

Windows Problems Demystified

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WINDOWS 7 includes a huge number of files and folders, and I could write an entire book about what each one does. In this chapter, however, I deal with the most important folders and file types, explaining the significance of each one.

INSIDE OUT

Show hidden system files and file extensions in Windows Explorer

By default, Windows 7 hides certain system files and file extensions so that you can't see them when you explore files and folders on your computer. To view these hidden files and extensions, press **Alt** on your keyboard in any Windows Explorer window and select **Folder Options** on the **Tools** menu in a Windows Explorer window. The **Folder Options** dialog box appears. (Alternatively, you can open the **Organize** menu from the Windows Explorer toolbar and select **Folder And Search Options**.) On the **View** tab in the **Folder Options** dialog box, select the **Show Hidden Files, Folders And Drives** option, the **(Un)Hide Extensions For Known File Types** option, and the **(Un)Hide Protected Operating System Files** option.

Windows 7 Core Operating System Files

Figure 16-1 shows the full Windows 7 folder structure. Some of these folders contain files for specific functions. For example, the **ehome** folder includes Windows Media Center files and the **Fonts** folder stores Windows fonts.

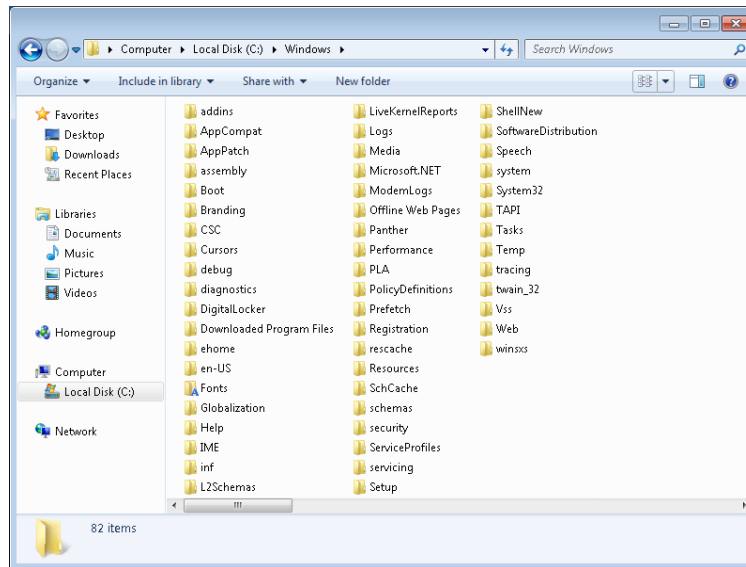


Figure 16-1 The folder structure for Windows 7

A few of these folders contain core operating system files, and it's worth focusing on these folders, because this is where file corruptions are most likely to occur.

X:\Windows\Boot This folder contains files necessary for starting Windows 7.

X:\Windows\Help The Windows 7 help files are located in the Help folder. If you cannot start Help, these files might be corrupt or missing.

X:\Windows\inf Windows uses the INF files in this folder when installing hardware and software drivers.

X:\Windows\System32 This folder contains the guts of Windows 7. All the main Windows components are located here. If you have a problem with a Windows file, it is likely located in this folder.

The following files are commonly located within the X:\Windows\System32 folder sub-structure.

ActiveX Files (*.ocx) ActiveX is a programming framework that software authors use to design reusable components to be shared across applications. Sometimes these controls are shared across programs from different software houses, and in older software, there might be incompatibilities with various versions of the .ocx files. For example, one program might require a specific version of the file, but another program needs a different version. Windows 7 is much better at handling these conflicts than previous versions of Windows; however, such conflicts can still occur.

Applications Applications are the main programs that comprise Windows 7. If you are trying to launch a built-in Windows feature and it cannot be found, the associated application file might be missing from the Applications folder.

Application Extensions (*.dll) Dynamic Link Library (.dll) files are shared library files. Like .ocx files, .dll files are program and Windows components that can be shared across software applications. Occasionally, Windows becomes unresponsive because a .dll file is corrupt or is an incorrect version that is not supported by the program or feature trying to access it.

