

Configuring a Microsoft Windows Server 2012/R2 Failover Cluster with Storage Center

Dell Compellent Solution Guide

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Revisions

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1 Preface

1.1 Audience

The audience for this document is system administrators who are responsible for the setup and maintenance of Windows servers and associated storage. Readers should have a working knowledge of Windows and the Dell Compellent Storage Center.

1.2 Purpose

This document provides an overview of Failover Clustering and additional guidance for the process of setting up and configuring a Failover Cluster on Windows Server 2012/R2 when using the Dell Compellent Storage Center.

1.3 Disclaimer

The information contained within this document provides general recommendations only. Configurations may need to vary in customer environments for many reasons, such as individual circumstances, budget constraints, service level agreements, applicable industry-specific regulations, and other business needs.

1.4 Customer support

Dell Compellent provides live support at 1-866-EZSTORE (866.397.8673), 24 hours a day, 7 days a week, 365 days a year. For additional support, email Dell Compellent at support@compellent.com. Dell Compellent responds to emails during normal business hours.



2 Introduction to Windows Server 2012/R2 failover clustering

2.1 Overview

Window Server 2012/R2 Failover Clustering provides the capability to tie multiple servers together to offer high availability and scalability for business-critical applications such as Microsoft Exchange, Hyper-V, Microsoft SQL Server, and file servers. Clustering is designed to maintain data integrity and provide failover support. Windows Server 2012/R2 Failover Clustering can scale up 64 nodes in a single cluster.

Windows Server 2012 Failover Clustering included new and changed functionality from the prior release included in Windows Server 2008 R2. This functionality supports increased scalability, continuously available file-based server application storage, easier management, faster failover, and more flexible architectures for failover clusters. For a complete list of changes and new features included in Windows Server 2012 Failover Clustering, please refer to <u>Microsoft TechNet</u>.

Windows Server 2012 R2 adds additional functionality to Failover Clustering by adding support for shared virtual hard disks (for guest clusters), improved handling of virtual machines in a Hyper-V cluster, Cluster Shared Volume (CSV) improvements, and new and improved cluster quorum handling. For a complete list of changes and new features included in Windows Server 2012 R2 Failover Clustering, please refer to <u>Microsoft TechNet</u>.

Failover Clustering is included in both the Standard and Datacenter versions of Windows Server 2012/R2.

2.2 Active/Active clusters

In active/active clusters, all nodes are active. In the event of a failover, the remaining active node takes on the additional processing operations, which causes a reduction in the overall performance of the cluster. Active/passive cluster configurations are generally recommended over active/active configurations because they often increase performance, availability, and scalability. Microsoft Exchange 2013 and SQL Server 2012 support a configuration that falls into the realm of what would be considered an active/active cluster configuration. These particular configurations will not be discussed as they are beyond the scope of this document. For detailed information about Microsoft Exchange 2013 and SQL Server 2012 clustering, please refer to <u>Dell Compellent Knowledge Center</u>.

2.3 Active/Passive clusters

In active/passive clustering, the cluster includes active nodes and passive nodes. The passive nodes are only used if an active node fails. Active/Passive clusters are commonly known as failover clusters. For example, file and print environments use the active/passive cluster model since two nodes cannot own the same disk resource at one time. Windows Server 2008 Failover Clustering operates in this mode.

2.4 Cluster quorum

2.4.1 Quorum definition

Put simply, cluster quorum is the collective status of all elements in the active cluster. Each element in the cluster casts a single quorum vote which contains the element status. If the majority of quorum votes show the cluster to be healthy, the cluster will start properly or continue running. Elements in the cluster include server nodes, and can also include a quorum witness. A quorum witness is configured when the number of nodes in the cluster cannot reach majority (such as an even number of cluster nodes) and works as the determining vote if needed. The witness can be a shared disk or a file share that runs outside of the cluster.

2.4.2 Quorum configurations

In Windows Server 2012/R2, 3 types of quorum configurations exist:

- 1. Node majority (no witness)
 - a. Only the cluster nodes have votes. Quorum is the majority of voting nodes.
- 2. Node majority with witness (disk or file share)
 - a. Cluster nodes as well as a witness have votes. Quorum is the majority of voting nodes plus the witness vote.
- 3. No majority (disk witness only)
 - a. Only a disk witness has a vote. No nodes have votes. Quorum is determined by the state of the disk witness. This is not a recommended configuration, as the witness disk becomes a single point of failure for the cluster.

Note: In clusters with an even number of nodes the default quorum configuration is node majority with witness. In clusters with an odd number of nodes the default quorum configuration is node majority with no witness.

In most cases, a disk witness should be used when a witness is required. A file share witness should only be used in the case shared storage between cluster nodes is not available.

Note: As mentioned above, Windows Server 2012/R2 will automatically assign the proper cluster quorum configuration based upon the number of nodes in the cluster. As a best practice, it is not recommended to change the cluster quorum configuration unless the number of nodes in the cluster has changed.

For more information about configuring and managing the quorum in a failover cluster, please refer to <u>Microsoft TechNet</u>.

2.5 Cluster shared volumes (CSVs)

Originally Introduced in Windows Server 2008 R2 Failover Clustering, CSVs allow all nodes in a cluster to simultaneously have read-write access to the same LUN that is formatted as an NTFS or ReFS (2012 R2 only) volume. Using CSVs, clustered roles can fail over quickly from one node to another node without requiring a change in drive ownership, or dismounting and remounting a volume. In Windows Server 2008 R2 CSVs were only allowed to be used with a Hyper-V virtual guest workload. Windows Server 2012 expanded CSV functionality, allowing CSVs to be utilized as file shares with the Scale-Out File Server role. Scale-out file shares can host application data, such as Microsoft SQL Server and Hyper-V guests.

2.6 Using MPIO with Microsoft failover clusters

Using MPIO with clustering is supported in both round-robin and failover-only configurations. In Windows Server 2012/R2, the MPIO load balance policy for each volume can be modified in Disk Management under the MPIO tab of the volume properties. A default load balance policy for MPIO can also be set, and any new volumes on the server will automatically be set to use the specified MPIO load balance policy. If the default load balancing policy has not been set, Windows Server 2012/R2 automatically default Compellent Storage Center volumes to a "round-robin" MPIO configuration.

Refer to the *Dell Compellent Microsoft MPIO Best Practices Guide* for more information on configuring MPIO in Windows Server 2012/R2.



3 Network configuration

3.1 Public interface

The public interface contains the IP address of the server that is accessed over the network. It should contain the specific subnet mask, default gateway, and DNS server addresses for accessing the network.

Note: If possible, the public interface for cluster traffic should be on a dedicated NIC, separate from the NIC accessed for server management. A specific adapter can be selected for cluster traffic after a cluster has been set up.

9	Network Conne	ections 📃 🗖 🗙
⊚ € ד ↑ 😰	« Net • Network Con •	✓ ♂ Search Network Connections
Organize 🔻		III 🔻 🔟 🔞
Name	Status	Device Name
 Public Private Mgmt ETH3 ETH2 10Gb #2 	techsol.local Unidentified network techsol.local Disabled Disabled Disabled	Intel(R) Ethernet 10G 2P X520 Adapter Intel(R) Gigabit 4P I350-t rNDC #3 Intel(R) Gigabit 4P I350-t rNDC Intel(R) Gigabit 4P I350-t rNDC #4 Intel(R) Gigabit 4P I350-t rNDC #2 Intel(R) Ethernet 10G 2P X520 Adapter #2
< III 6 items		

Figure 1 Network connections

3.2 Private interface

The private interface is reserved for cluster communications and is commonly referred to as the "heartbeat". In a two node cluster, a standard RJ-45 cable can be used to directly connect the first node to the second node. In a larger cluster configuration, a separate subnet or private network should be dedicated as a switch will have to be used for these cluster communications.

