SearchStorage

TechTarget

E-Guide

Scale-out NAS: Everything you need to know

With data storage requirements at an all-time high, *the flexibility of a scale-out network attached storage (NAS) architecture is something a growing number of IT managers are investigating. In this expert tutorial, you'll read why scale-out NAS continues to replace traditional NAS, and learn which questions to ask yourself and your vendor while researching scale-out technology. You'll also get a first-hand account of how UCLA employed scale-out NAS to tackle its rising data storage and much more.*

Contents

Scale-out network-attached storage: What you need to know

With data storage requirements at an all-time high, the flexibility of a scale-out network-attached storage (NAS) architecture is something a growing number of IT managers are investigating. This technology allows IT shops to scale their initial purchase by adding a virtually unlimited amount of NAS nodes down the line without having to replace the original infrastructure. That simple proposition is fueling a slew of new products and purchases in the data storage industry.

In this tutorial, you'll read why scale-out NAS continues to replace traditional NAS, and learn which questions to ask yourself and your vendor while researching scale-out technology. You'll also get a first-hand account of how UCLA employed scale-out NAS to tackle its rising data storage requirements.

Why many IT pros are praising scale-out network-attached storage systems

The insatiable need for file-based primary data storage is propelling three technologies -- scale-out network-attached storage (NAS), object-based storage and the cloud as a NAS tier -- to the forefront as potential lifelines for IT shops overwhelmed by unstructured data.

Contents

Scale-out NAS systems can boost capacity, performance and availability with the addition of storage nodes or x86 servers equipped with a special operating system and storage. The most scalable of the clustered storage systems have the potential to manage petabytes of data across more than 100 nodes, but they're accessed and managed as a single system through the use of a distributed file system or global namespace.

Object-based storage systems are another promising alternative to traditional NAS. Object storage foregoes traditional file systems, which have capacity and management shortcomings. Instead, these systems assign a unique identifier, or digital fingerprint, to each file plus its metadata. This identifier renders the physical location immaterial and provides massive scalability.

Using the cloud as a NAS tier is another option for IT shops coping with a flood of unstructured data. In particular, a lot of attention is gravitating toward a new wave of file-based gateway appliances that move data to a cloud service provider. These can be hardware or virtual appliances, and they can solve security and data access issues that make IT shops hesitant to use the public cloud.

Here's what you need to know about these three NAS technologies as you plot out your file storage:

Scale-out NAS

A traditional scale-up NAS box has a fixed amount of CPU, cache and drive slots. When it fills up, the customer needs to buy another device. Scale-out NAS systems appeal to organizations with huge files because of their potential for seemingly limitless expansion while still being managed as a single storage resource.

Also known as clustered NAS, scale-out NAS originally took aim at applications requiring high throughput and high bandwidth, such as those in media and entertainment, high-performance computing, bio-informatics, and oil and gas.

Contents

But these scale-out systems often weren't tuned to perform well with the typical enterprise application, where EMC Corp. and NetApp Inc. held sway with their traditional NAS devices.

Terri McClure, a senior analyst at Enterprise Strategy Group (ESG) in Milford, Mass, said scale-out NAS tended to excel in environments with fewer numbers of unusually large files rather than the large number of small files the typical enterprise has. That made them a good choice for applications such as video streaming. But as scale-out vendors tune their systems to perform better with more I/O-intensive enterprise applications, their systems are starting to show up in more enterprise IT shops.

Scale-out NAS got a major shot in the arm late last year when EMC acquired Isilon Systems. Isilon offers three options: its S-Series aimed at I/O-intensive smaller files, its X-Series for fewer number of large files and its NL-Series for bulk high-capacity and low-performance storage.

Isilon's 72000X has a maximum capacity of 10.4 PB in a single file system from a 144-node cluster. The company's solid-state drive (SSD)-equipped S200 has a lower maximum capacity at 2 PB, but offers 85 Gbps of aggregate throughput and 1.2 million NFS IOPS in a single file system/volume from a 144-node cluster.

Isilon claims its distributed file system-centric system was built from the ground up for scale-out storage, whereas systems that make use of a global namespace require a software layer for scale-out NAS.

But Jeff Boles, a senior analyst and director, validation services at Hopkinton, Mass.-based Taneja Group, said the nuances of the architecture matter less to end users than the ease with which the system scales and whether multiple storage nodes can be managed as a single storage system.

