USING "STORAGE SPACES" WITH EXTERNAL HARD DRIVE ENCLOSURES IN "WINDOWS 8.."

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EXECUTIVE SUMMARY

"Storage Spaces" is a new feature in "Windows 8..". It provides for real-time mirroring of two hard drives or two hard drive partitions. When using internal hard drives inside external hard drive enclosures, "Storage Spaces" has some special requirements ("gotchas") that you have to deal with.

TOPICS

- "Storage Spaces" Basics
- Special Requirements When Using Internal Hard Drives In External Hard Drive Enclosures In Two-Way-Mirrored "Storage Spaces

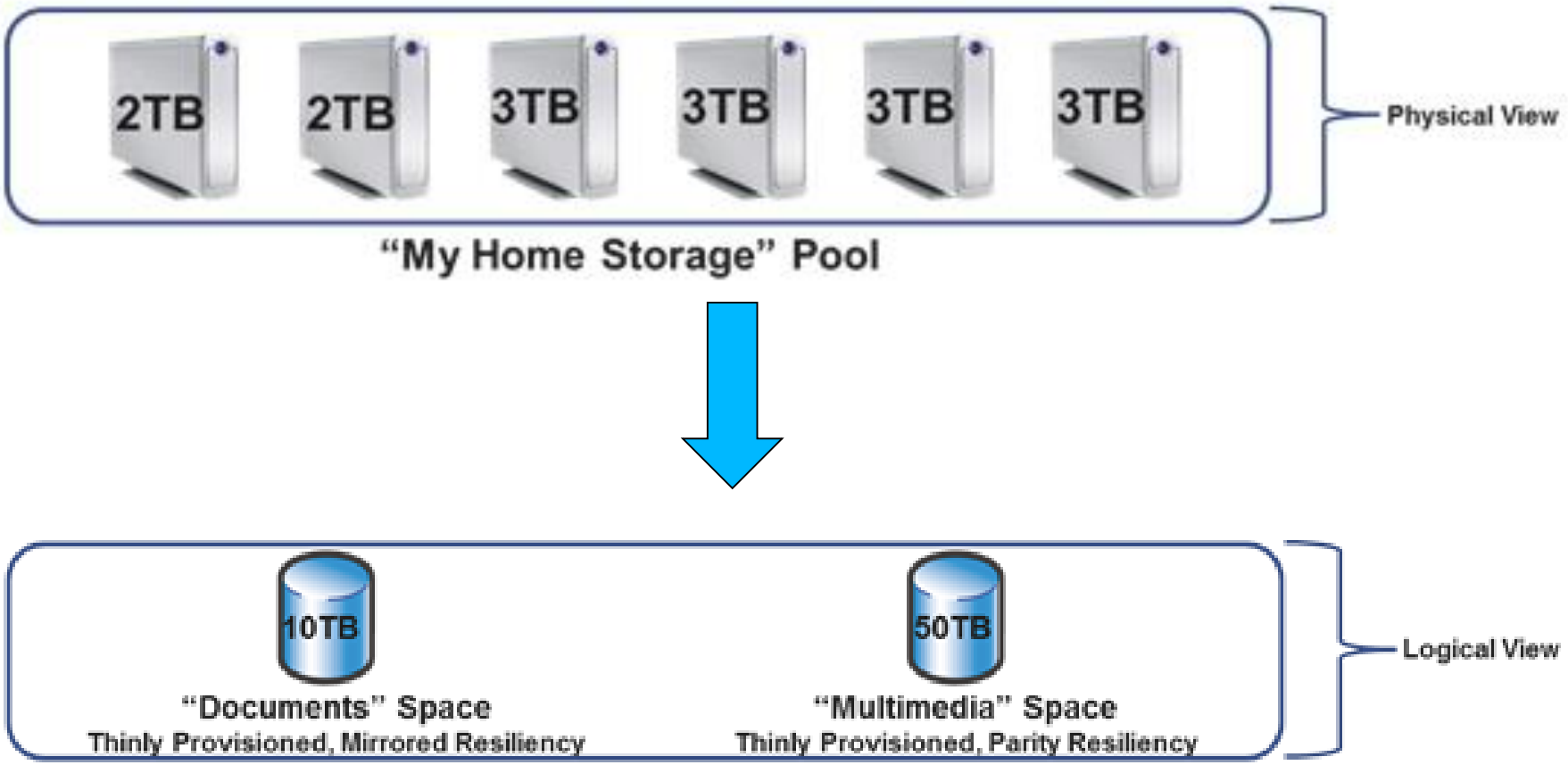
STORAGE SPACES BASICS

"STORAGE SPACES" BASICS

- "Storage Spaces" is a feature of "Windows 8" that is used to group physical hard drives into single logical "Storage Pool".
- A "Storage Pool" can then be used to create one or more "Storage Spaces" virtual hard drives
- A "Windows 8" computer can have more than one "Storage Pool".

"STORAGE SPACES" BASICS (continued)

- A "Storage Space" is a logical NTFS hard drive or a logical NTFS hard drive partition that is under the control of the "Storage Spaces" process.


2TB
2TB
3TB
3TB
3TB
3TB
Physical View
"My Home Storage" Pool
10TB
"Documents" Space
Thinly Provisioned, Mirrored Resiliency
50TB
"Multimedia" Space
Thinly Provisioned, Parity Resiliency
Logical View

"STORAGE SPACES" BASICS (continued)

- Using the "Storage Spaces" applet in "Windows 8", you create logical "Storage Pools" which are then used to create "Storage Spaces" virtual hard drives.

"STORAGE SPACES" BASICS (continued)

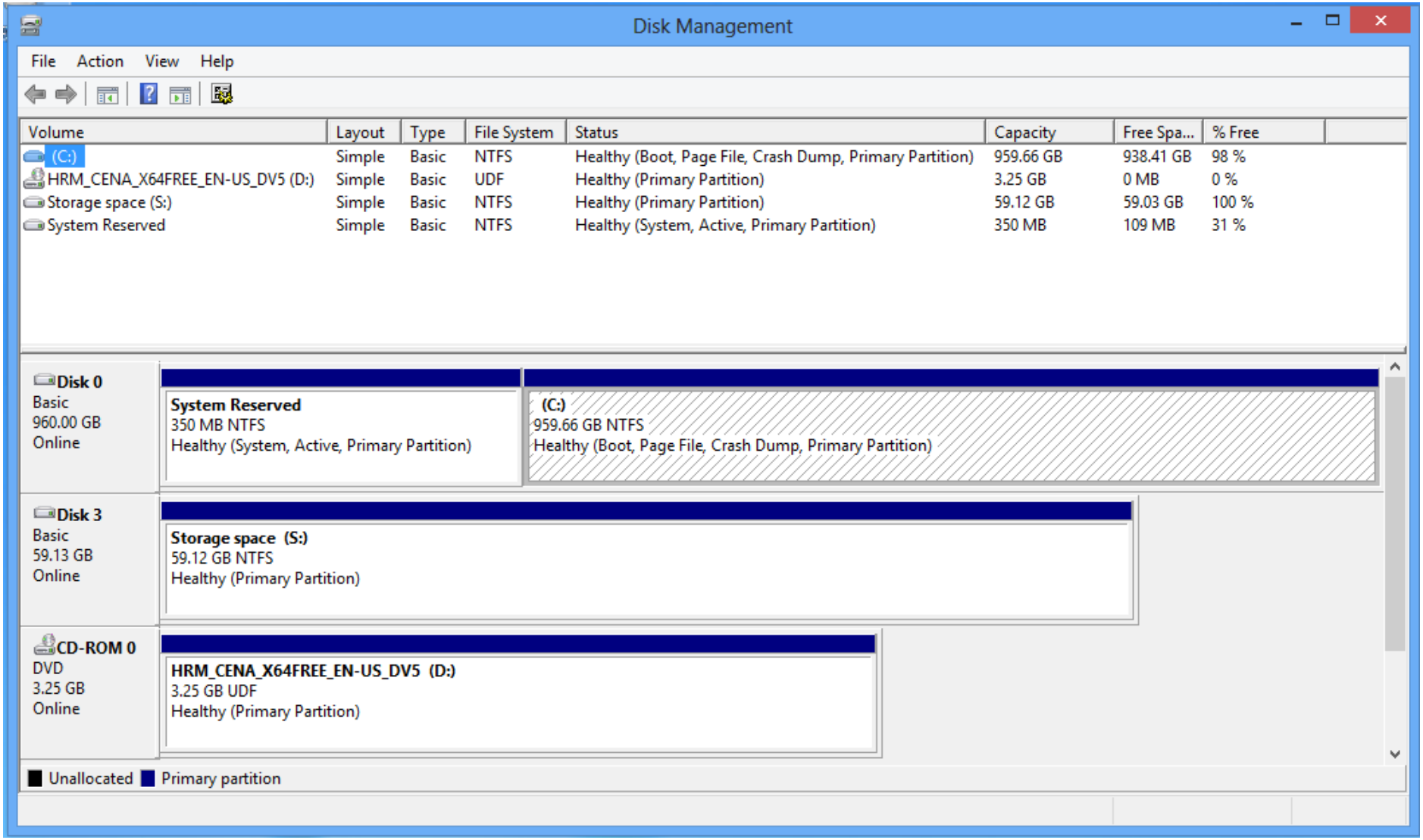
- "Storage Spaces" can be used to synchronize hard drives when you create a single virtual hard drive from a "Storage Pool" that consists of two physical hard drives:

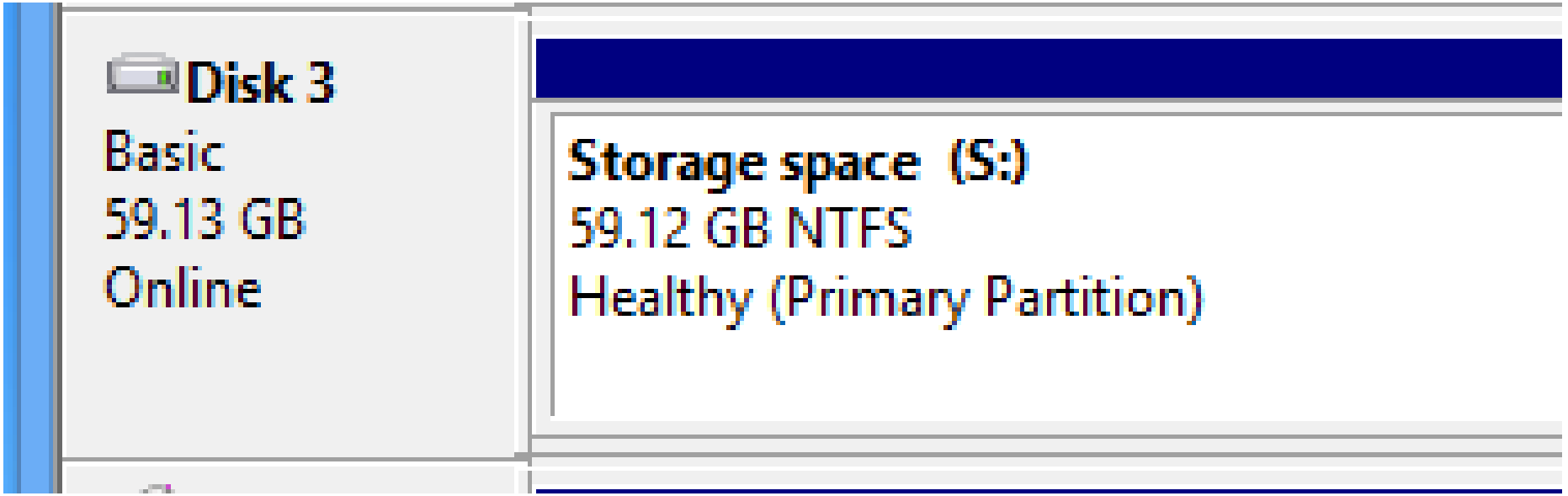
"STORAGE SPACES" BASICS (continued)

- When you create a logical "Storage Space", it gets a drive letter and it shows up in "Disk Management" in the "Control Panel" as a hard drive with a "GUID Partition Table" ("GPT").
  It also shows up in "File Explorer". It does not show up in "Device Manager" nor does it show up in "Devices and Printers".

