

Using Virtualization to Achieve Affordable Disaster Recovery

Physical-to-virtual Disaster Recovery from Microsoft,
PlateSpin, and Dell

Published: February 2007

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Microsoft®
Virtual Server 2005 R2

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Introduction

As IT departments are asked to do more and more on stagnant or shrinking budgets, they are increasingly turning to virtualization as a means to reduce hardware expenditures and decrease the per-server cost of power, floor space and human resources.

Virtualization first saw wide-spread use in development and test scenarios, which enabled organizations to rapidly evaluate software in different operating environments. More recently, organizations have turned to server virtualization for consolidation to benefit from increased infrastructure resource utilization and decreased hardware and maintenance costs as well as accelerated server installation and configuration.

A new application of server virtualization has emerged for disaster planning and recovery. Organizations are now able to leverage the benefits of virtualization technology to protect the servers in the network that are commonly left under-protected.

Organizations tend to share a core set of disaster planning and recovery needs:

- the backup and recovery process must be fast,
- it must have minimal impact on production operations, and
- it must be recoverable with a high level of data integrity.

These performance-oriented needs are always balanced against the fiscal need for an affordable solution. Most often, reality dictates that organizations forego one or more of these needs due to cost.

This whitepaper details PlateSpin's Physical-to-Virtual (P2V) Recovery solution, implemented using Microsoft® Virtual Server 2005 R2 with Service Pack 1 (SP1) in conjunction with Dell PowerEdge™ Servers. The solution created by using these products makes it possible to create a disaster planning and recovery solution that can help provide enterprise-caliber rapid restore times and data synchronization without enterprise-caliber costs..

Need for an Effective Disaster Planning and Recovery Solution

Two metrics commonly used to evaluate disaster recovery solutions are Recovery Time Objective (RTO), which measures the time between a system disaster and the time when the system is again operational, and Recovery Point Objective (RPO), which measures the time between the latest backup and the system disaster, representing the nearest historical point in time to which a system can recover.

Traditional disaster planning and recovery solutions, including tape backup, image capture, and clustering, fail to deliver desired RTO and RPO within reasonable budgetary constraints.

- **Tape Backup:** Tape backup is the most economically prudent alternative, however it can be difficult to administer and frequently takes days to restore.
- **Image Capture:** Image capture is a bit more expensive and maintains an adequate RPO, but recovery time tends to be lethargic and error prone due to the inflexibility of the underlying imaging technology.
- **Clustering:** Finally, clustering fully achieves recovery time and point objectives, but it can be prohibitively expensive, complicated to implement. With the exception of the most mission-critical server environments it is typically not a viable option.

A third metric that is emerging as a key point of measurement for the effectiveness of recovery alternatives is Test Time Objective (TTO), which measures the ease with which a disaster recovery plan can be tested.

For an organization to be truly confident in their disaster recovery strategy, solution, and procedures, they should be tested. However, most disaster recovery solutions are prohibitively complex and invasive in business operations and are thus not feasible to test regularly. When an organization most needs its disaster recovery solution to work, it may be the first time that it has truly implemented it at scale. In contrast to this situation, functionality built into PlateSpin PowerConvert (a key component of the P2V Recovery solution) allows for easy, rapid testing of the solution without disrupting business operations.

Virtualization, coupled with PlateSpin's OS Portability™ technology, presents new alternatives to traditional disaster planning and recovery solutions. The same features of virtualization that make it beneficial in server consolidation—encapsulation, portability, and virtual hard disk strategies such as disk differencing—bring flexibility and affordability to disaster planning and recovery. Moreover, the inherent versatility of PlateSpin P2V Recovery allows organizations to harness the benefits of virtualization to protect server workloads running in physical production environments.

