

By Andrew Gilman
Jon Bock

AUTOMATED DISASTER RECOVERY WITH VMWARE SRM AND DELL EQUALLOGIC iSCSI SANs

Virtualized IT infrastructures can simplify management and facilitate business continuity while helping minimize power consumption and procurement costs. Virtualization also helps organizations automate disaster recovery plans. Dell EqualLogic™ PS Series arrays and VMware® Site Recovery Manager (SRM) software provide integrated, cost-effective, automated site recovery and testing for enterprise data centers.

Organizations of all sizes have embraced virtualization as a key technology for consolidating server and storage infrastructure, helping reduce management costs and increase availability. Now IT managers are looking to use virtualization to help them overcome the challenges of traditional disaster recovery as well as tools to automate the recovery process. Deploying Dell EqualLogic PS Series Internet SCSI (iSCSI) arrays in conjunction with VMware Site Recovery Manager (SRM) software can help organizations implement simple, cost-effective, highly automated disaster recovery for virtualized environments.

ADDRESSING TRADITIONAL DISASTER RECOVERY DILEMMAS

Traditional disaster recovery is challenging in part because it relies on specialized hardware that is expensive and complex. Few IT staffs have the expertise to manage and maintain specialized systems for disaster recovery, which usually require costly outside service and support. IT managers also face significant costs for licensing replication software and leasing the required networked bandwidth between sites. In the face of these costs and management complexity, organizations often can provide disaster

recovery only for application-level or departmental implementations. But over time, this approach can leave organizations with disparate, incompatible implementations that are inefficient to manage and provide only partial protection.

Apart from the infrastructure investment for disaster recovery, organizations often lack the internal expertise to manually coordinate site failover for what may be hundreds or thousands of servers. Although small organizations typically have fewer servers to manage than large organizations, they also may lack the resources or expertise available to manually develop recovery plans on their own. A typical recovery plan can include hundreds of detailed steps, from changing cable configurations to bringing recovery site servers online in the proper order, all of which must be fully documented. If an event occurs that requires travel to a remote site, where the recovery documentation must be followed exactly and the primary IT administrator may be out of reach, then additional complications can delay the site recovery.

Plan testing can also be a significant challenge for IT organizations. Testing is essential to help ensure a plan works properly, and may also be required by regulatory agencies or insurance companies as proof that an effective disaster recovery plan is in place.

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However, the test process can cause unacceptable disruption to organizations and their customers. Typically, it takes a day or more to repeatedly adjust and retest a plan manually—and because the process involves both the production and recovery sites, the production environment must be shut down. Many companies simply cannot afford to have their services unavailable to internal or external customers for long periods.

CHANGING THE ECONOMICS OF DISASTER RECOVERY WITH iSCSI

Today, the economics of disaster recovery are changing for the better. Remote replication is available for iSCSI storage area networks (SANs). These SANs do not depend on the specialized equipment required by traditional Fibre Channel SANs, and enable organizations to leverage Ethernet infrastructure and IP networking skills already in place—helping reduce training and ongoing management costs.

The iSCSI protocol enables virtual storage implementations that complement and extend the server virtualization made possible by solutions such as VMware Infrastructure. Server virtualization consolidates enterprise application environments, while the virtualized SAN consolidates data assets to create flexible pools of networked resources. Together, server and storage virtualization enable greater scalability, flexibility, and performance compared with traditional all-physical architectures.

Organizations can realize other advantages with iSCSI SANs. The IT environment can be simplified by standardizing on IP networking for server communications,

storage access, and off-site replication, further helping reduce complexity and costs. In addition, the lack of distance limitations with IP networking means that a remote recovery site can be located almost anywhere for increased disaster tolerance.

As in physical environments, IT organizations can face formidable challenges when manually developing, testing, and implementing recovery plans for virtualized environments. Tools from VMware and Dell help address these challenges by building on virtualized iSCSI storage to help simplify management and deployment of automated disaster recovery plans.

