

Introduction

With the release of **Microsoft®** *Windows® Server 2008 R2*[™] and *Hyper-V R2*[™], Microsoft has taken a huge leap forward in the server virtualization race, offering some of the more advanced features and functions found in the leading hypervisor, VMware® *ESX*[™] (*vSphere*[™]). Using Hyper-V R2, organizations can leverage many of its inherent capabilities to build dynamic, cost-effective virtual datacenters that provide applications and/or services internally or within the cloud on demand. And while many industry pundits acknowledge that with Hyper-V R2, Microsoft's server virtualization offering is closer than ever to achieving "enterprise-ready" stature, there are still a few rather significant shortcomings that make it difficult for an organization to realize all the benefits afforded by a true, enterprise-class server virtualization platform.

For those organizations that have encountered these "drawbacks" while dabbling with Hyper-V R2 or for those that would prefer to bypass these drawbacks entirely, there is a solution: **Sanbolic**[®] *Melio 2010*[™]. A *complete* storage solution comprised of advanced software components that work in collaboration with one another, Melio 2010 enhances the value of applications deployed in today's enterprise datacenters by extending the benefits of virtualization to the storage layer.

About Melio 2010

At the core of Sanbolic Melio 2010 is an all-purpose, 64-bit, symmetrical cluster file system called **Melio FS**[™] that allows multiple Windows servers to share concurrent read-and-write access to volumes on SAN storage. Employing an advanced, multi-layer locking mechanism, Melio FS enhances Hyper-V server virtualization by addressing the limitations in performance, scalability, manageability and versatility imposed by the current storage component for Hyper-V, *Cluster Shared Volumes*[™] or *CSV*[™]. Using Melio FS to provide highly scalable, highly available shared storage for VM files, organizations deploying Hyper-V achieve the following:

- Significant boosts in performance as a result of multiple Hyper-V hosts sharing concurrent read-andwrite access to VHDs via enhanced VHD locking.
- Enhanced storage utilization as only one LUN is required to store all VM files.
- Quick and seamless scale-out as new Hyper-V hosts and new storage resources can be added to the infrastructure dynamically, without any system downtime.
- Reliable data protection in the form of cluster-wide VSS-based snapshots.
- Concurrent access to centrally-managed shared iSCSI target volumes by multiple virtual machines to enhance application performance, scalability and availability.
- Support for network sharing of data on Melio shared volumes.
- Support for up to 16 failover clusters and 256 hypervisors.

Compatible with all industry-standard server and storage hardware, Melio 2010 can be used with iSCSI or Fibre Channel SANs. It's also simple to install, allowing administrators to set up highly scalable, highly available, easy-to-manage shared storage in a matter of minutes. In addition, integration with Windows Failover Clustering is seamless as the Failover Cluster Service manager automatically recognizes storage managed by Sanbolic's cluster volume manager *LaScala*[™], which provides centralized management for volumes formatted with the Melio cluster file system.

By harnessing the combined capabilities of Hyper-V R2, Melio 2010 and SAN storage, organizations are able to take advantage of high-performance block-based storage, which can be accessed by multiple servers simultaneously, to create highly scalable and highly available Hyper-V clusters that can effectively meet both current and future demands, regardless of the intensity of those demands.

How Melio 2010 Enhances Hyper-V R2

Since a Hyper-V virtual machine (VM) can only be active on one host at a time, Windows Failover Clustering, which provides high availability for applications by failing over an application to a standby server when the primary server fails, must be used to move a VM between physical hosts while the VM remains active (aka "live migration").

In order to enable live migration for a VM, shared storage must be used to allow all host nodes to share concurrent access to the VM's files. Using Melio FS, all Hyper-V host nodes participating in a Failover Cluster can share concurrent, block-level read-and-write access to VM files located on a single storage volume.

Note: Since shared access to the volume is managed by Melio FS and not the Failover Cluster, the Melio volume should not be added to the Failover Cluster as a clustered disk resource and, thus, should not appear in the Storage section of the Failover Cluster management console.

To enhance the performance, scalability and availability of applications running on the VMs, application data can be stored on another Melio shared volume that can be accessed by multiple VMs simultaneously via iSCSI, allowing organizations to realize a greater return on their investment in Hyper-V server virtualization.



How to Create a Highly Scalable and Highly Available Hyper-V Server Virtualization Platform using Sanbolic Melio 2010

Note: Although the following instructions pertain to a two-node Hyper-V cluster, the same steps apply to Hyper-V clusters comprised of more than two physical host nodes.