It is common practice to use the 10.x.x.x network for the private interface. Below is an example of how to configure the TCP/IP settings of the private interface:

Internet Protocol Version 4 (TC	P/IPv4) Properties ? X			
General				
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.				
O Obtain an IP address automatical	y			
• Use the following IP address:				
IP address:	10 . 10 . 10 . 1			
Subnet mask:	255.255.255.0			
Default gateway:				
Obtain DNS server address auton	natically			
• Use the following DNS server add	resses:			
Preferred DNS server:				
Alternate DNS server:	· · ·			
Validate settings upon exit	Advanced			
	OK Cancel			

Figure 2 IP settings

Advanced TCP/IP Settings	?	x	
IP Settings DNS WINS			
DNS server addresses, in order of use:			
		t l	
Add Edit Remove			
Append parent suffixes of the primary DNS suffix Append these DNS suffixes (in order):		t	
Add Ediţ Remove			
DNS guffix for this connection:			
Register this connection's addresses in DNS Use this connection's DNS suffix in DNS registration			
ОК	Car	ncel	

Figure 3 Advanced DNS settings

Advanced TCP/IP Se	ettings ? X
IP Settings DNS WINS	
<u>W</u> INS addresses, in order of use:	
	t
	1
<u>A</u> dd <u>E</u> dit	Remo <u>v</u> e
If LMHOSTS lookup is enabled, it applies to all	connections for which
TCP/IP is enabled.	
	Import LMHOSTS
NetBIOS setting	
O De <u>f</u> ault:	
Use NetBIOS setting from the DHCP se is used or the DHCP server does not pr	rovide NetBIOS setting,
enable NetBIOS over TCP/IP.	
C Enable NetBIOS over TCP/IP	
Disable NetBIOS over TCP/IP	
	OK Cancel
L	

Figure 4 Advanced WINS settings

Referring to Figures 2 – 4 above, please note the following configuration settings:

- Do not specify a default gateway or DNS servers. It is not necessary.
- On the DNS Settings tab, be sure to uncheck **Register this connection's addresses in DNS**.
- On the WINS Settings tab, uncheck **Enable LMHOSTS lookup** and select **Disable NetBIOS over TCP/IP**.
- Label the network interfaces respectively as **Private** and **Public**.

3.3 NIC teaming

By default, the create cluster process will automatically create a public and private cluster network based upon the IP address assigned to the cluster. The NIC adapters assigned to each network are automatically assigned based upon the subnet assigned to each adapter.

In cases where there are two or more adapters on each node that belong to the same subnet, the cluster will only use one of the adapters on each node to allow access from the public network. In order to use more than one adapter on the same subnet in the cluster, the adapters need to be teamed prior to cluster creation. In Windows Server 2012/R2, NICs can be teamed via software from the NIC manufacturer (such as Intel or Broadcom), or through the built-in load balancing and failover option (LBFO) within the operating system. For more information on LBFO, please refer to <u>Microsoft TechNet</u>.

Note: Once a NIC has been added to a cluster it can no longer be modified. NIC teams must be configured before cluster creation.



4 Setup and configuration

4.1 Prerequisites

The following are required to successfully configure Failover Clustering:

- Windows Server 2012/R2 Standard or Datacenter Edition that is a domain member
- Compellent Storage Center
- Properly zoned Fibre or iSCSI connectivity
- Two Ethernet ports (min. one for public and one for private connectivity)
- One static IP address for public network connectivity

4.2 Server configuration

Identify the server that will be the first node in the new cluster. This will be referred to as Node 1 in this document.

To form a cluster it is required that cluster nodes must be domain member servers.

4.3 Installing the failover clustering feature

This process must be followed on each node. To install Failover Clustering:

1. Open Server Manager via the Start screen: Open **Administrative Tools**, and select **Server Manager**. Alternatively, Server Manager can be accessed via the icon on the Windows Desktop screen.



Figure 5 Server manager

2. On the Server Manager→Dashboard screen, select Add roles and features.

a	Add Roles and Features Wizard			x
Before you begin	DESTI TSSRVW2K	NATION SI 12A.techso	ERVEF ol.loca	R II
Before You Begin Installation Type Server Selection	This wizard helps you install roles, role services, or features. You determine which roles, rr features to install based on the computing needs of your organization, such as sharing de hosting a website. To remove roles, role services, or features:	ole servic ocument	es, c s, or	ır
Features Confirmation Results	Start the Remove Roles and Features Wizard Before you continue, verify that the following tasks have been completed: The Administrator account has a strong password Network settings, such as static IP addresses, are configured The most rurent security undates from Windows Undate are installed			
	If you must verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again. To continue, click Next.			
	Skip this page by default			_
	< <u>Previous</u> <u>Next ></u> <u>Install</u>	Car	ncel	

Figure 6 Add roles and features wizard

3. Click Next.

2	Add Roles and Features Wizard	x
Select installati	Destination serve DN type TSSRW2X12A technolog	ER tal
Before You Begin Installation Type Server Selection Server Roles Features Confirmation Results	 Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD). Role-based or feature-based installation Configure a single server by adding roles, role services, and features. Remote Desktop Services installation Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-base or session-based desktop deployment. 	al
	< <u>Previous</u> <u>Next ></u> Install Cancel	

4. Choose Role-based or feature-based installation and click Next.

Figure 7 Select installation type

5. Select the local server and click Next.

ł	Add Roles and Features Wizard
Select destination	DESTINATION SERVER DN SERVER TSSRW/2K12A.techyollocal
Before You Begin Installation Type	Select a server or a virtual hard disk on which to install roles and features. Select a server from the server pool
Server Selection Server Roles Features Confirmation	Server Pool
Results	Name IP Address Operating System TSSRVW2K12A.techsol.L 172.16.27.27 Microsoft Windows Server 2012 Datacenter
	1 Computer(s) found This page shows servers that are running Windows Server 2012, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.
	< <u>Previous</u> <u>Next ></u> <u>Install</u> Cancel

Figure 8 Select destination server

6. Click Next on the Select Server Roles screen.



Figure 9 Select server roles

7. On the Select Features screen, check the box next to Failover Clustering.

a	Add Roles and Features Wizard	_ D X
Select features Before You Begin	Select one or more features to install on the selected server.	DESTINATION SERVER TSSRVW2K12A.techsol.local
Installation Type Server Selection Server Roles Features Confirmation Results	Features Image: Status in the statu	Description Failover Clustering allows multiple servers to work together to provide high availability of server roles. Failover Clustering is often used for File Services, virtual machines, database applications, and mail applications.
	< <u>P</u> revious <u>N</u> ext	> Install Cancel

Figure 10 Select features

8. The following screen will appear asking to add required features for Failover Clustering. Click **Add Features**.



Figure 11 Add roles and features wizard

9. Click Next when returned to the Select Features screen.

10. Verify that the Failover Clustering feature and Administrative Tools are set to be installed.

b	Add Roles and Features Wizard	_ 🗆 X
Confirm installat	tion selections	DESTINATION SERVER TSSRVW2K12A.techsol.local
Before You Begin	To install the following roles, role services, or features on selected server, cli	ck Install.
Installation Type	Restart the destination server automatically if required	
Server Selection	Optional features (such as administration tools) might be displayed on this p	page because they have
Server Roles	their check boxes.	tures, click Previous to clear
Features		
Confirmation	Failover Clustering	
Results	Remote Server Administration Tools Feature Administration Tools Failover Clustering Tools Failover Cluster Management Tools Failover Cluster Module for Windows PowerShell Export configuration settings Specify an alternate source path	
	< <u>P</u> revious <u>N</u> ext >	Install Cancel

Figure 12 Confirm installation selections

11. Click Install.



Figure 13 Installation progress

12. Click **Close** when the installation is finished.

a	Add Roles and Features Wizard
Installation prog	CSS DESTINATION SERVER TSSRVW2K12A.txechuol.local
Before You Begin	View installation progress
Installation Type	1 Feature installation
Server Selection Server Roles	Installation succeeded on TSSRVW2K12A.techsol.local.
Features	Failover Clustering
Confirmation	Remote Server Administration Tools
Kesuits	Failover Clustering Tools Failover Cluster Management Tools Failover Cluster Module for Windows PowerShell
	You can close this wizard without interrupting running tasks. View task progress or open this page again by clicking Notifications in the command bar, and then Task Details. Export configuration settings
	< <u>P</u> revious <u>N</u> ext > Close Cancel

Figure 14 Completed installation



5 Creating a new cluster

5.1 Preparing disks for a new cluster

Although not a requirement to create a cluster, it is recommend to prepare two disks to be presented to the cluster. One of the disks will be used for the cluster quorum, the other disk will be used for cluster data.

