Catalyst

Dell technology accelerating business growth / Issue No. 3, 2013

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Catalyst

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2013 Issue 3

Welcome letter from our editor

Networked storage, connected customers

You can call it power from the people. For renewable energy provider Good Energy, connecting with a rapidly expanding base of electrical power-generating customers is their core business, as these former consumers of electrical power become residential energy producers under the United Kingdom government's feed-in tariff (FIT) program. Similar to the inverse-metering programs in the United States, where electrical utility customers with solar arrays or wind turbines installed on the roofs of their homes can receive credits on their bills for producing electrical energy, the FIT program awards participating customers by purchasing power from them as they feed excess power back onto the grid. As the renewable energy conduit standing between customers and the electrical grid, Good Energy relies on a holistic networked data management approach to their burgeoning business. You can read more about their end-to-end solution in our featured article, "Power play," which starts on page 6.

In concert with our data management theme for this issue, we have orchestrated three additional, in-depth articles on the subject. In "Optimizing storage performance," beginning on page 8, read about how the robust analytical, monitoring and management capabilities built into the Dell EqualLogic SAN Headquarters tool set can help increase storage uptime and availability. Insights on the Dell Fluid Data architecture and how the Dell Fluid File System enables scale-out network attached storage (NAS) for high data-volume workloads are covered in the article "Managing unstructured data," beginning on page 12. And lastly, in "Reworking data protection for a virtualized environment," we engaged a consultancy to offer their advice on new approaches to data protection and recoverability in the age of virtual machines. The article begins on page 21.

Are you connected to Tech Page One, Dell's multi-faceted digital destination for original, short-burst editorial and curated content? Designed to be "a rich source for news and analysis on technology, business and gadget-geek culture," Tech Page One launched at Dell World 2012 and has been expanding its content footprint ever since. You can access fresh editorial content streams from our sister publication, Dell Power Solutions, hosted on the mobile device-enabled Tech Page One going forward. Click through qrs.ly/wo3koim for one of our recent posts on the Dell PowerEdge VRTX platform.

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Want to change the world? Start here.

Young entrepreneurs address global problems and are rewarded for their efforts.

The Dell Social Innovation Challenge (DSIC) recognizes promising young student entrepreneurs whose visionary ideas address some of the world's most vexing problems. The winners receive start-up capital along with world-class teaching and training, as well as access to a network of mentors.

Since the DSIC was started, more than 15,000 students from 105 countries have proposed more than 4,500 ideas. Over US$450,000 has gone to more than 50 student teams from around the world. And this year's event was held in conjunction with the Dell Social Innovation Think Tank — a half-day, collaborative event featuring an influential group of entrepreneurs, financiers, academics and students raising awareness about social entrepreneurship.

Anyone can join the growing online social innovation community and support students on their projects. The online community is a place where innovators can get the resources they need, whether it's feedback on concepts, new team members with special skills, professional mentorship or cash awards.

The DSIC annual grand prize competition is open to currently enrolled university and college students. DSIC offers four project entry categories to reward and support impactful social innovations at all phases of development. Competitors can submit as many project entries as they like in any of the four phases:

- **Define** The concept about social impacts and the innovation driving them exists, or the student has a few general ideas with limited research at this point.
- **Design** The potential for social impacts is taking shape as students test project execution assumptions with prospective customers/beneficiaries. Beginnings of formal internal and external teams and some details on project pilot locale and test elements are captured.
- **Pilot** The innovation project has been tested with a small group of customers/beneficiaries and is demonstrating verifiable impacts. The team continues making project improvements based on live experience in the field.
- **Scale** Successful social impacts have been achieved in more than one geographic area. The project has sustainable financial and human resource models with strong leadership and strategic partner support in place.

The DSIC website offers participants the tools and teachings they need to help improve and advance their projects. It also provides a platform for participants to inspire other students to use their talents to change the world. With plans to grow to 20,000 entries each year by 2016, the DSIC promises to become the largest and most prestigious global competition for student social entrepreneurs.

Learn More
Dell Social Innovation Challenge:
Dellchallenge.org

BYOD by the numbers

Pair the proliferation of mobile devices such as smartphones, tablets and Ultrabook™ systems with widely available WiFi and what do you get? The bring-your-own-device (BYOD) phenomenon. And the upshot is that a highly mobile, always-on workforce is shaping up to be dramatically more responsive than past generations.

With the rate of consumer device adoption in the workplace on the rise, BYOD is simply becoming the way the enterprise works. Read more about BYOD adoption rates and how they affect the enterprise on Dell Tech Page One: qrs.ly/j73gupq

Learn More
Dell Tech Page One:
techpageone.com

Best in show

The simplicity of the Dell PowerEdge VRTX platform — which integrates servers, storage, networking and management into a single office-optimized chassis the size of a tower server (or 5U rack) — has received glowing reviews worldwide since its release.

It recently received a Best of Show 2013 award at Interop Japan. And the U.K.-based technology news and reviews hub IT Pro bestowed its IT Pro Innovation Award on VRTX, as well as a five-star rating. The overall review states, "The PowerEdge VRTX takes blade server technology, adds a few twists of its own and makes it more affordable for SMBs. It's built like a tank, is easy to manage and its shared storage and PCI-e architecture adds extra levels of versatility you won't find in blade servers."

Learn More
In this video, Dell enterprise solutions expert Hope Lawrence walks through the features and benefits of the Dell PowerEdge VRTX platform.
qrs.ly/l83gpsc

Dell PowerEdge VRTX:
Dell.com/vrtx

Power play

Dell-based network and disaster recovery solution keeps pace with company's rapid growth.

When the United Kingdom government's feed-in tariff (FIT) encouraged thousands of British subjects to start generating their own electricity, renewable energy provider Good Energy took advantage of the growth in this market to become the second-largest supplier for FIT in the United Kingdom. Chris Rose, head of business transformation at Good Energy, says, "In just two years, our FIT customer base has grown from 2,000 to 40,000. Our goal is for all of the U.K.'s electricity demand to be met from renewable sources by 2050."

Good Energy uses voice over IP (VoIP) technology to communicate with customers. But FIT's popularity strained the company's network infrastructure. Significant network traffic resulted in poor call quality and long delays accessing applications and data.

The company knew it had to make a significant investment in IT to improve network performance and resilience and ensure it could keep downtime to a minimum in the event of a disaster. After researching various options, the company discovered Dell EqualLogic storage solutions. "We were impressed with Dell's technology and the interest the sales team took in our issues," says Rose. "We're obviously not the largest potential customer, but the Dell team took time to find out about us. It provided us with excellent advice on how to achieve our two main goals of improving network performance and implementing a robust disaster recovery solution."