"Scale out is still very new and innovative and proprietary," Boles said. "Because it's not as simple of an operation as building a controller head on an array, you're not going to see a convergence of technologies around one best architecture."

In addition to Isilon's offering, other scale-out products include BlueArc Corp.'s Mercury and Titan Series Servers (which Hitachi Data Systems resells as the Hitachi NAS platform), Dell Inc.'s PowerVault NX3500 with a clustered file system acquired from Exanet, Hewlett-Packard (HP) Co.'s X9000 family (based on technology acquired from Ibrix), and IBM's SONAS. NetApp has a cluster mode version of its Data Ontap 8 operating system (but not a clustered file system) and Quantum Corp.'s StorNext and Symantec Corp.'s FileStor are clustered file systems that run on hardware appliances.

Greg Schulz, founder and senior advisor at StorageIO Group in Stillwater, Minn., said some scale-out NAS products increase the number of nodes for parallel performance or large sequential streaming, while others optimize for concurrent access of multiple small random file or page views. Some focus on data storage capacity, and others emphasize clustered file systems or clustered nodes, he said.

More scale-out options are on the way. Dell, for instance, plans to use Exanet technology to add scale-out capabilities to its EqualLogic and Compellent SAN systems, according to Scott Sinclair, senior manager of Dell enterprise storage.

NetApp's Brendon Howe, vice president and general manager of the NAS business unit, added via email that the company's next-generation Ontap 8 Cluster-Mode is designed as a scale-out version of its unified architecture that extends to enterprise applications and virtualized data centers.

"We find that segmenting the scale-out discussion to just 'NAS' isn't that meaningful to customers," Howe said.

Randy Kerns, a senior strategist at Evaluator Group Inc. in Broomfield, Colo., said although there are situations where scale-out NAS makes sense, there are also plenty of use cases where customers will prefer simpler traditional NAS.

"It may boil down to there's a place for both," Kerns said. "I think scale-out NAS and traditional NAS will both be around a long time."

Object-based storage

Object-based storage is hardly new. EMC pushed it into the forefront in 2002 with its Centera line in an attempt to stake out a new market known as content-addressable storage (CAS). But performance issues generally relegated the use of CAS products to archives of information that rarely if ever changed, such as medical images.

A new wave of object storage makes use of such protocols as Representational State Transfer (REST), and is gaining a second look for near-line and primary data storage -- especially in the cloud.

"There's no technical barrier that says you can't use object [storage] for primary storage," said Andrew Reichman, a principal analyst at Cambridge, Mass.-based Forrester Research Inc. "Some primary storage is not that performance sensitive, especially with files."

EMC now promotes Atmos for that purpose. Other object offerings include Caringo Inc.'s CAStor, DataDirect Networks Web Object Scaler (WOS), Dell's DX Object Storage (which uses Caringo's technology), NetApp's (formerly Bycast) StorageGrid, and products from startups such as Amplidata, Cleversafe Inc., Mezeo Software and Scality.

"In the long run, we could see object [as] a replacement for file storage -- just a better way to do file storage," Reichman said.

Object storage is attractive to cloud storage providers because of its massive scalability and shared tenancy features, especially in comparison to ordinary file- or block-based storage.

"You have so much metadata for each chunk of data, you can lock it down more easily and move it around based on policies and change the redundancy based on policies," Reichman said, explaining the draw for cloud providers.

Contents

Cloud NAS

Using the public cloud as a NAS tier for primary storage is a much tougher sell for most IT shops than for backups or archives. But one of the emerging technologies that could start to make that prospect more palatable is the gateway that acts as a hybrid cloud storage appliance.

The appliances supply an on-premises cache that can provide access to the most active or frequently accessed data, so latency or network or cloud outages won't prevent users from getting needed files. Algorithms determine which data to store in the cache.

Many of the appliances also offer data reduction technologies such as deduplication or compression to reduce bandwidth consumption and lower the fees associated with transferring data to and from the cloud. They also encrypt the data before sending it off-premises and offer extra features such as snapshots to lighten the load on backup systems.

Several startups currently rule the roost in the NAS hybrid cloud space and typically partner with prominent cloud storage providers. They include Ctera Networks Ltd., Nasuni Corp. and StorSimple Inc. Nasuni makes a software-based virtual NAS appliance that installs on a virtual machine (VM).

Another option is Nirvanix Inc.'s CloudNAS product, which can transform Linux or Windows servers into a virtual NAS gateway to the company's Storage Delivery Network (SDN) encrypted off-site storage. Nirvanix uses standard protocols such as NFS, CIFS and FTP for access to its service.