Note: Repeat this process for all disks that will be added to the cluster. It does not matter in which order the disks are added.

1. Create a new volume on the Storage Center and map it to all nodes in the cluster via the cluster object.

Note: Please refer to the Dell Compellent Storage Center Users Guide for instructions on how to create a new volume and cluster object in Storage Center, and how to map volumes to a cluster object.

Note: Cluster quorum disks do not require more than 1GB of space and should be sized accordingly.

- 2. Initialize the newly added volume to make it available to the cluster:
 - a. Open the Disk Management MMC: Start → Run → diskmgmt.msc <enter>

File Action View Help Image: System Exact System Status Capacity Free Spa % Free Image: System Reserved NTFS Healthy (B 119.65 GB 99.82 GB 75 % Image: System Reserved Simple Basic NTFS Healthy (S 350 MB 109 MB 31 % Image: System Reserved Simple Basic NTFS Healthy (S 350 MB 109 MB 31 % Image: System Reserved System Reserved Simple Simple 119.65 GB NTFS 119.65 GB NTFS 119.65 GB NTFS Healthy (Soct, Page File, Crash Dump, Primary Partition) Image: Simple	3				Disk Manag	ement				-	x
Image: System Reserved System Reserved System Reserved System Reserved System Reserved System Reserved System Reserved System Reserved Source System Reserved Source System Reserved Source System Reserved Source Source Source Source Source Source Source Online Source Source Source Source Source Source Source Source Source Source Source Velocity Unallocated Primary partition Velocity Velocity Velocity Velocity	<u>F</u> ile <u>A</u> ction <u>V</u> i	ew <u>H</u> elp									
Volume Layout Type File System Status Capacity Free Spa % Free Image: Color System Reserved Simple Basic NTFS Healthy (B 119.65 GB 89.82 GB 75 % Image: System Reserved Simple Basic NTFS Healthy (S 350 MB 109 MB 31 % Image: System Reserved Simple Basic NTFS Healthy (S 350 MB 109 MB 31 % Image: System Reserved Sto MB NTFS Healthy (Society Reserved) 119.65 GB NTFS 119.65 GB NTFS Item Disk 0 Basic Sto MB NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition) Image: Sto MB NTFS Image: Disk 1 Sto GB Sto GB Sto GB Sto GB Sto GB Image: Sto GB Sto GB Image: Sto GB Sto GB Image: Sto GB Sto GB Image: Sto GB	iter 🔿 🗰 🖉	TT 🖸 🖬 🗄	<u>.</u>								
(C) Simple Basic NTFS Healthy (B 119.65 GB 89.82 GB 75 % System Reserved Simple Basic NTFS Healthy (S 350 MB 109 MB 31 % Basic Disk 0 Basic 2000 GB 200	Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free			
System Reserved Simple Basic NTFS Healthy (S 350 MB 109 MB 31 % Disk 0 Basic 120.00 GB System Reserved 350 MB NTFS Healthy (System, Active, Primary Par Healthy (Boot, Page File, Crash Dump, Primary Partition) Disk 1 Basic S0.00 GB Online Vunallocated Primary partition	🖙 (C:)	Simple	Basic	NTFS	Healthy (B	119.65 GB	89.82 GB	75 %			
Basic System Reserved (C2) 120.00 GB 350 MB NTFS 119.65 GB NTFS Healthy (System, Active, Primary Part Healthy (Boot, Page File, Crash Dump, Primary Partition) Disk 1 50.00 GB 50.00 GB Junallocated Primary partition	System Reserved	d Simple Basic NTFS Healthy (S 350 MB 109 MB 31 %									
Basic System Reserved (C.) 120.00 GB Sto MB NTFS Healthy (System, Active, Primary Part Pisk 1 Healthy (System, Active, Primary Part Healthy (Boot, Page File, Crash Dump, Primary Partition) Pisk 1 So.00 GB So.00 GB So.00 GB Online Primary partition v											
Basic System Reserved 10,55 GB NTFS 120.00 GB System, Active, Primary Pan IC.3 Image: Solution of the second											
Basic System Reserved 119,55 GB NTFS 120,00 GB Sto MB NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition) Bisic So.00 GB So.00 GB Online So.00 GB Junallocated Vuallocated Primary partition											
Basic System Reserved 119.55 GB NTFS 120.00 GB So MB NTFS Healthy (Bystem, Active, Primary Part Healthy (System, Active, Primary Part Healthy (Boot, Page File, Crash Dump, Primary Partition) Bisic So.00 GB So.00 GB Online So.00 GB Unallocated Value Primary partition V											
Basic System Reserved (C.) 119.55 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition)	Disk 0									1	^
120.00 GB 350 MB NTFS Healthy (System, Active, Primary Pan 119.65 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition) Image: Crash Dump, Primary Partition Image: Crash Dump, Primary Partition Image: Crash Dump, Primary Partition Unallocated Primary partition	Basic	System Reserv	ed	(C:)							_
Image: Solution of the soluti	120.00 GB Online	350 MB NTFS 119.65 GB NTFS Healthy (Spot Page File Crack Dump Driman Partition)									
Disk 1 Basic S0.00 GB Online Unallocated Primary partition					.,			,			
Basic 50.00 GB Unallocated Unallocated Unallocated Primary partition	Disk 1										
50.00 GB 50.00 GB Online Unallocated Unallocated Primary partition	Basic		///////			///////////////////////////////////////		///////////////////////////////////////	2		
Unallocated Primary partition	50.00 GB	50.00 GB 50.00 GB									
Unallocated Primary partition		Chanocated									~
	Unallocated	Primary partition									

Figure 15 Disk manager

b. Click Action → Rescan Disks to detect the new Dell Compellent volume. The newly available volume will show up as unknown and offline.



8				Disk Manag	ement			_	x
<u>File</u> <u>A</u> ction <u>V</u> iew	Help								
⇔ ⇒ 🖬 🖬 •	1 🖸 🖆 📓	1							
Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
🖙 (C:)	Simple	Basic	NTFS	Healthy (B	119.65 GB	89.82 GB	75 %		
Ga System Reserved	Simple	Basic	NTFS	Healthy (S	350 MB	109 MB	31%		
Disk 3 Unknown 100.00 GB Offline Un Help	0.00 GB nallocated								^
CD-ROM 0 DVD (D:)									=
No Media	nan/ partition								~
- onanocated - Phi	nary partition								 _

Figure 16 New disk detected

c. Right-click on the new disk and choose **Online**.

Gisk 3		
Unknown 100.00 GB	Online	
Offline 🕕	Properties	
	Help	

Figure 17 Bring disk online

d. The disk will now show as **Not Initialized**. Right-click on the disk and choose **Initialize Disk**.

Disk 3	
Unknown	
100.00 GB Not Initialize	Initialize Disk
	Offline
	Properties
	Help

Figure 18 Not initialized

e. On the **Initialize Disk** screen, validate the correct disk is selected for initialization, and click **OK**.

jer can a	ccess it.	
S:		
II previou	is versions of	f
	Can	ad
	Il previou	Il previous versions o

Figure 19 Initialize disk

f. The new disk will now show **Online**.

Disk 3 Basic 100.00 GB Online	100.00 GB Unallocated
-------------------------------	--------------------------

Figure 20 Disk online

g. The disk must be formatted before it can be used by the cluster.i. Right-click on the disk and choose New Simple Volume.

Disk 3 Basic 100.00 GB Online		10 GB located
	Ľ	New Simple Volume
Unallocated	Pri	New Spanned Volume
		New Striped Volume
	_	New Mirrored Volume
		New RAID-5 Volume
		Properties
		Help

Figure 21 New simple volume

ii. Click **Next** on the dialog screen.

New Simple Volume Wizard
Welcome to the New Simple Volume Wizard
This wizard helps you create a simple volume on a disk. A simple volume can only be on a single disk. To continue, click Next.
< Back Next > Cancel

Figure 22 New simple volume wizard

iii. Specify the volume size, and click **Next**.

New Simp	le Volume Wizard	×
Specify Volume Size Choose a volume size that is between	the maximum and minimum sizes.	
Maximum disk space in MB:	102397	
Minimum disk space in MB:	8	
§imple volume size in MB:	102397	
	< <u>B</u> ack <u>N</u> ext >	Cancel

Figure 23 Specify volume size

iv. Select Do not assign a drive letter or drive path, click Next.