Microsoft, PlateSpin, and Dell offer products that enable and support virtualization. Combined, these products form a solution that is ideal for achieving RTO and RPO by using a virtual machine host computer allocated as a warm standby—all for costs that are more in line with the costs of traditional tape backup. As a key part of any virtualization strategy, Microsoft Virtual Server 2005 R2 SP1 offers the benefits of virtualization using familiar Windows Server® services, and complements investments in other Microsoft Windows Server technologies. With PlateSpin P2V Recovery, production servers can be backed up to virtual machines at a fraction of the cost of traditional disaster recovery solutions, and can be restored rapidly and with great ease. Moreover, Dell's reliable and cost-effective PowerEdge Servers, now with Intel Virtualization Technology, help make the disaster recovery strategy even more robust by including their own performance and redundancy features.

By using Virtual Server 2005 R2 SP1 with PlateSpin's P2V Recovery solution on Dell PowerEdge Servers, organizations can overcome the limitations of the current solutions to achieve fast recovery speed and high reliability for disaster recovery and backup at an affordable price.

Disaster Planning and Recovery Solution Components

The solution described in this paper consists of four key components, represented below:

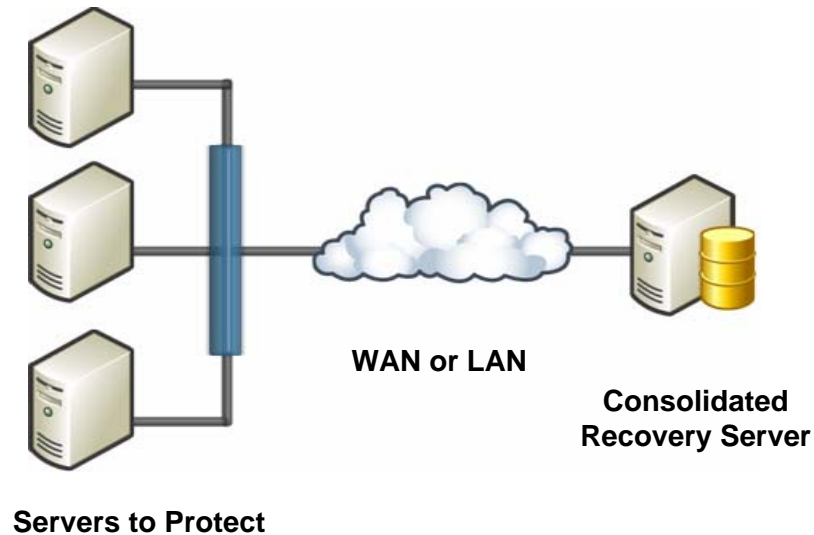


Fig. 1: Basic sketch of hardware used in P2V Disaster Recovery.

PlateSpin's P2V Recovery

A typical organization can allocate as much as 80 percent of their disaster recovery budget on only their most vital servers – frequently as few as 20% of the total server network. These are the mission-critical and business-critical fault-tolerant and highly available servers.

A disaster recovery budget allocated along these lines leaves the remaining 80 percent of servers under-insured against catastrophe. While the loss of any given one or group of these servers would not bring operations to a halt (as a loss of servers in the top-20-percent disaster-recovery echelon might), their loss would cost money. If a workload is worth running, it is worth keeping running. Clearly, many current organization-wide disaster-recovery plans are deficient.

PlateSpin revolutionizes business continuity with the concept of OS Portability, the unique ability to easily move any server workload—be it physical, virtual, or image-based—to any potential target platform: physical or virtual. In the context of P2V Recovery, this plays out as heterogeneous server workloads being duplicated to virtual-machine backups, which are periodically synchronized from the physical environment. In the event that some or all of the primary server workloads are lost to physical disaster or network or hardware failure, workloads can failover to their virtual duplicates and continue to run. More powerfully still, OS Portability ensures that these now virtualized workloads can also be restored (failback) either to their original location or a new location: dissimilar physical hardware or virtual machines.

