



EMC PERSPECTIVE: THE POWER OF WINDOWS SERVER 2012 AND EMC INFRASTRUCTURE FOR MICROSOFT PRIVATE CLOUD ENVIRONMENTS

EXECUTIVE SUMMARY

It's no secret that organizations continue to produce overwhelming amounts of data at unprecedented rates. From the proliferation of private self-service cloud environments to organizations capturing more business-analysis data than ever before, the challenges of quickly moving massive amounts of data can be daunting. Moving large volumes of data among physical servers can tax even the fastest networks and hardware.

Organizations need better methods of storing and transferring these vast amounts of data. Windows Server 2012, Microsoft's next generation of the Windows Server operating system, introduces a number of storage enhancements that help organizations take advantage of the data movement and storage optimization features of intelligent storage arrays, such as the EMC® Symmetrix® VMAX® storage family, the EMC® VNX® series, and the EMC® Isilon® scale-out NAS family. With new technologies such as Offloaded Data Transfer (ODX), improvements to the Server Message Block (SMB) protocol, and improved tools such as EMC® Storage Integrator 2.0, EMC and Microsoft bring new levels of functionality to Windows Server 2012 environments. These features and tools can help administrators increase storage performance while decreasing complexity and management costs.

INCREASE DATA TRANSFER PERFORMANCE WITH ODX

Offloaded Data Transfer (ODX) is a new Windows Server 2012 technology that helps move large volumes of data between Windows Server 2012 and Hyper-V hosts when that data resides on a shared storage array. This new feature can vastly increase data movement speeds, and is especially useful in Hyper-V private cloud environments where administrators and self-service users need the ability to move large virtual machines quickly.

ODX offloads data movement functions from source and destination host servers to the EMC storage array. By offloading these functions, ODX lowers host servers' CPU and host-to-storage-array network utilization to near zero during copy or move operations. In a Hyper-V environment, reduced CPU and network overhead on the host server means administrators can increase virtual machine density for each physical server, which can lead to a better return on investment.

In many host-based file-transfer scenarios, the data being transferred from one host to another resides on a single storage array shared by both the source and destination hosts. Moving data using traditional host-based file transfers to accomplish tasks such as migrating virtual machines, backing up data, or copying large video files can be a time-consuming and resource-intensive process. The data transfer must follow these steps:

- The source host reads data from the storage array over the storage network.
- The source host then sends the data over the host management network to the destination server.
- The destination server receives the data from the source host and then writes it back to the storage array over the storage network.

ODX accelerates copy operations by using a token-based mechanism for reading and writing data within an intelligent storage array. Instead of copying data from the array, through the hosts, and back to the array again, ODX optimizes the data transfer through the following steps:

- When the source host initiates a file copy or move function for data on a shared storage array, the storage array generates a token that represents a point-in-time view of the data to be copied, and then provides the token to the source host.
- The source host sends the token to the destination host over the host management network.
- The destination host passes the token to the storage array, which then initiates the file copy or move internally, without sending any of the actual data over the storage or host management networks.

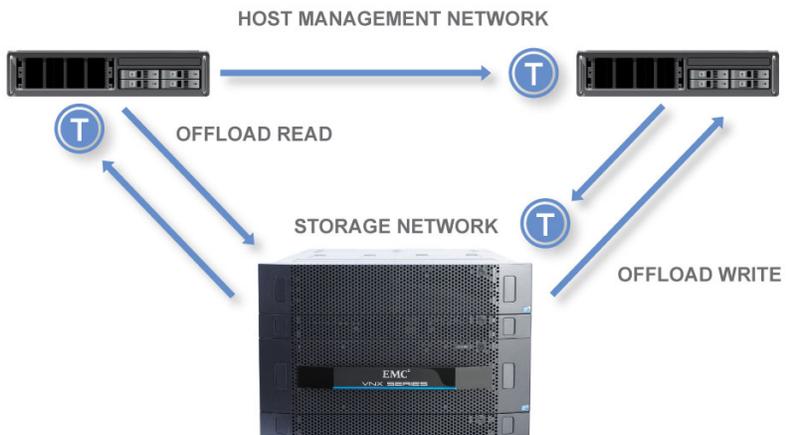


Figure 1: ODX-enabled file-copy operation

When the source host copies the token to the destination host, the token provides the location relationship to the intelligent storage array and removes the need to move the actual data through the hosts and host network. By transferring the data internally on the storage array, ODX dramatically increases file copy and move speeds while reducing the CPU and traffic load on the hosts and host network.

Windows Server 2012 and EMC intelligent arrays make ODX-enabled file functions transparent to applications, which means that Windows Server 2012 and Hyper-V hosts that use EMC storage arrays automatically optimize file and move functions without administrator intervention.