Nimble networking

Good Energy asked Dell Services to help design a network configured to meet the company's current and future needs. "Initially, we were skeptical about involving Dell Services, but the return on investment has been fantastic," says Rose. "The Dell Services team conducted an analysis and benchmarking review of our systems. It came back to us with an architecture that incorporated two major projects — disaster recovery and network latency — and used our existing storage array and server investments.

"The brilliant thing about working with Dell was that everyone was open with documentation and generous in terms of sharing knowledge. The amount we learned in two days was amazing — we went through a lot: how to do a replication, how to go about disaster recovery. It was invaluable."

Good Energy deployed three Dell PowerEdge R720 servers and two Dell Networking S4810P switches along with EqualLogic PS6110XV and PS6110X storage arrays at its primary site. "We created a highly resilient IT infrastructure featuring Dell-based primary and secondary sites," says Rose. "We've spent around 50 percent less than we would've paid if we'd chosen another solution provider. We've been impressed with Dell because it built a solution using our existing hardware — whereas when we talked to other big providers, they told us to replace our kit."

The Dell Networking switches and the Dell PowerEdge servers enabled Good Energy to gain more than a threefold increase in performance. Rose says, "The speed of our network is unparalleled, and we couldn't be more impressed."

Scalable storage

In three years, Good Energy's staff has more than doubled to keep up with the company's expanding customer base. Rose says, "The demand for storage is constantly increasing and with Dell EqualLogic we've got a solution that's designed to grow with us." Good Energy uses tools such as EqualLogic SAN Headquarters to help ensure optimal use of resources by identifying underused assets and potential bottlenecks.

The Dell EqualLogic storage arrays are designed to allocate data to the most appropriate tier, so data that is accessed infrequently is automatically moved to the lowest-cost tier. "We need to ensure our storage arrays are operating cost-effectively regardless of how much the business grows. We're confident that we're using our resources wisely with Dell EqualLogic tiering," says Rose.

Dell EqualLogic storage also has a long support period of seven years. "If we decide to take advantage of new releases, we know that they'll always integrate with our existing Dell solutions," says Rose. "We can continually build on our investments and avoid unnecessary costs."

Moreover, when the Dell team reviewed the company's infrastructure, it saw potential for reducing spending on virtualization licenses. "The Dell PowerEdge servers have 96 GB of memory, so we can run one as a virtualization host server," says Rose. "Now, instead of having five host servers, we have three, so we require fewer VMware licenses. We're reducing our ongoing licensing spending by 30 percent with the Dell PowerEdge servers, because we need fewer virtualization licenses."

Good Energy is confident in its ability to maintain the performance of its infrastructure through Dell ProSupport with Mission Critical four-hour on-site assistance for its servers, storage and switches. "Even minor issues are quickly resolved so that our staff can continue working unaffected," says Rose. "Dell understands the importance of IT to companies and has developed a comprehensive package of IT solutions and services to cover all of an organization's requirements."

Harnessing the power of technology

Good Energy implemented a networking and storage infrastructure designed to meet the demands of today and scale for tomorrow while securing valuable customer data.

50% Good Energy found that its Dell-based network and disaster recovery solution cost 50 percent less than expected.

30% By virtualizing on Dell PowerEdge servers, Good Energy reduced ongoing licensing spending by 30 percent.

3x After deploying Dell Networking switches and PowerEdge servers, Good Energy saw a threefold increase in network performance.

Learn More
Dell PowerEdge servers:
Dell.com/poweredge

Dell Networking:
Dell.com/networking

Dell EqualLogic:
Dell.com/equallogic

Optimizing storage performance

By Dylan Locsin, Achmad Chadran and Marc Keating

Dell solutions provide in-depth monitoring and analysis to accelerate problem resolution for EqualLogic storage.

Storage uptime and availability play a crucial role in optimizing IT service effectiveness and organizational productivity. To help keep their Dell EqualLogic storage area networks (SANs) running optimally, administrators can take advantage of the robust analytical capabilities and comprehensive monitoring and management functionality of EqualLogic SAN Headquarters (SAN HQ). Part of the powerful EqualLogic portfolio of advanced storage management and data protection software, the SAN HQ monitoring and reporting tool is provided at no additional cost with EqualLogic PS Series storage arrays.[1]

The recently released version 2.6 of SAN HQ extends administrators' capabilities with Dell SupportAssist, an automated proactive support technology that helps identify faults and accelerate time to resolution. SAN HQ version 2.6 with SupportAssist technology helps simplify storage management, optimize performance and boost efficiency. Also, SAN HQ version 2.6 adds support for Microsoft® Windows Server® 2012 and Windows 8 operating systems.

Integrating multigroup monitoring

SAN HQ integrates the monitoring of EqualLogic PS Series storage deployments across multiple sites and geographies to enhance operational awareness and facilitate performance optimization and capacity planning. To support ongoing operations planning, trend analysis and troubleshooting, SAN HQ gathers and displays performance, utilization and event data across multiple groups of EqualLogic PS series arrays. Data is gathered at multiple levels, including groups, pools, members, disks, volumes and volume collections. This data is then aggregated into a centralized, easy-to-use console designed to provide administrators with a single-pane-of-glass view of their entire EqualLogic storage environment, including performance, capacity and alert information. This ready access to integrated system intelligence and storage operations information allows administrators to view system health at a glance.

The Live View feature captures and displays detailed, near-real-time diagnostics information to accelerate problem diagnosis and resolution. Administrators can run one or more Live View sessions, each of which can monitor either a single member or a single volume. A rapid polling rate enables Live View to establish a baseline and capture performance spikes that deliver an extremely detailed view of member or volume status. For a view of storage arrays during normal operations, Normalized View Reporting — also called 95th-percentile reporting — factors out data spikes; these spikes occur infrequently, often comprise the top 5 percent of data I/O and do not reflect most typical I/O patterns.

To help administrators assess current system performance and reliability, as well as plan for future capacity requirements, SAN HQ includes advanced analytical and predictive capabilities. For example, version 2.6 of SAN HQ enhances the utility's RAID Evaluator feature with RAID reliability reporting capabilities. The updated RAID Evaluator calculates a RAID policy reliability score that indicates the current configuration's resilience in case of a disk failure, enabling administrators to analyze the overall reliability and effectiveness of current RAID policies.

RAID Evaluator is also designed to forecast performance and reliability impacts from potential RAID policy changes. Using information from RAID Evaluator, administrators can apply different RAID policies to individual members in a group or pool and evaluate both the performance benefits and the impact on reliability for each choice. This capability helps administrators choose the RAID policies that are most appropriate for specific usage requirements.