INTEGRATING REPLICATION OVER IP INTO VMWARE SRM

Dell EqualLogic PS Series arrays and VMware SRM offer an approach to disaster recovery designed to be quick, automated, and economical. PS Series arrays help reduce the complexity and cost barriers of traditional SANs by providing a cost-effective iSCSI SAN infrastructure that can be maintained efficiently by IT staff. They come with Auto-Replication software included, avoiding a major licensing expense and significant recurring software support subscription costs. Dell-engineered SRM Storage Adapter software, available as a download at no additional cost, integrates the PS Series Auto-Replication feature directly into VMware SRM.

The integration of Dell EqualLogic PS Series arrays and VMware SRM through the SRM Storage Adapter software combines the positive economics of replication over IP with automated disaster recovery made possible through virtualization, helping

STEP BY STEP: SETTING UP A DISASTER RECOVERY PLAN

IT administrators can single-handedly configure a disaster recovery implementation in a matter of minutes using Dell EqualLogic PS Series arrays and VMware Site Recovery Manager (SRM) software by following a few simple steps:

1. Initialize a PS Series array at the production site and another at the replication site.
2. Configure the built-in Auto-Replication feature to connect the two arrays.
3. Create a virtual volume at the production site to be replicated to the disaster recovery site.
4. Schedule the replication frequency—how often information is sent to the disaster recovery site (for example, every five minutes, each hour, or each day).
5. Access the VMware SRM feature in the VMware VirtualCenter application.
6. Configure VMware SRM to connect the two arrays.
7. Create a protection group of virtual machines for SRM to recover.
8. Set the order in which the virtual machines should be brought online during recovery, and configure any customized alerts.
9. Bring up the recovery site in VMware VirtualCenter and create a recovery plan.
10. Test the customized disaster recovery setup with the touch of a button.

Should a failover become necessary, VMware SRM automatically runs the recovery plan by starting virtual machines in the proper order with updated networking configurations.

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save time and enhance ease of use. This approach enables automated remote recovery and testing for large enterprises as well as automated recovery plan development that helps small organizations overcome the challenges imposed by limited staff and resources. It also advances enterprise reliability, using the redundant, hot-pluggable storage architecture of PS Series arrays and advanced system and disk monitoring capabilities to enhance system availability.

VMware SRM is a new VMware Infrastructure-based solution that provides disaster recovery management and automation for virtualized data centers—integrating tightly with VMware VirtualCenter and Dell EqualLogic PS Series array replication for recovery designed to be rapid, reliable, manageable, and cost-effective. It provides centralized management of recovery plans that not only automates the recovery process but enables enhanced testing of recovery plans. Using VMware SRM, a single IT administrator can configure a disaster recovery implementation quickly and easily (see the “Step by step: Setting up a disaster recovery plan” sidebar in this article).

AUTOMATING DISASTER RECOVERY FOR DATA CENTERS

The native Auto-Replication feature of Dell EqualLogic PS Series arrays helps perform the key disaster recovery function—making copies of data and sending the copies to a remote location at a safe distance from the primary data center. This feature integrates directly

into the IP network to help overcome distance limitations. The arrays support one-to-one, bidirectional, or many-to-one replication, and the time interval for replication can be adjusted to meet the needs of the organization.

Requirements for disaster recovery include having a PS Series array and VMware VirtualCenter server at each site. Through the PS Series Auto-Replication software, the arrays are connected to a switched Ethernet fabric and the IP network. The VirtualCenter servers with SRM software can also communicate over the network. The customized Dell SRM Storage Adapter software helps tie the integrated solution together and enables comprehensive, automated site failover.

MINIMIZING MANUAL PROCESSES WHILE RETAINING CONTROL

If the primary site goes down, the volumes are already at the recovery site, and VMware SRM can automatically coordinate the process of bringing the environment online (see Figure 1). SRM runs the entire recovery plan, starting virtual machines in the intended order with updated networking configurations. Many manual procedures associated with traditional disaster recovery are eliminated, but administrators have comprehensive visibility into the execution of the recovery plan through VMware VirtualCenter, and can pause or stop execution as needed.