"STORAGE SPACES" BASICS (continued)

- The physical hard drives that are added to a "Storage Pool" disappear from "Disk Management" in the "Control Panel".
- Instead, you see a new local "Storage Pool" drive in "Disk Management":


Disk Management
File Action View Help
Volume Layout Type File System Status Capacity Free Spa... % Free
(C:) Simple Basic NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition) 959.66 GB 938.41 GB 98 %
HRM_CENA_X64FREE_EN-US_DV5 (D:) Simple Basic UDF Healthy (Primary Partition) 3.25 GB 0 MB 0 %
Storage space (S:) Simple Basic NTFS Healthy (Primary Partition) 59.12 GB 59.03 GB 100 %
System Reserved Simple Basic NTFS Healthy (System, Active, Primary Partition) 350 MB 109 MB 31 %
Disk 0
Basic
960.00 GB
Online
System Reserved
350 MB NTFS
Healthy (System, Active, Primary Partition)
(C:)
959.66 GB NTFS
Healthy (Boot, Page File, Crash Dump, Primary Partition)
Disk 3
Basic
59.13 GB
Online
Storage space (S:)
59.12 GB NTFS
Healthy (Primary Partition)
CD-ROM 0
DVD
3.25 GB
Online
HRM_CENA_X64FREE_EN-US_DV5 (D:)
3.25 GB UDF
Healthy (Primary Partition)
Unallocated
Primary partition


Disk 3
Basic
59.13 GB
Online
Storage space (S:)
59.12 GB NTFS
Healthy (Primary Partition)

"STORAGE SPACES" BASICS (continued)

- You can create a logical "Storage Space" for any letter of the alphabet that is not already assigned.

"STORAGE SPACES" BASICS (continued)

- When a physical hard drive is added to a "Storage Pool":
  - The physical hard drive no longer has a drive letter
  - The physical hard drive no longer shows up in "File Explorer
  - The physical hard drive no longer shows up in "Disk Management" in the "Control Panel".

"STORAGE SPACES" BASICS (continued)

- The main place where the physical hard drive shows up will be the "Storage Spaces" list of "Physical Drives".
- The physical hard drive still shows up in the "Device Manager".
- The physical hard drive still shows up in "Devices and Printers".

"STORAGE SPACES" BASICS (continued)

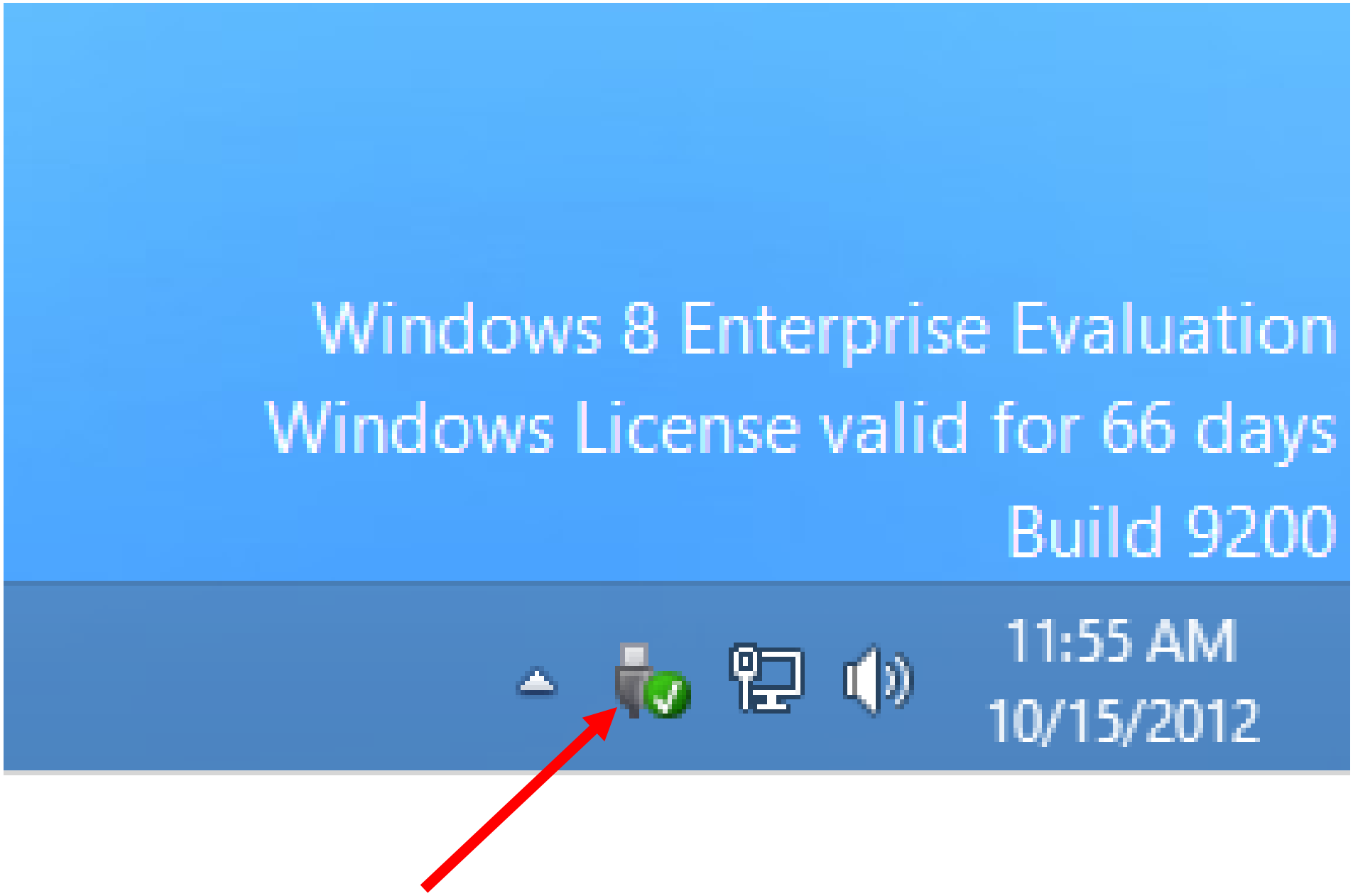
- The C: hard drive or hard drive partition where "Windows 8.." resides cannot be used for one of the physical hard drives in a "Storage Pool".

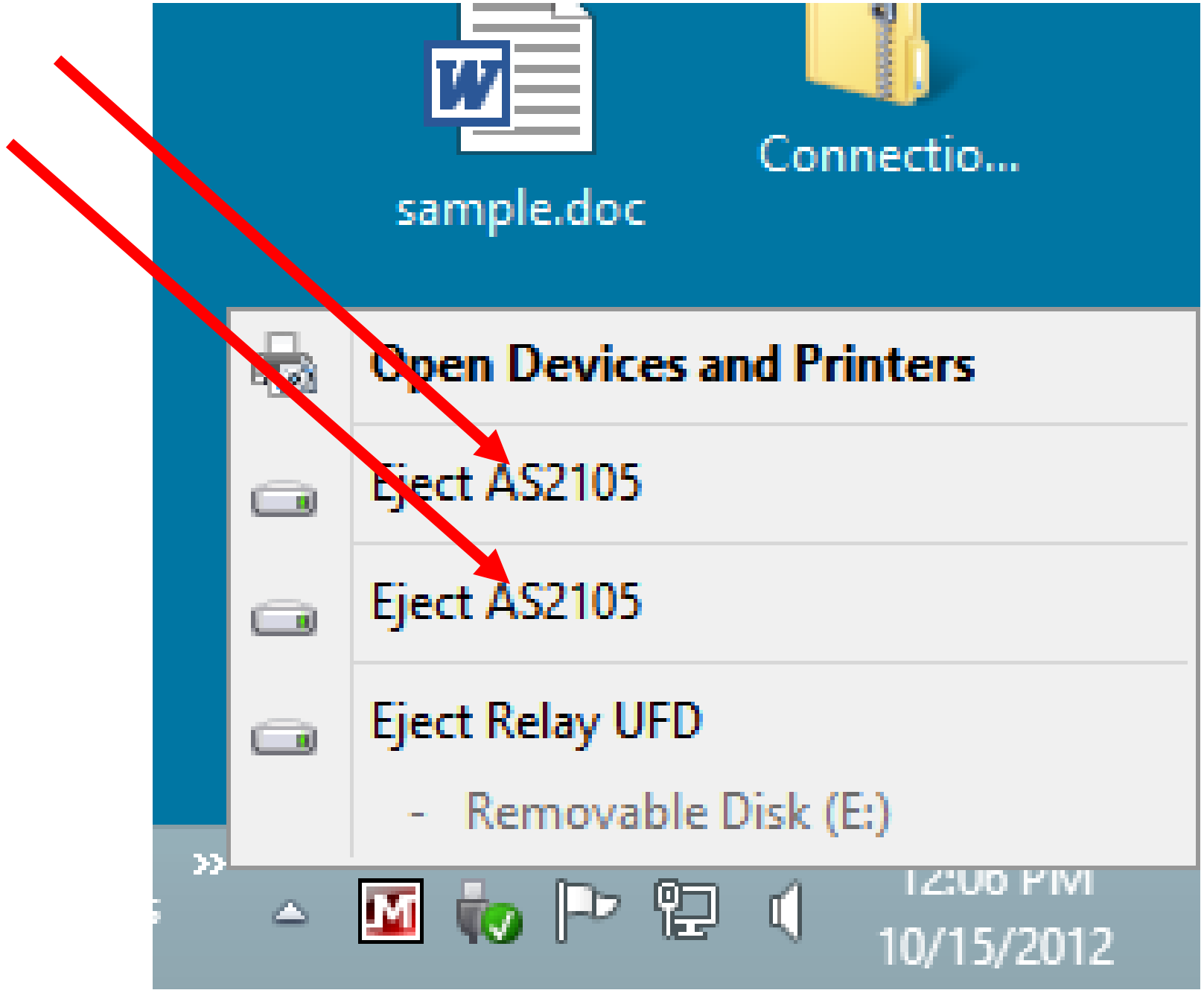
"STORAGE SPACES" BASICS (continued)