As with .ocx files, Windows 7 is much better than previous versions of Windows at handling .dll file conflicts, but issues with these files can still occur. Windows 7 includes more .dll files than any other type of file.

Control Panel Item (*.cpl) Windows 7 launches .cpl files when you access features in Control Panel. If an item cannot be found, the associated .cpl file might be missing or corrupt.

Device Driver (*.drv) The Device Driver folder contains certain Windows 7 software and hardware drivers. These files can occasionally become corrupt.

Boot The Boot folder contains the programs required to start Windows. If these files are deleted or become corrupt, Windows will not start.

Drivers and DriverStore These folders contain all of the software drivers for your hardware. You can back up these folders and restore them manually if an event such as a driver malfunction or faulty driver upgrade causes problems with Windows 7.

Microsoft Common Console Document The Microsoft Management Console (MMC) programs are stored in this folder. If you cannot start an MMC item, the program file might be corrupt or missing from this folder.

VBScript Script File (*.vbs) Visual Basic VBScript scripts can be a target for virus writers. Some VBScript scripts are stored in the main Windows 7 folders.

X:\Windows\winsxs Earlier, I discussed side-by-side compatibility protection for different versions of .dll, .ocx, and other files in Windows 7. Windows stores and organizes compatible duplicate versions of files in the winsxs folder. This folder is usually very large and even bigger than the System32 folder.

X:\Users\AppData In each user's folder is a subfolder named AppData, as shown in Figure 16-2. Application-specific files and settings are stored in this folder.

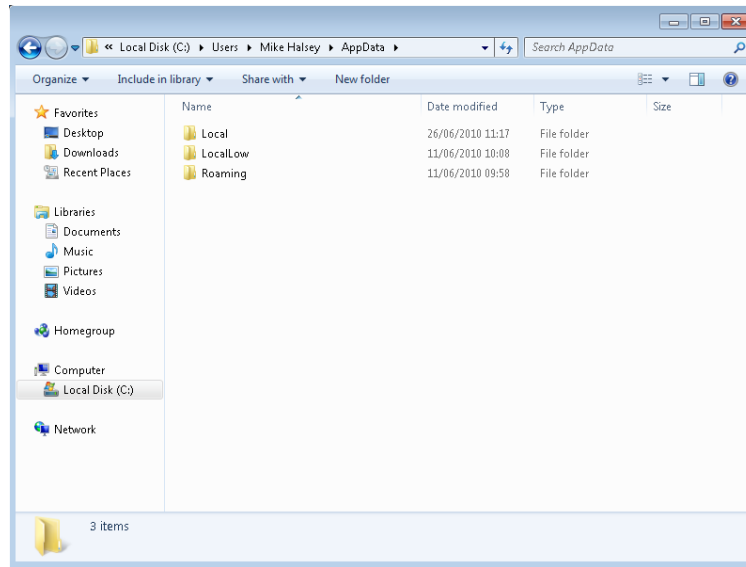


Figure 16-2 The AppData subfolders

The AppData folder is hidden by default, so you will need to change the default setting to show hidden files to see the folder contents. See the Inside Out sidebar “Show hidden system files and file extensions in Windows Explorer” earlier in this chapter for details.

Windows 7 Security and Policy Folders

Windows security and other policies that control login, software, and user behavior and permissions are stored in the following folders.

- X:\Windows\Security
- X:\Windows\ServiceProfiles

The Windows 7 Registry

The registry is a database that contains configuration options and settings for Windows and your installed programs. There is one registry folder named NTUSER.DAT for each user. You can see one hidden registry file in Figure 16-3 and can make all of them visible by showing hidden and operating system files. See the Inside Out sidebar “Show hidden system files and file extensions in Windows Explorer” earlier in this chapter for details.