Another advantage of integrating Dell EqualLogic PS Series arrays and VMware SRM is the Fast-Failback capability included in the PS Series Auto-Replication feature. Fast-Failback helps eliminate the need to retransmit complete volumes when the production site is ready to come back online; instead, the system sends back only the changes that have occurred since the SRM failover operation, helping save time, bandwidth, and expense.

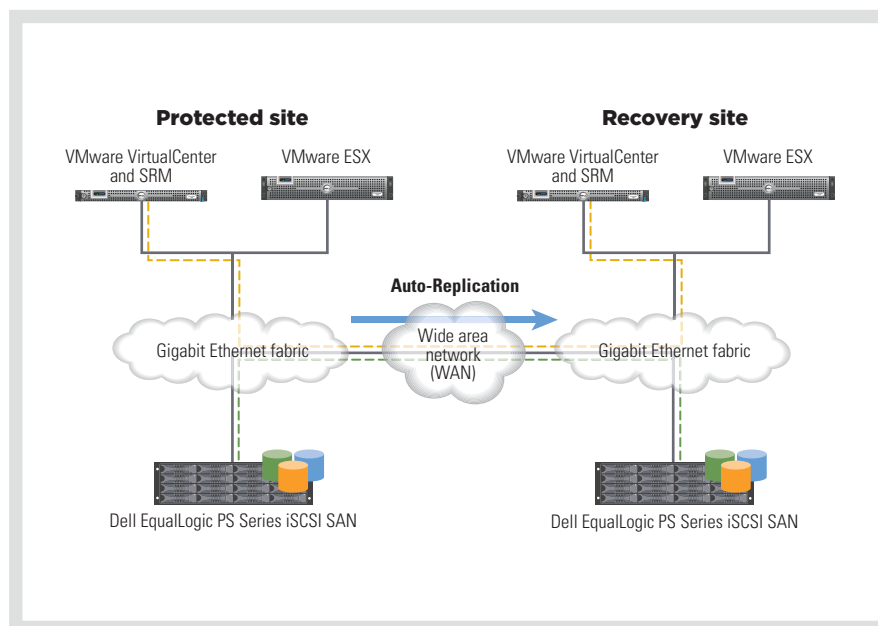


Figure 1. The Auto-Replication feature in Dell EqualLogic PS Series iSCSI SAN arrays sends volumes to the recovery site according to a user-defined schedule

HOW NAVICURE STREAMLINES DISASTER RECOVERY

Virtualized infrastructure and storage helped a health care technology company set up a disaster recovery plan 75 percent faster than anticipated.

Navicure handles claims transactions between physicians and insurers to help doctors speed claims processing, improve cash flow, and drive down the cost of billing. A Navicure-developed online application and outstanding customer service helped propel Navicure to the 2007 Deloitte Technology Fast 500 list of rapidly growing companies.

At Navicure, rapid growth revealed the need for flexible architecture and storage design. The company's entire IT infrastructure is standardized on Dell EqualLogic virtualized Internet SCSI (iSCSI) storage area network (SAN) technology, managing more than 75 TB of storage across 15 Dell EqualLogic PS Series arrays, including their core Oracle® database serving over 500,000 transactions each day as well as their front-end infrastructure and other services based wholly on VMware Infrastructure 3.

The company needed to find and implement a disaster recovery solution to protect its production environment, to both facilitate Health Insurance Portability and Accountability Act (HIPAA) compliance and earn key health care industry certifications. The Oracle environment is protected by Oracle Data Guard writing transactions to a standby database instance at the disaster recovery site that can quickly become the production database in the event of a site failure. The virtualized infrastructure was easy to replicate using the built-in Auto-Replication feature of the Dell EqualLogic PS Series SAN, but recovery of the virtualized infrastructure was not automated. This vulnerability made it difficult to ensure regulatory compliance.