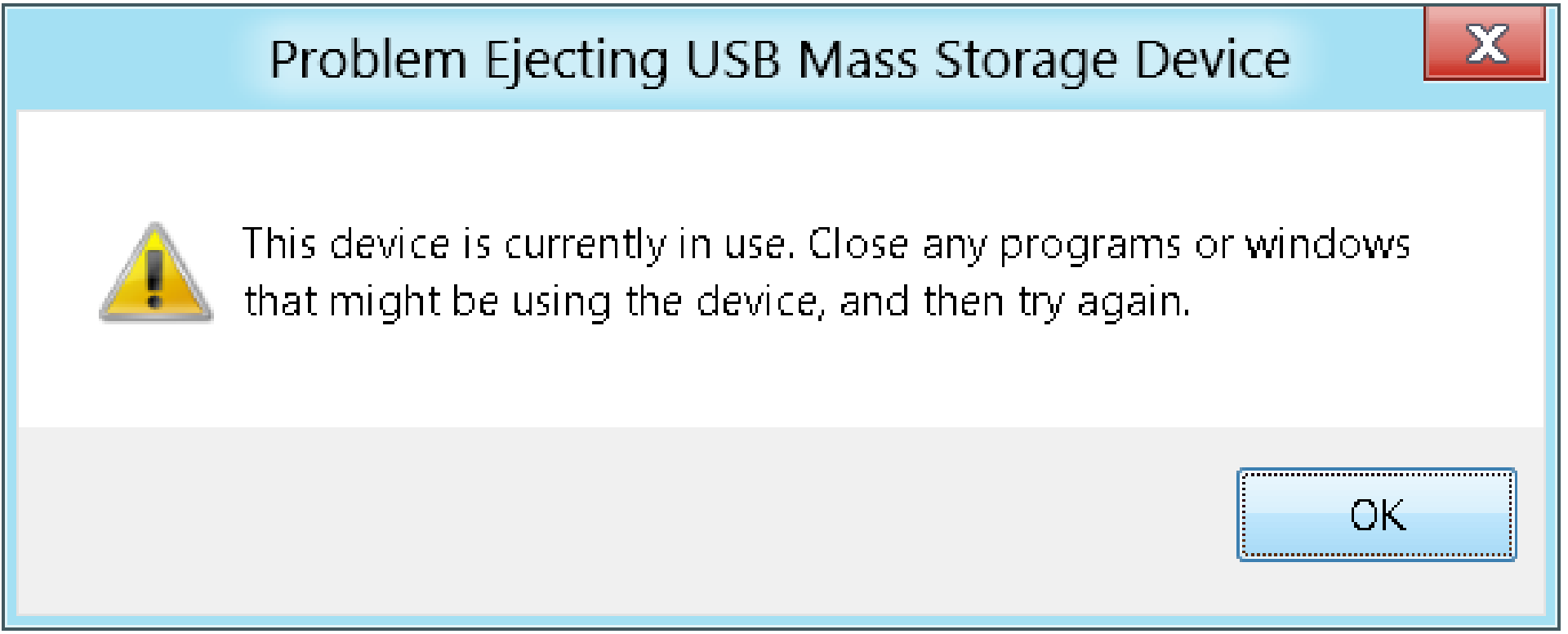
- At some point in the future, "Storage Spaces" will be able to utilize both NTFS and ReFS (Resilient File System) hard drives: At the present time, the new ReFS file system is only available on "Windows 8 Server".

"STORAGE SPACES" BASICS (continued)

- After a hard drive is placed into "Storage Pool", you cannot use the "Safely Remove Hardware and Eject Media" icon in the "Notification Area" to eject the mirrored hard drives.

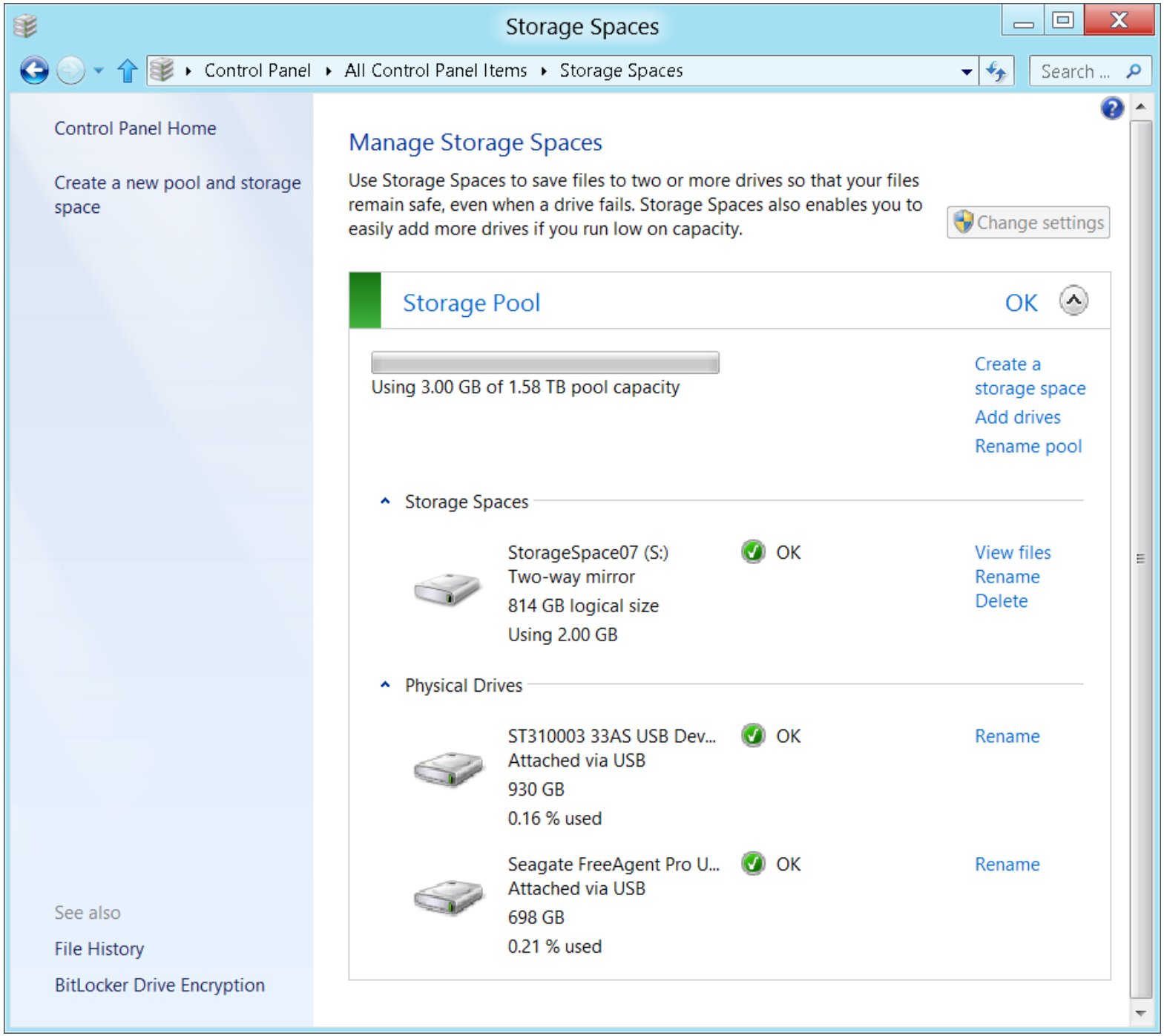

Windows 8 Enterprise Evaluation
Windows License valid for 66 days
Build 9200
11:55 AM
10/15/2012


sample.doc
Connectio...
Open Devices and Printers
Eject AS2105
Eject AS2105
Eject Relay UFD
- Removable Disk (E:)
10/15/2012


Problem Ejecting USB Mass Storage Device
This device is currently in use. Close any programs or windows that might be using the device, and then try again.
OK

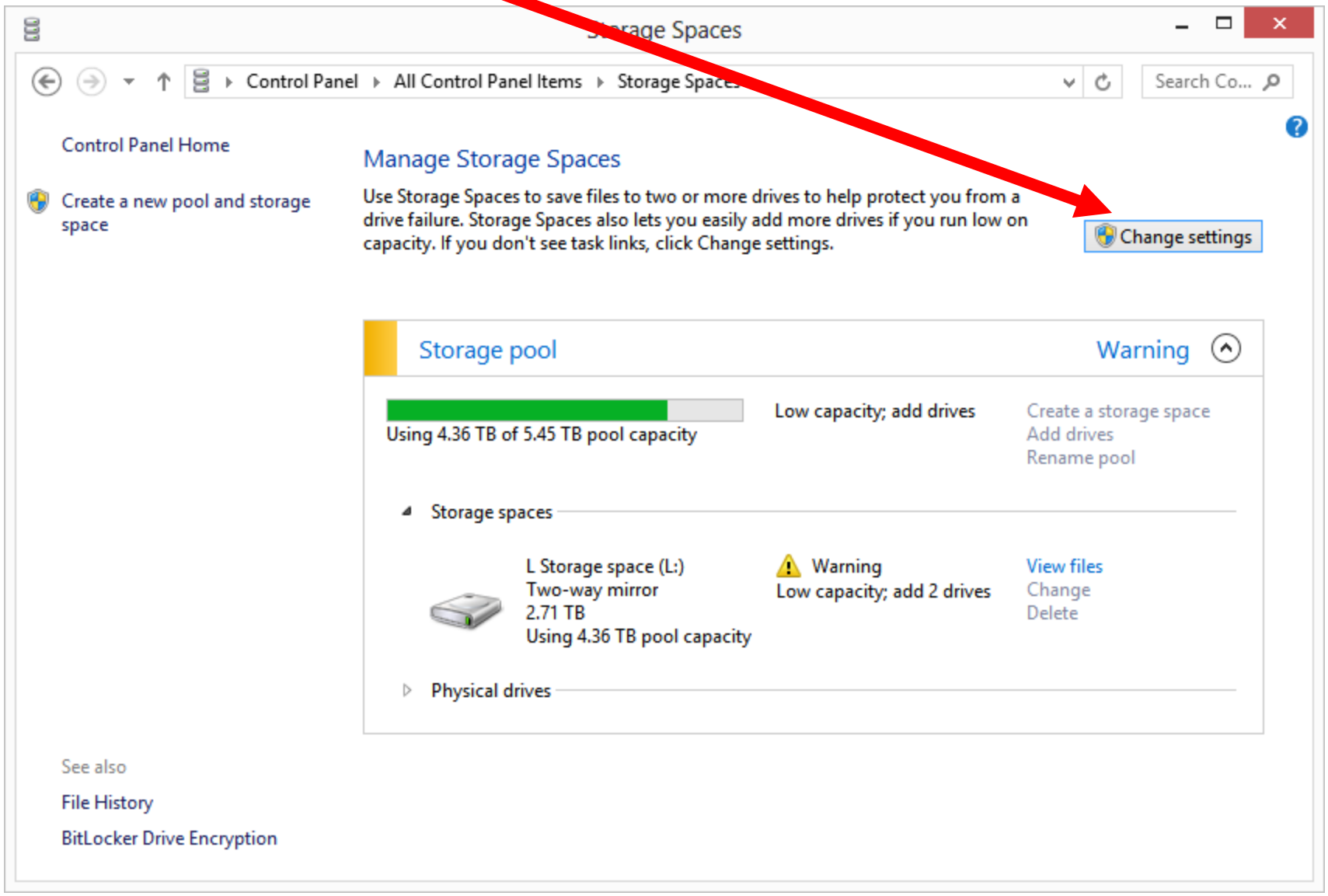
"STORAGE SPACES" BASICS (continued)

- A healthy "Storage Pool" looks like this:


Storage Spaces
Control Panel ▸ All Control Panel Items ▸ Storage Spaces
Search ...
Control Panel Home
Create a new pool and storage space
Manage Storage Spaces
Use Storage Spaces to save files to two or more drives so that your files remain safe, even when a drive fails. Storage Spaces also enables you to easily add more drives if you run low on capacity.
Change settings
Storage Pool
OK
Using 3.00 GB of 1.58 TB pool capacity
Create a storage space
Add drives
Rename pool
Storage Spaces
StorageSpace07 (S:)
Two-way mirror
814 GB logical size
Using 2.00 GB
OK
View files
Rename
Delete
Physical Drives
ST310003 33AS USB Dev...
Attached via USB
930 GB
0.16 % used
OK
Rename
Seagate FreeAgent Pro U...
Attached via USB
698 GB
0.21 % used
OK
Rename
See also
File History
BitLocker Drive Encryption

