

# WHITE PAPER

The Double-Edged Sword of Virtualization:

Solutions and Strategies for Minimizing the Challenges and Reaping the Rewards of Disaster Recovery in the Virtualized Environment

**FUSIONSTORM™**

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## EXECUTIVE SUMMARY

Disaster recovery has always been a difficult and costly proposition, and virtualization has upped the ante. Virtualization enables the consolidation of workloads onto fewer servers, increasing the business impact should any one physical server fail. As virtualization accelerates, more mission-critical applications are deployed on virtual machines (VMs), making effective disaster recovery even more critical in the highly virtualized environment.

At the same time, automated deployment tools can lead to the proliferation of VMs, creating bottlenecks in traditional backup and recovery processes. Using agents to back up VMs to tape drives or disk storage impacts the performance of shared server resources. Organizations are often forced to limit the number of VMs that share each physical server due to the added overhead of backup and recovery.

Done right, however, virtualization can enable a simpler and more efficient DR environment. Virtualization reduces the number of servers required at a disaster recovery site and increases the level of automation that is possible. And by abstracting the operating system from the hardware layer, virtualization allows IT shops to replicate data asymmetrically — that is, without having to provide a matching host or disk at the disaster recovery site.

With the right tools, organizations can overcome the challenges and reap the rewards of DR in a virtualized environment. A backup solution that is optimized for virtualization provides for more efficient backup of VMs and simple one-step recovery, while global client-side de-duplication eliminates the highly redundant data that is typical with virtualization. A tightly integrated solution and single-pane-of-glass management streamlines backup processes and helps ensure that all VMs are protected.

This paper discusses the double-edged sword of disaster recovery in virtualized environments. It focuses on EMC's suite of backup and recovery solutions, including Avamar, NetWorker and Data Domain. With next-generation backup and recovery technologies from EMC, organizations can simplify disaster recovery for VMs, reduce costs, and have the right data protection platform for expanding virtualization across the data center.

## VIRTUALIZED ENVIRONMENTS AT RISK

The challenge of managing disparate virtual, physical and cloud resources increases the complexity of data protection and disaster recovery operations. As a result, many virtual systems are not properly protected.

According to a recent study, 44 percent of data on virtual systems is not backed up regularly and 82 percent of backups occur only weekly or less frequently. Survey respondents indicated that the lack of available primary (57 percent) and backup (60 percent) storage hampers their ability to protect mission-critical data. Because of restore requirements, organizations typically perform both full virtual machine image backups and guest-OS-level backups for operational file recovery and application consistency. As a result, backup windows are frequently exceeded and large amounts of target backup media are consumed.

Only one in five survey respondents use replication and failover technologies to protect their virtual environments, and only 40 percent of virtualized servers are covered in their current disaster recovery plans. Organizations experienced an average of four downtime incidents in the 12 months preceding the study. Although the expected downtime per outage was two hours, the actual median downtime per outage was five hours. The adverse effect on recovery point objectives (RPOs) and recovery time objectives (RTOs) jeopardize business operations, customer goodwill and regulatory compliance.

These statistics must be improved if organizations are to maximize their use of virtualization on a path to the private cloud. Virtualization promises to improve data center efficiency, scalability and flexibility but not at the expense of data protection. As more mission-critical applications are moved to virtualized environments, effective disaster recovery and high availability become critical necessities.

## HOW VIRTUALIZATION BENEFITS DISASTER RECOVERY

Virtualization also brings significant benefits to DR readiness. In traditional environments, disaster recovery is typically implemented manually, requiring numerous complex steps to allocate recovery resources, perform bare metal and data recovery, and validate that systems are ready for use. These manual processes leave organizations exposed to significant risk of extended downtime because they are tough to set up and maintain. As a result, only a subset of important systems can be adequately protected.

To illustrate, traditional disaster recovery plans for data centers require extensive documentation consisting of hundreds of pages of instructions contained in runbooks that are nearly impossible to keep accurate and up-to-date. The complexity of the manual recovery processes in these runbooks makes it difficult for organizations to reliably recover within their RTOs.

Virtualization dramatically increases the level of DR automation that is possible. There are a number of powerful workflow management systems engines on the market that can automate runbooks and effortlessly trigger the movement and restoration of virtual environments between virtual server clusters. Middleware from several vendors can be tightly integrated with storage replication software to map production resources to the corresponding resources at the DR site.

Having a recovery plan is important but just as important is ensuring that the plan is reliable. Traditional recovery plans are often unreliable because they are hard to test, difficult to keep up-to-date, and depend upon correct execution of complex manual recovery processes. Many IT managers are reluctant to test their plans due to disruption to the business and lack of resources. Those who do test frequently fail to meet their RTOs, most often due to human error.

Automated testing tools for virtualized environments create an isolated testing environment on the recovery site, execute the recovery plan to be used in an actual failover and then clean up the testing environment once testing is complete. Test results are saved for viewing and export at any time. Hardware configuration dependencies are eliminated and testing can occur without impacting production systems.

## EMC IN THE VIRTUALIZED ENVIRONMENT

Minimizing the challenges and maximizing the benefits of DR in the virtualized environment requires centralized management and operational control of the backup and recovery infrastructure along with tools to increase the efficiency of data protection processes. EMC backup and recovery solutions do both by addressing pain points and integrating seamlessly into a cohesive backup and recovery strategy.