New Simple Volume Wizard	x
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.	
 Assign the following drive letter: Mount in the following empty NTFS folder: Bcowse ● Do not assign a drive letter or drive path 	
< <u>B</u> ack <u>N</u> ext > Cancel	

Figure 24 Assign drive letter

v. Specify partition format options. Click Next.

Note: To better manage cluster volumes, provide intuitive and descriptive volume labels that correspond to the name assigned to the LUN on Storage Center. This is particularly useful when multiple LUNs of the same size are presented to the same cluster.

New Si	mple Volume Wizard					
Format Partition To store data on this partition, you must format it first.						
Choose whether you want to forma	Choose whether you want to format this volume, and if so, what settings you want to use.					
O Do not format this volume						
• Format this volume with the	• Format this volume with the following settings:					
<u>F</u> ile system:	NTFS 🗸					
<u>A</u> llocation unit size:	Default V					
<u>V</u> olume label:	KP-R2CLUSTER_Data_Vol1					
✓ Perform a quick forma	✓ Perform a quick format					
Enable file and folder compression						
	< <u>B</u> ack <u>N</u> ext > Cancel					

Figure 25 Format partition

vi. Click Finish.

Completing the New Simple Volume Wizard	
You have successfully completed the New Simple Wizard.	e Volume
Volume type: Simple Volume Disk selected: Disk 3 Volume size: 102397 MB Drive letter or path; F: File system: NTFS Allocation unit size: Default Volume label: Cluster Data Check format: Yes To close this wizard, click Finish.	
< <u>B</u> ack Finish	Cancel

Figure 26 Completing the new simple volume wizard

h. The disk will now show as a usable volume, and is available to be added to the cluster.



Figure 27 Available disk

5.2 Cluster validate

Historically, cluster configurations (Windows 2000 and Windows 2003) had to be certified through the Windows Hardware Quality Lab (WHQL) in order to be approved and eligible for support by Microsoft. Starting with Windows Server 2008, the Cluster Validate tool has been included with the Operating System to test the functionality and compatibility of the servers and storage involved in a cluster. This tool verifies that the storage meets the requirements (supports specific commands) to operate in a failover cluster. The end user can run Cluster Validate and save the output as proof of supportability for the configuration.

It is Dell Compellent's best practices recommendation that Cluster Validate be performed on any cluster configuration that uses Dell Compellent Storage Center to ensure the customer can receive Microsoft Premier Support should a cluster issue arise.

Cluster Validate is a wizard-driven tool in Failover Cluster Manager that can be run as part of configuring a new cluster or at any time thereafter. The Cluster Validate tool assumes that the storage is attached and accessible by all nodes participating in the test.



Note: Running Cluster Validate on a live Failover cluster with active resources may require a maintenance window for all validation tests to run as some resources may temporarily go offline.

5.3 Cluster setup

The Failover Cluster Management MMC is used to create failover clusters, validate hardware for potential failover clusters, and perform configuration changes to failover clusters. To create a new cluster:

1. Start Failover Cluster Manager from the **Start** screen → **Administrative Tools** → **Failover Cluster Manager**.

Railover Cluster Manager		_ _ ×
Eile <u>A</u> ction <u>V</u> iew <u>H</u> elp		
Railover Cluster Manager Failover Cluster Manager	^	Actions
Create failover clusters, validate hardware for potential failover clusters, and perform	1	Failover Cluster Manager 🔺
Configuration changes to your failover clusters.		Validate Configuration
▲ Overview		Create Cluster
A failover cluster is a set of independent computers that work together to increase the	11	View
availability of server roles. The clustered servers (called nodes) are connected by physical cables and by software. If one of the nodes fails, another node begins to provide services (a		Q Refresh
process known as failover).		Properties
▲ Clusters	-	Help
▲ Management		
To begin to use failover clustering, first validate your hardware configuration, and then create a cluster. After these steps are complete, you can manage the cluster. Managing a cluster can include migrating services and applications to it from a cluster running Windows Server 2012, Windows Server 2018 R.z. of Windows Server 2008.		
Validate Configuration		
Create Ouster		
Connect to Cluster I Managing a failover cluster		
Morating services and applications. from a cluster		
More Information		
<pre></pre>	~	
		Activate Wind

Figure 28 Failover cluster manager

- 2. In the actions pane, click Create Cluster.
- 3. Click Next on the Before You Begin screen.





Figure 29 Create cluster wizard

4. Enter the servers that are to be part of the cluster. After the server name is entered, click **Add**. When all server names have been entered, click **Next**.

- 4 9		Create Cluster Wizard	×
Select Se	ervers		
Before You Begin Select Servers Validation Warning	Add the names of all the s	ervers that you want to have in the cluster. You must add at least one serv	er.
Access Point for Administering the Cluster Confirmation Creating New Cluster Summary	Enter server name:	TSSRVW2K12Atechsol.local TSSRVW2K12B.techsol.local	id iove
		< <u>P</u> revious <u>N</u> ext > Can	cel

Figure 30 Select servers

 In the Validation Warning dialog of the Create Cluster Wizard, select to run the configuration validation tests and then click Next.

Note: Microsoft requires cluster validation be performed in order to obtain assistance from Premier Support.



Note: The Cluster Validation tool will report a failure if both nodes of the cluster are not presented with (or are unable to access) available storage from Storage Center.

- 1	Create Cluster Wizard
Validatio	n Warning
Before You Begin Select Servers Validation Warning Access Point for Administering the Cluster Confirmation	For the servers you selected for this cluster, the reports from cluster configuration validation tests appear to be missing or incomplete. Microsoft supports a cluster solution only if the complete configuration (servers, network and storage) can pass all the tests in the Validate a Configuration wizard. Do you want to run configuration validation tests before continuing?
Creating New Cluster Summary	 Yes. When I click Next, run configuration validation tests, and then return to the process of creating the cluster. No. I do not require support from Microsoft for this cluster, and therefore do not want to run the validation tests. When I click Next, continue creating the cluster. More about Microsoft support of cluster solutions that have passed validation tests.
	< <u>P</u> revious <u>N</u> ext > Cancel

Figure 31 Validation warning

6. When the Before You Begin dialog appears, click Next.



Figure 32 Validate a configuration wizard



7. On the Testing Options screen, verify Run all tests is selected, and click Next.

樹	Validate a Configuration Wizard
Testing	Options
Before You Begin	Choose between running all tests or running selected tests.
Testing Options Confirmation	The tests examine the Cluster Configuration, Hyper-V Configuration, Inventory, Network, Storage, and System Configuration.
Validating	Microsoft supports a cluster solution only if the complete configuration (servers, network, and storage) can page all tests in this wizard. In addition, all bardware components in the cluster solution must be "Certified
Summary	Run gil tests (recommended) Run only tests I gelect
	<pre></pre>

Figure 33 Testing options

8. On the Confirmation screen click Next to begin cluster validation.



Figure 34 Confirmation

9. Review cluster validation results on the Summary dialog screen. Click Finish.



Figure 35 Summary

10. Type the cluster name, and provide an IP address for the cluster. This will be used to manage the cluster. Click **Next**.