AUTOMATED PLANNING, TESTING, AND DEPLOYMENT

The Dell team recommended that Navicure use VMware Site Recovery Manager (SRM) software



“We especially liked the fact that VMware SRM would work with the Auto-Replication feature in our Dell EqualLogic PS Series arrays, letting us build on our iSCSI investment.”

—Donald Wilkins
IT director at Navicure
July 2008

with the Dell EqualLogic PS Series arrays as a simple, affordable way to automate disaster recovery of the virtualized environment. In addition, SRM storage adapters developed by Dell enabled Navicure to integrate SRM with the Auto-Replication feature in the PS Series arrays to enhance disaster recovery and provide other advantages:

- Integrated Dell and VMware solution enabled Navicure to set up a disaster recovery plan 75 percent faster than anticipated.
- Built-in automation helps reduce data recovery plan testing time from one day to 20 minutes.
- VMware SRM software can enable disaster recovery testing with no downtime for Navicure customers.
- Dell EqualLogic PS Series arrays and VMware SRM help simplify HIPAA compliance by automatically documenting successful disaster recovery test runs.

- Dell EqualLogic iSCSI-based SAN infrastructure helps simplify deployment and ongoing management.
- Automatic load balancing across all SAN resources helps optimize storage performance and resource utilization.
- Virtualized storage makes it simple to add capacity as needed to accommodate business growth.

Working with Dell, Navicure implemented a scalable, iSCSI-based infrastructure using Dell EqualLogic PS Series arrays and deployed remote disaster recovery using VMware SRM software. Not only did replication and recovery of its virtualized data center environment help Navicure comply with industry certification regulations, but the combined solution helped Navicure keep up with business growth to support its health care industry customers.

TAKING THE COMPLEXITY OUT OF DISASTER RECOVERY

In keeping with the mission of simplifying IT with standards-based, integrated, end-to-end solutions, the integration of Dell EqualLogic PS Series arrays and VMware SRM software helps simplify the complexity of disaster recovery. PS Series arrays can help dramatically minimize the time and labor associated with setting up and virtualizing data center storage and deploying a disaster recovery plan.

For example, the need to train staff may be significantly reduced. Traditional storage may require IT staff members to attend several days of classes to set up and use their systems for disaster recovery plans, or may require costly professional service engagements. In contrast, IT staff members can quickly familiarize themselves with the PS Series arrays, and the arrays themselves can go from the box to serving data in under an hour. By using PS Series arrays together with Dell™ PowerEdge™ servers, IT organizations can deliver a comprehensive virtualized infrastructure designed to enable and protect the entire enterprise.

In addition, IT organizations can implement replication between additional sites without buying additional software and licenses for various systems—helping

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simplify the process of scaling their infrastructure as the organization grows. Dell EqualLogic PS Series arrays include expanded functionality at no additional cost and come with a comprehensive suite of data protection tools. IT administrators can also update or modify a recovery plan at any time through the VMware VirtualCenter management console and VMware SRM.

SETTING UP AND TESTING AUTOMATED DISASTER RECOVERY

After the virtualized environment is in place, Dell EqualLogic PS Series arrays and VMware SRM enable rapid disaster recovery setup. PS Series arrays provide tools that help simplify the configuration of replication partners and protection groups for rapid deployment (see Figure 2). The SRM software guides IT administrators through the setup process. Using the VMware

VirtualCenter management interface, administrators can quickly set plan parameters such as the order in which virtual machines are powered up, and specify the virtual machines that can be suspended to free resources for recovery.

VMware SRM also helps save IT organizations days of work by automating the recovery documentation that contains the step-by-step directions for orchestrating site recovery. Traditional disaster recovery methods use complex paper documentation that is difficult to compile and manage. VMware SRM enables administrators to readily capture the recovery steps in electronic form, which becomes an integrated element of virtual infrastructure management.

