## Creating a mirrored operating system volume for UEFI-based systems

Prerequisites: You should have a system with at least two disks. The second disk need not be identical to the primary disk—it can even be a different size or on a different bus. Disks with a native sector size of 512 bytes are recommended (in favor of those with an emulated sector size). However, USB disks, whether internal or external, cannot be used. You should be familiar with Diskpart and Bcdedit. You should already be familiar with concepts like partitions and disks. For background information on these topics, see [http://go.microsoft.com/fwlink/?LinkId=184841.](http://go.microsoft.com/fwlink/?LinkId=184841)

Creating the software disk mirror (RAID1) involves several phases:

1. Set up Windows Recovery Environment (Windows RE) on its own partition, if it is not already configured that way.

2. Clone the system partition from the primary disk to the secondary disk. Computer firmware requires that each boot disk have a system partition. It is preferable that the first partition on each disk is the system partition.

3. Mirror the operating system volume from the primary disk to the secondary disk. This is the key portion of the procedure, which may take the longest to complete.

4. Clone the recovery partition from the primary disk to the secondary disk.

5. Update the BCD store for the primary disk.

6. Update the BCD store for the secondary disk: The secondary BCD store should be updated so that the system can boot from the secondary disk automatically.

7. Update secondary plex entries on the secondary disk.

The following procedures involve creating and using several partitions with unique drive letters. These procedures are based on a simple retail installation—your installation may have different drive letters or disk numbers. You can use any drive letters corresponding to the roles in the table that are appropriate for your system but be careful to alter any commands that refer to the drive letters or disk numbers accordingly and consistently throughout all of the procedures.

For your reference, the following table clarifies the various volumes and the corresponding letters as used in the procedures. In the course of the procedures, you will create all of the partitions in this table except the system partition (S:) on the primary disk and the primary plex of the operating system volume (C:) on the primary disk.

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| Primary disk (disk 0) | Secondary disk (disk 1) |
| System partition (primary copy) | S: | System partition (secondary copy) | T: |
| Operating system volume (the primary plex of the mirror) | C: | Operating system volume (the secondary plex of the mirror) | C: |
| Recovery partition (primary copy) | Q: | Recovery partition (secondary copy) | R: |

Similarly, in the following procedures, disk 0 refers to the primary disk and disk 1 refers to the secondary disk. If the primary and secondary disks are numbered differently on our system, alter any commands accordingly.

To move Windows Recovery Environment to its own partition

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| 1. Note If Windows Recovery Environment is already on a separate partition, perhaps as a result of configuring a mirror previously, you should skip this procedure and move on to “clone the system partition.”First, start Diskpart by typing Diskpart.exe at an elevated command prompt. Then shrink the Windows Server 2008 R2 partition using the following commands at the Diskpart prompt in order: Select volume=c Shrink desired=3002. Create the primary recovery partition using the following commands at the Diskpart prompt: Create partition primary size=300 Format fs=ntfs quick label=Recovery Assign letter=q3. Move Windows RE to the primary recovery partition you just created with the following commands at an elevated command prompt: Reagentc.exe /disable Rd C:\Recovery Robocopy.exe C:\Windows\System32\Recovery\ Q:\Recovery\WindowsRE\ Winre.wim /copyall /dcopy:t /move reagentc.exe /setreimage /path Q:\Recovery\WindowsRE Reagentc.exe /enable |

To clone the system partition

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| 1. First, start Diskpart by typing Diskpart.exe at an elevated command prompt. Then create the secondary system partition and prepare to copy the contents of the partition using the following commands at the Diskpart prompt in order: Select disk 1 Convert gpt Select partition 1 Delete partition override Create partition efi size=100 Format fs=fat32 quick assign letter=t select disk 0 select partition 1 assign letter=s2. Copy the contents of the primary system partition to the secondary system partition using this command at an ordinary elevated command prompt (that is, not at a Diskpart prompt): robocopy.exe s:\ t:\ \* /e /copyall /dcopy:t /xf BCD.\* /xd "System Volume Information"3. At the Diskpart prompt, run the following commands to finish the operation and create a reserved partition on the secondary disk: Select volume=s remove select disk 1 create partition msr size=128 |