The PlateSpin P2V Recovery solution can be used to replicate a whole server image by streaming it over the network to an available virtual machine host allocated as a warm standby system. Live transfer functionality enables incremental synchronization to occur at user-defined intervals to maintain a high degree of currency between the production environment and the virtual standby system. In the event of a primary server outage, the standby system can be activated to take over the workload immediately. After recovery, the

system can be moved back to a restored physical server of dissimilar hardware, or moved to a production virtual machine server for continued operation in a virtual machine. It can also be left running as-is in the virtual recovery environment. Recovery time and point objectives are achieved without the need for high cost, complex clustering environments. For data centers already employing image backup tools, PlateSpin P2V Recovery is able to restore third-party images in a completely hardware-independent manner as well. Finally, data centers are able to leverage P2V Recovery's rapid test restore capabilities to run test failure scenarios which were previously too time consuming to operate for all but the most mission critical server assets.

The cornerstone of the affordable, wide-ranging disaster-recovery solution outlined in this paper is PlateSpin's P2V Recovery solution, which brings together PlateSpin's PowerRecon and PowerConvert products.

Implementing a recovery plan is not possible without first creating a plan. PlateSpin PowerRecon allows an organization deploying the P2V Recovery solution to inventory existing resources, and plan any new resources necessary to create the virtual recovery environment. PowerRecon identifies available virtual host space, and then designs a protection scheme that accounts for the resource utilization trends of physical servers in the data center. This effectively enables the data center to either employ unused virtual resources across the network, or accurately size the required virtual recovery environment. Furthermore, PowerRecon ensures that if a failure does occur, the recovery environment is properly balanced to handle the new workload requirements. As server workloads change over time, PowerRecon can be used to re-assess the recovery plan and form the foundation for adjustments where necessary.

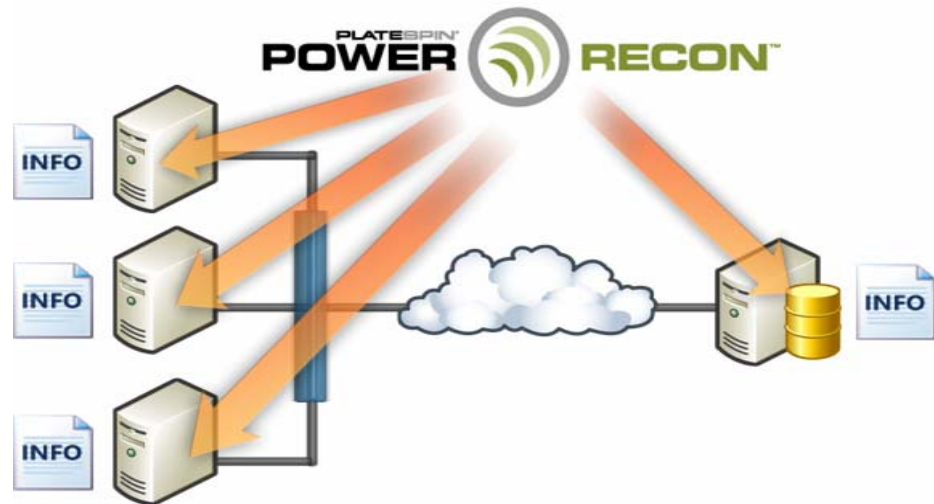


Fig. 2: PlateSpin PowerRecon for DR inventory, planning, and configuring.

PowerConvert performs the initial full replication of physical workloads into the virtual standby environment. A single, live P2V migration is performed to copy the entire system, and stream it over the network into a virtual machine environment that was created and configured by PowerConvert. After the initial full replication, users are able to schedule at customizable intervals, incremental data transfers to maintain synchronicity between the physical production server and the virtual recovery environment. Any file that has changed since the previous incremental transfer will be copied over to the virtual restore system on the next synchronization.

Once the synchronization schedule is created, users can rapidly test the integrity of the disaster recovery plan by powering on the virtual recovery machine within an isolated, internal network to ensure the environment is intact.