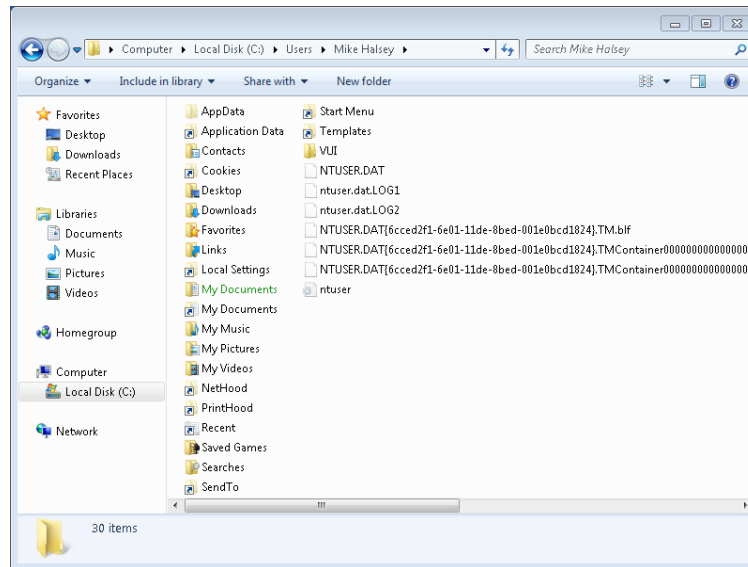


Figure 16-3 The registry files are hidden in user folders.

Personalization Folders

The main folders containing wallpapers and other personalization options are:

- X:\Windows\Globalization
- X:\Windows\Media
- X:\Windows\Resources
- X:\Windows\Web

Windows 7 Logs

Several folders contain Windows 7 logs. You can normally access these logs through Control Panel and Microsoft Management Console. You can also access the logs manually if you can't get Windows 7 to start. You can find the logs in the following folders.

- X:\Windows\debug
- X:\Windows\diagnostics

- X:\Windows\LiveKernelReports
- X:\Windows\Logs
- X:\Windows\ModemLogs

Temporary Files Stores

You can delete all the contents in several Windows 7 folders if you suspect they are causing problems.

- **X:\Windows\Downloaded Program Files** Windows does not usually use this folder, so it will normally be empty anyway.
- **X:\Windows\Prefetch** Windows tracks what programs and files you frequently use and stores this information in the Prefetch folder to preload them when appropriate (for instance, when starting a program you run often). Sometimes the prefetch files can become corrupt. If you suspect this has happened, you can safely delete the contents of this folder. Windows will then rebuild the prefetch database.
- **X:\Windows\SoftwareDistribution** This folder contains Windows Update configuration options and downloaded files. If Windows Update will not install updates, you can delete the contents of this folder to try to fix the problem.
- **X:\Windows\Temp** This folder is the temporary files store. Its contents can be deleted at any time if you suspect one or more temporary files is causing a problem.

Advanced File Restore

As I stated previously, I could write an entire book on the Windows 7 file and folder structure. But the guide presented in the previous section should be enough to help you restore Windows 7 files and folders on a file-by-file, folder-by-folder basis. You can infer from this discussion that you do not need to restore folders that contain temporary files; temporary files are unnecessary when restoring Windows to working order, and you could run the risk of restoring a corrupt file. You can also use the descriptions above to decide which folders containing user personalization options to specifically include or ignore in a restore.

The most important folders, and the ones you are most likely to restore, are the Boot, INF, System32, and WinSxS folders. These folders contain the essential parts of the operating system. Most likely, problems are caused by corrupt or missing files in these essential folders.

CAUTION!

If you restore the folders containing security or other computer policies, be certain that there have been no changes since the backup was made. If changes were made, you could encounter additional problems, such as a faulty smart card or fingerprint reader.

System File Checker

I wrote about the extremely useful System File Checker in Chapter 15, “Advanced Repair Methods.” This utility checks every system file in Windows against the original version on the installation DVD. If it finds a file that has changed or become corrupt, it restores the original file.

System File Checker quickly repairs problems with Windows 7, but if you have a service pack installed on your computer, you will also need to **slipstream** the service pack onto the installation DVD before running System File Checker. The following section details how to create a slipstreamed DVD.

Creating a Slipstreamed Install DVD

Slipstreaming is the process of integrating a service pack into the original installation DVD. You might want to do this for a couple of reasons. First, a slipstreamed installation DVD is useful when you need to reinstall Windows or install it on a new PC. A slipstreamed version of the software is far better updated than the original install. You may also want to create a slipstreamed installation DVD if you want to use System File Checker as mentioned previously. The installation DVD you use with System File Checker must include the service pack that matches the one installed on your PC. If it doesn't, some operating system files will not match, and System File Checker will abort with an error.

