

Windows Storage Spaces Demonstration

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This video will look at using Windows Storage Spaces in Windows Server 2012 R2. Windows Storage Spaces is a new system introduced in Windows Server 2012 that allows multiple physical drives to be combined together to form the one virtual drive. This can be done for redundancy or capacity reasons.

What is looked at in this video

- Creating a Storage Pool
- Automatic vs manual allocation
- Creating simple, mirror and parity virtual disks
 - Three-way mirrors and dual parity
- Removing a disk from the storage pool
- Extending a virtual disk
- Replacing a failed disk
- Storage Tiering

What is looked at in this video

This video will look at seven different topic areas in storage pools and how to configure them in Windows Server 2012 R2. These seven areas are

- 1) Creating a storage pool
- 2) Automatic vs manual allocation
- 3) Creating simple, mirror and parity virtual disks
- 4) Removing a disk from the storage pool
- 5) Extending a virtual disk
- 6) Replacing a failed drive
- 7) Storage Tiering

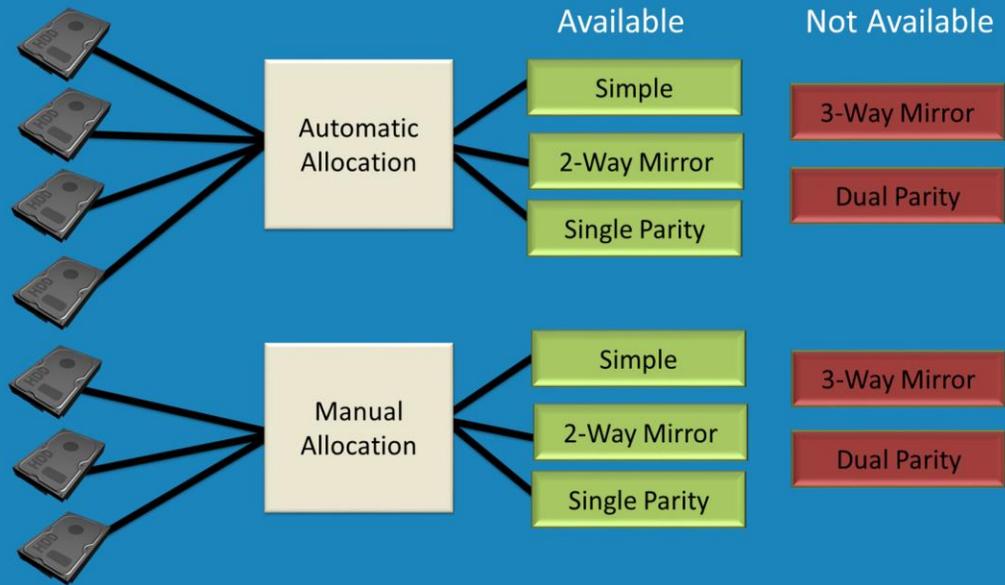
Demonstration

- Allocation types
 - Automatic: Windows will decide how to use the physical drive
 - Hotspare: If a physical drive fails the hotspare will automatically replace that physical drive
 - Manual: It is up to the administrator to decide
- Automatic and Manual should not be used together
 - Physical drive in each allocation can be used in the other

Demonstration creating a storage pool

- 1) If you right click on the start icon this will display a menu. Select the run option and then run "Diskmgmt.msc". This will run disk management in full screen mode. Windows Storage Spaces is not managed through Disk Management; however Disk Management will tell you what physical disks are present in the system.
- 2) To configure Storage Spaces, run Server Manager and then select the option on the left hand side "File and Storage Services".
- 3) In the File and Storage Services admin tool, if you select Disks this will show all the physical disks installed in the system. This will show all the physical disks in the system including those that are not useable by Windows Storage Spaces. For example, the physical drive that contains the operating system will not be able to be used with Windows Storage Spaces.
- 4) If you select the option "Storage Pools" this will show any storage pools that have been created. If a physical drive is available but has not been put into a storage pool it will be listed under Primordial.
- 5) If you right click on Primordial this will give you the option for "New Storage Pool" which will start the new storage pool wizard.
- 6) The wizard will allow you to enter in a name and description and also select which physical drives you want to use in the storage pool.
- 7) When selecting the type, it is best to choose all physical drives as automatic or manual but not a mixture of both as this will limit what kinds of virtual disks you can create if the storage pool does not have enough physical drives in it. If you select the option for hotspare, this physical drive will automatic replace another drive in the system if it fails.
- 8) Once you have selected all the required options, at the end of the wizard you have the create button which will create a storage pool. Once the storage pool is created, virtual disks can be created in the storage pool.