Rick Villars, vice president of storage systems and executive strategies at Framingham, Mass.-based IDC, predicted that major NAS vendors such as EMC or NetApp will eventually provide the protocol support for a cloud tier in addition to their SSDs and SATA and SAS drives.

"We think that day is coming. It may not be this year. It may be parts of next year," Villars said, acknowledging the business model challenges for the NAS vendors. "That's the last step. That hasn't happened yet, but there's

certainly no reason why they can't. It would require some software. It would require some links. But you could absolutely add that function in."

Vendor landscape overview guide to your next scale-out NAS infrastructure purchase

Today's storage managers are facing exponential data growth and the number of NAS technologies and products offered to combat data sprawl seem to be growing just as quickly. More and more, data storage managers are looking at the differences between traditional scale-up choices and newer scale-out products.

Here's a quick overview of the evolving NAS market. As 2012 nears, dominant players position themselves with aggressive acquisitions and new scale-out offerings.

Traditional/Scale-up NAS: EMC and NetApp, a NAS pioneer that released its first system in 1993, continue to dominate the NAS market. Through the first quarter of this year, EMC had a 48.8% revenue share and NetApp was next at 30.8%, according to IDC.

Both EMC and NetApp have proprietary NAS operating systems, but many of their competitors -- including Dell, HP and IBM -- leverage Microsoft Corp.'s Windows Storage Server in traditional NAS. IBM also rebrands NetApp products as its enterprise NAS platform.

Traditional NAS products tend to differentiate largely based on the built-in or add-on software that vendors make available, rather than performance or minimum/maximum starting points, according to Arun Taneja, founder and consulting analyst at Taneja Group in Hopkinton, Mass.

"People buy NetApp because NetApp has the best surrounding software: SnapMirror, SnapVault and the list just goes on," Taneja said. "That's the No. 1 distinguishing factor on the traditional NAS side."

Smaller vendors, such as Buffalo Technology Inc., D-Link Corp., Drobo Inc., Iomega Corp. (a wholly owned subsidiary of EMC), LaCie Group S.A.,

Contents

Netgear Inc. and Overland Storage Inc., target small- and medium-sized businesses (SMBs) and departments of large corporations with low-end systems.

Scale-out NAS: Traditional NAS may currently represent the majority of file-based storage systems in business environments, but industry analysts expect the situation to flip in favor of scale-out NAS over the next few years.

“In the end, everything will be scale-out to some extent,” said Andrew Reichman, a principal analyst at Forrester Research Inc. in Cambridge, Mass. “File data growth is at a very high rate for most companies, and having to buy a single box and predict how much capacity you’re going to need for the next five years is a real challenge. Nobody wants to do that.”

Major storage vendors have made scale-out NAS a prime acquisition target. In the largest deal, EMC paid approximately $2.25 billion in late 2010 to purchase Isilon Systems Inc. and gain a foothold in scale-out NAS.

The most recent deal was Hitachi Data Systems (HDS) Corp.’s acquisition of its OEM partner BlueArc for about $600 million. HDS rebranded BlueArc’s products for years as Hitachi NAS (HNAS). BlueArc had sold its enterprise-class Titan Series for more than eight years and its midrange Mercury Series since mid-2009. Regardless, some analysts question the true scale-out nature of the BlueArc systems.

“BlueArc’s approach is less about clustering and more about really big, really fast boxes that can be paired,” Reichman said. “The clustering they talk about is really a two-way cluster more than an n-way cluster.”

NetApp had a big head start on its NAS archrival, EMC, with the purchase of Spinnaker Networks Inc. in November 2003. But the fruits of the merger didn’t start to take shape until the 2006 release of NetApp's Ontap GX and, more significantly, with the 2009 release of its Data Ontap 8 operating system. NetApp still isn’t a true scale-out architecture, but Data Ontap 8.1, expected by year’s end, aims to integrate more of the enterprise-class features and functions from NetApp’s traditional NAS with the cluster mode.

HP's mid-2009 deal for Ibrix produced its X9000 family of scale-out NAS products, and that same year, Oracle Corp.'s purchase of Sun Microsystems Inc. led to the ZFS OpenStorage Appliance that Sun marketed as its 7000 series.

Dell's February 2010 purchase of Exanet Ltd.'s assets contributed to its PowerVault NX3500, which launched in April 2011. Dell also added scale-out NAS capabilities to its EqualLogic FS7500 and is working on integrating its scalable file system into the SAN platform acquired from Compellent Technologies Inc.