In addition, SAN HQ version 2.6 includes the Experimental Analysis function, which estimates the maximum theoretical I/Os per second (IOPS) for a particular storage configuration. The function uses historical workload information to determine the potential performance headroom available for growth. These analyses help administrators obtain directional indications about how much additional workload their existing pool structures can handle.

"SAN HQ version 2.6 with SupportAssist technology helps simplify storage management, optimize performance and boost efficiency."

[1] For arrays with valid support contracts, Dell EqualLogic SAN HQ can be downloaded at eqlsupport.dell.com.

Stepping up to enterprise-class support

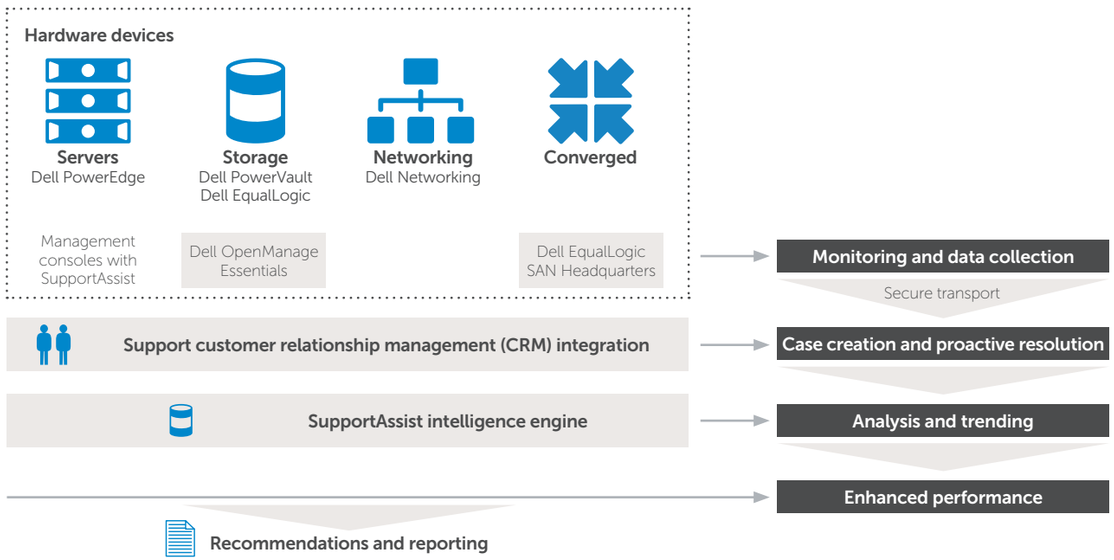
To maintain the performance and availability of Dell EqualLogic storage arrays, administrators need to stay ahead of problems that can put daily operations at risk. A feature of EqualLogic SAN Headquarters (SAN HQ) version 2.6, Dell SupportAssist provides problem identification and automatic case creation for EqualLogic arrays covered by the Dell ProSupport service offering. In addition, SupportAssist enables advanced reporting and recommendations for customer organizations as part of the Dell ProSupport Plus service.

ProSupport Plus offers levels of support and service beyond those already enjoyed by ProSupport customers. This comprehensive offering is designed to help organizations improve the performance and stability of their critical systems, as well as maximize their workload availability. Key additional features of ProSupport Plus include the following:

- A dedicated technical account manager as a single point of contact for enterprise-class support
- Immediate access to elite ProSupport Plus engineers for quick and efficient resolutions
- Monthly contract and support-history reporting to aid in budgeting, planning and recommendations based on trends and best practices across the Dell customer base

For more information about ProSupport Plus, visit Dell.com/prosupportplus.

Part of a broad support initiative, Dell SupportAssist provides integrated, automated support across the Dell enterprise portfolio to streamline problem identification and resolution.



Based on these indications, administrators can determine if any changes are necessary to support new requirements, such as rebalancing workloads across pools or adding hardware to an existing pool.

To facilitate the analysis of performance metrics, SAN HQ can archive existing storage performance data to be accessed offline. Administrators can combine this storage performance data with server and application performance data collected by the Dell Performance Analysis Collection Kit (DPACK).[2] Using SAN HQ in conjunction with DPACK enables administrators to compare server segments and storage segments within their environments. They can then use this comprehensive, systemwide view of performance to assess current usage, diagnose bottlenecks, identify trends and plan for future requirements. Administrators can share SAN HQ and DPACK archives with Dell service and sales support experts for additional analytical and planning expertise.

Automating problem resolution

Version 2.6 of SAN HQ introduces the implementation of the SupportAssist automated proactive support capability for EqualLogic storage. Available as part of the Dell ProSupport and ProSupport Plus service offerings, SupportAssist is designed to proactively identify issues and create support cases without manual intervention. (For more information about Dell ProSupport Plus, see the sidebar, "Stepping up to enterprise-class support.")

In a traditional support scenario, resolving technical problems often includes time-consuming, back-and-forth communication between the organization and the technology vendor. For example, if a component such as a hard disk should malfunction, the administrator typically notifies the vendor of the failure. After the vendor verifies support entitlement and creates a case, the administrator uploads configuration and diagnostic information and communicates with the vendor by phone or email to troubleshoot the issue until it is resolved. This process can involve considerable time and distract IT administrative resources from value-added initiatives.

To streamline problem resolution, SupportAssist helps remove the need for administrators to initiate certain support cases. When an administrator enables SupportAssist through SAN HQ for EqualLogic storage groups, SupportAssist automatically collects select configuration, diagnostic and capacity data and uploads that information to a secure Dell Support web server. SupportAssist has an intelligence engine that analyzes this data for critical events and conditions. When an issue arises, SupportAssist notifies both Dell Support teams and the customer organization. To minimize impact on performance and resources, SupportAssist is designed for fast deployment, rapid data collection and minimal data transmission.

In a proactive support scenario of a disk failure, SupportAssist would detect the fault automatically. SupportAssist then sends diagnostic and configuration information to Dell over a secure connection and creates a Dell Support case so that support engineers can review the data and proactively begin work on the case. SupportAssist also emails the customer's administrator with information about the newly opened case. This streamlined path to problem resolution helps eliminate time-consuming communication, improve system uptime and minimize burden on IT resources.

To help ensure security, SupportAssist, via SAN HQ, interacts with the EqualLogic arrays exclusively through a read-only administrator account. SupportAssist encrypts communications between the EqualLogic array and Dell and scrubs user passwords prior to upload; any transmissions to Dell are documented in the SAN HQ activity logs.

SupportAssist automated proactive technology is also available for a wide range of Dell enterprise devices, including Dell PowerEdge servers and Dell Networking offerings (see figure). In addition, SupportAssist integrates with management consoles such as Dell OpenManage Essentials to provide added remote monitoring capabilities.