To mirror the operating system volume

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| 1. First, start Diskpart by typing Diskpart.exe at an elevated command prompt. If the primary and secondary disks are not already dynamic disks, convert them to dynamic using the following commands at the Diskpart prompt in order: Select disk 1 Convert dynamic Select disk 0 Convert dynamicNow that the primary and secondary disks are dynamic disks, mirror the boot volume using the following commands in order: Select volume=q retain select volume=c add disk=1 waitNote This last command commences the mirroring operation immediately. Depending on the size of the operating system volume, this operation may proceed quickly or it may take a considerable time—it is best to avoid restarting the computer until the operation completes.  |

Note

This procedure assumes that the secondary disk contains no data or a partition table. If you have any important data on the secondary disk, back it up before starting this procedure.

To clone the recovery partition

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| 1. First, start Diskpart by typing Diskpart.exe at an elevated command prompt. Then create the secondary recovery partition using the following commands at the Diskpart prompt in order: create volume simple disk=1 size=300 retain format fs=ntfs quick label=Recovery assign letter=r2. Copy the contents of the primary recovery partition to the secondary recovery partition using this command at an ordinary elevated command prompt (that is, not at a Diskpart prompt): Robocopy.exe q:\ r:\ \* /e /copyall /dcopy:t /xd "System Volume Information"3. At the Diskpart prompt, run the following commands: Select volume=q remove |

To update the BCD store on the primary disk

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| 1. At an elevated command prompt, run bcdedit/exe /enum all and note the identifier for the Windows Boot Manager entry which has the description Windows Boot Manager or Windows Boot Manager – Primary Disk.2. If the description for this entry is already Windows Boot Manager – Primary Disk, proceed to the next step. Otherwise, run bcdedit.exe / set {identifier} description “Windows Boot Manager – Primary Disk”, where {identifier} is the identifier from Step 1.Note Be sure to include the curly brackets whenever you enter an {identifier}.3. Run bcdedit.exe /copy {identifier} /d “Windows Boot Manager – Secondary Disk”, where {identifier} is the identifier from Step 1. Note the identifier for the entry Windows Boot Manager – Secondary Disk.4. Run bcdedit.exe /set {identifier} device partition=t:, where {identifier} is the identifier you noted for Windows Boot Manager – Secondary Disk in the previous step.5. Run Bcdedit.exe /enum all.6. Note the identifier for each of the following entries:

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| Entry | Description |
| Resume from Hibernate | Windows Resume Application – secondary plex |
| Windows Boot Loader | Windows Server 2008 R2 – secondary plex |

7. Run Bcdedit.exe /export t:\EFI\Microsoft\boot\BCD8. Run Bcdedit.exe /delete{identifier}, where {identifier} is the identifier for Resume from Hibernate.9. Run Bcdedit.exe /delete{identifier}, where {identifier} is the identifier for Windows Boot Loader. |

To update the BCD store on the secondary disk

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| 1. At an elevated command prompt, run Bcdedit.exe /enum all2. Note the identifier for each of the following entries. You will use these identifiers in several steps that follow.Caution The same entry name may appear more than once with different descriptions. Each entry/description pair will have its own unique {identifier}, so take care to check that you are using the correct one for each command.

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| Entry | Description |
| Device Options | Ramdisk Options |
| Windows Boot Loader | Windows Recovery Environment |
| Resume from Hibernate | Windows Resume Application |
| Windows Boot Loader | Windows Server 2008 R2 |
| Windows Boot Manager | Windows Boot Manager – Primary Disk |
| Resume from Hibernate | Windows Resume Application – secondary plex |
| Windows Boot Loader | Windows 2008 R2 – secondary plex |
| Windows Boot Manager | Windows Boot Manager – secondary disk |