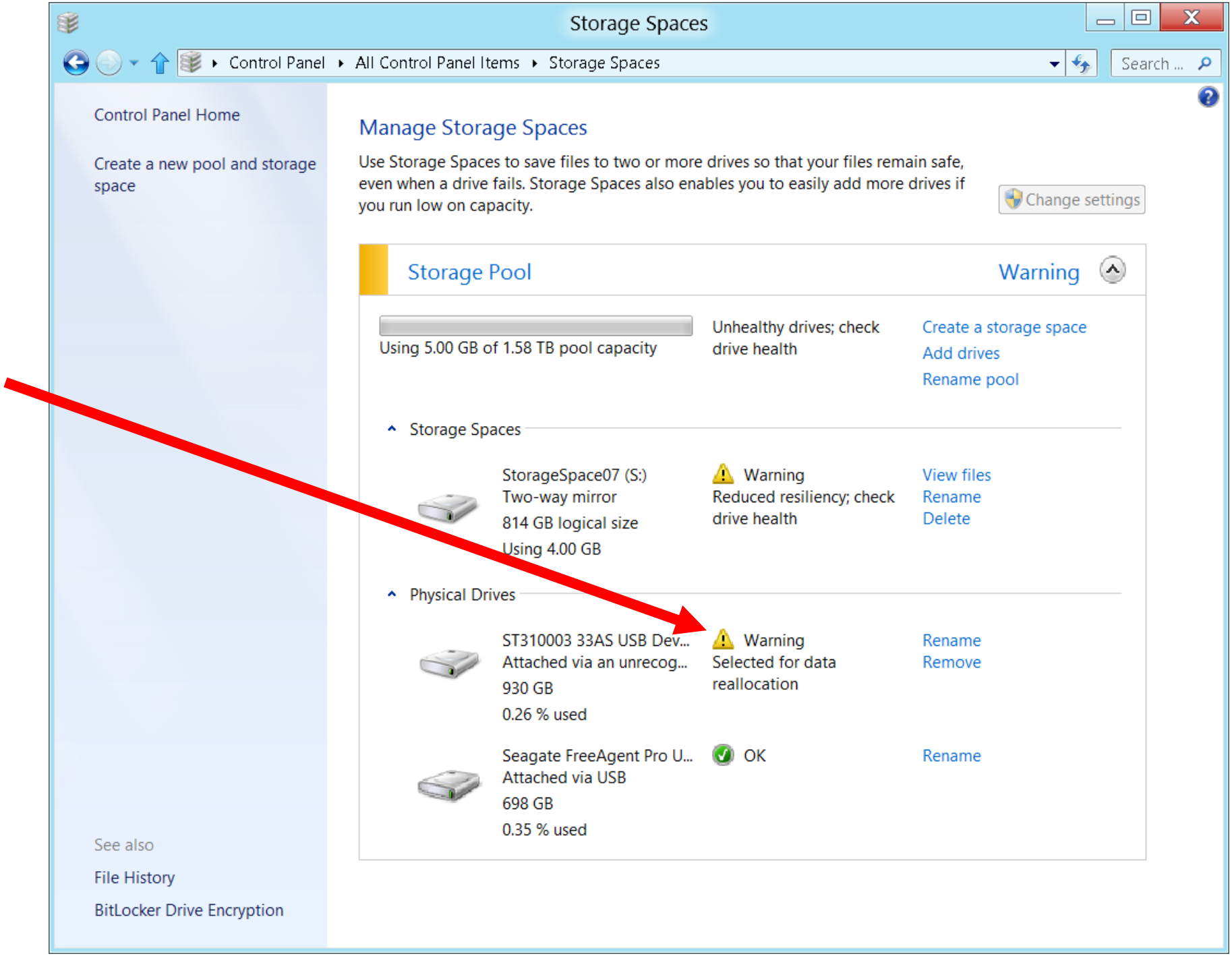
"STORAGE SPACES" BASICS (continued)

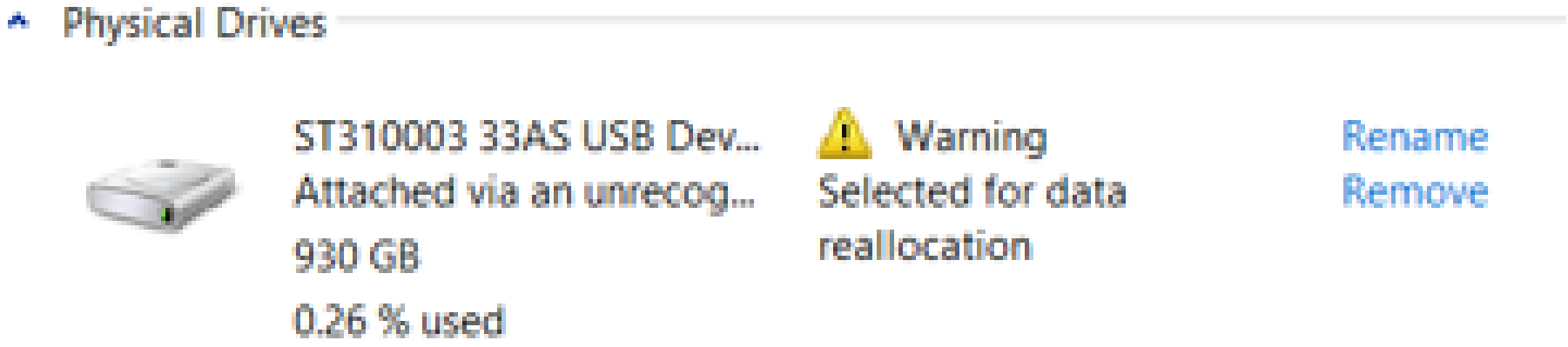
- To make a change to a "Storage Pool", you first have to click on the "Change Settings" button:


Storage Spaces
Control Panel ▸ All Control Panel Items ▸ Storage Spaces
Search Co...
Control Panel Home
Create a new pool and storage space
Manage Storage Spaces
Use Storage Spaces to save files to two or more drives to help protect you from a drive failure. Storage Spaces also lets you easily add more drives if you run low on capacity. If you don't see task links, click Change settings.
Change settings
Storage pool
Warning
Using 4.36 TB of 5.45 TB pool capacity
Low capacity; add drives
Create a storage space
Add drives
Rename pool
Storage spaces
L Storage space (L:)
Two-way mirror
2.71 TB
Using 4.36 TB pool capacity
Warning
Low capacity; add 2 drives
View files
Change
Delete
Physical drives
See also
File History
BitLocker Drive Encryption

"STORAGE SPACES" BASICS (continued)

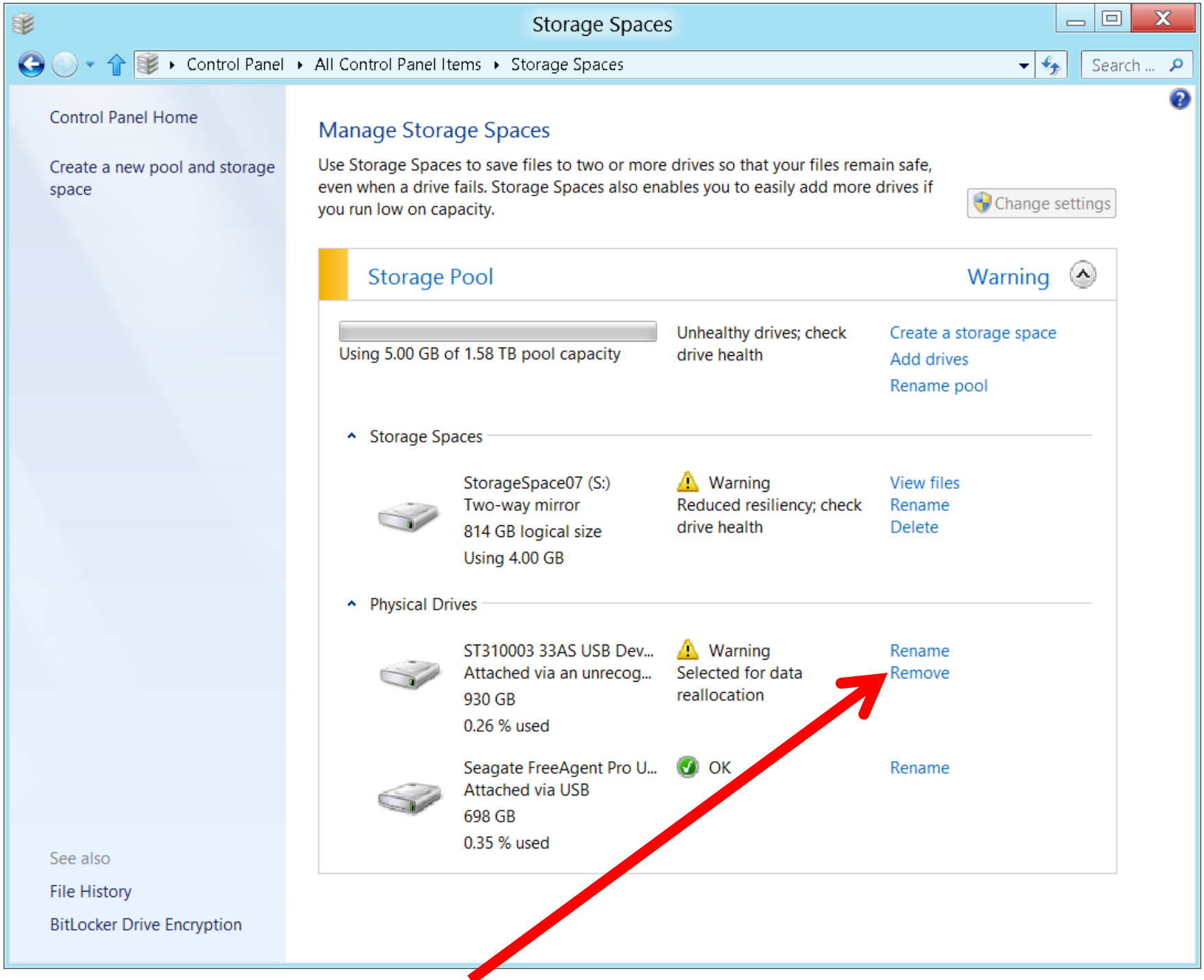
- When a physical hard drive in a "Storage Pool" fails or when you physically disconnect the physical hard drive:

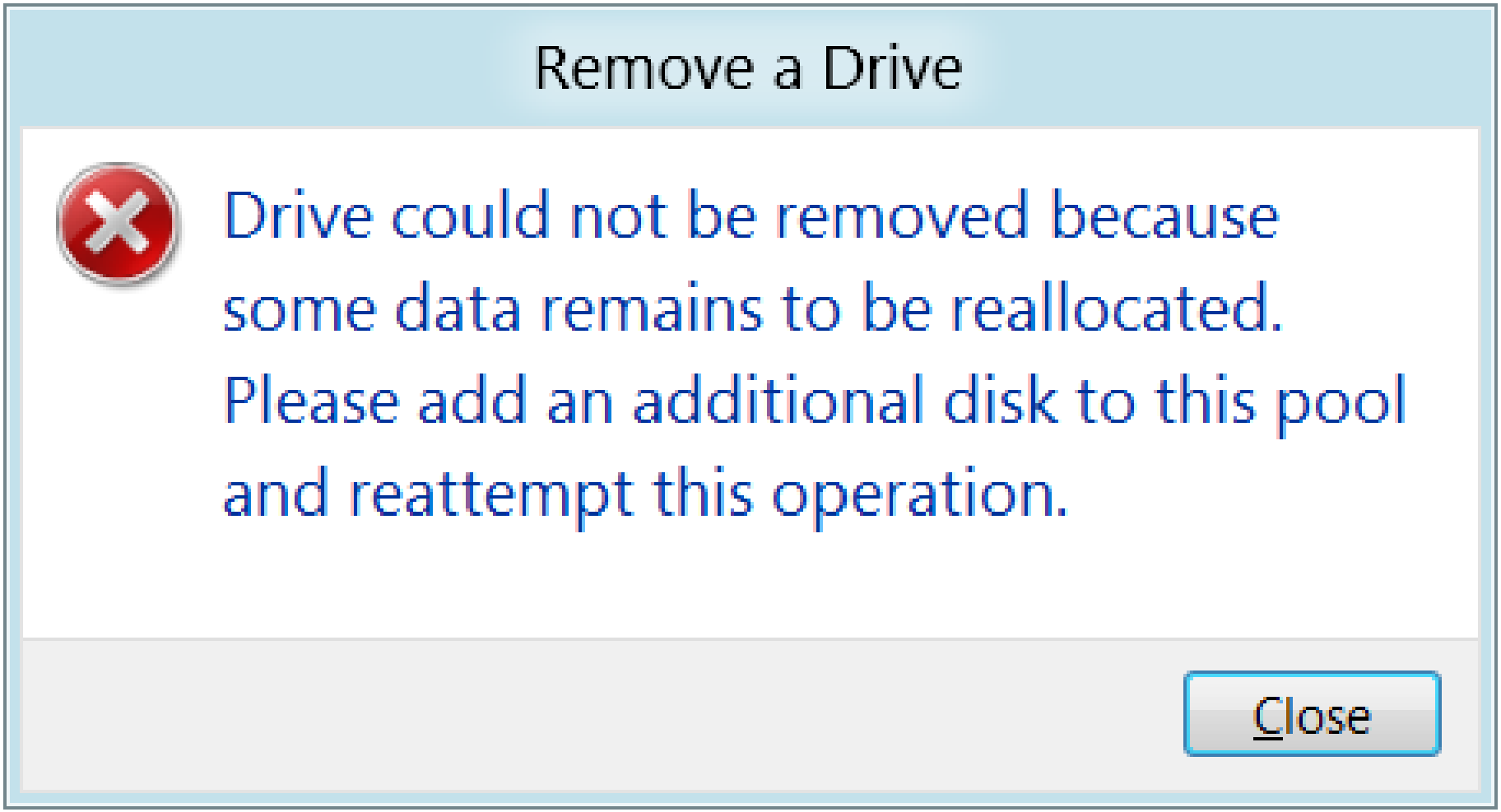

Storage Spaces
Control Panel ▸ All Control Panel Items ▸ Storage Spaces
Search ...
Control Panel Home
Create a new pool and storage space
Manage Storage Spaces
Use Storage Spaces to save files to two or more drives so that your files remain safe, even when a drive fails. Storage Spaces also enables you to easily add more drives if you run low on capacity.
Change settings
Storage Pool
Warning
Using 5.00 GB of 1.58 TB pool capacity
Unhealthy drives; check drive health
Create a storage space
Add drives
Rename pool
Storage Spaces
StorageSpace07 (S:)
Two-way mirror
814 GB logical size
Using 4.00 GB
Warning
Reduced resiliency; check drive health
View files
Rename
Delete
Physical Drives
ST310003 33AS USB Dev...
Attached via an unrecog...
930 GB
0.26 % used
Warning
Selected for data reallocation
Rename
Remove
Seagate FreeAgent Pro U...
Attached via USB
698 GB
0.35 % used
OK
Rename
See also
File History
BitLocker Drive Encryption


Physical Drives
ST310003 33AS USB Dev...
Attached via an unrecog...
930 GB
0.26 % used
Warning
Selected for data reallocation
Rename
Remove

"STORAGE SPACES" BASICS (continued)

- If a hard drive belongs to a "Storage Space", and you physically remove the hard drive from your computer, you cannot logically remove the hard drive from the "Storage Pool" unless you first add in another hard drive to the "Storage Pool":


Storage Spaces
Control Panel ▸ All Control Panel Items ▸ Storage Spaces
Search ...
Control Panel Home
Create a new pool and storage space
Manage Storage Spaces
Use Storage Spaces to save files to two or more drives so that your files remain safe, even when a drive fails. Storage Spaces also enables you to easily add more drives if you run low on capacity.
Change settings
Storage Pool
Warning
Using 5.00 GB of 1.58 TB pool capacity
Unhealthy drives; check drive health
Create a storage space
Add drives
Rename pool
Storage Spaces
StorageSpace07 (S:)
Two-way mirror
814 GB logical size
Using 4.00 GB
Warning
Reduced resiliency; check drive health
View files
Rename
Delete
Physical Drives
ST310003 33AS USB Dev...
Attached via an unrecog...
930 GB
0.26 % used
Warning
Selected for data reallocation
Rename
Remove
Seagate FreeAgent Pro U...
Attached via USB
698 GB
0.35 % used
OK
Rename
See also
File History
BitLocker Drive Encryption


Remove a Drive
Drive could not be removed because some data remains to be reallocated. Please add an additional disk to this pool and reattempt this operation.
Close

"STORAGE SPACES" BASICS (continued)

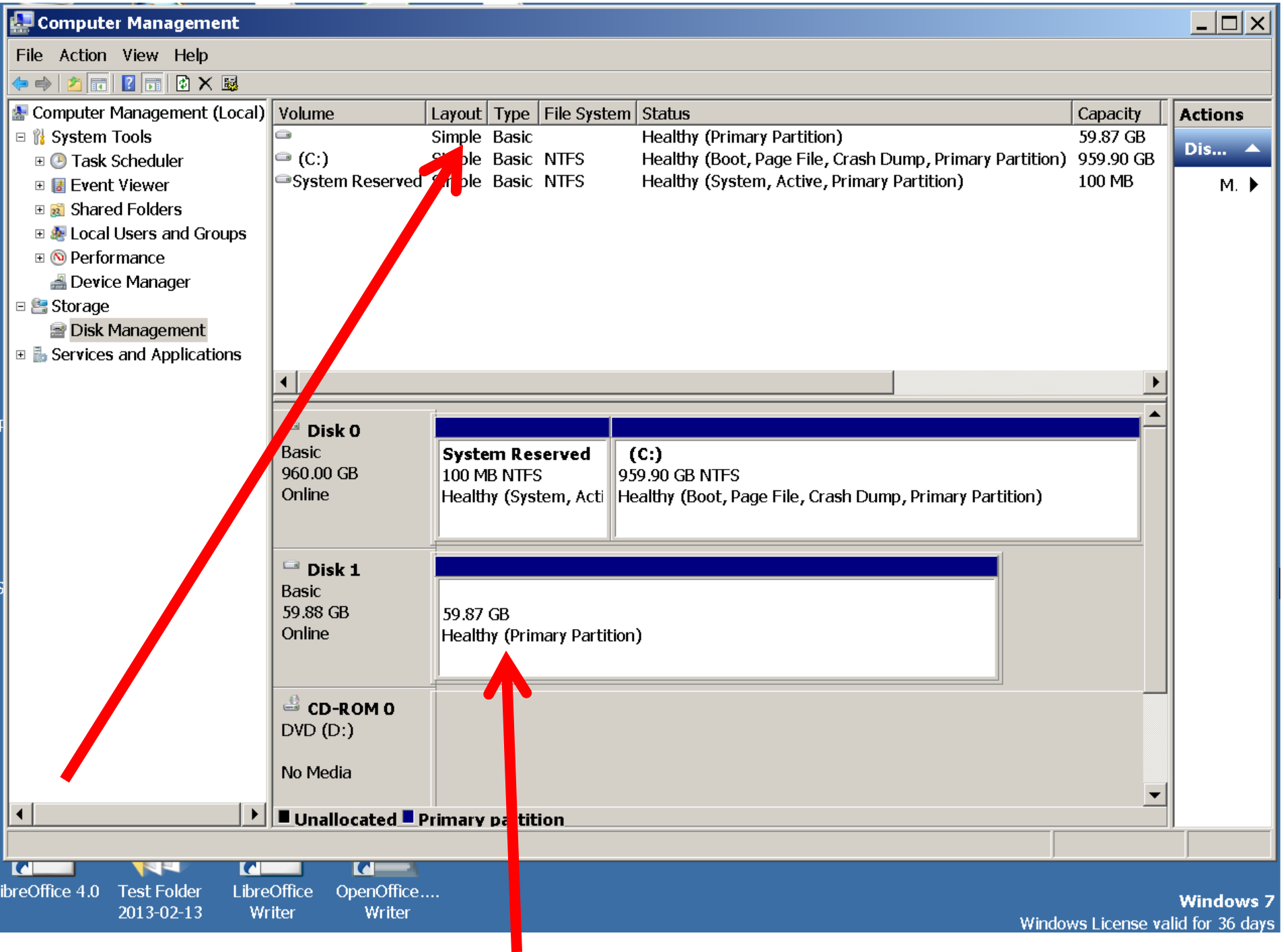
- Once a "Storage Space" is created, you cannot change its "synchronization" option. Instead, you have to delete the "Storage Space" and use the freed up hard drives to make a new "Storage Space".

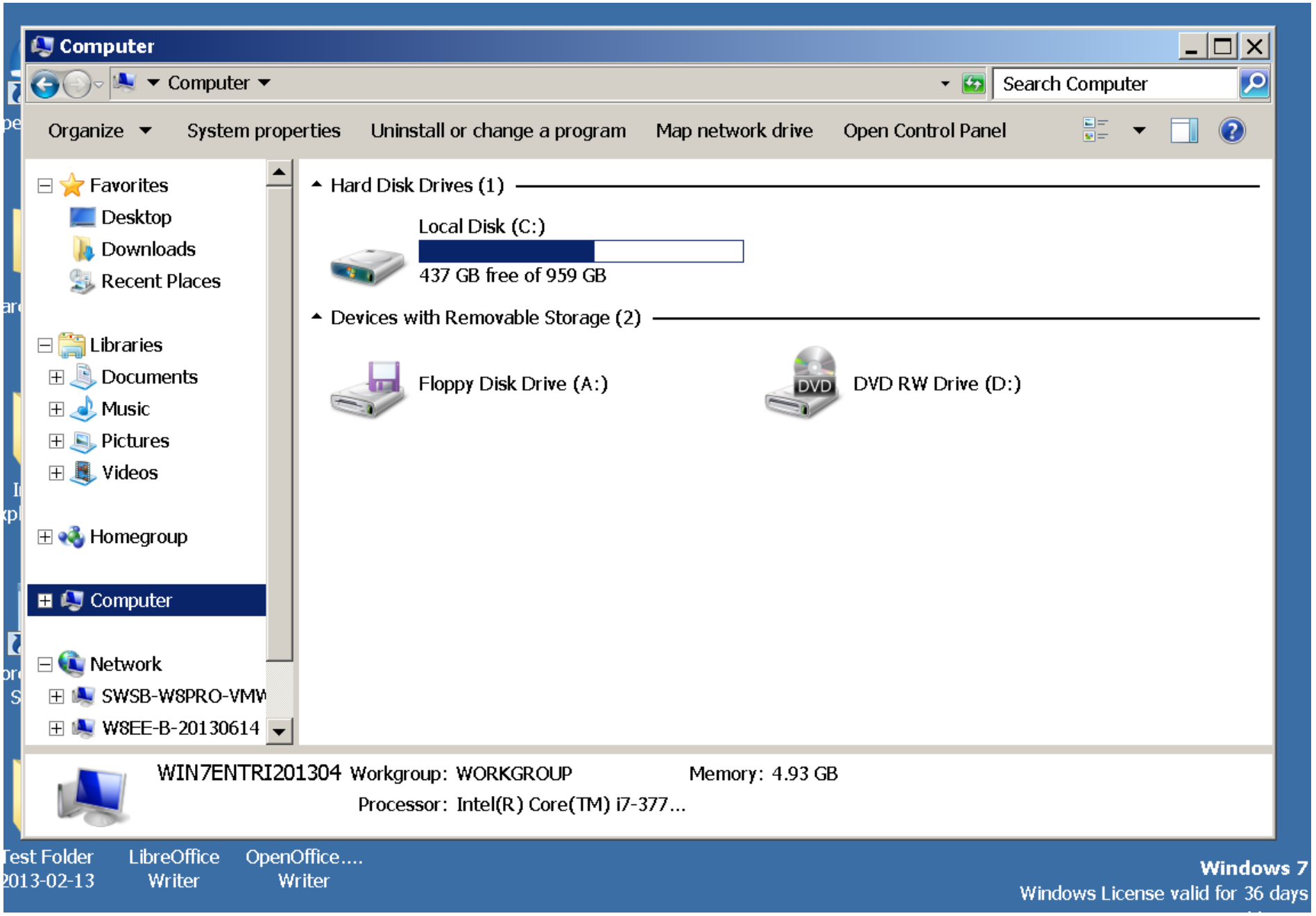
"STORAGE SPACES" BASICS (continued)