- 1	Create Cluster Wizard				
Access P	oint for Adminis	stering the Cluster			
Before You Begin	Type the name you	want to use when administering the	e cluster.		
Select Servers	Cluster Name:	TSSRVW2K12CLUS			
Administering the	The NetBIOS na	me is limited to 15 characters. Or	e or more IPv4 addresses could not be configur	ed	
Confirmation	 automatically. F address. 	or each network to be used, mak	e sure the network is selected, and then type a	n	
Creating New Cluster		Networks	Address		
Summary		172.16.16.0/20	172 . 16 . 27 . 29		
				-	
			< Previous Next > Cance		
				_	

Figure 36 Cluster access point



11. Verify the information, and then click Next.

- 8		Create Cluster Wizard	x
Confirma	tion		
Before You Begin Select Servers	You are ready to creat The wizard will create	e a cluster. your cluster with the following settings:	
Access Point for Administering the Cluster Confirmation Creating New Cluster Summary	Cluster: Node: Node: IP Address:	TSSRVW2K12CLUS TSSRVW2K12A.techsol.local TSSRVW2K12B.techsol.local 172.16.27.29	
	I ☑ Add all eligible stora To continue, click Next	age to the cluster.	
		<pre></pre>	ancel

Figure 37 Confirmation

Note: By enabling the **Add all eligible storage to the cluster** checkbox, all storage that is presented to both nodes of the cluster and formatted with NTFS will be added to the cluster available storage pool. In a 2 Node cluster configuration if 2 (or more) drives are added to the cluster, the smallest capacity disk will be configured automatically as the cluster quorum disk.

a		Create Cluster Wizard	×
Summary			
Before You Begin Select Servers Access Point for	You have succ	cessfully completed the Create Cluster Wizard.	
Administering the Cluster		Create Cluster	^
Confirmation			
Creating New Cluster			
Summary	Cluster:	TSSRVW2K12CLUS	
	Node:	TSSRVW2K12A.techsol.local	
	Node:	TSSRVW2K12B.techsol.local	
	Quorum:	Node Majority	
	IP Address:	1/2.10.27.29	\checkmark
	To view the report crea To close this wizard, cl	ated by the wizard, click View Report. lick Finish.	<u>V</u> iew Report
			<u>F</u> inish

12. Once the cluster creation is completed, click Finish.



6 Adding disks to a cluster

Adding disks to the cluster is a simple process once the new volume has been created on the Dell Compellent Storage Center and then mapped to each node of the cluster. Complete the following steps from either node to add a new disk (or disks) to the cluster:

Note: For instructions on how to add Dell Compellent volumes to the cluster, please refer to <u>section 5.1</u> of this document.

1. In Failover Cluster Manager, expand the cluster, expand Storage, and then click on Disks.

	Failover Cluster Manager
<u>File A</u> ction <u>V</u> iew <u>H</u> elp	
🗢 🔿 🙍 📅 📓 🖬	
🝓 Failover Cluster Manager	Disks (2) Actions
▲ WP-R2CLUSTER.techsol.loca	Search P Queries V 🖬 V Olisks
Nodes	Name 🕶 Status Assigned To Owner Node Disk Number Capacity 🛃 Add Disk
4 📇 Storage	🕂 KP-R2CLUSTER_Quorum 💿 Online Disk Witness in Quorum TSSRV304 2 1.00 GB 📑 Move Available Storage
Disks	KP-R2CLUSTER_Data_Vol1 () Online Available Storage TSSRV304 1 100 GB View
Metworks	G Refresh
Eluster Events	I Help
	KP-R2CLUSTER_Quorum
	🔯 Bring Online
	Take Offline
	📳 Information Details
	Show Critical Events
	More Actions
	Properties
	l Help
	V RV-R2CLUSTER_Quorum
	/olumes (1)
	KP-R2CLUSTER_Quorum (E)
	G
L	

Figure 39 Failover cluster manager

- 2. In the Actions pane, click Add Disk.
- 3. Select the disk or disks to add and then click **OK**. The disk(s) will be mounted and brought online.

Note: When adding multiple disks to the cluster (especially if they are the same size), it is a best practice to add each disk individually to keep track of the Compellent LUN assigned to each cluster disk.

30

Add Disks to a Cluster							
Select the disk or disks that you want to add.							
Available disks:							
Resource Name	Disk Info	Capacity	Signature/Id				
🗹 进 Cluster Disk 1	Disk 3 on node TSSRV300	100 GB	439163294				
				ОК	Cancel		

Figure 40 Add disk to cluster

職	Failover Cluster Manager	• ×
<u>File Action View H</u> elp		
🧇 🄿 🖄 🖬 📓 🖬		
🝓 Failover Cluster Manager	Disks (3) Actions	
▲ W KP-R2CLUSTER.techsol.loca	²⁸ Search ρ Queries ▼ H ▼ ♀ Disks	
Nodes	Name 🕶 Status Assigned To Owner Node Disk Number Capacity 🔮 Add Disk	
4 📇 Storage	🕂 KP-R2CLUSTER_Quorum 💿 Online Disk Witness in Quorum TSSRV304 2 1.00 GB 📑 Move Available Storage	•
Disks	E KP-R2CLUSTER_Data_Vol1 Online Available Storage TSSRV304 1 100 GB View	•
Networks	Cluster Disk 1 (Conline Available Storage TSSRV304 3 100 GB	
🗓 Cluster Events	Help	
	Cluster Dick 1	
		_
	Take Offline	
	Add to Churter Shared Volum	
	Information Details	
	Show Critical Events	
	More Actions	
	Remove	
	V Disk 1	
	Help	
	/olumes (1)	
	KP-R2CLUSTER Data Vol1 (F:)	
	VTES 99 9 GB (rev of 100.0 GB	
< III >	K	
Disks: Cluster Disk 1		

4. The newly added disk will be shown in Failover Cluster Manager.

Figure 41 Available cluster disks

- 5. (Optional) Rename the cluster disk.
 - a. Right-click on the cluster disk to rename and select Properties.

	C	luster Dis	k 1 Prop	erties		x
General	Dependencie	s Policies	Advanced	Policies	Shadow Copie	s
9	<u>N</u> ame: Type: Status:	Cluster Disk Physical Dis Online	1 k			
Disk nu	mber:	3				
Volum	ie	Capacity 100 GB		Free Spa 99 GB	ice	
					<u>R</u> epair	
		(ок	Cancel	Арр	ly

Figure 42 Cluster disk properties

b. Change the name of the disk and click **OK**.

Note: For more efficient disk management, the cluster disk name should match the name that was set when the volume was formatted.

	Cl	uster Disk 1 Prop	erties x
General	Dependencies <u>N</u> ame: Type: Status: (Policies Advanced KP-R2CLUSTER_Data Physical Disk Online	Policies Shadow Copies
Disk nur Volum F:	mber: 3 e	Capacity 100.0 GB	Free Space 99.9 GB
		ОК	Repair

Figure 43 Cluster disk properties name change

c. The disk name change will be reflected in Failover Cluster Manager.

檻		F	ailover Cluster Man	ager				_ 🗆 X
Eile Action View Help								
Failover Cluster Manager	Disks (3)				_		Actions	
Roles	Search			P	Queries 🔻 🔓	•	Disks	^
Nodes	Name 💌	Status	Assigned To	Owner Node	Disk Number	Capacity	👌 Ad	ld Disk
🛛 📇 Storage	A KP-R2CLUSTER_Quorum	Online	Disk Witness in Quorum	TSSRV304	2	1.00 GB	者 Me	ove Available Storage
📇 Disks	KP-R2CLUSTER_Data_Vol2	Online	Available Storage	TSSRV304	3	100 GB	Vie	sw 🕨
Networks	HP-R2CLUSTER_Data_Vol1	Online	Available Storage	TSSRV304	1	100 GB	G Re	fresh
Cluster Events							Ине	lp
							KP-R2	CLUSTER_Data_Vol2
							Bn	ing Online
							Ta	ke Offline
							Ad 🔤	ld to Cluster Shared Volumes
							🐴 Inf	ormation Details
							🔠 Sh	ow Critical Events
							🖸 Mo	pre Actions
	<	ш				>	🙀 Re	move
							📄 Pro	operties
	* The RP-RZCLUSTER_DA	sta_Vol2					🛛 He	lp
	(alumaa (1)						-	
	rolunes (1)							
	KP-R2CLUSTER_Data_Vo	(1 (F:)						
	NTFS 99.9 GB free of 100.	0 GB						
< III >	<		ш			>		
Disks: KP-R2CLUSTER_Data_Vol2								

Figure 44 Renamed disk In failover cluster manager

6.1 Creating a cluster shared volume (CSV) from available cluster storage

Once a disk has been added to Available Storage in the cluster, it can be converted to a CSV. The process for converting a disk to a CSV is as follows:

1. Open Failover Cluster Manager, expand Storage, select Disks, right-click the disk to convert and select Add to Cluster Shared Volumes.



Figure 45 Disks in failover cluster manager

2. The conversion takes place immediately. The disk will now show as a **Cluster Shared Volume** in the **Assigned To** column.