Boosting the bottom line

Manageability and ease of support can greatly affect IT service effectiveness and return on investment (ROI). The Dell vision is to enhance effectiveness through robust management capabilities combined with proactive technology and support service offerings. Dell EqualLogic SAN HQ and SupportAssist technology integrate storage management with automated problem resolution. By using SAN HQ in concert with the Dell ProSupport and ProSupport Plus service offerings, administrators can streamline storage management and boost the uptime and efficiency of their EqualLogic storage deployments — enhancing the bottom line.

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Dell EqualLogic software:
Dell.com/equallogicsoftware

Dell SupportAssist:
Dell.com/supportassist

Dell ProSupport Plus:
Dell.com/prosupportplus

[2] For more information on DPACK, see "Fine-tuning IT infrastructure through rapid system assessment," by Sam Kirchoff and Joanna Norling, in Dell Power Solutions, 2011 Issue 4, qrs.ly/k33gwq3.

Managing unstructured data

By Julita Kussmaul, Emily Rund, Oliver Kaven and David Stevens

Dell Fluid File System is designed to scale performance and capacity to quickly meet growing data demands.

Today's rapid growth of unstructured data calls for efficient storage management of emerging data types — a critical consideration for keeping up with evolving business demands cost-effectively. In particular, organizations are realizing a huge shift in data composition, driven by trends such as virtualization, electronic document stores, Web 2.0 technologies and digital records retention. As a result, the capacity needed to store unstructured file data continues to escalate far beyond the capacity required for structured database–type data typically stored on block storage.

Now, IT leaders are looking to deploy additional file storage to meet data growth without intensifying administrative burden — for example, by simplifying data migration, backup and disaster recovery. At the same time, IT leaders must minimize capital expenditures to help the enterprise run as efficiently as possible.

Traditional file servers and network attached storage (NAS) appliances often do not address the demands of massive, high-growth data volumes. Although file servers offer an easy way to add file capacity, they have scaling limitations. They create data silos that limit access to mission-critical information, complicating day-to-day administration and increasing data center–wide management complexity. Traditional NAS appliances commonly incur performance bottlenecks as storage capacity is added and typically require a forklift upgrade every refresh cycle.

These approaches often cannot efficiently meet the requirements of growing file systems that must scale performance and capacity transparently, independently and linearly. To address these scalability challenges, IT leaders are rethinking their storage strategy and seeking tools that help them manage burgeoning file data in a simple, cost-efficient manner.

Foundation for scalable file storage

A core component of the Dell Fluid Data architecture, Dell Fluid File System (FluidFS) was developed from the ground up to avoid the scalability limitations associated with traditional, monolithic NAS and file servers, such as limited volume size, rigid allocation of file systems to physical volumes and siloed namespaces. FluidFS is an advanced scale-out NAS technology designed to completely separate the management of data from the underlying disks and logical units (LUNs).

The FluidFS architecture is a symmetric clustered file system with distributed metadata, native load balancing, advanced caching capabilities and a rich set of enterprise-class features. A FluidFS cluster includes up to four 2U NAS gateway appliances. Each appliance, which is Dell hardware specifically designed for FluidFS, houses a pair of redundant active-active controllers, or nodes. FluidFS is virtualized across controllers in the cluster, enabling any node to serve any file. The file system supports industry-standard protocols, including Network File System (NFS) and Common Internet File System (CIFS), to translate between client-side protocol requests and internal file system requests. The cluster connects to a shared back-end storage area network (SAN) fabric — a Dell Compellent Storage Center or Dell EqualLogic PS Series group (see figure).

A shared infrastructure for block-based and file-based storage enables exceptional efficiencies and cost savings. FluidFS unifies block and file data by delivering dynamic, scale-out NAS capabilities across Dell Compellent or EqualLogic SAN arrays. Through FluidFS, advanced features of the SAN back end are extended to the file storage environment: for instance, the automated tiered storage and thin provisioning capabilities of Dell Compellent arrays or the peer scaling feature of EqualLogic arrays.

FluidFS is easily configured to support the requirements of a wide variety of applications, from standard user shares to cost-effective high-density archiving to high-performance storage in compute-intensive, vertical-industry workloads. FluidFS is designed to scale capacity and performance independently and transparently, avoiding disruption of system availability. Administrators can scale capacity by adding disks to the SAN and scale performance by adding additional NAS appliances or SAN controllers. This approach allows organizations to purchase only the performance and capacity they need today and simply add NAS appliances, storage controllers or disk capacity to accommodate block and/or file growth as required.

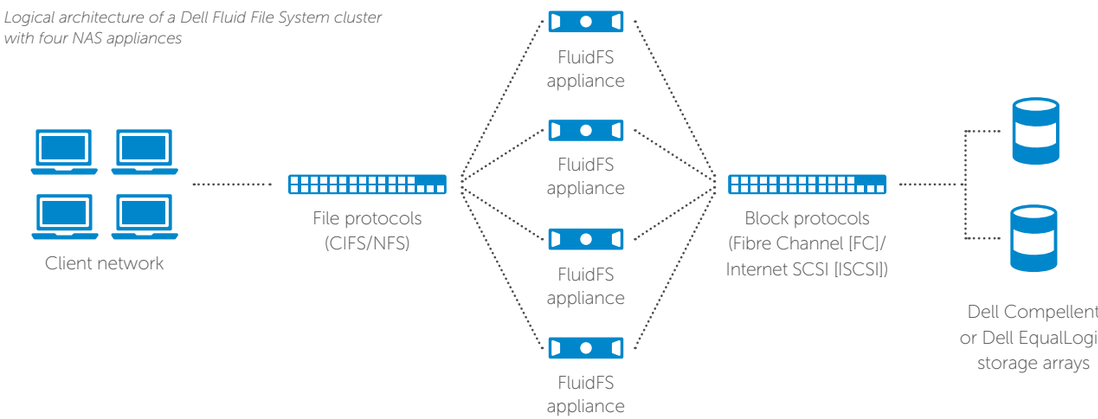
To bolster these scale-out capabilities and meet the needs of demanding enterprise workloads, Dell is introducing the next major release of FluidFS, version 3. FluidFS v3 includes planned features such as enhanced file-protocol support, Fluid Data Reduction with policy-based deduplication and compression, and an expanded maximum namespace. (For more information, see the sidebar, "Advancing efficiency.")

Enterprise-class file solution for diverse workloads

Because of its flexible, scalable architecture, a FluidFS-based storage solution can serve a wide range of applications, including traditional NAS workloads, performance-intense workloads and high-capacity workloads.

