

# Windows Server® 2008 Hyper-V™ Disaster Recovery and High Availability Solutions using SteelEye® DataKeeper™

## Overview

As virtualization technology moves from a test and development role into the data center, the many benefits of virtualization bring with them a new problem that must be addressed - the hypervisor and the physical server on which it runs represent a single point of failure (SPOF). With multiple physical servers being replaced by Windows Server 2008 Hyper-V VMs running on a single physical server, that single physical server represents a SPOF for not only one server, but also all of the VMs hosted on that server. This is a classic “all your eggs in one basket” problem that could result in a catastrophic failure should the Hyper-V host server fail.

Fortunately, Microsoft has the answer in Windows Server 2008 Failover Clustering (WSFC). WSFC provides protection against both planned and un-planned downtime by including a Virtual Machine cluster resource type which automates the process of clustering Hyper-V VMs. Once the VM is clustered, any unexpected failure of the Host server, or failure of the VM itself, will result in a switch-over to the standby cluster node.

WSFC is also the mechanism that enables “Hyper-V Quick Migration<sup>1</sup>”. A Quick Migration allows administrators to move a Hyper-V VM from one Hyper-V host server to another, with minimal interruption. This is used for planned downtime, such as when an OS patch requires a reboot, or when hardware needs to be replaced, etc. Planned downtime accounts for the majority of outages experienced by organizations, so having a solution that reduces planned downtime for Hyper-V is essential.

SteelEye DataKeeper provides additional functionality that further increase the availability of Hyper-V VMs by replicating the entire VM from one storage array to another. SteelEye DataKeeper’s support of Hyper-V can work standalone or in conjunction with Microsoft WSFC to provide a complete array of disaster recovery, high availability and backup solutions for Hyper-V VMs.

## Hyper-V Disaster Recovery Configurations

### Replicating Hyper-V VMs for Disaster Recovery

One of the most compelling reasons to deploy virtualization in your data center is server portability. A VM can be moved from one server to another as simply as restoring a VM file to an alternate server, without regard to the server make and model.

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1) <http://blogs.technet.com/virtualization/archive/2008/04/24/hyper-v-quick-migration-vmware-live-migration-part-1.aspx>

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Such portability is extremely attractive when it comes to disaster recovery planning as VM restoration is much less complicated than traditional bare-metal recovery from tape backups.

With traditional backup and restore technology, full backups are taken on a regularly scheduled basis (weekly, daily, etc.) and then incremental or differential backups are taken periodically in between the regularly scheduled full backups. In the event of a disaster, recovery involves restoring the most recent full backup and any incremental or differential backups that are available. Of course, this is assuming that these backups are available in the disaster recovery location.

This leads to a recovery time of hours and a recovery point only as good as the last available backup. In the event of a disaster, even with the advantages gained by portable virtual machines, you still stand to lose a significant amount of data and you still have some work to do to get your VMs back online. This will likely not meet your company’s recovery time objectives (RTO) and recovery point objectives (RPO).

SteelEye DataKeeper Standard Edition addresses the gaps of traditional backup and restore of Hyper-V VMs by doing a continuous replication of a live running Hyper-V VM from your primary server to an alternate server located either locally in the same data center, across the WAN in your disaster recovery site, or both by utilizing the multiple target feature of DataKeeper.

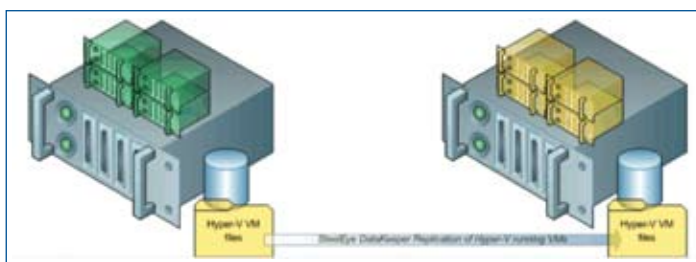


Figure 1. A typical disaster recovery configuration consists of a Hyper-V host server running SteelEye DataKeeper replicating multiple active VMs to a second Hyper-V host server, either in the same data center or across the WAN to a secondary data center.