OPTIMIZE STORAGE UTILIZATION WITH VIRTUAL PROVISIONING DETECTION

EMC virtual provisioning gives storage administrators flexibility in deploying storage to Windows Server 2012 and Hyper-V hosts. Virtual provisioning, which is also known as thin provisioning, lets storage administrators allocate storage on demand by presenting more storage to hosts than is physically available on the EMC storage array. As the operating system writes data to a thin-provisioned logical unit number (LUN), the storage array automatically allocates storage on-demand to handle the write requests.

One weakness of thin-provisioned storage is that once the storage array allocates storage to a thin-provisioned LUN, the storage remains allocated even if the host deletes data from the LUN. As time passes, LUN file-system utilization might remain constant even though storage allocation on the array continues to increase.

Windows Server 2012 can detect thin-provisioned storage on EMC storage arrays and reclaim unused space, including when Windows Server 2012 is deployed within a Hyper-V virtual machine. For example, suppose a storage administrator creates and assigns a 100 GB LUN to a host that is unaware of the LUN's thin-provisioned status. If the host writes 50 GB of data to the LUN, the storage array allocates 50 GB of storage to the LUN and removes that same amount from the storage pool. But if the host eventually deletes 10 GB of data from the LUN, the storage array will still keep 50 GB allocated to the LUN, even though 10 GB is now unused. With Windows Server 2012, the unused 10 GB of storage would automatically be reclaimed and returned to the pool, where it could be used by other applications.

With virtual provisioning detection, storage administrators can confidently deploy thin-provisioned LUNs knowing that unused storage will be returned to the storage pool, which keeps storage allocation in equilibrium with file-system utilization. This feature is especially important in large Hyper-V private cloud deployments or self-service Hyper-V private cloud environments where users continually create and delete virtual machines.

PROVIDE FLEXIBLE AND RELIABLE SERVER STORAGE WITH SMB 3.0

SMB 3.0 brings several improvements to the SMB protocol that help enhance EMC storage in Windows Server 2012 and Hyper-V environments. While updating the SMB protocol, Microsoft focused on features that would have the most impact on server and cloud environments. Some of these features include:

- **SMB Multichannel:** Increases network performance in Hyper-V environments through network link aggregation, and provides fault tolerance to Hyper-V hosts by routing data over multiple network paths.
- **SMB Transparent Failover:** Provides applications a continuously available connection to storage by letting administrators configure clustered Windows file shares.
- **BranchCache:** SMB 3.0 features BranchCache improvements that better optimize bandwidth over wide-area network (WAN) connections between BranchCache content servers and remote clients.
- **SMB Encryption:** Protects data on unsecured networks by encrypting in-flight data between the client and server.
- **Windows PowerShell Cmdlets:** Ease administration tasks by providing end-to-end command-line management of file shares.

These enhancements bring added flexibility and reliability to Windows Server 2012 and Hyper-V deployments that use SMB-based storage on EMC storage arrays. EMC fully supports SMB 3.0 within its unified storage platforms, such as EMC VNX.

SIMPLIFY STORAGE MANAGEMENT WITH EMC® STORAGE INTEGRATOR 2.0

EMC Storage Integrator 2.0 helps simplify storage management in a Windows Server 2012 environment by providing tools for viewing and provisioning storage on EMC storage arrays. With EMC Storage Integrator, general IT administrators can quickly and easily provision block or file storage for Hyper-V cloud deployments.

Administrators can also simultaneously create, provision, and remove multiple LUNs and grant access to specific storage pools using EMC Storage Integrator. EMC Storage Integrator supports EMC VNX, VNXe®, CLARiiON® CX4, Symmetrix VMAX and VMAXe® platforms.

In addition to providing a standalone management application, EMC Storage Integrator also provides EMC-specific Windows PowerShell capabilities. These capabilities let storage administrators write Windows PowerShell cmdlets to perform common storage tasks and to batch process multiple tasks without user intervention.

TRANSFORM MICROSOFT BACKUP AND RECOVERY

EMC backup and recovery solutions, including EMC® Avamar®, EMC® NetWorker®, and EMC® Data Domain®, help protect Windows Server 2012 environments while providing accelerated performance, efficiency, and agility. EMC's extensive support for Windows Server 2012 lets EMC and Microsoft customers confidently deploy cloud technologies with efficient data protection using EMC's latest backup, recovery, and deduplication technologies.

SEE HOW EMC AND MICROSOFT CAN ENHANCE YOUR INFRASTRUCTURE

EMC and Microsoft continue a tradition of providing performance and ease of management with EMC's line of intelligent storage arrays and Windows Server 2012. Together, EMC and Microsoft provide the capabilities your infrastructure needs to manage rapidly increasing volumes of data while benefitting from powerful management tools. To learn more about how a joint EMC and Microsoft solution can help your organization, visit <http://www.emc.com> or contact your EMC reseller.

CONTACT US

To learn more about how EMC products, services, and solutions can help solve your business and IT challenges, [contact](#) your local representative or authorized reseller—or visit us at www.EMC.com.

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