This approach also enhances the efficiency of testing disaster recovery plans. In this case, failover executes in an isolated environment, and the environment is quickly and automatically cleaned up following the testing to help avoid disrupting operations. As a result, the IT team can minimize impact on the production environment and avoid downtime for customers. VMware SRM allows administrators to initiate the test at the touch of a button, watch it run automatically, and then make changes (see Figure 3).

In addition, the automated testing capability helps simplify compliance with regulatory specifications¹—for example, helping streamline Health Insurance Portability and Accountability Act (HIPAA) compliance for organizations in the health care industry (see the “How Navicure streamlines disaster recovery” sidebar in

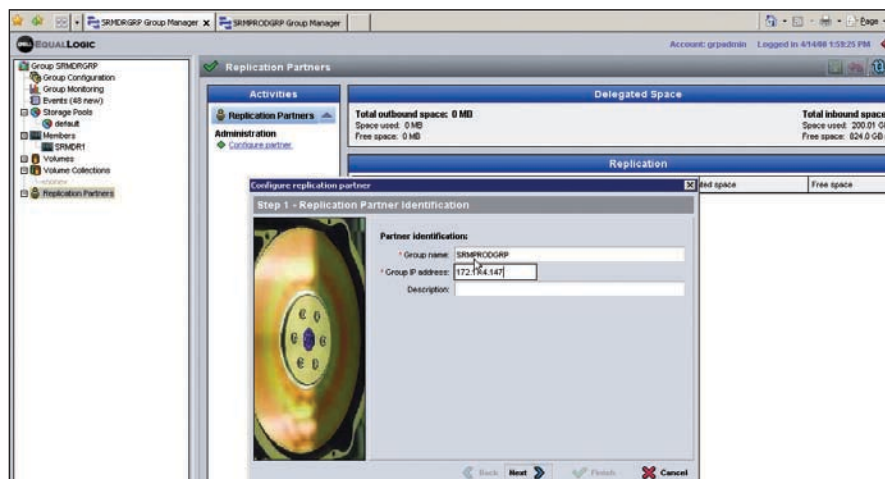


Figure 2. Group Manager software included with Dell EqualLogic PS Series arrays helps simplify the configuration of replication partners and protection groups

¹ These materials reflect Dell's view of compliance with the statutes and standards as of July 2008 and may be superseded by changes in the statutes/standards. This information is not intended as legal advice and may not be used as such, nor does this information reflect a full and exhaustive explanation of all relevant statutes and standards. You should seek the advice of your own legal counsel on any legal compliance questions.

this article). Instead of running multiple demonstrations, administrators can provide a report to management documenting that a complete test of the organization's disaster recovery plan has been conducted successfully. Because failover is automated, regulatory bodies presented with a copy of the report may be assured that the process will run successfully in the future.

USING VIRTUALIZED iSCSI STORAGE TO DEPLOY DISASTER RECOVERY

When hurricanes hit the Gulf Coast, tornadoes strike the Midwest, or wildfires threaten western states, organizations are reminded that almost any location can be susceptible to disaster. The potential for disaster adds urgency to the importance of implementing a business continuity plan that includes remote disaster recovery.

The good news is that disaster recovery no longer must be a complex, manual process or an afterthought put off because of cost considerations. Instead, it can be part of the initial IT discussion for utilizing virtualization in the data center. By implementing Dell EqualLogic PS Series arrays and VMware SRM software, organizations can deploy flexible disaster recovery using virtualized iSCSI storage in the data center. And because integrated Dell EqualLogic PS Series arrays and VMware SRM help free IT administrators from time-consuming SAN management tasks, organizations can use valuable staff resources for application development and strategic planning that advances bottom-line business goals.

“Using Dell EqualLogic PS Series SANs and VMware SRM, organizations worldwide can achieve simple, cost-effective, and highly automated disaster recovery for their virtualized data centers.”