Sadly, creating a slipstreamed service pack installation DVD for Windows 7 isn't as simple as it is for Windows XP. With Windows XP, you simply copy the contents of your Windows XP installation disc to your hard drive and use an `/integrate` switch with the service pack to build it into the file structure. Then you burn back to a bootable DVD. This procedure changed with Windows Vista, and while you can still slipstream, it's a significantly more complex process. Here, however, I'll describe how to do it step by step.

What You Will Need

Before beginning the slipstream procedure, gather the following items.

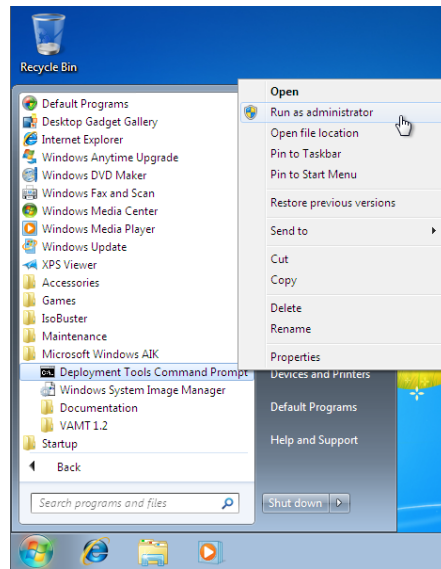
- A spare hard disk or partition on which you can install a fresh copy of Windows 7.
- The Windows 7 Automated Installation Kit (AIK), which you can download for free from <http://www.microsoft.com/downloads/details.aspx?displaylang=en&FamilyID=696dd665-9f76-4177-a811-39c26d3b3b34> or by searching the Microsoft website for Windows 7 AIK. You will need approximately 1.5 GB of free disk space to install the Windows AIK on your PC.
- A blank CD or DVD.
- Software for creating an ISO file such as UltraISO, (available from www.ezbsystems.com/ultraiso) or WinISO (available from www.winiso.com). You might be able to download a free trial version of the software, which will be fine for a quick job.

Step 1: Creating a Windows Pre-Installation Environment Startup Disc

1. You first need to create a startup disc for the Windows Pre-Installation Environment (WinPE). To do this, run the Windows 7 AIK installer and select Windows AIK Setup.



2. When the Windows 7 AIK is installed, select Microsoft Windows AIK from the Start menu, right-click Deployment Tools Command Prompt, and select Run As Administrator.



3. In the command prompt window that appears, type **C:** and press Enter. Then type **cd .\Program Files\Windows AIK\Tools**, and press Enter again to access the AIK folder.
4. Use the Copype.cmd script, changing the arguments as necessary to match the locations for your WinPE files and the desired destination folder. (Valid versions include 32-bit [x86] or 64-bit [x64]. Other supported types are amd64 and ia64.) Type **copype.cmd x86 C:\winpe_x86** or **copype.cmd x64 C:\winpe_x64**, and press Enter.
 5. The command in step 4 creates a folder structure in a new folder. (For the purposes of this tutorial, we'll assume this is C:\winpe_x86.)
Next, to copy the base WinPE image to this folder structure, type **copy C:\winpe_x86\winpe.wim C:\winpe_x86\ISO\sources\boot.wim**, and press Enter.
 6. Next, you need to add disk boot files to the files you have created in steps 4 and 5, ready for burning to a CD or DVD.
 - a. Type **dism /Mount-wim /Winfile:C:\winpe_x86\ISO\sources\boot.wim /index:1 /MountDir:C:\winpe_x86\mount**, and press Enter.
 - b. Type **copy C:\winpe_x86\ISO\bootmgr C:\winpe_x86\mount**, and press Enter.

