DR plan, the ongoing "preparedness as part of production" culture shift, and the recurring BC/DR plan testing and maintenance all take a multi-member, cross-functional team:

- Executive sponsorship is needed to ensure that the plan does affect culture. The backup administrator isn't going to change the culture of the IT team, much less the culture of the whole business.
- In many cases, you, as the backup manager, don't have enough information to understand (as production changes) what related [changes the BC/DR plan needs to receive](#). Often, that's where tech tools can help; they can assess what's on the wire through discovery and potentially tell you what the interdependencies are, which is hard to discover otherwise. You have to know how your production environment is evolving, so your BC/DR team can sustain and evolve the BC/DR plan accordingly.

*Preparedness has to be part of production.* It's a cultural change that's dependent on a technology-level understanding of what is in, and what is evolving with, the IT infrastructure.

This emphasis on needing a broader team than just the backup staff won't diminish the value of their role. After all, no amount of process or procedure will help if the data doesn't survive the calamity. The good news for [backup administrators considering their participation](#) within a BC/DR framework is that the conversations BC/DR planning drives may actually help a backup administrator get to a managers' desk or a corner office.

- A backup admin *manages*; a BC/DR architect *leads*.
- A manager is *tactical*; a leader is *strategic*.

When you think about ways to affect culture, to convert technical challenges into business challenges and solutions, that's when you go from being a manager of backup tactics to a leader of BC/DR strategy. Not only will your company benefit from the better preparedness as part of production, but the view from your desk might improve as well. ■

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# Storage management is still elusive

*There's a lot more to managing storage than ensuring that performance and scalability are addressed. Traditionally, it's been an expensive affair, but new architectures are doing a better job of managing storage resources.*

# W

**E'VE BEEN ON** a multi-decade crusade to address performance and [basic storage management tasks](#) to handle things such as protecting data in place, and scaling and [expanding our data storage systems](#) to meet new requirements. But today, when performance and scaling and expansion issues are addressed, it will be revealed that the last major challenge in the data center is storage management.

Storage management is a massive challenge, and the enormity and complexity of this task are why it always seems to be addressed last, after performance and other core storage features. But just because it's often overlooked or given a low priority doesn't mean it's not important. In fact, the level of efficiency with which [storage is](#)

[managed](#) can make or break a data center.

Today, midrange storage systems run in the neighborhood of \$3 to \$5 per gigabyte at street prices. But storage management has always incurred a far greater cost when calculated on an annual basis. While advancements have lowered those costs over the past couple of years, today management still adds another \$5 to \$10 per gigabyte, even topping the up-front cost of a storage system, especially when those costs are added up over a three- to five-year storage system lifespan.

For virtual infrastructures, the problem is even worse. There's a greater need for [management of the virtual machine](#) to physical storage interaction and, because of the density of workloads, there's also more of a need to manage data-in-place operations (snapshots, replication and so on). These two elements greatly increase storage

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complexity and the level of routine interaction with storage. Despite these needs, management is still too often overlooked or not valued strongly enough during the storage purchasing process.

Right now, the industry is in the throes of software-defined buzzology. Regardless of the specific software-defined (fill-in-the-blank) technology (SDx technology), the focus is on greater business agility through dynamic, on-demand adaptability and programmatic manipulation of the newly abstracted logical infrastructure that has been set free from its physical boundaries. It's something of a utopian vision, where we can get away from plugging things into each other only to find out that they don't work together. So it's easy to sit back and hope that SDx will solve all our management woes, but management is a far broader issue than programmatic manipulation.

If we miss the management boat this time, there's no place the enterprise will feel the pain worse than in its storage environment. If we don't tackle management at the outset, software-defined storage (SDS) could potentially scale into a tremendous nightmare. Logically and dynamically weaving connections together won't be very advantageous if you can't figure out and manage the connected resources.

But the outlook isn't all bad. I've never been fond of yet another layer for solving the management challenge. I prefer to think we should expect a comprehensive and well-[integrated solution for our storage infrastructure](#)

without spending even more money on another product. There are a handful of vendors delivering practical SDS today—even aiming for a more ambitious SDS tomorrow—and some of those solutions are also tackling parts of the management challenge.

**If we miss the management boat this time, there's no place the enterprise will feel the pain worse than in its storage environment.**

On one hand, there are solutions with an element of SDS, such as [converged infrastructure](#) and [hyper-convergence products](#) that are trying to reduce complexity and enhance manageability by more closely coupling hardware and applications. A few that stand out are Hewlett-Packard (HP)'s VirtualSystem/CloudSystem family with its recently announced and API-enabled OneView, Hitachi's Unified Compute Platform, IBM with PureSystems, Nutanix, SimpliVity and the VCE coalition.