In the event that a failure or disaster occurs, PowerConvert is used to transfer production operations from the failed physical production server to the virtual recovery environment. After this transfer from the failed physical production server has completed, PlateSpin's OS Portability technology provides data centers with a variety of options. If the original failure is repaired and the hardware intact, users can de-virtualize the workload from the virtual recovery environment back to the original physical platform. Alternatively, if the hardware cannot be repaired, users can restore the workload with a V2P migration onto new, dissimilar hardware. Finally, it is also possible to simply leave the server running in the virtual recovery environment.

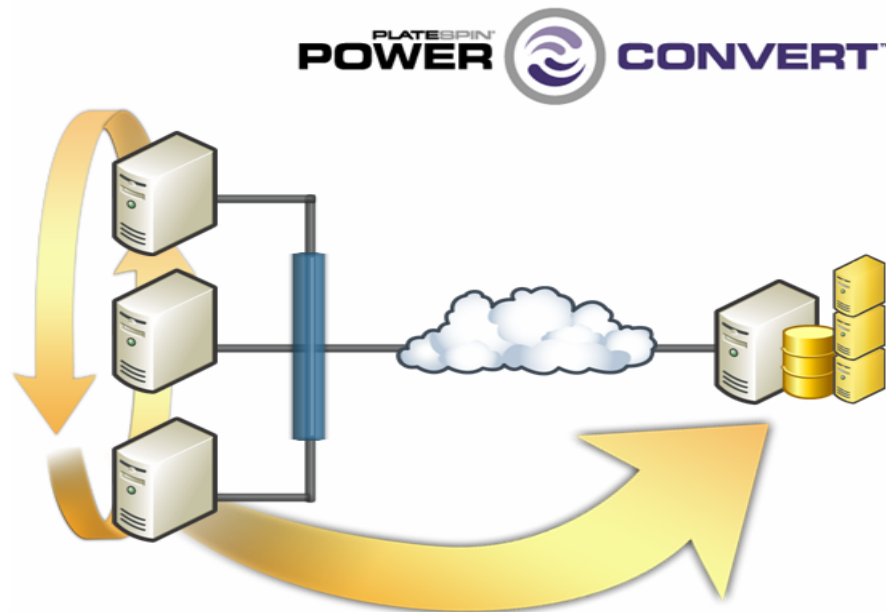


Fig. 3: PlateSpin PowerConvert for DR backup, replication, testing, failover, and restoration.

Microsoft Virtual Server 2005 R2 SP1

The disaster recovery solution described in this paper uses Microsoft Virtual Server 2005 R2 SP1 as the virtualization platform. Virtual Server 2005 R2 SP1, hosted on the Windows Server 2003 R2 operating system, delivers the performance necessary to carry out consolidation, migration, and isolation tasks through virtualization technology in an enterprise-ready computing environment with advanced levels of scalability, manageability and reliability. All of these tasks are critical to implementing the virtualization-based disaster planning and recovery solution outlined in this paper.