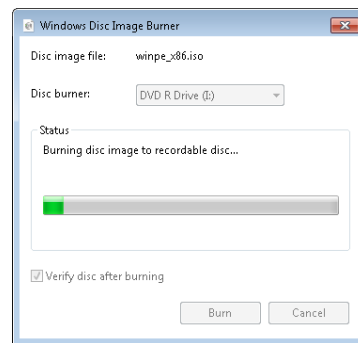
- c. Type **mkdir C:\winpe_x86\mount\boot**, and press Enter.
 - d. Type **xcopy /cherky C:\winpe_x86\ISO\boot C:\winpe_x86\mount\boot**, and press Enter.
7. Add the ImageX disc image creation program to the folder by typing **copy "C:\Program Files\Windows AIK\Tools\x86\ImageX.exe" C:\winpe_x86\mount**, and pressing Enter.
8. Next, create the boot configuration data (BCD) file for the disc. Type the following commands, pressing Enter after each one.
 - a. **Del c:\winpe_x86\mount\boot\BCD**
 - b. **Bcdedit /createstore c:\winpe_x86\mount\boot\BCD**
 - c. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -create {bootmgr} /d "Boot Manager"**
 - d. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {bootmgr} device boot**
 - e. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -create /d "WINPE" -application osloader**
9. The command in step 8e returns a GUID value. Type the following commands, substituting the GUID value returned by step 8e for {GUID}. The GUID should look similar to *{21EC2020-3AEA-1069-A2DD-08002B30309D}* but will contain different numbers and letters. Press Enter on your keyboard after each step.
 - a. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} osdevice boot**
 - b. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} device boot**
 - c. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} path \windows\system32\winload.exe**
 - d. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} systemroot \windows**
 - e. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -set {GUID} winpe yes**
 - f. **Bcdedit /store c:\winpe_x86\mount\boot\BCD -displayorder {GUID} -addlast**

10. Finally, create an ISO disc image that you can burn to a CD or DVD. Type **oscdimg -n -m -o -bC:\winpe_x86\etfsboot.com C:\winpe_x86\mount C:\winpe_x86\winpe_x86.iso**, and press Enter.

For Intel Itanium–based architecture, replace **etfsboot.com** with **efisys.bin**.

If you are building an ISO to an AMD Extensible Firmware Interface (EFI) ISO instead, type **oscdimg.exe -bC:\winpe-x64-efi\efisys.bin -pEF -u1 -udfver102 C:\winpe-x64-efi\ISO x64-efi-winpe.iso**, and press Enter.

11. You will now have an ISO file in the C:\winpe_x86 folder that you can double-click to start Windows Disc Image Burner.



Note

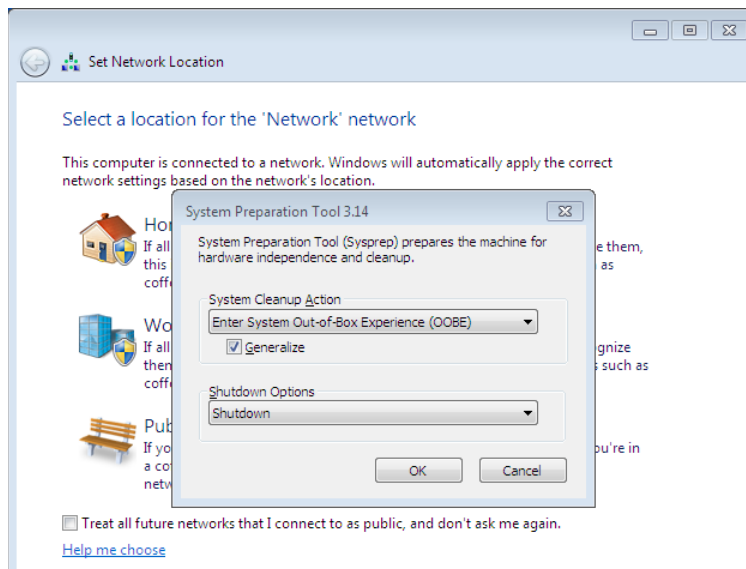
You only ever need to create a single WinPE startup disc (and disc image). You can use the same disc to install a slipstreamed version of Windows 7 on any computer.