There are also SDS solutions that aim to move storage entirely into software for reasons of portability, enhanced adaptability and/or complexity reduction. These solutions include [virtual storage appliance \(VSA\) offerings](#) from FalconStor, HP StoreVirtual, Nexenta, StorMagic and others, as well as VMware's own VSAN. By encapsulating

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the storage instance in the virtual infrastructure, these products can run anywhere, use otherwise stranded capacity, and often make use of unique virtual infrastructure integrations to make [virtual storage management](#) a bit less complex.

A few vendors, such as Gridstore and Tintri, are fundamentally rethinking storage integration in a somewhat more ambitious manner. Gridstore is breaking the storage controller apart from the storage capacity, so that storage functionality can be deployed closer to the application and be a bit more intelligent. We've had Tintri's Zero Management Storage in our test labs and saw how they

have effectively taken the storage array entirely out of the equation by making everything virtual machine-centric, radically changing how storage is managed.

So, there is hope. Ultimately, however, it's up to you to determine whether it turns into a broad-based change in how storage is managed in our enterprises. If your storage vendor wants to talk SDS, tell them the conversation better start with what they're going to do for storage management. ■

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**JEFF BOLES** is a senior analyst at Taneja Group.

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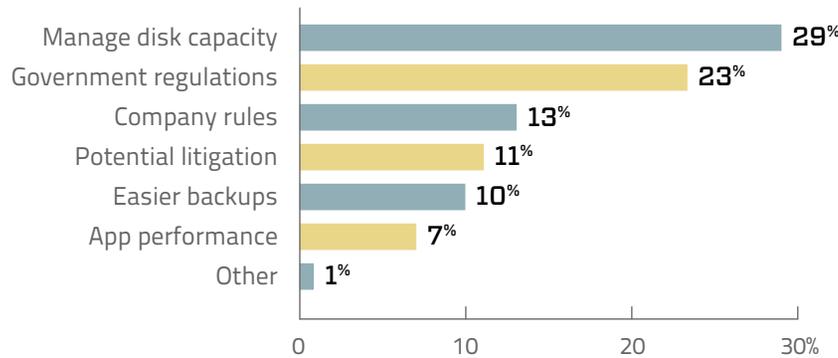
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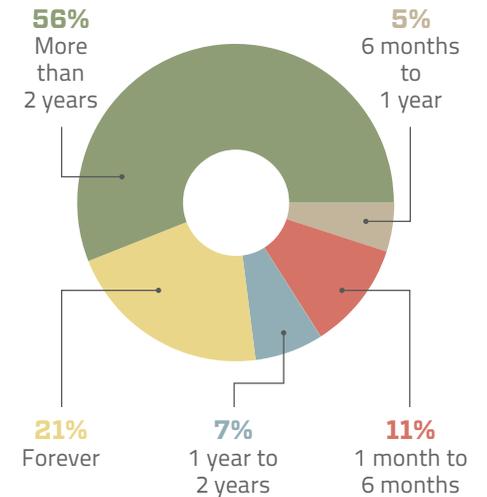
## More than half of IT shops archive email, but nearly a third don't archive at all

**ONCE UPON A TIME**, most IT shops considered really old [backup tapes their archives](#). But now we know that really old backup tapes are just really old backup tapes, while archives are collections of inactive—but useful—data that can be [retrieved and searched as needed](#). Fifty-five percent of our survey respondents use email archivers; 39% use file system archivers and 29% [archive their databases](#). The main reason shops archive is to control disk capacity (29%), but 23% do it to toe the line with government regulations. Eleven percent archive data for up to six months, 56% keep it for more than two years and for 21%, [archiving means forever](#). Fifty-five percent must like archiving, as they say it's made their job easier; 12% say the opposite (it made it harder!) and 33% don't see a difference. Most shops report their archivers do a pretty good job—on a scale of 1 (inadequate) to 5 (excellent), users rated file and database archivers highest at 3.4; [email archivers](#) and app-specific archivers received a 3.1. For the 29% of companies that still aren't archiving, 32% think backups suffice while 27% admit they should be archiving but haven't started yet. —*Rich Castagna*

### WHAT'S THE MAIN REASON YOU ARCHIVE DATA?



### HOW LONG IS YOUR COMPANY'S ARCHIVED DATA STORED ON "ACTIVE" DISK?



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PERCENT OF COMPANIES THAT AREN'T DOING DATA ARCHIVING AT THIS TIME



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CONTROLLING CAPACITY AND REGULATIONS CHIEF REASONS FOR DATA ARCHIVING

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