Prerequisites:

- Operating Systems Windows Server 2008 R2 Enterprise or Datacenter edition
- Roles and Features Hyper-V, Failover Clustering
- **Software** Sanbolic Melio 2010
- Failover Clustering Failover Clustering for all host nodes participating in the Hyper-V cluster must be fully-functional, including the establishment of a valid quorum. Click the following link to learn more about recommended quorum configurations:

http://technet2.microsoft.com/windowsserver2008/en/library/13c0a922-6097-4f34-ac64-18820094128b1033.mspx?mfr=true

- Networking A minimum of two network adapters, each with TCP/IP connectivity to the LAN. Also, an additional network adapter connected to a stand-alone (private) network dedicated for Melio FS cluster administration traffic.
- Storage All host nodes participating in the Hyper-V cluster must have access to SAN storage.
- Hardware Two identical host nodes (i.e., same CPU type and number; same amount of RAM; same number of network adapters) that have passed the Failover Clustering Hardware Validation test. (Click the previous link to learn more about Failover Clustering and Failover Clustering Hardware Validation.)

Once all of the prerequisites outlined above have been met, download the following tech note to create highly scalable, highly available, easy-to-manage shared storage using Melio 2010: http://www.sanbolic.com/pdfs/Quick_Guide_to_Creating_Shared_Storage_using_Melio_2010.pdf

Creating a Hyper-V Virtual Machine (VM):

1. Open the Hyper-V management console (*Start > Administrative Tools > Hyper-V Manager*).

Hyper-V Manager						
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Hyper-V Manager	A Contract Manager					Actions
Y-21-2K8×64	YIRUAI MACHIN	ies	201	T.	9	Y-21-2K8X64
¥-22-2K8×64	Name 🔺	State	CPU Usage	Uptime	Operations	
	1 Snapshots	No vitual machi	nes were found on th	iis server.	<u>}</u>	New Import Virtual Machine Import Virtual Machine Virtual Network Manager Edit Disk Inspect Disk Stop Service Renove Server Refersh
		No virt	ual machine selected			New Window from Here

2. On the right-hand side of the management console, select **New > Virtual Machine**.

3. Follow the steps in the **New Virtual Machine Wizard** to create a new virtual machine.

🏠 New Virtual Machine Wi	zard	×
Specify Nar	me and Location	
Before You Begin Specify Name and Location Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	Choose a name and location for this virtual machine. The name is displayed in Hyper-V Manager. We recommend that you use a name that helps you easily identify this virtual machine, such as the name of the guest operating system or workload. Name: Hyper-V M1. You can create a folder or use an existing folder to store the virtual machine. If you don't select a folder, the virtual machine is stored in the default folder configured for this server. C Store the virtual machine in a different location Location: 0:\ Browse If you plan to take snapshots of this virtual machine, select a location that has enough free space. Snapshots include virtual machine data and may require a large amount of space.	
	< <u>P</u> revious <u>N</u> ext > <u>F</u> inish Cancel	

- 4. Enter a name for the virtual machine.
- 5. Select the checkbox Store the virtual machine in a different location.
- 6. Click **Browse** and navigate to the folder on the Melio shared volume where the virtual machine files will reside.
- 7. Click Next.

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🏚 New Virtual Machine Wiz	zard
Assign Mem	iory
Before You Begin Specify Name and Location Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	Specify the amount of memory to allocate to this virtual machine. You can specify an amount from 8 MB through 18430 MB. To improve performance, specify more than the minimum amount recommended for the operating system. Memory:
	< <u>Previous</u> <u>Next</u> > <u>Finish</u> Cancel

8. Assign memory to the virtual machine.
 9. Click Next.

New Virtual Machine Wiz	zard Sand
Before You Begin Specify Name and Location Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	Each new virtual machine includes a network adapter. You can configure the network adapter to use a virtual network, or it can remain disconnected. Cognnection: Intel(R) PRO/1000 EB Network Connection with I/O Acceleration Not Connected Intel(R) PRO/1000 EB Network Connection with I/O Acceleration
	< <u>Previous</u> <u>N</u> ext > <u>Finish</u> Cancel

10. Select and assign a network (non-Melio FS network) to the virtual machine.

11. Click Next.

Connect Vir Before You Begin Specify Name and Location Assign Memory	A virtual machine requires storage so that you can install an operating storage now or configure it later by modifying the virtual machine's prop © Create a virtual hard disk	system. You can specify the perties.
Configure Networking Connect Virtual Hard Disk Installation Options Summary	Name: Hyper-V VM1.vhd Location: o:\VHD_store\ Size: Image: GB (Maximum: 2040 GB) C Use an existing virtual hard disk	Browse
	Location: 0:\VHD_store\2k3-x64 - 1.vhd	Browsen
	< <u>P</u> revious <u>N</u> ext >	<u> </u>

- 12. To create a virtual hard disk (.VHD) for the virtual machine, enter a name for the virtual hard disk.
- 13. Click **Browse** and navigate to the folder on the Melio shared volume where the .VHDs will reside.
- 14. Enter the size for the virtual hard disk.
- 15. If a .VHD already exists for the virtual machine, select the button Use an existing virtual hard disk.
- 16. Click **Browse** and navigate to the folder on the Melio shared volume where the .VHD resides.
- 17. To attach a .VHD to the virtual machine at a later time or if a .VHD will not be used by the virtual machine, select the button **Attach a virtual hard disk later**.