- The physical hard drives that are part of a "Storage Pool" are formatted in a proprietary format that only "Windows 8.." computers can access:

"STORAGE SPACES" BASICS (continued)

- If you attach a "Storage Spaces" hard drive to a "Windows XP", "Windows Vista", or "Windows 7" computer, it will show up in "Disk Management" but you will be unable to access the hard drive with "Windows Explorer":


Computer Management
File Action View Help
Computer Management (Local)
System Tools
Task Scheduler
Event Viewer
Shared Folders
Local Users and Groups
Performance
Device Manager
Storage
Disk Management
Services and Applications
Volume Layout Type File System Status Capacity
Simple Basic Healthy (Primary Partition) 59.87 GB
(C:) Simple Basic NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition) 959.90 GB
System Reserved Simple Basic NTFS Healthy (System, Active, Primary Partition) 100 MB
Actions
Dis...
M.
Disk 0
Basic
960.00 GB
Online
System Reserved
100 MB NTFS
Healthy (System, Acti
(C:)
959.90 GB NTFS
Healthy (Boot, Page File, Crash Dump, Primary Partition)
Disk 1
Basic
59.88 GB
Online
59.87 GB
Healthy (Primary Partition)
CD-ROM 0
DVD (D:)
No Media
Unallocated Primary partition
ibreOffice 4.0
Test Folder
2013-02-13
LibreOffice
Writer
OpenOffice....
Writer
Windows 7
Windows License valid for 36 days


Computer
Computer
Search Computer
Organize
System properties
Uninstall or change a program
Map network drive
Open Control Panel
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
Network
SWSB-W8PRO-VMW
W8EE-B-20130614
Hard Disk Drives (1)
Local Disk (C:)
437 GB free of 959 GB
Devices with Removable Storage (2)
Floppy Disk Drive (A:)
DVD
DVD RW Drive (D:)
WIN7ENTRI201304 Workgroup: WORKGROUP
Memory: 4.93 GB
Processor: Intel(R) Core(TM) i7-377...
Test Folder
2013-02-13
LibreOffice
Writer
OpenOffice....
Writer
Windows 7
Windows License valid for 36 days

"STORAGE SPACES" BASICS (continued)

- If any single drive fails in a "Storage Pool" that has "redundancy", the "Storage Pool" logical drive will not disappear from "File Explorer".
- If all drives fail, the "Storage Pool" logical drive will disappear from "File Explorer".

"STORAGE SPACES" BASICS (continued)

- If all drives fail, the "Storage Pool" logical drive will disappear from "File Explorer". If any single drive is restored, then the "Storage Pool" drive will be restored to "File Explorer".

"STORAGE SPACES" BASICS (continued)

- You cannot add a hard drive that already contains data files to a new or existing "Storage Space". If you do so, all data files on the hard drive will be deleted.

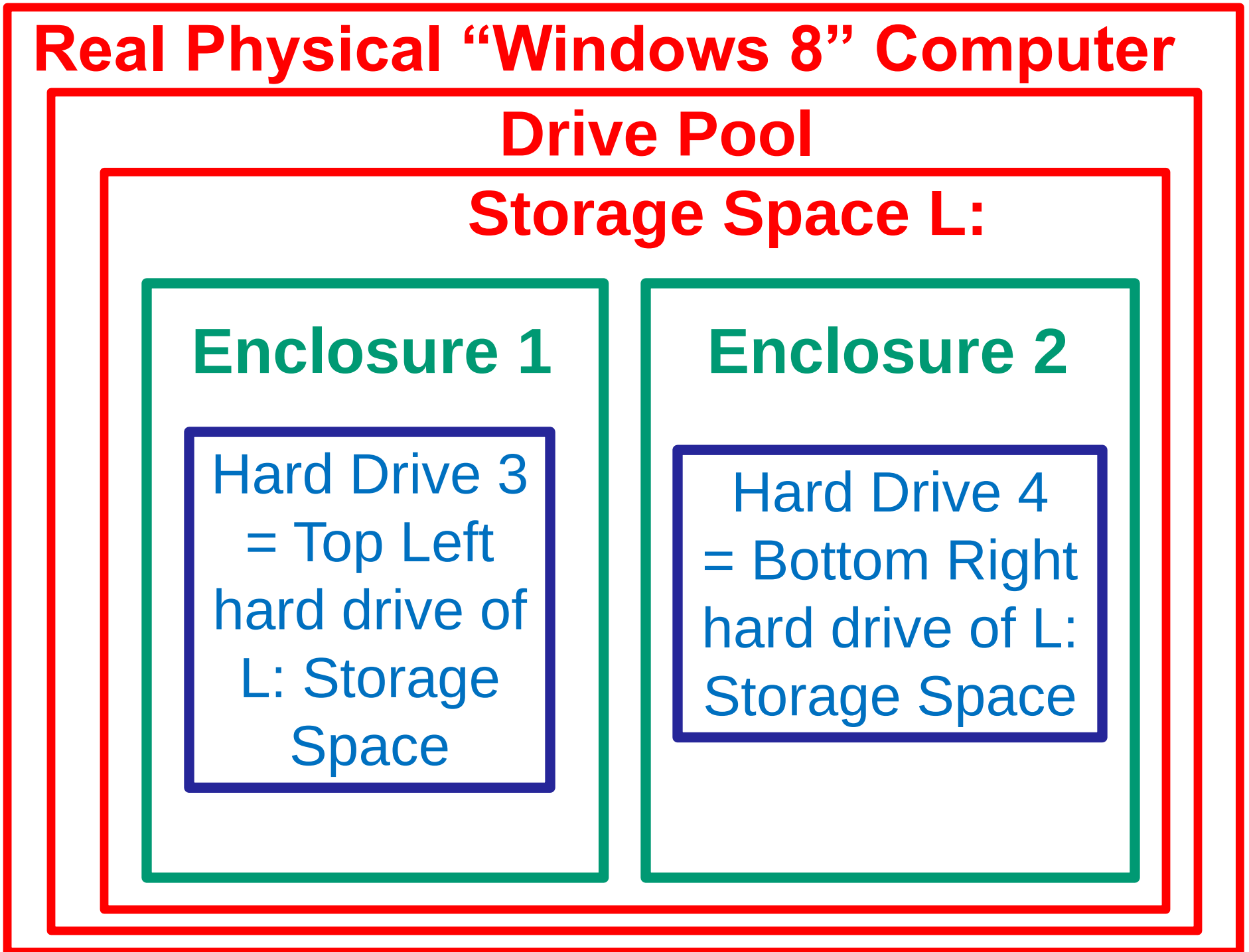
SPECIAL REQUIREMENTS ("GOTCHAS") WHEN USING INTERNAL HARD DRIVES IN EXTERNAL HARD DRIVE ENCLOSURES IN TWO-WAY-MIRRORED "STORAGE SPACES

Special Requirements..When Using External Hard Drive Enclosures (continued)

- When using an internal hard drive inside an external enclosure, if the hard drive fails and the external enclosure is still operational, you can replace the the internal hard drive and perform the procedure for "Replacing A Physical Hard Drive In A Two-Way-Mirrored "Storage Space".

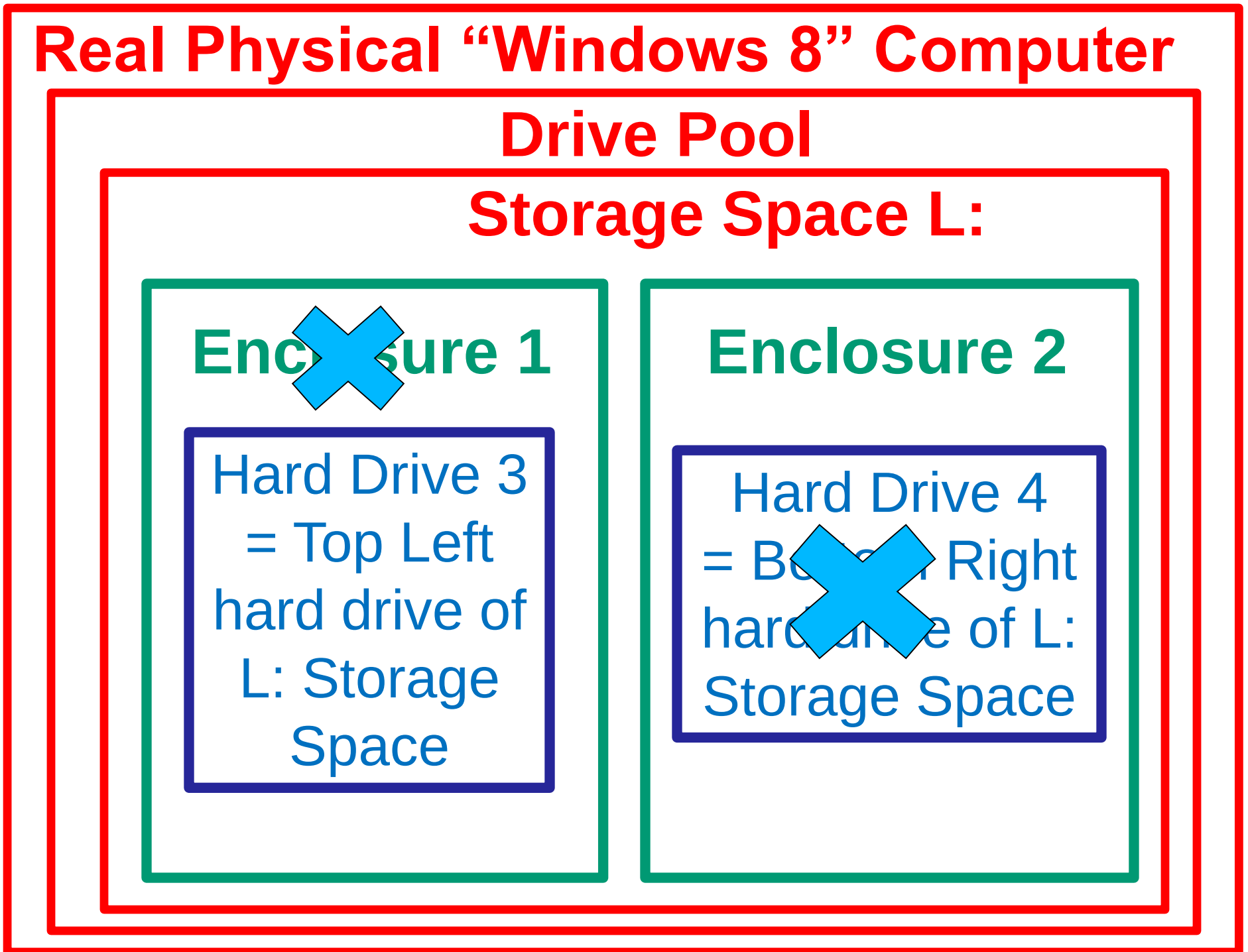
Special Requirements..When Using External Hard Drive Enclosures (continued)