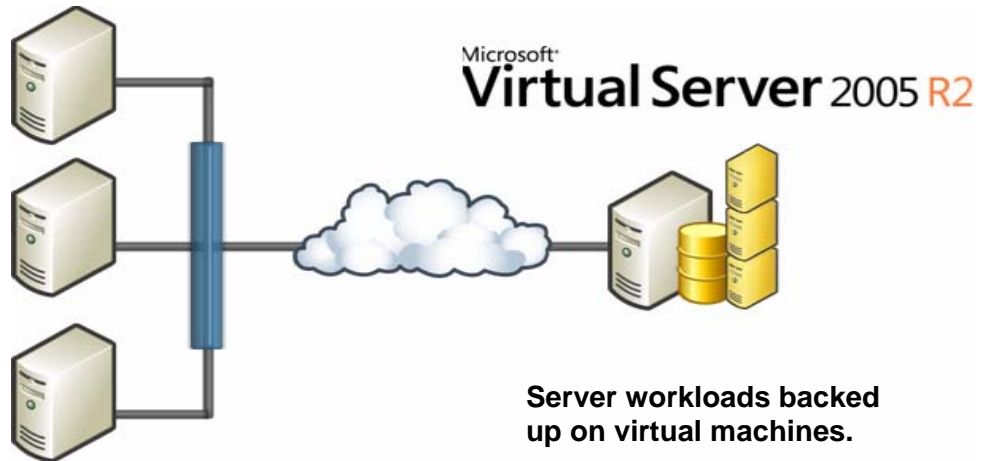


Fig. 4: Virtual Server 2005 R2, P2V DR virtualization platform.

Virtual Server 2005 R2 SP1 provides a virtualization platform that runs most major x86 operating systems in a guest environment, and is supported by Microsoft as a host for Windows Server operating systems and Windows-based applications. Virtual Server 2005 R2 SP1's comprehensive COM API, in combination with the Virtual Hard Disk (VHD) format and support for virtual networking provide administrators complete scripted control of portable, connected virtual machines and enables easy automation of deployment, and ongoing change and configuration. Additionally, its compatibility with a wide variety of existing Microsoft and third-party management tools allows administrators to seamlessly manage a Virtual Server 2005 R2 SP1 environment with their existing physical server management tools. There are a wide variety of complimentary product and service offerings available from Microsoft and a broad set of partners to help businesses plan for, deploy and manage Virtual Server 2005 R2 SP1 in their environment. Due to its ability to increase server hardware utilization (and thus enhance administrative productivity), Virtual Server 2005 R2 SP1 plays a key role in Microsoft's Dynamic Systems Initiative (DSI) – an effort to dramatically simplify and automate how businesses design, deploy, and operate IT systems.

New features in Service Pack 1 for Virtual Server 2005 R2 include storage improvements and feature enhancements which simplify and accelerate the backup and restore process for virtual machines running on Virtual Server. These new features enable new disaster recovery scenarios. These new disaster recovery scenarios can help organizations to update or re-craft disaster recovery solutions to simplify, streamline, and accelerate disaster recovery processes. New disaster recovery approaches using virtual machines can reduce the overall cost to implement and operate disaster recovery solutions and they can simultaneously help reduce the administrative effort required to manage the solution.

Microsoft Windows Server 2003 R2, Enterprise Edition

The disaster-recovery solution described in this paper uses Windows Server 2003 R2 as the server operating system on the virtual machine host. Windows Server 2003 R2 makes it easy and cost-effective to extend connectivity and control to identities, locations, data and applications throughout and beyond your organization. Particularly for virtualization, Windows Server 2003 R2 Enterprise Edition provides the security, reliability, and scalability to confidently power business critical workloads.