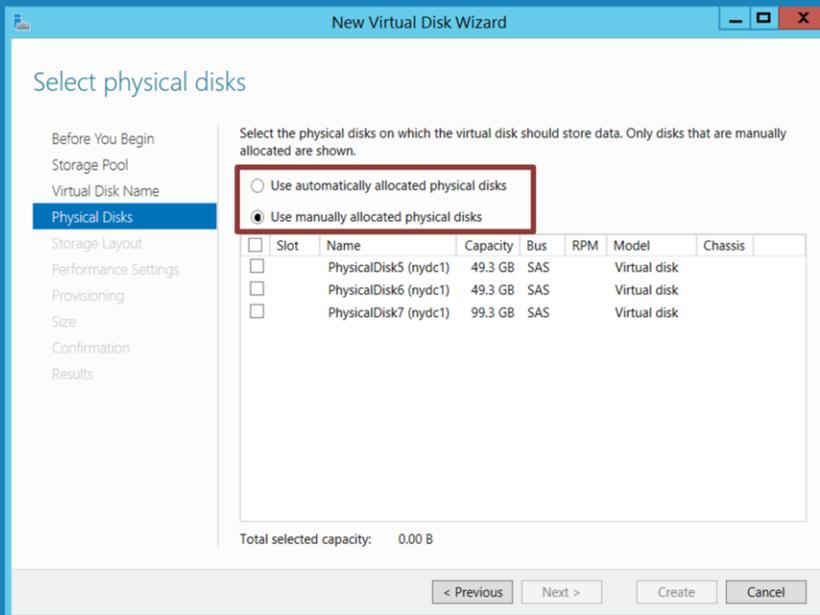
Automatic and Manual Allocation



Automatic vs manual allocation

When creating a Storage Pool, Windows will ask if the physical drives used in the storage pool should be automatic or manual. It is recommended that one or the other is used. In this example 7 physical drives exist..

Automatic and Manual Allocation



Automatic vs manual allocation

Four have been put in an automatic allocation and 3 in a manual allocation. When this occurs, when creating a new virtual drive, Windows will ask which allocation you want to use. In this case, options like 3 way mirror and dual parity are not available as both pools do not have the minimum of 5 physical disks. If all 7 physical drives were put in the same allocation then all options for virtual drives would be available

Demonstration Virtual Disks Available

	Thin provision	Require R2	Minimum disks required
Simple	Yes	No	1
Two-way Mirror	Yes	No	2
Three-way Mirror	Yes	Yes	5
Single Parity	Yes	No	3
Dual Parity	No	Yes	7
* Simple Tier	No	Yes	1
* Two-way mirror Tier	No	Yes	2
* Three-way mirror Tier	No	Yes	5

* Uses 1 Gigabyte write back cache

Demonstration Creating simple, mirror and parity virtual disks

Once a storage pool has been created it will appear in Storage Pools in File Storage Services. If there is no storage pool available you will need to create one.

To create a virtual disk inside a storage pool, right click on the storage pool and then select the option "New Virtual Disk" to start the new virtual disk wizard. Windows can support 160 virtual disks in the one storage pool.

The wizard will ask which storage pool that you want to use, a name for the virtual disk and a description for the virtual disk.

For the layout of the virtual disk you can choose simple, mirror and parity. The option will change depending on which operating system you are using and how many physical drives are in the storage pool. It important to remember that if you choose simple there is no redundancy. If any physical drive in the storage pool was to fail that was being used with that simple disk, all the data from the simple disk is lost.

The provisioning option will determine if the virtual disk will allocate all the space when the virtual disk is created or as needed. If you want the virtual disks to expand in size as required use the thin option. If you want to allocate all the space at once use the fixed option. The fixed option gives better performance and offers some additional options. For example, Dual Parity requires the fixed option.

The wizard requires the size of the virtual disk to be entered. Windows will automatically check to ensure that there is enough space in the Storage Pool to create a virtual disk of that size.