- **File server consolidation** For example, many organizations use FluidFS for file server consolidation by simply consolidating file servers and/or traditional NAS devices on a single FluidFS-based platform. Unifying block and file storage helps increase storage utilization, centralize storage management and streamline

Logical architecture of a Dell Fluid File System cluster with four NAS appliances



Advancing efficiency

Dell Fluid File System (FluidFS) v3, which Dell plans to release toward the end of this year, is designed to offer organizations advanced file storage capabilities that accommodate enterprise workloads.

FluidFS v3 is expected to be the industry's only primary storage solution with policy-driven, variable block data reduction. Administrators can use this feature, called Fluid Data Reduction, to establish best-practice lifecycle management policies on a per-volume basis to enable the efficient storage of large data volumes.

Fluid Data Reduction is a policy-driven, post-process operation. After files are written to the network attached storage (NAS) appliance, they are deduplicated once they meet an administrator-defined set of criteria. System administrators also have the option to compress file data after it is deduplicated. The post-process implementation is designed to align data reduction with the aging of files, as defined by the administrators. This capability enables Fluid Data Reduction in FluidFS v3 to impose little or no performance overhead to active data I/O. Fluid Data Reduction utilizes advanced variable-block/sliding-window deduplication technology and Level Zero Processing System (LZPS) compression, an algorithm that maximizes throughput while minimizing system resource consumption.

Other features planned for FluidFS v3 include the following:

- Expanded multiprotocol support for Server Message Block (SMB) 2.1 and Network File System (NFS) v4 with the MIT Kerberos v5 network authentication protocol
- Thin-volume cloning
- Multiple back-end storage area network (SAN) and client-side connectivity options
- Access-based enumeration at file and directory levels
- Nondisruptive scaling to up to four dual-controller appliances and up to 2 PB within a single namespace in the Dell Compellent FS8600 scale-out NAS

All enhancements are included with the upgrade, which is available at no additional cost to existing owners of Dell Compellent and EqualLogic storage; licenses do not need to be repurchased.

backup and recovery. By mitigating server sprawl and reducing the time spent on system management, many organizations are able to minimize operational expenditures and free resources for mission-critical tasks.

- **Electronic design automation** Demanding electronic design automation (EDA) workloads require file storage that can keep up with the large number of EDA data files generated by many users who access shared data throughout the process of designing electronic systems such as integrated circuits or printed circuit boards. EDA users create and share massive libraries of files that can grow extremely large as engineers and designers work together to complete a project. The intelligent caching of FluidFS lends itself to this type of workload by dynamically adjusting the size of the shared read/write cache, helping reduce latency.

- **Animation and special effects** In the media and entertainment industry, high-capacity and high-bandwidth performance is essential to efficiently complete animated features or special-effects scenes. Continual competition to enhance scene details and support novel viewing models such as 3D applies intense pressure on the scale and performance of the rendering infrastructure. Advanced storage technology can help keep rendering times low while accommodating dramatically expanding data scale. FluidFS-based NAS solutions are well suited to meet these requirements. End users can scale up a FluidFS cluster by adding storage to the back end and scale out the cluster by adding NAS appliances — thus accelerating performance.

- **Medical imaging** Research and clinical healthcare organizations using medical imaging technology such as picture archiving and communication systems (PACSs) need high-capacity systems for storing and retrieving large medical files. Providers can consolidate disparate storage systems into a single, scalable FluidFS-based platform with the ability to capture thousands of patient files. These patient records are then readily available to doctors from their workstations; multiprotocol support enables fast access for NFS and CIFS clients.

- **Biotechnology** The same healthcare organizations also may invest in biotech applications such as sequencing, proteomics and metabolomics. Processes such as DNA sequence assembly and protein-folding simulation create novel storage challenges because of the heavy processing required. These processes not only produce massive data volumes, but also need gigabyte-per-second performance for analysis in clustered compute environments — both requirements that are easily addressed by the flexible FluidFS architecture. Organizations can easily configure a FluidFS NAS system to meet performance, capacity and budget requirements for biotech workflows.

- **Virtual desktop infrastructure** A virtual desktop infrastructure (VDI) allows employees to easily access organizational resources without compromising IT security. Organizations looking to enhance virtual machine performance and end-user productivity can separate user data from desktop virtual machines on a FluidFS-based platform. The virtual machines can be placed on block storage for high performance and the user data on file storage for granular data protection.

Designed for performance and scalability

For organizations facing ever-growing streams of unstructured data, Dell FluidFS is designed to go beyond the limitations of traditional file systems. Its flexible architecture helps add nondisruptive scale-out and scale-up NAS capabilities to Dell Compellent and EqualLogic storage. This scalability allows organizations to keep pace with growth while avoiding the risk and expense of forklift upgrades. By growing storage in step with the business, organizations can leverage their existing infrastructures and minimize capital expenditures.

Furthermore, not only can IT teams manage diverse data sources efficiently, they can also meet the needs of business users by putting the data to work. FluidFS leverages advanced data management features of Dell Compellent and EqualLogic storage, enabling data to be tiered according to value and processed in a way that keeps it readily available to inform business decisions. By maximizing performance and streamlining data management, storage solutions based on FluidFS help organizations gain control of data, minimize complexity and cost-effectively meet ever-changing, ever-expanding demands.

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Dellstorage.com/equallogic/nas

Dell PowerEdge VRTX: Simple, efficient and versatile

Integrated IT platforms can be the key to success for quickly growing remote/branch offices (ROBOs) and small and medium businesses, which often deal with a complex, disparate mix of IT systems. The Dell PowerEdge VRTX platform is the first integrated IT solution designed specifically for remote- and small-office environments. It packs the power and function of a data center into a single, compact chassis that combines servers, storage, networking and management.

Flexible, integrated infrastructure

Incorporating the latest Intel and Dell technology, PowerEdge VRTX is an excellent platform for consolidation, virtualization and growth in ROBO environments.

PowerEdge VRTX supports up to four PowerEdge M-Series server nodes powered by the latest Intel® Xeon® processor E5 family, which helps dramatically boost performance per server node. In fact, just one PowerEdge M620 node in PowerEdge VRTX, configured with two Intel Xeon E5-2690 processors, can replace up to four PowerEdge M600 blade servers.

Shared among the server nodes is a huge internal storage capacity of up to 48 TB, enabling high-availability capabilities including live migration inside the chassis. The server nodes also share the resources made available through eight PCI Express (PCIe) slots in the chassis, which provide high I/O throughput and budget-friendly expansion. A built-in Gigabit Ethernet (GbE) switch avoids the need for a separate networking device.