One of the main distinctions between scale-out NAS products is whether they tilt toward throughput to better handle large files or IOPS for large numbers of small files.IBM based its Scale Out Network Attached Storage (SONAS) product, launched last year, on its General Parallel File System (GPFS) and the Scale-Out File Services (SOFS) offered through IBM Global Technology Services.

Panasas Inc. heads the list of vendors focused on HPC. Other HPC specialists include Terascala Inc. and Xyratex International Inc. DataDirect Networks Inc. also plays in the space when its arrays are bundled with the open-source Lustre distributed file system or IBM's GPFS.

Additional vendors with targeted offerings include Facilis Technology Inc., which focuses on media and entertainment; Gridstore Inc., Reldata Inc. and Scale Computing Inc., which cater to small- and medium-sized enterprises (SMEs); and Nexenta Systems Inc. NexentaStor, Quantum Corp. StorNext and Gluster Inc. Virtual Storage Appliance that have file systems that serve as the underlying technology for scale-out NAS systems.

"The instant you know the answer to that question," Taneja Group's Taneja said, "you know which applications it will do very well in and which applications it will not be a good product for."

Contents

Taneja noted that Isilon started with throughput-centric systems that performed well with large files such as rich media. But, more recently, Isilon worked to balance its architecture and improve its IOPS performance, he said. The company now offers three product lines, each geared toward a different type of workload.

Another thing to look for in scale-out products is their support for the Common Internet File System (CIFS), the file-sharing protocol in Windows-based systems, noted Randy Kerns, a senior strategist at Evaluator Group in Broomfield, Colo.

Kerns said that scale-out network-attached storage systems in HPC were predominantly Unix- or Linux-based, and may lack a native CIFS implementation. Without native CIFS, users might experience problems with permissions handling, security and Active Directory integration, he said.

Scale-up and scale-out: Some NAS vendors, such as Dell and HDS BlueArc, claim to support both traditional/scale-up capacity and scale-out performance configurations, with a single namespace to ease management.

“Scale-up systems can’t typically scale out, but scale-out systems can scale up,” said ESG’s McClure. She said the transactional file I/O capabilities in EMC's Isilon S-Series qualify those products as scale-up and scale-out. Isilon also sells an X-Series for large capacity needs and a NL-Series focused on nearline storage.

How Isilon scale-out network-attached storage keeps a digital media business rolling

Industrial Color Inc. installed its first of five Isilon Systems Inc. scale-out network-attached storage (NAS) clusters five years ago to cope with a deluge of digital photos uploaded through its homegrown GLOBALedit Web application.

Aaron Holm, the company’s vice president of development, said he can’t imagine using anything other than scale-out NAS to handle the digital photos

and videos of customers such as Kohl's, NBC Universal, Old Navy, Victoria's Secret and Warner Brothers.

New York-based Industrial Color had approximately 25 TB of data in 2006 when it purchased its first clustered NAS system from Isilon, long before EMC Corp. acquired the vendor in late 2010. The company currently stores about 250 TB of data across its five Isilon scale-out NAS clusters.

"I don't think we'd be able to do what we do as a business unless we had that kind of storage," Holm said. "It's fundamental."

Industrial Color has two businesses: software and creative photo/video production. The company builds and hosts two Web-based software-as-a-service (SaaS) applications: GLOBALedit for work-in-progress photo and video management, review and approval; and File Society for high-speed file transfer. The IT team also manages data storage of digital photos and videos that the company's technicians shoot for the Capture and Motion businesses.

Although Holm didn't specifically seek out "clustered" NAS or "scale-out" NAS prior to the initial Isilon purchase, he was looking for a system that would let the company scale as easily and inexpensively as possible to meet escalating data storage needs.

"We just wanted really high availability and high-performance storage," he said.

Before switching to Isilon scale-out NAS, GLOBALedit used a traditional NAS system from NetApp Inc. When the NetApp NAS system reached its limit, the IT team faced the prospect of buying new NAS heads and disk trays or perhaps an entire new device.

Holm said with Isilon's OneFS operating system running across all the hardware, adding storage nodes is as easy as plugging in a new Isilon blade and typing a command to add it to the cluster.

Contents

“With Isilon, you add the storage, but you also add the additional network interfaces, cache and processing because of the new hardware you’ve added to the infrastructure,” Holm said. “Because every node in an Isilon cluster has the same components, when you scale it, you’re actually adding performance [in addition to capacity].”