In the event of a disaster, the replicated VM can be brought into service with minimal to no data loss, without the need to do any restoration from backup media. This gives you one of the highest RPO and RTOs available for Hyper-V recovery. SteelEye DataKeeper Standard Edition suits the disaster recovery needs of organizations that do not require “automatic” failover to the



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disaster recovery site. If fully automated (no user intervention required) disaster recovery options are required, please continue reading the section below entitled Hyper-V High Availability Solutions, where geographically dispersed clusters are discussed.

### Non-obtrusive Hyper-V Disaster Recovery Testing

The use of SteelEye DataKeeper and Hyper-V VMs allow for non-disruptive disaster recovery testing. By simply accessing the replicated VMs in the DR site, the administrator can segment a virtual network separate from the production network and start the replicated VMs for disaster recovery testing. Complete disaster recovery testing can be performed without impacting the production site at all.

Once the testing is complete, SteelEye DataKeeper throws away any changes that were made on the target server during the testing and picks up the replication where it left off before the testing began. With a disaster recovery test plan as simple, painless and non-obtrusive as described above, DR testing can be completed more often with minimal impact to production networks.

### SteelEye DataKeeper and Hyper-V clusters

#### Unplanned Downtime

WSFC included with Windows Server 2008 Enterprise and Data Center Editions provides high availability clustering that ensures if the Hyper-V host fails, the VMs hosted on that server get restarted on the standby server. This requires that the Hyper-V VMs all reside on a shared fiber channel or iSCSI array. But what happens if the shared storage array fails? What if there is a regional power outage? In those cases, you will not have automated recovery with WSFC alone.

SteelEye DataKeeper Cluster Edition integrates seamlessly with WSFC, providing a new replicated storage class resource that can be used in place of the physical disk resource. By utilizing SteelEye DataKeeper Cluster Edition as an extension to WSFC, you can protect your Hyper-V VMs in the scenarios described above by eliminating shared storage as a single point of failure. Eliminating the need for a shared storage device also allows you to deploy geographically dispersed clusters to shield yourself from regional power failures and other natural disasters. SteelEye DataKeeper replicates the entire VM from one Hyper-V host to another, ensuring that the VM is available even in those dire circumstances.

#### Planned Downtime

What happens when you need to update the BIOS of your server? How about a Microsoft security update that requires a system reboot? All of these scenarios require planned downtime.

Planned downtime of a Hyper-V host server affects all of the workloads that are being virtualized on that Hyper-V host server. In some circumstances, that could mean dozens of servers would need to be brought offline while maintenance is performed on the Hyper-V host server. Generally this is not a tolerable situation.

The solution is termed "Hyper-V Quick Migration" by Microsoft. Quick Migration is facilitated through WSFC, but instead of an unplanned outage resulting in a restart of the Hyper-V VM on the secondary server, the Administrator simply uses the Failover Cluster Management GUI to move the VM to the standby node, resulting in a brief outage while the running VM is moved to the secondary server.

But what happens if the hardware that needs service is the SAN that holds your VM files? In this case, Quick Migration alone will not do the trick because the storage array needs to be available. In order to eliminate downtime associated with SAN maintenance, you will need to move the VMs to an alternate storage device.

SteelEye DataKeeper Cluster Edition works hand-in-hand with WSFC to automate this process. Just as described above in the unplanned downtime section, DataKeeper keeps a real-time copy of the running VM in sync on an alternate storage device, allowing quick migration to not only move the VM from one server to another, but also from one storage device to another.

### Conclusion

Regardless of the virtualization technology you choose to implement, high availability and disaster recovery of virtual machines must be considered at the beginning of each deployment.

If you need a simple and efficient means to keep a real-time copy of your VMs in your DR site, SteelEye DataKeeper Standard Edition fits the bill.

For more protection, a logical choice for Hyper-V high availability is WSFC. An even better choice is WSFC combined with SteelEye DataKeeper Cluster Edition, eliminating the SPOF of the SAN, facilitating replicated storage WSFC clusters and geographically dispersed WSFC clusters. The additional protection provided by SteelEye DataKeeper extends protection beyond the server all the way to the storage array and data center, providing protection against SAN failure and complete data center loss.

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