EMC Avamar software and hardware is optimized for virtualized environments, enabling faster backups and single-step restores while drastically improving server performance and reducing the amount of network bandwidth required for backup processes. The Avamar agent can be installed directly on the VM host operating system for guest-OS-level backup, or application-specific agents can be run within the VM for application consistency. Avamar's management console controls scheduling, policies, retention and recoveries, and enables administrators to quickly see which VMs are protected and which are not.

Avamar features source-based de-duplication that eliminates redundant data before it is sent over the network to the backup target. Avamar backs up only unique data segments, alleviating the backup bottleneck cause by contention for shared resources and enabling customers to expand their use of virtualization by significantly reducing backup overhead.

Avamar's tight integration with EMC Data Domain de-duplication storage systems enables customers to direct backups to the optimal storage system based upon their attributes. Data Domain's inline de-duplication is ideally suited for VM images, databases and other applications that require industry-leading performance and scale. These workloads can be moved from the Avamar client to Data Domain systems, providing centralized management and simplified operations.

EMC NetWorker supports a number of different client and device types in order to provide one operational process for backup and replication. It provides de-duplication via integration with Avamar and Data Domain, allowing centralized, automated and accelerated backup and recovery across the enterprise. From a single console, administrators can manage traditional backups while also protecting file systems, databases and VM images with de-duplication that requires up to 98 percent less storage and enables 90 percent faster backups.

## EMC DATA DOMAIN BOOST

EMC Data Domain Boost extends the optimization capabilities of Data Domain systems. It distributes part of the de-duplication process from the Data Domain system to the backup server or application client, increasing backup performance up to 50 percent and reduces the load on the server during backup by up to 40 percent.

## A HOSTED ALTERNATIVE: FUSIONSTORM DISASTER-RECOVERY-AS-A-SERVICE

FusionStorm's Disaster-Recovery-as-a-Service (DRaaS) solution provides DR protection for production VMware environments without the need to acquire hardware, software, data center space or IT skill sets. It is a fully hosted service that is provisioned, monitored and managed 24x7 by FusionStorm's staff of IT experts.

- **VMware vCloud Powered.** Based on VMware vCenter Site Recovery Manager and vSphere Replication, FusionStorm DRaaS delivers simple, efficient and cost-effective replication of VMs.
- **Application-Consistent Failover and Failback.** FusionStorm DRaaS provides application-level consistency for failover and provides automated failback by "reversing" the data replication process from the recovery site to the primary site.
- **Customizable RPO and RTO.** The service is customizable to meet almost any RPO, RTO or business requirement.
- **Semiannual Failover Testing.** FusionStorm DRaaS provides for semiannual, scheduled testing of the disaster recovery solution, including optional failback testing.

FusionStorm DRaaS is built upon EMC's enterprise-class storage solutions, including Avamar, Data Domain and RecoverPoint. A Data Domain storage system installed at the production site functions as the target, with Avamar providing client-side data de-duplication for fast and efficient backup and recovery for the VMware environment. The data is then replicated to Data Domain storage hosted in FusionStorm's secure, enterprise-class data centers.

FusionStorm DRaaS is compatible with most applications running on vSphere and is especially well-suited to customers that do not have a second data center for disaster recovery. Optional hosted VMs connected to the recovery Data Domain system enable fast and easy recovery of data if needed and can be used to run customer applications.

## CONCLUSION

Organizations of all sizes are faced with the impact that virtualization has on data protection. The combination of full VM image backups and guest-OS-level backups across dozens, even hundreds of VMs creates huge volumes of backup data and slows backup processes. Existing backup solutions are just not able to keep up, leaving organizations struggling to reduce backup windows, manage application uptime and meet data RPO and RTO requirements. To alleviate these challenges, organizations need high-performance backup solutions that utilize de-duplication to shrink backup volumes and increase efficiency.

Organizations can also take advantage of virtualization to improve data protection. Virtualization minimizes risk by automating DR processes and ensuring that they are executed rapidly, correctly and cost-efficiently. Centralized management and operational control of the backup environment can help organizations take full advantage of these benefits.

EMC's line of enterprise-class backup and recovery solutions fulfill both requirements. EMC delivers industry-leading de-duplication in a tightly integrated environment that supports highly efficient and scalable backup across the organization. With Avamar, Data Domain and NetWorker, organizations can utilize a single management console to perform VM image and guest-OS-level backups, along with traditional backup processes, while dramatically reducing backup storage, bandwidth and server resource demands.

FusionStorm offers a hosted alternative built upon EMC technology. With FusionStorm's DRaaS solution, organizations gain foolproof protection of their production VMware environments backed by FusionStorm's leading expertise.

## About FusionStorm

FusionStorm delivers best-of-breed technology solutions that give our customers a competitive edge. Our deep technical expertise and business acumen enable us to design and implement solutions aligned with each customer's unique business requirements. We maintain the highest certifications from industry leaders and offer an array of services designed to maximize the efficiency of our customers' operations.

Headquartered in San Francisco, FusionStorm has offices and data centers across the globe, and a culture that emphasizes long-term relationships. By partnering with FusionStorm, customers gain a team of seasoned professionals with a track record of success and an unwavering commitment to customer satisfaction.



800.228.TECH | [info@fusionstorm.com](mailto:info@fusionstorm.com) | [www.fusionstorm.com](http://www.fusionstorm.com)

**Headquarters**

FusionStorm Inc.  
2 Bryant Street, Suite 150  
San Francisco, CA 94105

PHONE: 800 228-TECH  
FAX: 415 623-2630