Step 2: Installing a Fresh Copy of Windows 7

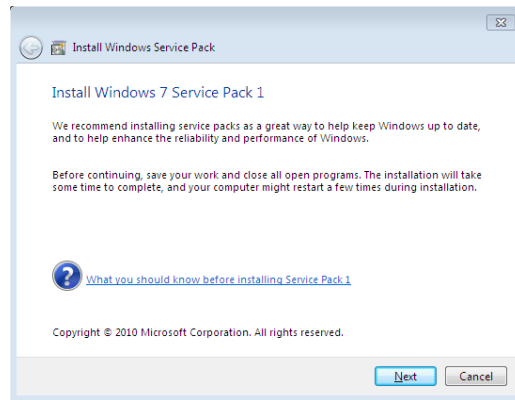
1. Using your Windows 7 installation DVD, install a fresh copy of Windows 7 onto a spare hard disk or partition. Use the version you want to create the slipstreamed disc for, that is Home Premium, Professional, Enterprise, and so on.
2. When Windows 7 is installed and the screen asking for your username and password appears, press Ctrl+Shift+F3 on your keyboard.



3. The system restarts in audit mode. *Do not* close the System Preparation Tool window that appears; you will need it later.



4. Install the appropriate service pack. (You can either download the service pack or install it from a CD, network, or USB pen drive).



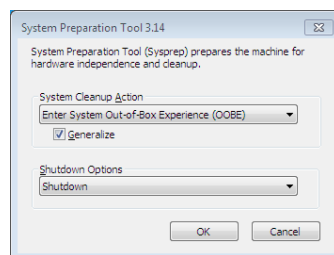
- Windows may restart during the service pack installation. If the Windows 7 password screen appears again, press Ctrl+Shift+F3 again to re-enter Audit Mode.

INSIDE OUT

Performing other actions in Audit Mode

You can also perform other actions in Audit Mode, such as installing software, changing Windows settings, or installing device drivers. Be careful installing drivers if you intend to use this new install image to install Windows on a different PC from the one you are creating the image on, because the hardware will likely be different. Also take care when installing software; you must leave enough space for the final disc image to fit on a single blank DVD.

- In the System Preparation Tool window, select Enter System Out-Of-Box Experience (OOBE) from the System Cleanup Action menu, and select the Generalize option. Place the WinPE startup disc in the CD/DVD drive. In the System Preparation Tool dialog box, select Restart under Shutdown Options, and then click OK when you are ready to create the new Windows image.

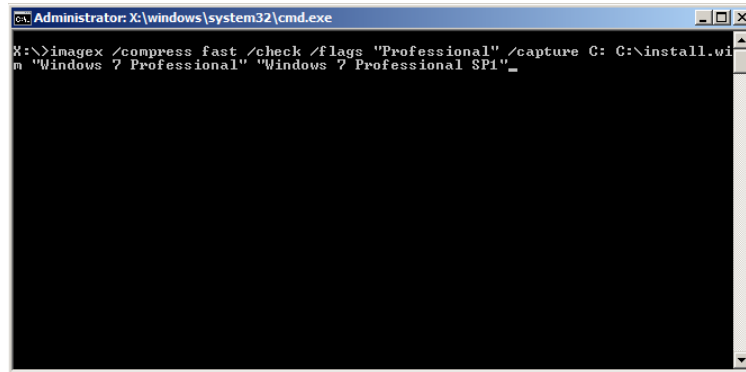


Step 3: Creating a New Windows Image File

1. After you follow the previous procedure, the system will start in the WinPE environment, and a command prompt window will appear.

Noting the following substitution guidelines, type **E:\imagex /compress fast /check /flags "Professional" /capture D: E:\install.wim "Windows 7 Professional" "Windows 7 Professional Custom"** at the command prompt.

- If necessary, substitute the name of your Windows 7 edition for *Professional* in the command.
- Substitute the drive letters of the disks on which you have the second copy of Windows 7 installed and the disk where you want WinPE to store the new Windows 7 Image file. The file will be approximately 2 to 2.5 GB.



```

ca. Administrator: X:\windows\system32\cmd.exe
X:\>imagex /compress fast /check /flags "Professional" /capture G: C:\install.wim
n "Windows 7 Professional" "Windows 7 Professional SP1"
  