18. Click **Finish** to create the virtual machine.

New Virtual Machine Wi	zard the New Virtual Machine Wizard	×
Before You Begin Specify Name and Location Assign Memory Configure Networking	You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine. Description: Name: Hyper-V VM1 Name: Electron	
Connect Virtual Hard Disk Summary	Memory: 512 MB Network: Not Connected Hard Disk: 0:\VHD_store\2k3-x64 - 1.vhd	
	Start the virtual machine after it is created To create the virtual machine and close the wizard, click Finish.	
	< <u>Previous</u> <u>Next></u> <u>Finish</u> Cance	*

- 19. If the virtual machine is going to be started immediately and an existing virtual hard disk was attached to the virtual machine, select **Start the virtual machine after it is created** and click **Finish**.
- 20. If the virtual machine is going to be started immediately and a new virtual hard disk was attached to the virtual machine, select the checkbox Start the virtual machine after it is created, install the media containing the operating system for this virtual machine into the physical host node and click Finish. When the virtual machine starts, follow the instructions to install the OS on the virtual machine.
- 21. The new virtual machine will appear in the Hyper-V management console.

Hyper-V Manager		
Eile Action View Window Hel	p	8×
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🟥 Hyper-V Manager	Actions	
Y-21-2K8×64	Virtual Machines Y-21-2K8X64	
	Hyper-V VM1 Off New	•
	🕞 Import Virtual Machine	
	Hyper-V Settings	
	🛒 Vitual Network Manager	
	💋 Edit Disk	
	Inspect Disk	
	Stop Service	
	A Remove Server	
	Spanshots	
	View	۲
	The selected virtual machine has no snapshots. New Window from Here	
	👔 Help	
	Hyper-V VM1	•
	onnect	
	Settings	
	Start	
	📷 Snapshot	
	Export	

Configuring Windows Failover Clustering for Hyper-V Virtual Machines:

1. Open the Failover Cluster management console (*Start > Administrative Tools > Failover Cluster manager*).



2. Right-click on the Failover Cluster manager and select Create a Cluster.

3. Follow the steps in the Create Cluster Wizard to create a new Failover Cluster.

Before You Begin	Add the names of all t	he servers that you want to have in the cluster. You	must add at least one server.
elect Servers			
Validation Warning			
Access Point for Administering the	<u>E</u> nter server name:		<u>B</u> rowse
Cluster	Selected servers:	y-21-2k8x64.sanbolic.local	Add
Confirmation		y-22-2K8x64.sanbolic.local	Bemove
Creating New Cluster			<u></u>
Summary			

Enter the names of the Hyper-V host nodes that will be participating in the Failover Cluster.
 Click Next.



6. In the Failover Cluster Validation Warning window, select **Yes** to run the configuration validation tests.7. Once the Validation tests have completed successfully, continue configuring the Failover Cluster.

Polo a Polo Color			inistening the cluster.
	Cluster N <u>a</u> me:	Hyper-V-Melio	
Access Point for Administering the Cluster	sure the network	is selected, and then type	an address.
Confirmation		Networks	Address
Creating New Cluster	ସ	10.10.0.0/16	10 . 10 . 121 . 21
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- 8. Enter a name and IP address for the Failover Cluster.
- 9. Click Next.

Validation Warning Access Point for Administering the Cluster y-21-2k8x64,sanbolic.local Node: y-22-2k8x64,sanbolic.local Node: y-22-2k8x64,sanbolic.local IP Address: 10.10.121.21	
Sreating New Cluster Summary	×

- 10. Review the configuration settings and click **Next** to create the Failover Cluster.
- 11. A window will appear stating that the Failover Cluster is being created.

Creating	New Cluster	
Before You Begin	Please wait while the cluster is configured.	
Select Servers		
/alidation Warning		
Access Point for Administering the Cluster		
onfirmation		
reating New Cluster	Creating IP Address resource 'Cluster IP Address'.	
ummary		

12. Once the Failover Cluster has been created, a window will appear stating that the Failover Cluster has been successfully created (see following illustration).



13. Click Finish to close the Create Cluster Wizard.

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14. On the left-hand side of the Failover Cluster management console, right-click on **Services and Applications** and select **Select Service or Application**.