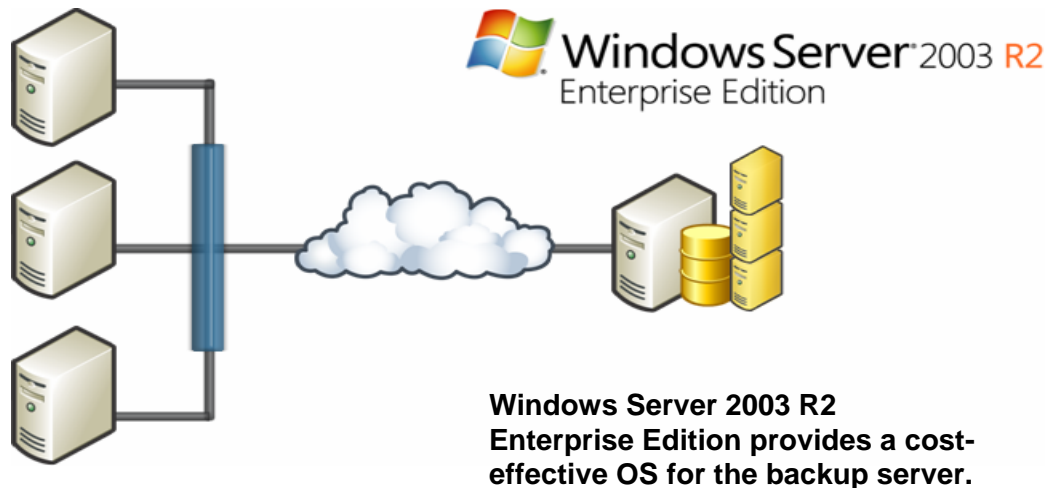


Fig. 5: Windows Server 2003 R2 Enterprise Edition, P2V DR server operating system.

With Windows Server 2003 R2, Microsoft has introduced advantageous new licensing to better facilitate virtualization. First, a single Windows Server 2003 R2 Enterprise Edition license grants the organization use rights to that physical instance of the operating system **plus** up to four **virtual** instances of either Windows Server 2003 R2 Standard Edition or Enterprise Edition on the same server. Moreover, Windows Server 2003 R2 licenses only apply to **running** instances of the operating system; an organization with a library virtual machines with Windows Server 2003 R2 installed on them would not pay for a license of for each installed instance (as with the traditional licensing model); rather, the customer would pay for only those instances of Windows Server 2003 R2 that were running at any given time.

Thus not only does this new licensing model provide excellent value with Windows Server 2003 R2 Enterprise Edition, it also facilitates the adoption of virtualization by only making organizations pay for what they use. This also allows organizations with existing Windows Server 2003 R2 Enterprise Edition licenses to implement the solution outlined in this paper without incurring additional licensing costs.

Dell PowerEdge™ Servers

The solution proposed in this paper is built on Dell PowerEdge Servers. Dell's rack-optimized server family provides a broad offering of cost-effective choices for any virtualization initiative. With Microsoft Windows Server 2003 R2 pre-installed, and Microsoft Virtual Server 2005 R2 SP1, organizations can host and manage multiple virtual machines on each Dell PowerEdge Server.

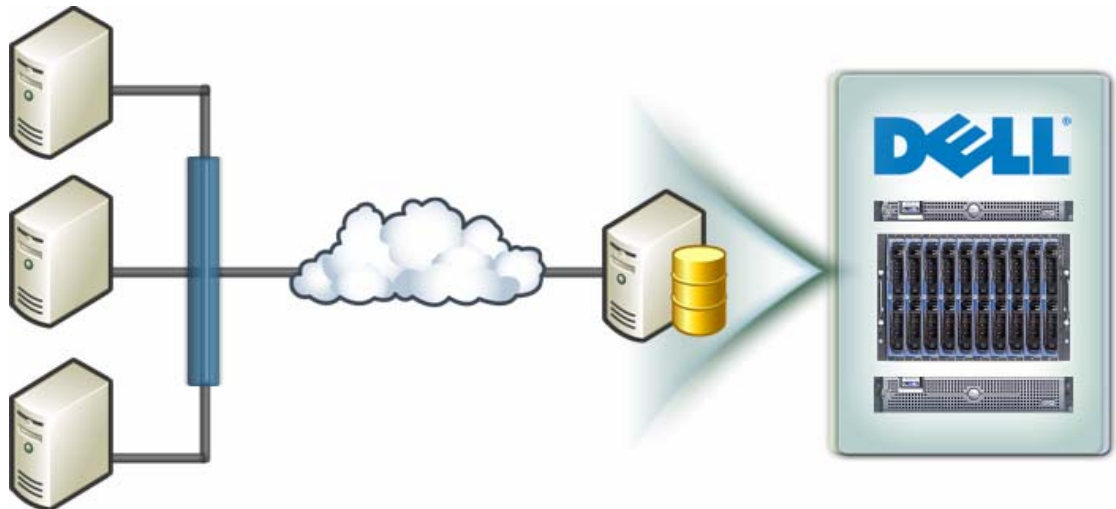


Fig. 6: Dell PowerEdge Servers, P2V DR hardware.