Disks (2)					
Search			٩	Queries 🔻 🖡	• •
Name	Status	Assigned To	Owner Node	Disk Number	Capacity
HVCluster01_CSV	🕜 Online	Cluster Shared Volume	TSSRV300	2	100 GB
HVCluster01_Quorum	🕥 Online	Disk Witness in Quorum	TSSRV300	3	1 GB

Figure 46 Newly created cluster shared volume

3. The newly created CSV is presented as a mount point in the C:\ClusterStorage directory on each node of the cluster.

⊿		Local Disk (C:)
	⊿	퉬 ClusterStorage
		🛚 😹 Volume1

Figure 47 Location Of newly created CSV

Note: When CSV mount points are created they are named sequentially as Volume1, Volume2, etc... CSV mount points can be renamed for ease of management reasons. As a best practice, rename the CSV mount point to match the associated cluster disk name.



Figure 48 Renamed CSV mount point

Note: CSV mount points should be renamed before cluster resources are configured to the corresponding CSV. Renaming a CSV mount point with associated active cluster resources will cause the resources to fail.



7 Hyper-V guest clustering

Within Hyper-V, guests can be used to create a Failover Cluster. Guests to be clustered have the following requirements:

- Windows Server 2008 R2 (Enterprise or Datacenter) or Windows Server 2012/R2 (Standard or Datacenter) that is a domain member.
- Shared Dell Compellent storage via iSCSI, virtual Fibre Channel or shared virtual hard disks (VHDs) (shared VHDs are supported with Server 2012 R2 only see section 7.1 below).
- Two Ethernet ports (min. one for public and one for private connectivity).
- One static IP address for public network connectivity.

Note: For increased high availability, guest clustering can be configured in a clustered Hyper-V environment. For detailed information on how to install, configure and administer Windows Server 2012/R2 Hyper-V clustering, please refer to the *Dell Compellent Storage Center Best Practices for Hyper-V Guide* on Knowledge Center.

7.1 Shared virtual disks

Windows Server 2012 R2 adds support for shared virtual hard disks (in the .vhdx format). Shared .vhdx files can be used for cluster data and quorum disks. In previous versions of Windows Server, shared disks for guest clustering were only provided through virtual Fibre Channel or iSCSI to the guest. Please refer to the Dell Compellent Storage Center Best Practices for Hyper-V guide on <u>Knowledge Center</u> for detailed information on how to setup iSCSI or virtual Fibre Channel connectivity to Hyper-V guests.

Note: Due to the .vhdx requirement, only Windows Server 2012 and Windows Server 2012 R2 guests support clustering with shared virtual disks.

7.1.1 Configuring Hyper-V guests to use shared virtual disks in failover cluster manager

In a clustered Hyper-V environment, the .vhdx file(s) to be used for guest clustering should reside on a Cluster Shared Volume available to all nodes in the Hyper-V cluster.

In the following example Hyper-V guests reside in a clustered Hyper-V environment. In this configuration guests are managed through Failover Cluster Manager. In a stand-alone Hyper-V environment guests are managed through Hyper-V Manager.

Note: The following process must be performed on all guests that are to be used as cluster nodes.

1. Within Failover Cluster Manager, select Roles, right click on the guest and select Settings.



Figure 49 Failover cluster manager

2. In guest settings, select SCSI Controller, verify Hard Drive is selected, and click Add.

Hardware	SCSI Controller
Mdd Hardware Firmware Boot from File	You can add hard drives to your SCSI controller or remove the SCSI controller from the virtual machine.
Memory 16384 MB	Click Add to add a new <u>h</u> ard drive to this SCSI controller. Hard Drive
Processor 2 Virtual processors	DVD Drive
🗉 🐼 SCSI Controller	
Hard Drive KP-R2GUEST1.vhdx	
DVD Drive	Add



3. Specify the path to the .vhdx file to be used as a shared virtual disk, click **Apply**.

(ou can change ho	ow this virtual har	d disk is at	tached	to the virtual ma	achine. If an
perating system i virtual machine fro	is installed on this om starting.	disk, chan	ging the	e attachment mi	ght prevent the
Controller:			Location	1:	
SCSI Controller		~	4 (in us	e)	
Media					
You can compace	ct, convert, expan	nd, merge,	reconn	ect or shrink a v	/irtual hard disk
Virtual bard	diele:	cony die ie	in pour	to the file.	
C:\ClusterS	Storage Wolume 1V	Huner-WW	rtual Ha	rd Dieke\Clueter	r Shared Dick vh
C. (Clubici C	ronage (volume 1)	iyper v (vi		,	
	New	Edi	t	Inspect	Browse
O Physical har	rd disk:				
Dick 0, 1, 00	CR Rus O Lup 1 T	Second 0			
DISK 0 1.00	OB BUS O LUIT I I	argero			
(II) If the I	physical hard disk	you want	to use i	s not listed, mak	ke sure that the
If the disk is physical	physical hard disk offline. Use Disk I al hard disks.	you want Manageme	to use i nt on th	s not listed, mał e physical comp	ke sure that the outer to manage
 If the plast is physical o remove the virt 	physical hard disk offline. Use Disk I al hard disks. tual hard disk, clid	you want Manageme k Remove.	to use i nt on th This dis	s not listed, mai e physical comp connects the di	ke sure that the uter to manage sk but does not
 If the p disk is physici o remove the virt elete the associa 	physical hard disk offline. Use Disk I al hard disks. tual hard disk, clid ted file.	you want Manageme k Remove.	to use i nt on th This dis	s not listed, mak e physical comp connects the di	ke sure that the uter to manage sk but does not
 If the plast is physical o remove the virt elete the association 	physical hard disk offline. Use Disk t al hard disks. tual hard disk, clid ted file.	you want Manageme k Remove.	to use i nt on th This dis	s not listed, mał e physical comp connects the di	ke sure that the outer to manage sk but does not Remove
 If the idisk is physical o remove the virt elete the association 	physical hard disk offine. Use Disk t al hard disks. tual hard disk, clic ted file.	you want Manageme k Remove.	to use i nt on th This dis	s not listed, mał e physical comp connects the di	ke sure that the outer to manage sk but does not Remove
 If the disk is physical o remove the virt lelete the associal 	physical hard disk offline. Use Disk t al hard disks. tual hard disk, clici ted file.	you want Manageme k Remove.	to use i nt on th This dis	s not listed, mak e physical comp connects the di	ke sure that the outer to manage sk but does not Remove
 If the idea of th	physical hard disk offline. Use Disk ! al hard disks. tual hard disk, clici ted file.	you want Manageme k Remove.	to use i nt on th This dis	s not listed, mak e physical comp connects the di	ke sure that the uter to manage sk but does not Remove
 If the idd is is physic. o remove the virt lelete the association 	physical hard disk offline. Use Disk t al hard disks. tual hard disk, clic tud file.	you want Manageme k Remove.	to use i nt on th This dis	s not listed, mak	ke sure that the uter to manage sk but does not Remove
If the is physical of the original of the is physical of the original of th	physical hard disk offline. Use Disk I al hard disks. tual hard disk, did tud file.	you want Manageme k Remove,	to use i nt on th This dis	s not listed, mak	ke sure that the uter to manage sk but does not Remove
 If the idea is is physical in the physical intervention of th	physical hard disk offine. Use Disk I al hard disks. tual hard disk, clici ted file.	you want Manageme	to use i nt on th This dis	s not listed, mak	ke sure that the uter to manage sk but does not Remove
 If the idda is is physical in the physical intervention of th	physical hard disk offine. Use Disk I al hard disks. tual hard disk, clic ted file.	you want Manageme k Remove,	to use i nt on th This dis	s not listed, mak	ke sure that the uter to manage sk but does not Remove
 If the issue of the second seco	physical hard disk offine. Use Disk h al hard disks. tual hard disk, did ted file.	you want Manageme k Remove.	to use i nt on th This dis	s not listed, mak	ke sure that the uter to manage sk but does not Remove
 If the issue of the second seco	physical hard disk offine. Use Disk h al hard disks. tual hard disk, did ted file.	you want Manageme	to use i nt on th This dis	s not listed, mai e physical comp	ke sure that the uter to manage sk but does not Remove

Figure 51 Virtual hard drive settings



4. Select the newly added virtual hard drive, expand the selection by clicking the **plus sign**, and select **Advanced Features**.