Purpose-built for the office environment

Since floor space may be at a premium in office environments, PowerEdge VRTX helps overcome hardware sprawl by converging IT resources in a single 5U chassis the size of a tower server. PowerEdge VRTX also supports 100V AC – 240V AC, so it can run on the 110V AC power already found in offices, avoiding the cost of rewiring for high-line power.

In addition, office environments demand a noise level conducive to workforce productivity. Designed to be quieter than a hallway conversation when running, PowerEdge VRTX is nondisruptive even in open office spaces. And the Intel Xeon processor E5 family helps deliver outstanding energy-efficient performance for a cool and quiet platform that can operate under a desk.

PowerEdge VRTX security features include the Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI), designed to accelerate encryption and decryption — helping protect mission-critical data from being compromised when stored or transmitted.

Learn More
PowerEdge VRTX:
Dell.com/vrtx

Bring order to chaos

By integrating servers, storage and networking into a single, compact chassis, PowerEdge VRTX helps eliminate the hardware sprawl and cabling complexity of multiple disparate systems. In addition, IT administrators can manage all resources inside the chassis with a unified management tool presented in a single console.

Redefine IT operations

Dell OpenManage systems management tools help reduce the potential for error and downtime. The embedded Chassis Management Controller (CMC) tool delivers a user-friendly, unified interface for control of PowerEdge VRTX servers, storage and networking. The Dell OpenManage Essentials console streamlines administrative tasks, including automated updates of remote PowerEdge VRTX systems. The Geographic View for PowerEdge VRTX feature provides a map-based, at-a-glance assessment of remote system health and location.

Deploy performance anywhere

Through its flexible configuration, PowerEdge VRTX is designed to provide excellent scalability. Organizations can add servers, storage and I/O as needed to readily accommodate evolving workload requirements.

Dell innovators

Innovators exist everywhere — around the globe and in every industry. These businesses not only rely on Dell technology, they take advantage of its many benefits to make their businesses more productive, efficient and profitable.

Know a Dell innovator that should be highlighted in a future issue of Catalyst? Nominate them @DellCatalyst.

Emirates Team New Zealand

Who they are

Emirates Team New Zealand, Auckland, New Zealand

The team deployed an HPC environment to design a new class of multihull boats, increasing design prototyping from 30-40 candidates to 300-400.

How they innovate

Recognizing that technology would play a crucial role in the development of two 72-foot catamarans for racing in the Louis Vuitton Cup challenger selection series and the America's Cup finals, the team decided to invest in a high-performance computing (HPC) solution to test design concepts prior to building the final boats. Emirates Team New Zealand's AC72 as are developed within a powerful HPC environment featuring Dell PowerEdge C6100 servers with Intel® Xeon® 5600 series processors. Through testing designs in the HPC cluster, the team has increased the number of candidates tenfold for the 2013 cup challenge.

Learn More
Emirates Team New Zealand:
qrs.ly/s23k7m3

Worldnow

Who they are

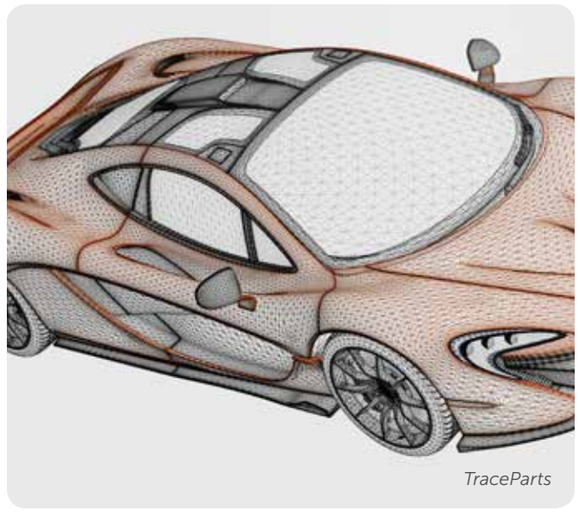
Worldnow, Long Island City, NY, United States

The company provides a content management system that can get the news out in 2½ minutes — even during emergencies.

How they innovate

Worldnow helps local television stations in the United States deliver news content on digital platforms. Forty percent of the nation's local television stations with news programming use Worldnow's content management system (CMS) to post news to digital platforms that cover 80 percent of the country's households. The company consolidated its infrastructure by migrating servers to virtual environments on Dell blade servers, supported by Dell management tools, support services and client devices. The stability and performance of Worldnow's infrastructure was proven during Hurricane Sandy, delivering continuous digital news services to the public in time of great need.

Learn More
Worldnow:
qrs.ly/cq3k7nx



TraceParts

Who they are

TraceParts, Saint Romain, France

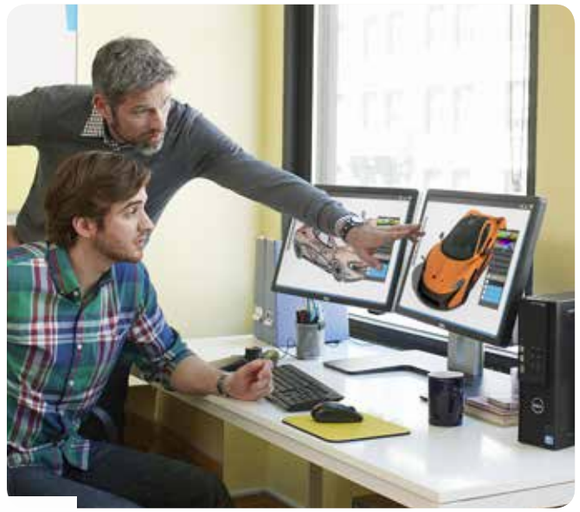
The 3D content specialists speed customer 3D CAD file downloads by 20 percent, meeting strict service-level agreements for uptime.

How they innovate

TraceParts offers its customers easy access to more than 100 million 3D computer-aided design (CAD) files online. With visits to its online catalogues increasing by 30 percent a year, the firm needed a scalable infrastructure. To meet these demands, it deployed a solution based on Dell Precision workstations, Dell PowerEdge servers, Dell EqualLogic storage and VMware vSphere® server software, with Dell ProSupport. All CAD users can now access and download 3D models at least 20 percent faster than before. As a result, the TraceParts IT team is better placed to retain and win new customers by meeting contractual demands for high availability.

Learn More
TraceParts:
qrs.ly/3b3k7m6

The ideal first server for SOHOs: Dell PowerEdge T20 mini-tower server



Getting organized, enhancing collaboration and protecting information are critical for success in your small office/home office (SOHO) business. The Dell PowerEdge T20 is an ideal first server that enables cost-sensitive SOHOs to consolidate data from multiple desktops and workstations onto a single platform, where it can be more easily shared and protected. The PowerEdge T20 delivers capable performance with a powerful multi-core Intel® processor. Additionally, it offers sizeable storage capacity and numerous expansion ports to grow with you as your business grows.