```

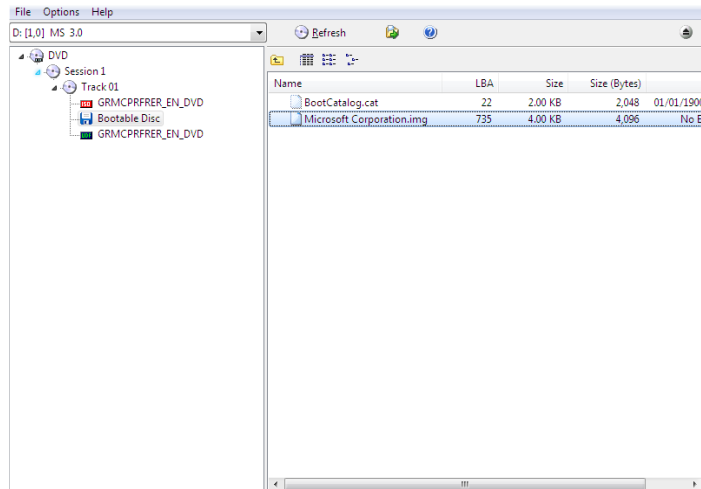
Step 4: Creating a New Windows 7 Installation DVD

1. Use ISO creation software (see the Inside Out sidebar below for more information about where you can get this) to make an ISO file from your original Windows 7 installation DVD.
2. Using the same ISO creation software, locate the newly created Install.wim file you created in the previous procedure and add it to the disc image file, overwriting the one that exists there in the \sources\ folder. Double-click the image to burn it to the DVD using the Windows Disc Image Burner.

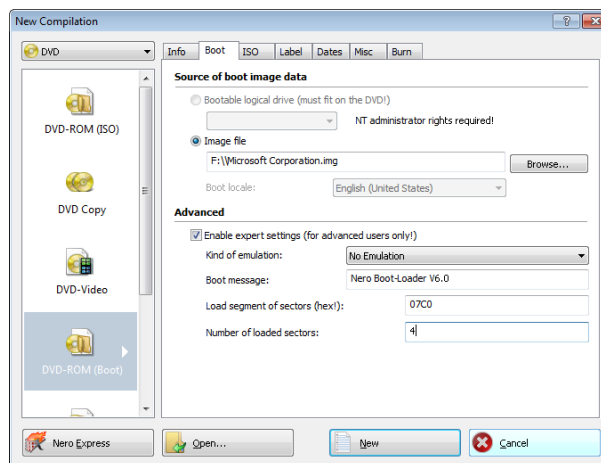
INSIDE OUT

Extracting a Windows 7 DVD to your hard disk

Depending on what ISO creation software you are using, you may need to extract the contents of the installation DVD to your hard disk and then add the new Install.wim file to it there. To re-burn your image to a disc, you may need a Microsoft bootable disc image. You can use software such as ISOBuster (available at www.isobuster.com) to extract the Microsoft Corporation.img file from the disc.



You will also need DVD burning software such as Nero (www.nero.com) or Roxio (www.roxio.com) to burn this new replacement Windows 7 install disc. In Nero, use the options shown in the following image.



Tip

You can delete the second copy of Windows 7 once you are done with the procedures, although I always recommend testing the install disc before deleting anything that's taken a long time to install and configure.

Third-Party Slipstreaming Software

Third-party solutions are available for slipstreaming Windows service packs. Two popular programs for Windows Vista are vLite (www.vlite.com) and Vista Update Integrator (www.winvistaside.de), which may be updated to support Windows 7. These third-party programs can simplify the Windows 7 service pack slipstreaming process and can also offer support for creating discs that will install into any edition of Windows 7.

When software becomes available to make slipstreaming Windows 7 service packs simple, I will announce it on my website, www.theLongClimb.com.

Summary

Windows 7 is an extremely complex piece of software engineering. Third-party tools can streamline some processes, such as creating a slipstreamed service pack installation DVD, but, generally, the file, folder, and maintenance structure of Windows 7 makes file-level work very difficult.

The complexity of Windows 7 is due in large part to the need to maintain compatibility with legacy hardware and software, which is why so many empty folders sit on your Windows drive. If particular files and folders not listed in this chapter are causing problems, I suggest a quick search online or on a website such as <http://technet.microsoft.com> where you will commonly find that you are not the first person to encounter your problem.