When you reach the last screen of the wizard, once you press create the virtual disk

will be created and available in the operating system as an empty unused drive. In other words, it will still need to be partitioned and formatted like any physical drive would need to be. After the wizard has completed, the new volume wizard can be run which will allow the virtual disk to be formatted. If you do not do this now, you can always perform this step using disk management later on.

The “New Volume Wizard” is a simple wizard which allows you to prepare the virtual disk for use in the server. It asks a number of simple questions like the size of the drive you want to create, the drive letter you want to use and also what sort of file system that you want to use.

Now running the virtual disk wizard, options will be available based on the operating system used, the number of physical disks in the pool and which type of provisioning that you have selected. For a list of what is available refer to the PDF.

If you want to get an indication of how much space is left in the storage pool, you can right click the storage pool and select the option properties. Also there are options for health and additional details about the storage pool.

Demonstration removing a disk from the storage pool

On the right hand side of File and Storage Services is listed the physical drives.

To remove a physical drive from the system, right click the physical drive and select the option “Remove disk”.

When this is attempted, Windows will attempt to move all the data off the physical disk to other disks. If a simple disk is on that physical drive, the simple virtual disk will need to be removed first before you can remove the physical disk.

To remove a simple disk from the storage pool, right click in the disk section and select the option “Delete Virtual Disks”.

If you attempt to delete a virtual disk that has a volume on it, the operation will fail. In order to delete the virtual disk you need to first go into Disk Management and delete any volumes of the virtual disk first.

If you attempt to remove a physical disk from the system, Windows will attempt to move any data from that physical disk to other physical disks. In this example there is a dual parity disk which requires 7 physical disks and there are only 7 physical disks in the system. Before the disk can be removed, another physical disk needs to be added to the system and adding it to the storage pool.

Extending a virtual disk

To make a virtual disk larger, right click the virtual disk and select the option “Extend Virtual Disk”.

Extending a virtual disk will only make the virtual disk larger. If you have any volumes on the virtual disk you will still need to go into Disk Management and make the volume larger to use the extra space added to the virtual disk.

Replacing a failed drive

When a physical drive fails in a Storage Pool, an exclamation mark will appear to indicate that there is a problem. This will appear in the storage pool, the physical disk, and the virtual disks that are effected.

To repair a virtual disk, right click the virtual disk and select the option “Repair Virtual Disk”.

If there are not enough available physical disks in the system to repair the virtual disk the operation will fail.

The simplest way to replace a physical disk that has failed is to put in an additional physical disk and set the type to hot spare. When you select the option for “Repair Virtual disk”, Windows will copy any data that was on the failed physical disk to the hot spare. Once the data has been copied to the new physical disk, the old physical disk should be reported as retired and can be removed.

Storage Tiering

This is a feature that is available in Windows Server 2012 R2. This allows data that is used more often to be placed on Solid State drives and data that is used less often to be placed in physical hard disks.

Under physical disks there is a media type that should show the type of hard disk as being mechanical hard disks or solid state hard disks. If this is not the case, open PowerShell and run the following.

“Get-PhysicalDisk” This command will show all the current physical disks in the system.

“Get-PhysicalDisk | where FriendlyName -Like PhysiscalDisk[2-4]” This will display physical disks 1 through to 4.

“Get-PhysicalDisk | where FriendlyName -Like PhysiscalDisk[2-4] | Set-PhysicalDisk – MediaType HDD” This command will configure disks 2 through 4 as mechanical hard disks.

“Get-PhysicalDisk | where FriendlyName -Like PhysiscalDisk[5-8] | Set-PhysicalDisk – MediaType SSD” This command will change physical disks 5 through 8 to solid state drives.

To create a new virtual disk that uses storage tiers, right click the storage pool and select the option “New Virtual Disk”.

Creating a virtual disk that uses Tiers is much the same as creating a standard virtual disk. When you get the option for virtual disk name, there is a tick box at the bottom of the screen called “Create storage tiers on this virtual disk”. This option needs to be ticked in order for the virtual machine to use tiers.

Storage Tiers require fixed provisioning so when you get to that part of the wizard you will not be able to select the thin option.

On the size screen you have to enter in the size of the virtual disk. The big difference here over non tier storage is that you need to enter in how much space that you want to use on the SSD space and how much you want to use on HDD space. Adding both

together will give the total amount of space available for the virtual disk.

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References

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