Get organized

Eliminate misplaced or lost information by consolidating data, images and videos onto a single PowerEdge T20, which hosts up to six hard drives. Its mini-tower form factor and quiet office acoustics enable the T20 to operate nondisruptively under, beside or even on top of a desk.

Reap the rewards

Enhance collaboration and productivity by sharing applications and information on a central server. Boost end-user and customer satisfaction through accelerated transaction response times enabled by the T20's powerful Intel® processor.

Take it to the next level

Grow through time at your own pace with extensive internal storage capacity. Attach external devices flexibly and easily with four I/O slots and 12 USB ports. And protect your data automatically with Intel® Rapid Storage Technology, which is built into Intel processors.

Learn More
PowerEdge T20:
qrs.ly/ox3kzic

Reworking data protection for a virtualized environment

By Jason Buffington

Key capabilities take data protection efficiency and performance to a new level in virtualized IT environments.

When IT professionals who work at large and midsize organizations are asked to list their organizations' IT priorities, "improving data backup and recovery" consistently ranks near — or at — the top of the most-cited priorities they mention.[1] But backup and recovery are not alone at the top of people's minds in terms of strategic importance. The urgency that organizations feel about data protection is influenced by another phenomenon: increases in server virtualization.

Both a tactical association and a strategic association exist between backup and virtualization. As virtualization becomes ever more of a mainstay in data centers, traditional approaches for backing up an IT environment pose a data protection challenge that continues to escalate, growing in proportion to the pace at which IT environments become virtualized.

Accordingly, if tasked with managing what has turned into a highly virtualized IT environment, IT professionals must take the time to reassess their organizations' data protection strategies.

Old backup processes, new virtual machines

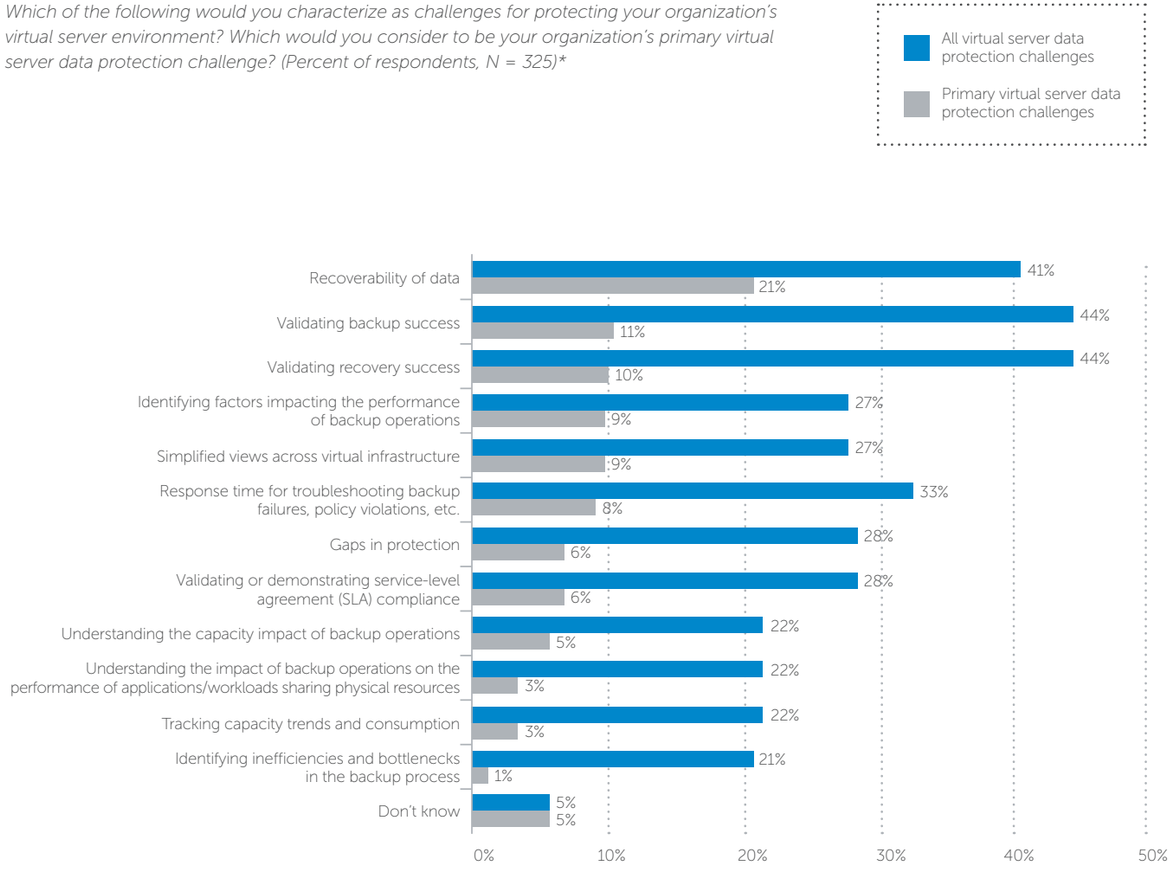
Imagine looking at a performance meter for a traditional physical server, which shows lines indicating routine, periodic spikes in processor and storage read/write activity. Now, imagine looking at that meter as the server is being backed up. It would definitely display heightened I/O activity tied to both processor and storage, either rapidly spiking or just pegged to the top of the meter. This relatively heightened activity occurs because a traditional backup application basically orders the physical server to "give me all the data you have, as fast as possible." Such a command is achievable for physical servers

[1] "Research Report: 2013 IT Spending Intentions Survey," by Jennifer Gahm, Bill Lundell and John McKnight, Enterprise Strategy Group, January 2013, qrs.ly/ki3gwq5; "Research Report: 2012 IT Spending Intentions Survey," by Jennifer Gahm, Kristine Kao, Bill Lundell and John McKnight, Enterprise Strategy Group, January 2012, qrs.ly/nf3gwq6; "Research Report: 2011 IT Spending Intentions Survey," by Jennifer Gahm, Bill Lundell and John McKnight, Enterprise Strategy Group, January 2011, qrs.ly/3x3gwq7; "Research Report: 2010 IT Spending Intentions Survey," by Jennifer Gahm, Bill Lundell and John McKnight, Enterprise Strategy Group, January 2010, qrs.ly/9d3gwqb.