Before You Begin	Select the service or application that you want to configu	re for high availability:
Select Service or Application Select Virtual Machine Confirmation Configure High Availability Summary	File Server Generic Application Generic Script Generic Service Internet Storage Name Service (iSNS) Server Message Queuing Dther Server Print Server Vitual Machine	 Description: A virtual machine is a virtualized computer system running on a physical computer. Multiple virtual machines can run on one computer.

15. In the Select Service or Application window, select Virtual Machine and click Next.

efore You Begin	Select the virtual machine(s)	from the list that you wish to n	nake highly available.	
elect Service or	Name	Status	Host Server	
Select Virtual Machine	Hyper-V VM1	Stopped	y-21-2k8x64.sanbolic.local	
ontimation				
onfigure High vailability				
ummary				
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16. In the Select Virtual Machine window, select the virtual machine (created earlier) and click Next.

igh Availability W	/izard ion			I
Before You Begin Select Service or Application	You are ready to configure	high availability for a Virtua	al Machine.	
Select Virtual Machine Configure High Availability Summary	Virtual Machine:	Hyper-V VM1		×
	To continue, click Next.			*
			< <u>P</u> revious <u>N</u> ext >	Cancel

In the **Confirmation** window, click **Next** to configure high availability for the virtual machine.
 Once the virtual machine has been added to the Failover Cluster, a window will appear stating that high availability was successfully configured for the virtual machine (see following illustration).

		<u> </u>
7.81		
🛡 Virtual Machine		
Name	Result	Description
Hyper-V VM1		Success
		_
	Virtual Machine Name Hyper-V VM1.	Virtual Machine Name Result Hyper-V VM1 Image: Compare the second seco

19. Note that the virtual machine now appears under **Services and Applications** on the left-hand side of the Failover Cluster management console.

🖏 Failover Cluster Management				_ 🗆 🗵
File Action View Help				
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Failover Cluster Management Virtual Machi	ine Hyper-V VM1	Becent Cluster Events: 🔥 Critical 3: En	tor: 39: Warning: 7	Actions
Hyper-V-Melio.sanbolic.local Services and Applications	Summary of Virtual Machine Hyper-V VM1		Virtual Machine Hyper-V VM1 🔹	
Vitual Machine Hyper				Bring this service or application online
Storage	Status: Online Alerts: <none> Preferred Owners: <none></none></none>			🐞 Take this service or application offline
Networks Status: Unine Alerts: (none)				Show the critical events for this appli
Cluster Events Preferred Own				📰 Move this service or application to a 🕨
Current Owner:	Current Owner: y-21-2k8x64			Refresh virtual machine configuration
				<table-of-contents> Manage virtual machine</table-of-contents>
Name	Status			📆 Manage shares and storage
Virtual Machi	ine Service			👸 Add a shared folder
S Virtual M	achine Confi (*) Online achine Hune (*) Online			dd storage
	Vinuai Macrine Hype 🕥 Unline			🚰 Add a resource 🔹 🕨
				Show Dependency Report
				View +
				🔀 Delete
				Mename
				Refresh
				Properties
				I Help
				1

- 20. On the left-hand side of the Failover Cluster management console, right-click on the virtual machine and select **Start**.
- 21. Once the virtual machine is started, right-click on the virtual machine again and select **Live Migrate** virtual machine to another node and then select the other Hyper-V host node in the Failover Cluster.
- 22. A message will appear in the Failover Cluster management console stating that the virtual machine has successfully migrated to the other Hyper-V host node in the Failover Cluster.
- 23. Create additional virtual machines in the Hyper-V management console and then configure high availability for the virtual machines using the Failover Cluster manager (see following illustration).

Alexandree Alexan	Services and Applications	i Ri	ecent Cluster Eveni	ts: 🛕 Critical:3; Error: 39; Warning: 7	Actions	
Services and Application Vitual Machine Hyper-V VM1 Vitual Machine Hyper-V VM2 Vitual Machine Hyper-V VM2 Storage Networks Custer Events	Virtual Machine Hyper-V VM1	Status The Driftee The Driftee Status Stat	Type Vitual Machine Vitual Machine	Current Owner 9:22:0:064 9:21:21:8:064	Services and Applications Configure a Service of Application More Actions View Refresh Refresh Help	

Congratulations... you now have a flexible and robust server virtualization platform built on Hyper-V R2 and Melio 2010 shared storage that supports live migration of virtual machines between Hyper-V host nodes for minimal system downtime and maximum user productivity.

Conclusion

Offering a highly scalable, highly available, easy-to-manage shared storage solution for **Microsoft** *Hyper-V R2*, **Sanbolic** *Melio 2010* empowers organizations with the ability to create flexible, scalable, dynamic virtual datacenters capable of meeting both current and future demands. The end result: organizations are able to achieve all of the benefits afforded by enterprise-class server virtualization in order to realize the greatest return on their investments in *Hyper-V R2*.

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