3. First, convert the primary plex entries to secondary plex entries in the secondary BCD store using the following commands at an ordinary elevated command prompt: Bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier} ramdisksdidevice partition=r:, where {identifier} is the identifier for the Device Options entry. Bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {memdiag} device partition=t: bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier1} device ramdisk=[r:]\Recovery\WindowsRE\Winre.wim,{identifier2}, where {identifier1} is the identifier for the Windows Boot Loader entry with the description Windows Recovery Environment and {identifier2} is the identifier for the Device Options entry. bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier1} osdeviceramdisk=[r:]\Recovery\WindowsRE\Winre.wim,{identifier2}, where {identifier1} is the identifier for the Windows Boot Loader entry with the description Windows Recovery Environment and {identifier2} is the identifier for the Device Options entry. Start Diskpart by typing Diskpart.exe at an elevated command prompt, and then run the following two commands at the Diskpart prompt: Select volume=r remove4. Remove the remaining primary plex entries from the secondary BCD store by running the following commands at an elevated command prompt: bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /delete {identifier}, where {identifier} is the identifier for the Resume from Hibernate entry with the description Windows Resume Application. bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /delete {identifier}, where {identifier} is the identifier for Windows Boot Loader with the description Windows Server 2008 R2. bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /delete {identifier} /f, where {identifier} is the identifier for Windows Boot Manager with the description Windows Boot Manager – Primary Disk.5. Update the secondary plex entries in the secondary BCD store by running the following commands at an elevated command prompt: bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier} description “Windows Resume Application”, where {identifier} is the identifier for the Resume from Hibernate entry with description Windows Resume Application – secondary plex that you noted earlier. bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier} description “Windows Server 2008 R2”, where {identifier} is the identifier for the entry Windows Boot Loader with the description Windows Server 2008 R2 – secondary plex. bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier1} resumeobject {identifier2}, where {identifier1} is the identifier for the entry Windows Boot Loader with the description Windows Server 2008 R2 – secondary plex and {identifier2} is the identifier for the entry Resume from Hibernate with the description Windows Resume Application – secondary plex. bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier1} recoverysequence {identifier2}, where {identifier1} is the identifier for the entry Windows Boot Loader with the description Windows Server 2008 R2 – secondary plex and {identifier2} is the identifier for the entry Windows Boot Loader with the description Windows Recovery Environment. bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier1} default {identifier2}, where {identifier1} is the identifier for the entry Windows Boot Manager with the description Windows Boot Manager – Secondary Disk and {identifier2} is the identifier for the entry Windows Boot Loader with the description Windows Server 2008 R2 – secondary plex. bcdedit.exe /store t:\EFI\Microsoft\boot\BCD /set {identifier1} resumeobject {identifier2}, where {identifier1} is the identifier for the entry Windows Boot Manager with the description Windows Boot Manager – secondary plex and {identifier2} is the identifier for the entry Resume from Hibernate with the description Windows Resume Application – secondary plex.6. At the Diskpart prompt, run the following commands: Select volume=t remove |

To update secondary plex entries on the secondary disk

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| 1. At an elevated command prompt, run bcdedit.exe /enum all and note the identifier for the entry Windows Boot Manager with the description Windows Boot Manager – Secondary Disk.2. Run bcdedit.exe /set {fwbootmgr} displayorder {identifier} /addfirst, where {identifier} is the identifier from Step 1.3. Restart the computer with the command shutdown.exe /r /t 0.4. Once the computer has restarted, start Diskpart by typing Diskpart.exe at an elevated command prompt, and then run the following commands at the Diskpart prompt: Select disk 0 Select partition 1 Assign letter=s5. At an ordinary elevated command prompt, run bcdedit.exe /store s:\EFI\Microsoft\boot\BCD /enum all and note the identifier for the entry Windows Boot Manager with the description Windows Boot Manager – Secondary Disk.6. Run Bcdedit.exe /store s:\EFI\Microsoft\boot\BCD /delete {identifier}, where {identifier} is the identifier you noted in the previous step.7. Return to the Diskpart prompt, and run the following two commands: Select volume=s remove8. At the ordinary elevated command prompt, run bcdedit.exe /enum all and note the identifier for the entry Firmware Application {101fffff} with the description Windows Boot Manager – Primary Disk.9. Run bcdedit.exe /set {fwbootmgr} displayorder {identifier} /addfirst, where {identifier} is the identifier you noted in the previous step.10. Restart the computer through the primary system partition with the command shutdown.exe /r /t 0. |