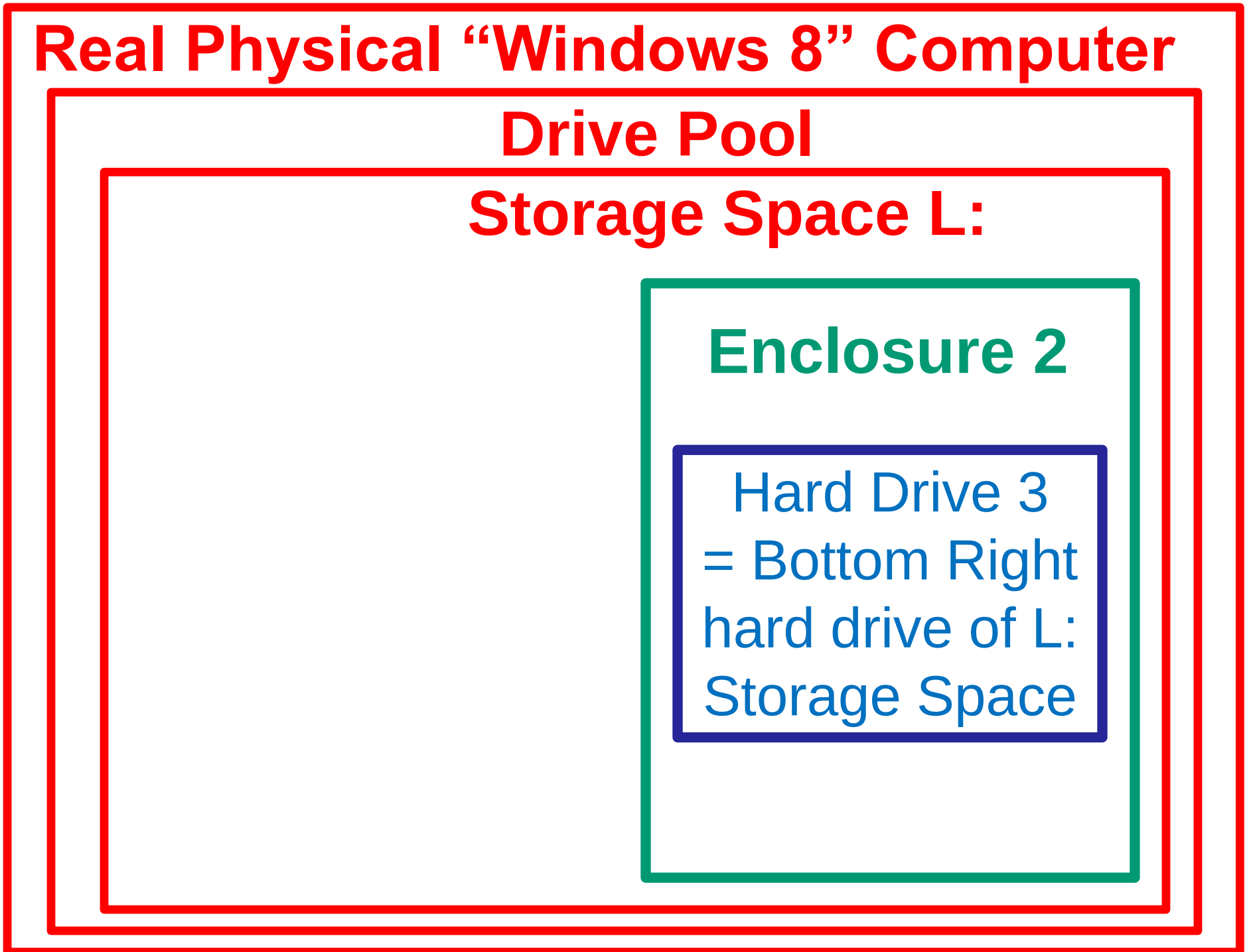
- If the external enclosure fails and the internal hard drive is still operational, you can provide the internal hard drive with a replacement external enclosure. However, the "Storage Space" will fail to recognize the data files and folders on the internal hard drive and you will have to perform the procedure for "Replacing A Physical Hard Drive In A Two-Way-Mirrored "Storage Space".


Real Physical “Windows 8” Computer
Drive Pool
Storage Space L:
Enclosure 1
Hard Drive 3 = Top Left hard drive of L: Storage Space
Enclosure 2
Hard Drive 4 = Bottom Right hard drive of L: Storage Space

Special Requirements..When Using External Hard Drive Enclosures (continued)

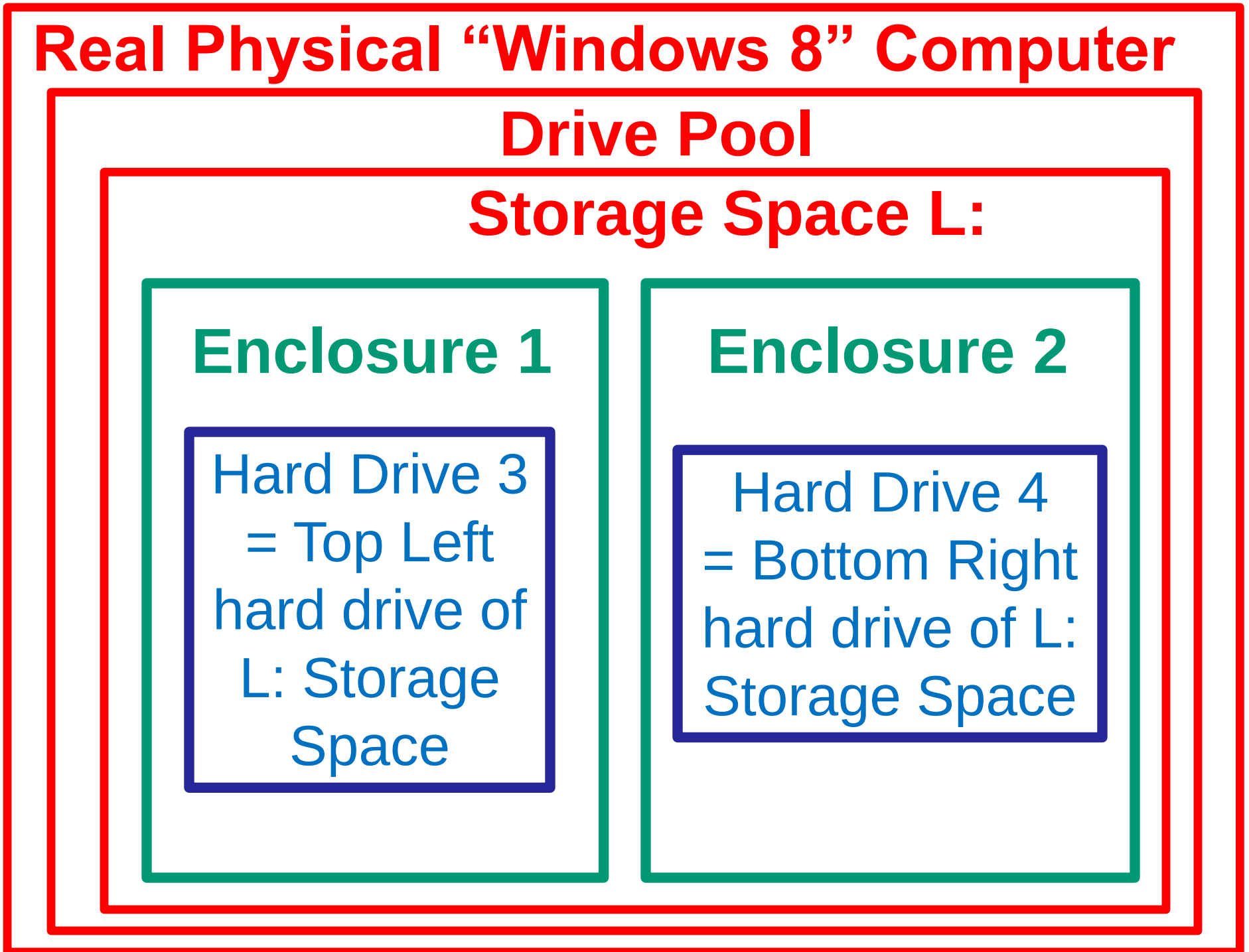
- If "Enclosure 1" fails and the "Hard Drive 4" fails at the same time, you can move "Hard Drive 3" to "Enclosure 2" and access all of your data files and folder.
- (Then you can perform the procedure for "Replacing A Physical Hard Drive In A Two-Way-Mirrored "Storage Space".)


Real Physical “Windows 8” Computer
Drive Pool
Storage Space L:
Enclosure 1
Hard Drive 3
= Top Left
hard drive of
L: Storage
Space
Enclosure 2
Hard Drive 4
= Bottom Right
hard drive of L:
Storage Space


Real Physical “Windows 8” Computer
Drive Pool
Storage Space L:
Enclosure 2
Hard Drive 3
= Bottom Right
hard drive of L:
Storage Space

Special Requirements..When Using External Hard Drive Enclosures (continued)

- However, you cannot put "Hard Drive 3" into a new enclosure that was not part of the original two-way-mirrored "Storage Space".


Real Physical “Windows 8” Computer
Drive Pool
Storage Space L:
Enclosure 1
Hard Drive 3 = Top Left hard drive of L: Storage Space
Enclosure 2
Hard Drive 4 = Bottom Right hard drive of L: Storage Space