Figure 52 Advanced features

5. Check the box to Enable virtual hard disk sharing, click Apply.



Figure 53 Virtual hard disk sharing

6. Click OK to close guest settings.

For more information about deploying a guest cluster using shared virtual disks, please refer to <u>Microsoft</u> <u>TechNet</u>.

7.2 Creating a guest cluster

Aside from setting up shared storage, the process to create a cluster using Hyper-V guests is the same as setting up a cluster using physical servers. Please refer to <u>Chapter 4</u> and <u>Chapter 5</u> of this document for details on how to install and configure Failover Clustering.



8 High availability

In previous versions of Windows clustering, cluster groups contained the resource necessary to manage failover and determined how failover was handled. In Windows Server 2008/R2 failover clustering, cluster groups were referred to as "Services and Applications". In Windows Server 2012/R2, highly available services and applications are referred to as "Roles". Examples of a highly available cluster role might be a file server, DNS, or a virtual machine. It should be noted that in order to add a role to the cluster, that role or feature must already be installed on each node of the cluster. For example, in order to add the File Server role to the cluster, the File Server role must be installed from the Add Roles and Features Wizard on each node of the cluster.

Note: Windows Server 2012 and 2012 R2 include many enhancements for clustering Hyper-V and virtual machines. For detailed information on how to install, configure and administer Windows Server 2012 and 2012 R2 Hyper-V clustering, please refer to the *Dell Compellent Storage Center Best Practices for Hyper-V Guide* on Knowledge Center.

8.1 Creating a high availability file server

Windows Server 2012/R2 offers two options for a clustered file server:

- File Server for general use
- Scale-Out File Server for application data

A File Server for general use provides a central location on the network for users to share files or for server applications that open and close files frequently. This option supports both the Server Message Block (SMB) and Network File System (NFS) protocols. It also supports Data Deduplication, File Server Resource Manager, DFS Replication, and other File Services role services.

Note: A File Server for general use cannot use a Cluster Shared Volume (CSV) for storage.

A Scale-Out File Server for application data provides storage for server applications or virtual machines that leave files open for extended periods of time. Scale-Out File Server client connections are distributed across nodes in the cluster for better throughput. This option supports the SMB protocol. It does not support the NFS protocol, DFS Replication, or File Server Resource Manager.

Note: A Scale-Out File Server requires the use of a Cluster Shared Volume (CSV).



In this example, we'll use a disk that has been added to the cluster to create a High Availability File Server for general use.

1. From Failover Cluster Manager, right-click the cluster name, and choose Configure Role.



Figure 54 Configure role

2. Click Next on the Before You Begin dialog screen of the High Availability Wizard.



Figure 55 High availability wizard

3. Select File Server from the list of available roles. Click Next.

ka N	High Availability Wiz	ard	2
Select R	ole		
Before You Begin Select Role	Select the role that you want to configure for high av	alabilty:	
File Server Type	DFS Namespace Server	^	Description:
Select Storage	Distributed Transaction Coordinator (DTC)	-	A File Server provides a central location on your network where files
Confirmation	File Server		applications. For more information,
Configure High Availability	Generic Script		Clusters.
Summary	Generic Service		
	C-ISCSI Target Server	×	
	More about roles that you can configure for high avai	ability	rvious <u>N</u> ext > Cancel

Figure 56 Select role

4. Select File Server for general use. Click Next.



Figure 57 File server type

5. Enter a name that clients will use to access the file server. Enter a unique IP address for the file server. Click **Next**.

刻		High Availability Wizard		×
Client Ac	cess Point			
Before You Begin Select Role	Type the name that cli N <u>a</u> me:	lients will use when accessing this clu FILECLUSTER	ustered role:	
File Server Type Client Access Point Select Storage Confirmation	The NetBIOS name automatically. For address.	ne is limited to 15 characters. One or or each network to be used, make su	r more IPv4 addresses could not be configured are the network is selected, and then type an	
Configure High Availability Summary		Networks	Address 172 . 16 . 27 . 35	
	l			
			< Previous Next > Cancel	

Figure 58 Client access point

6. Select an available storage volume to assign to the file server cluster. Click **Next**.

	High Availability Wizard	x
Select St	torage	
Before You Begin Select Role File Server Type	Select only the storage volumes that you want to assign to this clustered role. You can assign additional storage to this clustered role after you complete this wizard.	_
Client Access Point Select Storage Confirmation Configure High Availability	Name Status ☑ ☐ ﷺ Cluster Disk 2 ④ Online Volume: (F) File System: NTFS 100 GB free of 100 GB	
Summary		
	< <u>P</u> revious <u>N</u> ext > Cancel	

Figure 59 Select storage



7. Confirm settings and click Next.

8 0	High	n Availability Wizard	x
Confirma	tion		
Before You Begin Select Role	You are ready to configure high	availability for a File Server.	
File Server Type Client Access Point Select Storage Configure High Availability Summary	Storage: Network Name: OU: IP Address:	Cluster Disk 2 FILECLUSTER CN=Computers,DC=techsol,DC=local 172.16.27.35	< v
	To continue, click Next.		
		< Previous Next >	Cancel

Figure 60 Confirm settings

8. Click Finish on the Summary screen.



Figure 61 Summary



9. Once the file server role configuration has completed, the server, network access point and assigned storage will be visible in Failover Cluster Manager.

Roles (1)			
Search			P Queries
Name	Status	Туре	Owner Node
🛃 FILECLUSTER	🕥 Running	File Server	TSSRVW2K12A
6			_
✓ FILECLUSTER			Preferred Own
Name		Status	Information
Server Name			
🗉 🍓 Name: FILECLUSTE	R	💿 Online	
File Server			
🔒 File Server (\\FILECI	USTER)	Online	
Storage			
🖃 进 Cluster Disk 2		Online	
Cluster Data (F:)		
NTFS 100 GB fr	ee of 100 GB		

Figure 62 Roles window



8.2 Provision a shared folder for the file server

Provisioning of shared folders on the cluster volumes that are contained in the file server cluster is required to provide failover of these resources in the event of a node or service failure. Follow these steps to provision a shared (SMB) folder in the file server cluster:

1. In Failover Cluster Manager, expand the cluster, click on Roles, right-click on the file server, and choose Add File Share.



Figure 63 Context menu

2. The New Share Wizard appears. Select SMB Share – Advanced, and click Next.

Note: By choosing the Advanced option, enhanced configuration settings such as data classification and quota management are available through the new share wizard. Also note that in order to select the Advanced option, the File Server Resource Manager Role must be installed on both nodes of the cluster.



Select the profile	New Share for this share	Wizard 💶 🗖
Select Profile Share Location Share Name Other Settings Permissions Management Properties Cluota Cluota Confirmation Results	File share grofile: SMB Share - Quick SMB Share - Advanced SMB Share - Applications NFS Share - Quick NFS Share - Advanced	Description: This advanced profile offers additional options to configure a SMB file share. Set the folder owners for access-denied assistance Configure default classification of data in the folder for management and access policies Enable quotas
		< Brevious Next > Create Cancel

Figure 64 New share wizard

3. Select the server and path for the share. Select **Next** when complete.

Select Profile	Server:			
Share Location	Server Name	Status	Cluster Role	Owner Node
Share Name	FILECLUSTER	Online	File Server	
	This list displays s	servers only with File Server R	esource Manager in	nstalled.
	Share location:			
	Select by volume	8		
	Volume	Free Space	Capacity File Sys	stem
	F:	99.4 GB	100 GB NTFS	
	The location of t	he file share will be a new fok	der in the \Shares d	irectory on the selected
	Volume.	a the		
	O Lype a custom p	athc		

Figure 65 Select server path

4. Enter a share name and click Next.

a .	l	New Share Wizard	_ 🗆 X
Specify share nan	ne		
Select Profile	Share n <u>a</u> me:	Share1	
Share Location	Share description:		
Other Settings			
Permissions			
	local path to share:		
	E:\Shares\Share1		
	If the folder does	not exist, the folder is created.	
	Permote path to share	a.	
	VEILECT USTER/Shar	-1	
	(inceded) ren(dial		
		< <u>Previous</u> <u>Next</u> > <u>Create</u>	Cancel

Figure 66 Specify share name

5. Configure share settings. Click **Next** to continue.



Figure 67 Configure share settings

6. Specify share permissions for SMB-based access to the folder. Click **Next**.

a		New Share Wiz	ard		-	□ X
Select Profile Share Location Share Name Other Settings Boroticioar	Permission permission Share perm Eolder per	s to access the files on a sha s, and, optionally, a central a nissions: Everyone Full Contr missions:	re are set using a access policy. ol	combination of folder permi	ssions,	share
Anagement Properties Quota Confirmation Results	Allow Allow Allow Allow Allow Allow Allow	RUILTINUSers BUILTINUSers CREATOR OWNER NT AUTHORITASYSTEM BUILTINUAdministrators BUILTINUAdministrators	Special Special Read & execute Full Control Full Control Full Control	This folder and subfolders This folder, subfolders, and Subfolders and files only This folder, subfolders, and This folder, subfolders, and This folder only	l files I files I files	
		< <u>F</u>	revious <u>N</u> ex	t > <u>C</u> reate	Ca	ncel

Figure 68 Specify permissions

7. (Optional) select the type of data that will be stored on the share. Enter an email address to be notified when denied users request access to the folder. Click **Next**.