The concept of failover in scale-out vs. traditional NAS also appeals to Holm. “With NetApp, the failover is based on the idea that I have two of everything,” he said. “With Isilon, the failover is based on the operating system being striped across the entire cluster.”

But because Isilon wasn’t designed to handle mainstream business applications, Industrial Color kept its NetApp system with approximately 5 TB for database servers.

Industrial Color’s second Isilon cluster coincided with its move from Manhattan to White Plains, N.Y., to a new disaster recovery (DR) facility. The project spanned four months because the team decided to shift its production data from GLOBALedit’s legacy Isilon iSeries 6000 to its new X-Series 9000. Holm said the iSeries system is used for DR now.

Holm said he’s impressed by Isilon’s continually evolving roadmap, which tends to keep pace with his needs. For example, Industrial Color recently needed to roll out a 10 Gigabit Ethernet (10 GbE) network to stream high-definition video simultaneously to four desktops. Isilon’s latest S-Series supports 10 GbE.

“A year ago, Isilon didn’t have a product that would have met what we wanted to do,” he said.

Industrial Color had been using Apple Inc.’s Xsan storage with its Capture and Motion businesses when it recognized the need for a system that could scale faster and require less time to manage.

“At that point, the metadata implementation on the Xsan had hurt us. We’d had situations where we’d had total storage failure,” Holm said.

But the three-month move from the Xsan to the more sophisticated Isilon cluster was not without pain; the new system required more administrative expertise as well as engineering work on the network to get it to perform as desired. But, Holm said, the effort was worth it.

“We need to be able to pivot on a dime,” he said, noting that a customer might need 10 TB of storage in less than a day.

The GLOBALedit application now runs across 30 servers and uses Isilon’s X-Series 9000, or 9000x, with nine storage nodes for approximately 70 TB of primary data and about 60 TB for disaster recovery. File Society’s 9000x, purchased in 2009, has four nodes and approximately 24 TB. Capture uses 9000x (bought in 2008) and has close to 36 TB across four nodes. And Motion uses the faster S-Series and has 48 TB across seven nodes.

The IT team can add storage nodes while the system is running. To compensate for any performance hit when adding a server to the cluster, the team times the changes to coincide with periods of low activity.

“The reason why we’ve liked Isilon is because ultimately their implementation is just simpler,” Holm said. “It’s a simpler way to provide both administration and provisioning for very large, scalable storage clusters.”

Why UCLA opted for a scale-out NAS approach to its big data storage problems

Because Linux servers with direct-attached Fibre Channel (FC) disks couldn’t keep pace with the rapid growth of file data storage required by UCLA’s Institute for Digital Research and Education (IDRE) compute cluster users, the institute turned to high-performance network-attached storage (NAS) four years ago.

IDRE’s systems store a broad range of data, from home directories to millions of smallish genomics files, to the huge files of physicists and other scientists doing computational work. UCLA has three BlueArc Corp. Titan 3200 servers from Hitachi Data Systems (HDS) with a total capacity of

approximately 500 TB. It also stores 240 TB on a Panasas ActiveStor 11 (PAS 11) and another 160 TB on more expensive PAS 12 systems.

Scott Friedman, chief technologist at UCLA's IDRE, said he plans to add another 540 TB to the PAS 11, which will increase the total capacity of the Panasas system to 940 TB.

IDRE began its ongoing journey to scale-out NAS with BlueArc Titans for its compute cluster. Over time, it has made the powerful data storage systems available to other campus users, including the athletic department with its extensive library of video game footage.

"What they're really good at is lots of IOPS, lots of small operations, lots and lots of clients," Friedman said of the Titans, which are now sold by HDS following its acquisition of BlueArc last September.

HDS claims the Titan 3200 can deliver 200,000 IOPS per node, scale to eight nodes per cluster and manage 16 PB of data under a single namespace. But each node is currently limited to two 10 Gigabit Ethernet (10 GbE) ports.

File data storage requirements cause bandwidth issues

Unfortunately, the bandwidth wasn't always adequate for some of UCLA's research scientists. With its three Titan 3200 nodes, IDRE gets good performance only when the heaviest users aren't choking the links to the heads. Even just one researcher can overload the connection to the Titans, according to Friedman.

"It's a network limitation. We aggregated two 10 Gigabit links to each head, and they're often saturated," he said. "That's the limit of bandwidth that you can feed into one of the heads, and it's just not cost effective for us to keep adding those heads because it doesn't scale the way we need it to scale.