Insights on keeping data safe
Visit the Technical Optimist blog to get fresh ideas on what IT professionals should be looking for to protect their virtualized environments.
TechnicalOptimist.com

Data protection challenges in a virtual server environment

*Which of the following would you characterize as challenges for protecting your organization's virtual server environment? Which would you consider to be your organization's primary virtual server data protection challenge? (Percent of respondents, N = 325)**



*Source: Research Report, "Trends for Protecting Highly Virtualized and Private Cloud Environments," by Jason Buffington and Bill Lundell, Enterprise Strategy Group, June 2013, qrs.ly/jl3h0yg

because they typically are underutilized and usually have plenty of excess processing headroom to accommodate resource-intensive backup operations.

The situation is dramatically different when one physical server hosts many virtual machines inside it. Although one virtual machine consumes the same underutilized resources that it might have on its own physical server, other virtual machines consume the rest of the resources. In a well-managed virtualization host, a majority of the resources are in use, as they should be, which means the extra headroom that legacy backup applications assume will be there is not available.

Ultimately, traditional approaches do not work in a highly virtualized environment. And because inefficient backup is not acceptable, IT professionals who manage highly virtualized environments need to rethink their data protection strategies. The advantages that make server virtualization appealing — the device consolidation and footprint reduction, the near-instant server setup, the power and cooling savings, and the simplified disaster recovery testing, to name a few — also create challenges in protecting what is really important: the information.

Reshaping a data protection strategy

The Enterprise Strategy Group (ESG) routinely surveys IT professionals about how easy or difficult it is for them to implement backup and recovery processes for virtualized servers. In one survey, 87 percent of responding IT managers reported that virtual server backup/recovery is among their top 10 challenges, with 9 percent calling it their "most significant data protection challenge."[2] Among specific concerns, ESG found that basic recoverability of data was most commonly mentioned, followed by the ability to validate the success of backup and recovery operations *(see figure)*.

Unreliable and complicated backups, combined with a lack of assurance in protection, recoverability and monitoring, continue to plague backup administration of virtualized environments. This situation often results in consistently high levels of data protection–focused investment appearing prominently alongside high levels of server virtualization investment.

To bring their organizations' data protection strategies in line with the requirements of a virtualized environment, IT professionals should consider four important capabilities when assessing and implementing backup solutions.

1. Embrace source-side deduplication Virtual machines that use the same or similar operating systems and that host similar applications generate many redundant binaries. Source-side deduplication — through VMware® changed-block tracking, file-system filtering, Microsoft® NT File System journaling and other means — is especially valuable to help eliminate those redundancies.

The key is to get the deduplication process as close to the virtual machines as possible. Conversely, a process that uses only storage-centric deduplication results in data from all the virtual machines flowing from the host to the backup server — consuming compute, storage and networking resources. The data ends up in a deduplication storage device, which then discards much of the data because it is a version of data already received during backup operations for similar applications and other virtual machines.

In contrast, when the deduplication discernment process is positioned as close as possible to production workloads, less redundant data is moving across the network only to be rejected. Instead, the overall backup infrastructure is reduced. That is source-side deduplication, and it is a huge win.

2. Make sure deduplication is global across hypervisors Consider an environment with 20 hypervisors from one vendor, each running 20 virtual machines. Many deduplication methods could help reduce those 20 virtual machines per host down to a single set of application binaries. On the other hand, in a situation with 20 hosts on different hypervisors, deduplication may not be possible across those hypervisors. As a result, far too much data may be sent to deduplicated storage, which just discards it — after creating a huge I/O penalty for the IT environment along the way.

In 2012, ESG conducted a study on storage infrastructure spending.[3] IT professionals who were buying a large amount of disk were asked how they planned to use all of it. The most frequently

[2] Source: ESG Research, "Virtual Server Data Protection," September 2011.
[3] Research Brief, "2012 Storage Infrastructure Spending Trends," by Bill Lundell, Terri McClure and Mark Peters, Enterprise Strategy Group, March 2012, qrs.ly/512z6az.

mentioned answer was that the disk supported a data protection solution. It may be reasonable to conclude, then, that taking advantage of global source-side deduplication significantly helps reduce storage spending.

3. Look for robust post-process application handling Some vendors sell backup applications that are agent-based; others provide agentless technologies that, despite the name, insert a small executable file inside the virtual machine to support certain situations. Regardless of the terminology, the important distinction in backing up virtualized servers is whether the widgets, agents or modules behave like traditional physical backup agents (bad) or simply help with application quiescing in support of virtual machine–centric backup behavior (good). Not many use-case scenarios exist that warrant putting agents inside virtual machines for backing up data the traditional way. So for most scenarios, the important function of agents is to support application management to help ensure a recoverable backup.

With some backup products, the hypervisors' application programming interfaces enable the backup software to freeze the storage for an adequate backup of the application itself, but a mechanism is still needed to notify applications that they can truncate their backup-transaction logs, reset their checkpoints and go back to doing work. In the end, it does not matter if the backup vendor refers to that activity as agent-based or agentless. The important outcome is to end up with virtualized applications that are properly groomed for overall continued, consistent operational efficiency.

4. Emphasize integrated monitoring and management Many organizations spend time and money establishing a highly virtualized, easily managed private cloud infrastructure that enables them to provision virtual machines on the fly — and then find themselves needing to step completely out of that world to configure the backup of those virtual machines. The goal is to achieve as much integrated visibility as possible, at best to include integrated management but at least to offer integrated monitoring so that administrators can observe how the environment's many separate but often interrelated data protection processes are functioning. The most efficient management and monitoring solutions are those that integrate either at the hypervisor layer or within the private cloud management interface. This integration minimizes the number of management consoles needed to determine whether the provisioned virtual machines are being protected adequately.

The path to virtualization protection

In general, ESG has been seeing an uptick in organizations preferring to use a unified solution to protect both physical and virtual servers, rather than running a separate solution just for protecting virtual machines. Although backup vendors on both sides of the unified-versus-separate argument are still actively innovating, the real battleground of virtualization protection is not centered on the unified-versus-separate issue or whether one can back up a virtual machine. It is centered on how agile IT can be in recovering the data, the whole virtual machine or a set of virtual machines. For example, can IT restore a whole virtual machine without needing to put it back on the original host? Or accomplish item-level, file-level and even message-level recovery from within a virtual machine?

Four key data protection capabilities — source-side deduplication, global deduplication across hypervisors, robust post-process application handling, and integrated monitoring and management — offer an indication of where virtualization protection is today: in the midst of continuing advances that IT administrators soon won't want to live without. And they even provide a glimpse into how it is going to keep evolving, with multihypervisor strategies becoming pervasive and with the unified-versus-separate physical and virtual server protection debate continuing to grow.

Jason Buffington is senior analyst at the Enterprise Strategy Group, focusing primarily on data protection, Microsoft Windows Server infrastructure, management and virtualization. Follow Jason on Twitter @JBuff.

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