Dell offers a range of virtualization solutions that can help organizations elicit gains in disaster planning and recovery, such as improved CPU utilization, manageability, interoperability through Linux guest support, and scalability for the newest 64-bit solutions. These solutions include the powerful, scalable, and reliable Dell PowerEdge Servers, based on Intel Xeon processors featuring hardware-level support for virtualization through Intel Virtualization Technology. Dell's standards-based servers are designed to simplify server administration and enable modular "pay-as-you-grow" scalability.

The Dell PowerEdge 2950 server is often considered the standard server "building block" for virtualization environments when configured with two of Intel's Xeon 5300 line of quad-core processors (formerly code-named Clovertown), featuring Intel Virtualization Technology. This hardware platform designed to support heavy virtual machine workloads, provides outstanding processing power and capacity for hosting the virtual recovery site outlined in this paper

For customers who need to consolidate multiple virtual machines on one physical server, Windows Server 2003 R2 Datacenter Edition is available from Dell pre-installed on Dell PowerEdge Servers. Additionally, Windows Server 2003 R2 Datacenter Edition, once only available from original equipment manufacturers (OEMs), is now available across hardware architectures and can be purchased directly by customers.

Windows Server 2003 R2 Datacenter Edition licensing itself facilitates large-scale virtualization: Windows Server 2003 R2 Datacenter Edition licenses now include unlimited virtualization rights, meaning that customers can run an unlimited number of virtualized instances of Windows Server on processors licensed with Windows Server 2003 R2 Datacenter Edition without having to purchase additional licenses.

Business Benefits

Organizations regardless of size generally acknowledge the importance of disaster recovery, but few have a genuinely proven, tested solution. The solution discussed in this paper helps address the barriers blocking organizations of all sizes from implementing a viable, supportable disaster recovery solution.

Medium-sized and Mid-market Organizations

For the discussion in this paper, medium-sized and mid-market organizations are defined as those with 500 or fewer desktops deployed across the organization. With proportionally more constraints and demands on limited resources relative to larger organizations, organizations in the mid-market segment face significant challenges to implementing sound disaster recovery solutions. However, medium-sized organizations increasingly deploy more sophisticated technology as a central part of their operations, yet tend to concentrate all IT assets onto only a hand full of servers. In such a deployment scenario, even a disaster as small as the failure of a single server can lead to major operational disruptions or even business failure.

The disaster-recovery solution outlined in this document brings full-scale disaster recovery within reach of even the smallest organizations. Deploying a disaster recovery solution based on Microsoft Virtual Server, PlateSpin P2V Recovery, and Dell hardware, even the smallest business can reap all of the benefits of a disaster-ready infrastructure. Specifically, this disaster-recovery solution carries the following benefits for medium-sized organizations:

- **Fast** – The solution provides extremely fast recovery, saving lost time and productivity trying to get back up and running.
- **Accurate** – The point from which data are recovered is a known point, saving time assessing when the last backups occurred and how to recover lost data.
- **Affordable** – The low total cost of the solution makes it ideal for small to mid-sized organizations.
- **Easy to use** -- The solution is easy to set up and administer, allowing smaller businesses with few or limited IT resources to take advantage of it.

Organizations will see improved business continuity with a strong disaster recovery solution that is accessible, yet powerful. Organizations can take advantage of a data center class solution for a price that is more in line with small to medium business prices.

Large Organizations and Data Centers

For purposes of this paper, consider larger organizations to be those with more than 500 desktops deployed across the organization. Beyond large-scale organizations, smaller entities with more sophisticated data needs—such as maintaining a data center—fit the characteristics of organizations in this market segment.

Though pressured to a lesser extent than mid-market organizations, enterprises with larger IT staffs and bigger budgets are still under considerable pressure to maintain focus on maintaining day-to-day business operations and deliver on strategic IT initiatives. These initiatives are often intended to help develop emerging lines of business rather than dwell on doomsday planning. This leaves disaster recovery trailing in priority, in spite of apparent resource expertise and availability to implement a solution.