"If I'm opening and then writing to a huge file, and I'm constrained on the network, it doesn't matter how many IOPS they can do," he continued. "We

can't take advantage of it. It's not that there's anything wrong with BlueArc. It means it's just not the right tool for the job for that user."

Fred Oh, a senior product marketing manager for the Hitachi NAS product line, agreed that network bandwidth is the limiting factor to the file-sharing server on the front end or to the storage array on the back end. He said HDS intends to support 40 GbE connections with its next-generation architecture, due later this year.

"We've been waiting for a while now for the network bandwidth to catch up to our NAS head horsepower," Oh said.

Friedman, at UCLA's IDRE, hoped Parallel NFS (pNFS) would address the problem. The long-awaited protocol promised a performance boost by providing parallel, rather than serial, client access to the file data and metadata distributed across multiple clustered storage devices.

Prior to the HDS acquisition, BlueArc announced plans to make pNFS available in the first half of this year. But HDS' Oh said the specification still needs work. He declined to give a timetable for its public release, saying only that HDS will bring pNFS to market when it's "ready and reliable."

Panasas products offer scaling

Last spring, UCLA's IDRE decided it couldn't wait any longer for BlueArc's implementation of the pNFS standard (which is part of NFS version 4.1). It turned to Panasas Inc., which helped develop pNFS, although Panasas has yet to support the pNFS standard in products. Panasas, however, does make available its direct precursor to pNFS, called DirectFlow.

In April 2011, UCLA deployed a PAS 12 with four 40 TB disk shelves, and last October it added a less expensive PAS 11 with four 60 TB disk shelves. All servers in UCLA's Linux-based compute cluster run NFS and Panasas' DirectFlow clients, which IDRE installs via an automated provisioning mechanism.

“What we really needed was the scalability, and I don’t care whether it’s NFS or what the protocol is,” Friedman said. He added that, in the end, it’s more important to have a product suited to horizontal scaling, “where as our needs grow, the scalability of the bandwidth can increase with it. And that works a lot better in the Panasas case for us than BlueArc.”

Each of UCLA’s PAS shelves has a 10 GbE link. The PAS 12s, which IDRE uses only as scratch space, offer write throughput of 1.6 GBps and the PAS 11s can write data at 950 MBps.

When IDRE added a second shelf to its PAS 11 and used the DirectFlow clients, the system rebalanced and supplied 1.8 GBps of write bandwidth, spreading the load over all 20 blades instead of only the 10 blades in a single shelf, Friedman said.

Tests have also shown performance scaling almost perfectly with the four shelves they’ve tried so far, according to Friedman. IDRE has no plans to spread Panasas’ object-based parallel file system over more than five or six disk shelves.

“As long as we keep our infrastructure up to support each new shelf that we add, we get almost linear scaling in the performance,” he said. “We’ve seen the scalability match the advertising, so far.”

Friedman expressed hope that once the users causing the problems on the BlueArc Titans move over to the Panasas NAS systems, those remaining on the BlueArcs will have a better experience.

“To us, the systems serve two different purposes,” Friedman said. “We have a really wide array of use cases here, and there's no one vendor that can cater to all the needs that we have.”

TechTarget

Contents

Free resources for technology professionals

TechTarget publishes targeted technology media that address your need for information and resources for researching products, developing strategy and making cost-effective purchase decisions. Our network of technology-specific Web sites gives you access to industry experts, independent content and analysis and the Web's largest library of vendor-provided white papers, webcasts, podcasts, videos, virtual trade shows, research reports and more —drawing on the rich R&D resources of technology providers to address market trends, challenges and solutions. Our live events and virtual seminars give you access to vendor neutral, expert commentary and advice on the issues and challenges you face daily. Our social community IT Knowledge Exchange allows you to share real world information in real time with peers and experts.

What makes TechTarget unique?

TechTarget is squarely focused on the enterprise IT space. Our team of editors and network of industry experts provide the richest, most relevant content to IT professionals and management. We leverage the immediacy of the Web, the networking and face-to-face opportunities of events and virtual events, and the ability to interact with peers—all to create compelling and actionable information for enterprise IT professionals across all industries and markets.

Related TechTarget Websites

SearchDataBackup

SearchDisasterRecovery

SearchSMBStorage

SearchVirtualStorage

SearchCloudStorage

SearchConsumerization