	New Share Wizard	
Specify folder ma Select Profile Share Location Share Name Other Settings Permissions Management Properties Quota Confirmation Results	New Share Wizard A generative property specifies the purpose of the folder and the type of files stored is used by data management policies such as classification rules. Select the Eolder Usage value for this folder: User Files Group Files Application Files Backup and Archival Files The Folder Owner Email property specifies the distribution list or email addresses that are contacted when users request assistance after being denied access to the folder.	in it, and
	Specify the Folder Owner Email addresses (separated by semicolons):	
	shareadmin@compellent.com	
	< Previous Next > Create	Cancel

Figure 69 Folder management properties

8. If desired, apply a quota to the share. Click **Next** to continue.

- 🔁	New Share Wizard						
Apply a quota to a folder or volume							
Select Profile	Do not apply a quota						
Share Location	○ <u>Apply</u> a quota based on the template:						
Share Name	100 MB Limit						
Other Settings	200 MB Limit Reports to User						
Permissions	Monitor 200 GB Volume Usage Monitor 500 MB Share						
Management Properties	200 MB Limit with 50 MB Extension						
Quota	250 MB Extended Limit						
Confirmation							
Results	Summary of template:						
	Learn more about creating or modifying a template						
	< <u>Previous</u> <u>Next</u> <u>Create</u> Cancel						

Figure 70 Apply quota

9. Confirm selections and click **Create** to add the share to the clustered file server.

New Share Wizard					
Confirm selection	S				
Select Profile	Confirm that the following	are the correct settings, and then click Create.			
Share Location	SHARE LOCATION				
Share Name	Server:	FILECLUSTER			
Other Settings	Cluster role:	File Server			
Permissions	Local path:	F:\Shares\Share1			
Management Properties	SHARE PROPERTIES				
Quota	Share name:	Share1			
Confirmation	Protocol:	SMB			
Results	Access-based enumeration:	Enabled			
	Caching:	Enabled			
	BranchCache:	Disabled			
	Encrypt data:	Disabled			
	Continuous availability:	Enabled			
	MANAGEMENT PROPERTIES				
	Folder usage:	User Files			
	Folder owner email:	shareadmin@compellent.com			
	Quota template:	None applied			
		< Previous Next > Greate Cancel			

Figure 71 Confirm selections

10. Review the share creation results. Click Close to exit.

View results					
Select Profile	The share was successfu	ully created.			
Share Location	Task	Progress	Status		
Share Name	Create SMB share		Completed		
Other Settings	Set SMB permissions		Completed		
Permissions	Set folder usage		Completed		
Management Properties	Set folder owner email		Completed		
Quota					
Confirmation					
Results					
		< Previous Next	> Close	Cance	1

Figure 72 View results

11. The new share is visible in the **Shares Tab** in the **Roles** window of File Server Manager.

Roles (1)					
Search			۾ ر	Queries 🔻 🕁 👻	
Name	Status	Туре	Owner Node	Priority Information	
FILECLUSTER	Running	File Server	TSSRVW2K12A	Medium	
<	Ш			>	
FILECLUSTER Preferred Owners: Any node					
Shares (2)					
Name Pat	h	Protocol	Continuous Availability	Remarks	
🜙 F\$ F:	X	SMB	No	Cluster Default Share	
🌙 Share1 F:	\Shares\Share1	SMB	Yes		
<		I		>	
Summary Resources Sha	ares				

Figure 73 Roles window

9 Administrative tasks

9.1 Testing failover/moving roles

While pulling the power on one of the nodes can be done to test the failover capabilities, Failover Cluster Manager can also be used to move a Role from one node to another.

To move a configured Role to another node:

1. From **Failover Cluster Manager**, expand the cluster and highlight **Roles**. In the Roles window, rightclick the Role to failover and then choose **Move**, then **Select Node**.



Figure 74 Move context menu

2. Select the node to move the Role to and click **OK**.

Move	e Clustered Role	
Select the destination nod 'TSSRVW2K12A'.	le for moving 'FILECLUS'	TER' from
Look for:		
🔎 Search		Clear
Cluster nodes:		
Name	Status	
TSSRVW2K12B	💿 Up	
	OK	Canad
	UK	Cancei

Figure 75 Move clustered role window

50



3. The Role will move to the other node. Verify the owner node in the Roles window.

Roles (1)			
Search			<i>۾</i>
Name	Status	Туре	Owner Node
🔒 FILECLUSTER	💿 Running	File Server	TSSRVW2K12B

Figure 76 Verify owner node

9.2 Cluster-Aware updating

Included in Windows Server 2012/R2, Cluster-Aware Updating (CAU) is an automated feature that allows update clustered servers with little or no loss in availability during the update process. During an Updating Run, CAU transparently performs the following tasks:

- Puts each node of the cluster into node maintenance mode
- Moves the clustered roles off the node
- Installs the updates and any dependent updates
- Performs a restart if necessary
- Brings the node out of maintenance mode
- Restores the clustered roles on the node
- Moves to update the next node

CAU is a powerful feature that can be scheduled on regular, daily, weekly, or monthly intervals.

9.3 Windows PowerShell

As with previous versions of Windows Server, Windows Server 2012/R2 includes Failover Cluster Cmdlets to allow for the installation, configuration and administration of failover clustering from within PowerShell. For a complete listing of all available Failover Clustering Cmdlets, please refer to <u>Microsoft TechNet</u>.

Dell Compellent offers the Storage Center Command Set version 7.0 for Windows PowerShell. Available on <u>Knowledge Center</u>, this free download contains 99 Cmdlets for streamlining SAN management, including administration, snapshot schedules and data recovery. Complete instructions for installing and using the Storage Center Command Set are found in the Administrator's Guide, included with the Command Set download.



A Additional resources

Support.dell.com is focused on meeting your needs with proven services and support.

DellTechCenter.com is an IT Community where you can connect with Dell Customers and Dell employees for the purpose of sharing knowledge, best practices, and information about Dell products and installations.

Referenced or Recommended Dell Compellent publications on Knowledge Center: http://kc.compellent.com

- Dell Compellent Storage Center Windows Server 2012 Best Practices Guide
- Dell Compellent Storage Center Microsoft Multipath IO (MPIO) Best Practices Guide
- Dell Compellent Storage Center Best Practices for Hyper-V
- Dell Compellent Storage Center Virtual Fibre Channel for Hyper-V 2012 Demo Video

Referenced or recommended Microsoft publications:

- What's New in Failover Clustering in Windows Server 2012 <u>http://technet.microsoft.com/en-us/library/hh831414.aspx</u>
- What's New in Failover Clustering in Windows Server 2012 R2 <u>http://technet.microsoft.com/en-us/library/dn265972.aspx</u>
- Configure and Manage the Quorum in a Windows Server 2012 Failover Cluster <u>http://technet.microsoft.com/en-us/library/jj612870.aspx</u>
- NIC Teaming Overview <u>http://technet.microsoft.com/en-us/library/hh831648.aspx</u>
- Deploy a Guest Cluster Using a Shared Virtual Disk <u>http://technet.microsoft.com/en-us/library/dn265980.aspx</u>
- Failover Clusters Cmdlets in Windows PowerShell
 <u>http://technet.microsoft.com/en-us/library/hh847239.aspx</u>