The simplicity and convenience of the Microsoft/PlateSpin/Dell solution make the disaster recovery planning and implementation undertaking easier for large organizations with broad IT agendas.

- **Readiness** – Prepare the enterprise for a variety of disaster and recovery scenarios. Have a viable, easily testable, solution to take to executives. Deliver in crisis situations.
- **Ease of maintenance** – Keep focus on strategic, revenue generating IT activities by creating a solution that is easy to configure, maintain, and test.
- **Cost effective** – In stark contrast to conventional disaster recovery approaches, virtualization pays the biggest dividends on the enterprise scale.
- **Scalable** – The scalable platform created by Windows Server 2003 R2 Enterprise Edition and Virtual Server 2005 R2 on Dell hardware is enterprise-ready.
- **Reliable** – Microsoft, Dell, and PlateSpin are market leaders in their respective industries. Using the award winning Windows Server platform, the market proven PlateSpin PowerSolution, and the latest industry standard Dell hardware creates a reliable environment for all disaster recovery activities.

Large organizations and data centers can see tremendous benefits from this new disaster recovery solution. The affordability and flexibility of this solution allows organizations to protect more of their servers, including previously under-protected servers. With this solution, disaster recovery can be performed in place quickly enough to meet increasingly aggressive RTO and RPO goals. More uniquely, this solution also allows test scenarios to be conducted easily and quickly, helping to drastically reduce TTO.

Note: While PlateSpin PowerConvert can replicate data between the server workloads being protected by the P2V Recovery solution and the backup virtual machines, it will also work in conjunction with the existing data replication software that a large organization may already have in place. This allows large organizations to leverage their investments in existing replication tools, while also realizing the benefits of P2V Disaster Recovery.

Summary

Virtualization has rapidly become a standard technology for use in software development and test, and server consolidation scenarios. A growing trend is for organizations to further leverage virtualization to achieve superior disaster planning and recovery operations

Traditional disaster planning and recovery solutions, including tape backup, image capture, and clustering, fail to deliver the necessary combination of recovery speed and integrity within reasonable budgetary constraints. While hardware clustering fully delivers RTO and RPO, it is extremely expensive to implement and manage. At the same time, image capture and tape backup can be affordable, but are often error-prone and slow to restore, making RTO and RPO difficult to meet. Moreover, traditional disaster recovery strategies can be cumbersome—and costly—to test, meaning that too many organizations have no idea what their TTO is for their disaster-recovery strategy. The PlateSpin P2V Disaster Recovery solution has built-in testing capabilities, making TTO a meaningful metric.

The PlateSpin P2V Disaster Recovery solution in combination with Virtual Server 2005 R2 SP1 on Dell hardware can help organizations achieve superior recovery speed and reliability for disaster recovery and backup at an affordable price.

Related Links

- For more information from PlateSpin about the solution outlined in this paper visit: <http://www.platespin.com/easyDR>.
- For information about Virtual Server 2005 R2 SP1 and to download Virtual Server visit the Virtual Server home page on the Microsoft Web site at: <http://www.microsoft.com/virtualserver>.
- For more information about Windows Server 2003 R2 Enterprise Edition visit the Enterprise Edition home page on the Microsoft Web site at: <http://www.microsoft.com/windowsserver2003/enterprise>.
- For information about PlateSpin and their products visit: <http://www.platespin.com/>.
- For information about PlateSpin's P2V Recovery Solution visit: <http://www.platespin.com/p2vdr/>.
- For information about Dell server products: <http://www.dell.com/poweredge>.
- For information about Dell virtualization solutions: <http://www.dell.com/virtualization>.
- For information about backup and recovery with Dell: http://www.dell.com/content/topics/global.aspx/services/en/dps_bus_cont?c=us&cs=55&l=en&s=biz.



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Document published February 2007.