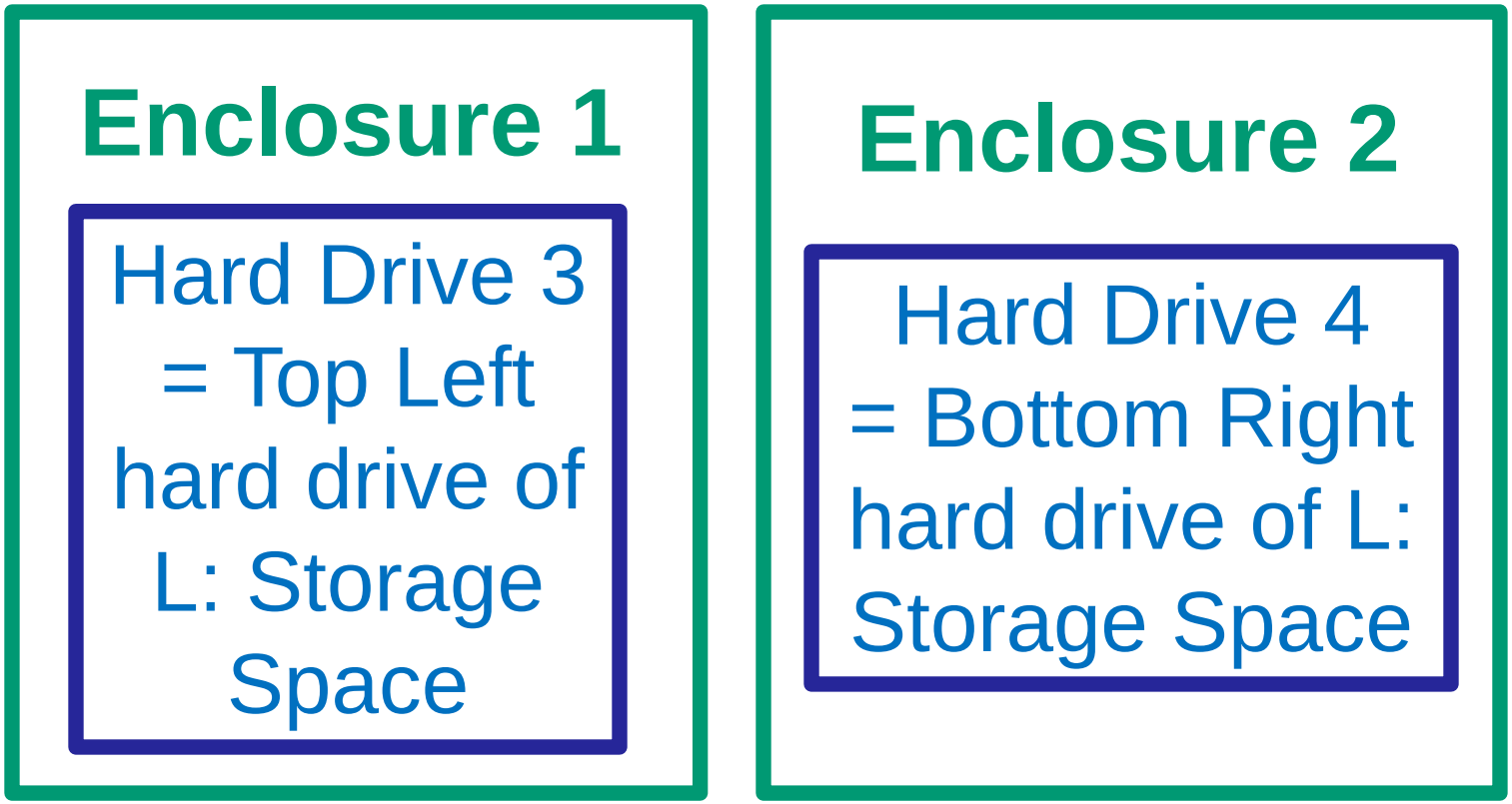
Special Requirements..When Using External Hard Drive Enclosures (continued)

- When you move one or both internal hard drives to another "Windows 8" computer, they have to reside inside one of the two hard drive enclosures that were part of the original two-way-mirrored "Storage Space".

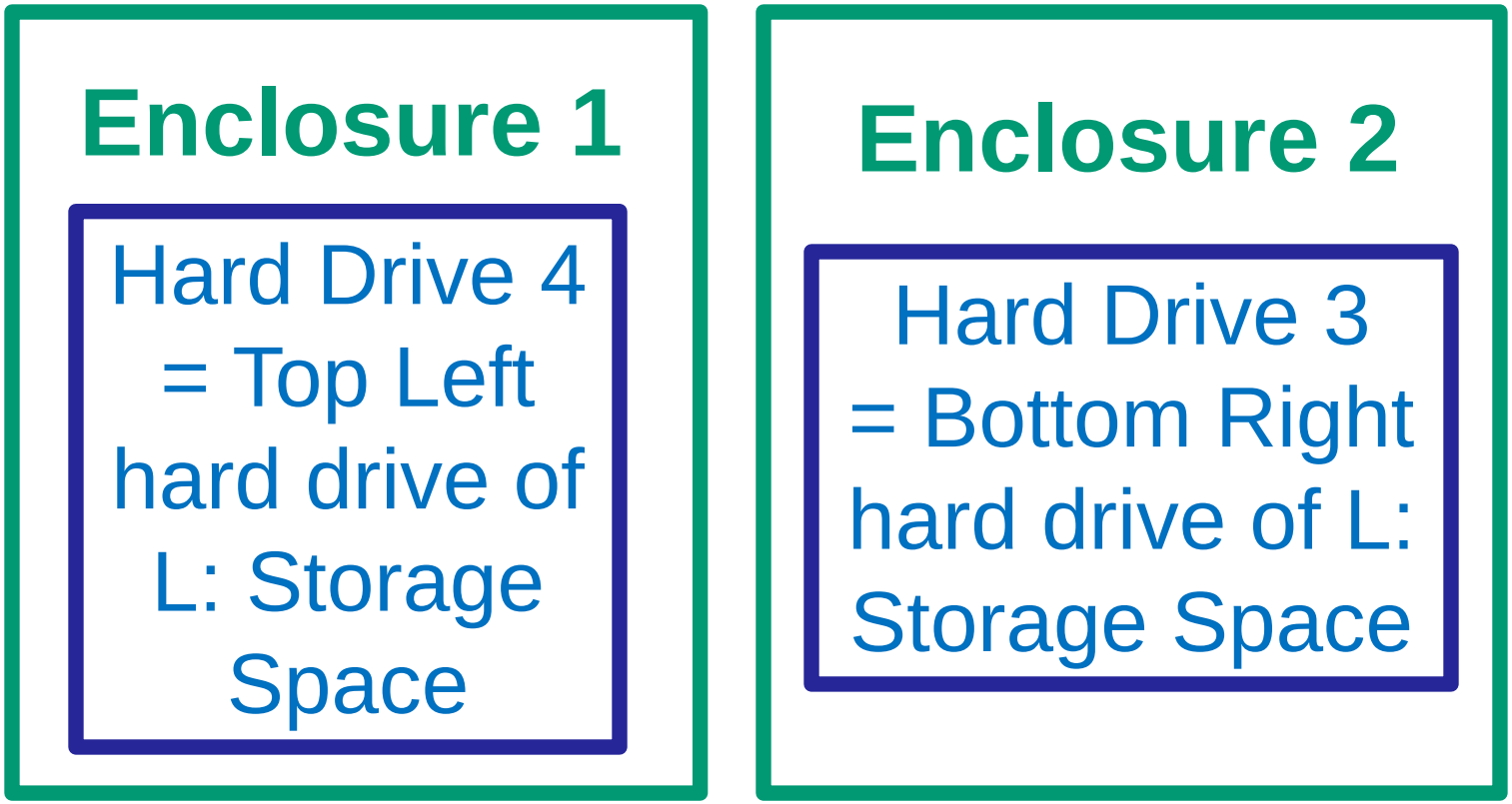
Special Requirements..When Using External Hard Drive Enclosures (continued)

- In our example, you can either leave "Hard Disk 3" inside "Enclosure 1" or put it inside "Enclosure 2" and any "Windows 8" will allow you to access your data files and folders on "Hard Disk 3".
- Ditto for "Hard Disk 4".

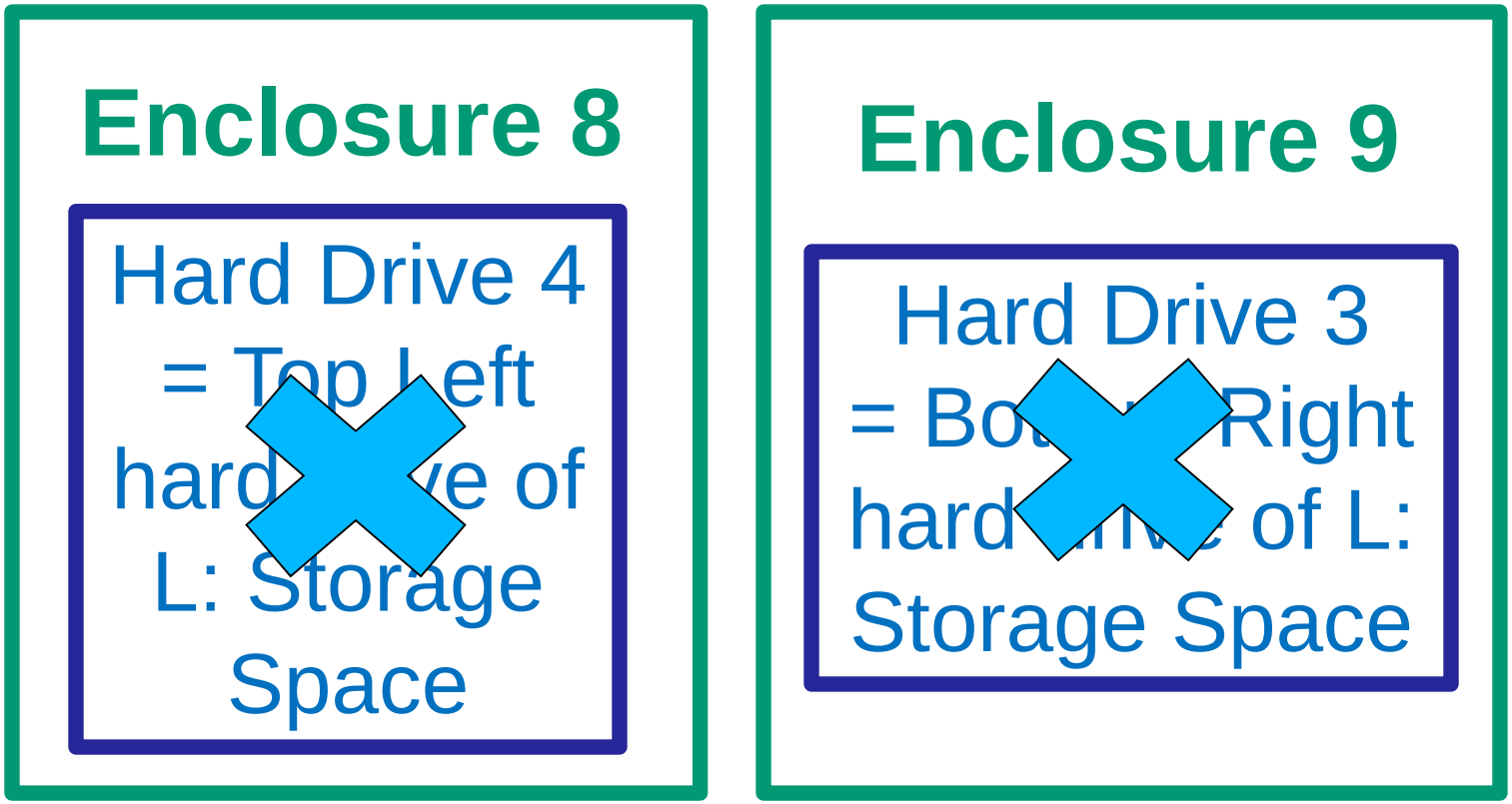
If you leave the internal hard drives in their original enclosures, another "Windows 8" computer can "read" one or both them as a "Storage Space":



If you swap the internal hard drives to the other original enclosures, another "Windows 8" computer can still "read" one or both them as a "Storage Space":



If you more the internal hard drives to the enclosures that were not part of the original "Storage Space", then no "Windows 8" computer can "read" any of them as a "Storage Space":



Special Requirements..When Using External Hard Drive Enclosures (continued)

- If you install an internal hard disk drive into an external hard drive enclosure that was not part of the original working two-way-mirrored "Storage Space", then no "Windows 8" computer will be able to access the data files and folders on the internal hard disk drive.

Special Requirements..When Using External Hard Drive Enclosures (continued)

- Conclusion:

When you create a two-way-mirrored "Storage Space" and one drive enclosure fails or one hard drive fails, still-functional hard drive(s) will only work (as part of a degraded "Storage Space", if you use the original hard drive enclosures were part of the original "Storage Space".

REFERENCES

- http://social.technet.microsoft.com/wiki/contents/articles/11382.storage-spaces-frequently-asked-questions-faq.aspx
- http://social.technet.microsoft.com/Forums/windowsserver/en-US/6c4a5f08-55a3-43e8-a555-ffdee8dad698/can-you-move-storage-spaces-pools-between-computers

REFERENCES (continued)

- http://www.pcpro.co.uk/features/379408/windows-8-storage-spaces-a-how-to-guide/4