Recovery Step	Status	Task Started	Task Completed	Mode
1. Shutdown Protected Virtual Machines at Protected Site "PROD SRM 172.17.4.166"				Recovery only
1. Shutdown Low Priority Protected Virtual Machines				Recovery only
2. Shutdown Normal Priority Protected Virtual Machines				Recovery only
3. Shutdown High Priority Protected Virtual Machines				Recovery only
2. Prepare Storage	Success	6/25/2008 4:57:28 AM	6/25/2008 5:02:39 AM	
1. Attach Disks for Protection Group "Demo Group 2"	Success	6/25/2008 4:57:28 AM	6/25/2008 5:02:39 AM	
3. Suspend Non-critical Virtual Machines	Success	6/25/2008 5:02:39 AM	6/25/2008 5:02:39 AM	
4. Recover High Priority Virtual Machines	Success	6/25/2008 5:02:39 AM	6/25/2008 5:02:39 AM	
5. Recover Normal Priority Virtual Machines	Success	6/25/2008 5:02:39 AM	6/25/2008 5:07:51 AM	
1. Recover VM "SQL ASM Server"	Success	6/25/2008 5:02:39 AM	6/25/2008 5:05:37 AM	
1. Change Network Settings	Success	6/25/2008 5:02:39 AM	6/25/2008 5:04:04 AM	
2. Pre-Power On	Success	6/25/2008 5:04:04 AM	6/25/2008 5:04:04 AM	
3. Power On	Success	6/25/2008 5:04:04 AM	6/25/2008 5:05:37 AM	
4. Wait for OS Heartbeat	Success	6/25/2008 5:05:37 AM	6/25/2008 5:05:37 AM	
5. Post Power On	Success	6/25/2008 5:05:37 AM	6/25/2008 5:07:51 AM	
2. Recover VM "Server 2"	Success	6/25/2008 5:05:37 AM	6/25/2008 5:05:37 AM	
1. Change Network Settings	Success	6/25/2008 5:05:37 AM	6/25/2008 5:05:37 AM	
2. Pre-Power On	Success	6/25/2008 5:05:37 AM	6/25/2008 5:05:37 AM	
3. Power On	Success	6/25/2008 5:05:37 AM	6/25/2008 5:06:40 AM	
4. Wait for OS Heartbeat	Success	6/25/2008 5:06:40 AM	6/25/2008 5:07:50 AM	
5. Post Power On	Success	6/25/2008 5:07:50 AM	6/25/2008 5:07:51 AM	
6. Recover Low Priority Virtual Machines	Success	6/25/2008 5:07:51 AM	6/25/2008 5:07:51 AM	
7. Recover No Power On Virtual Machines	Success	6/25/2008 5:07:51 AM	6/25/2008 5:07:51 AM	
8. Message: Test recovery complete. Please verify the success of the test. When done,...	Waiting for input	6/25/2008 5:07:51 AM	0%	Test only
9. Cleanup Virtual Machines Post Test				Test only
10. Resume Non-critical Virtual Machines				Test only
11. Reset Storage Post Test				Test only

Figure 3. Recovery plan testing with VMware SRM helps administrators start and stop trial runs and pause them to make changes

Organizations of all sizes are embracing iSCSI SANs and the next-generation disaster recovery enabled by server and storage virtualization. Using Dell EqualLogic PS Series SANs and VMware SRM, organizations worldwide can achieve simple, cost-effective, and highly automated disaster recovery for their virtualized data centers.

Andrew Gilman is a solutions marketing manager at Dell responsible for virtualization marketing activities for the Dell EqualLogic product family. Before coming to Dell, he held a variety of product marketing roles at EMC and worked in both technical and marketing capacities at several successful startups in the telecommunications industry. Andrew has a B.S. in Business

Administration from the Boston University School of Management.

Jon Bock is the senior product marketing manager for business continuity solutions at VMware, where he is responsible for working with organizations to determine how VMware technology can be used in their business continuity solutions. Before joining VMware, Jon worked at Hewlett-Packard managing alliances with enterprise software solution partners. Jon has a B.S. degree in Electrical Engineering from Stanford University and an M.B.A. from the Duke University Fuqua School of Business.

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