



Creating a Windows 7 Hard Disk Recovery Solution

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Summary

The purpose of this whitepaper is to document a prescriptive method for Windows 7 hard disk Recovery Solution, one that reinstalls Windows 7 to its state at the time it left the factory.

Customers that wish to restore their systems only need to use the Advanced Recovery Method inside Windows 7 or press F8 while the system is booting and choose the Repair Your Computer option.

Intended Audience

This procedure is specifically targeted for Original Equipment Manufacturers (OEMs), and applies only to all Windows 7 operating systems.

Step 1.0: Prepare your lab environment

In this step you will set up your lab environment, which includes installing the latest Windows 7 OPK tools onto your designated technician computer. You will use a USB hard drive to move files between computers.

Prerequisites

1. A machine dedicated as your technician computer
2. A machine dedicated as your reference computer
3. A machine dedicated as your master computer

Computer Minimum Specifications:

- Windows 7 operating system
 - Processor: 1.5 GHZ or better
 - Memory: 2 GB or better
 - Video: DirectX 9.0 capable and WDDM 1.0 Driver support, 128 MB graphics memory
 - HDD: at least 20 GB of free space
 - DVD: Reader
4. Windows 7 OPK Product DVD
 5. Windows 7 Product DVD
 6. CD-ROM and/or DVD-ROM media
 7. USB hard drive; the size must be at least 15 gigabytes (GB) or larger
 8. USB flash drive (UFD); the size must be at least 2 gigabytes (GB) or larger
 9. Microsoft Office 2010 OPK
 10. (Optional) 3rd party drivers and applications
 11. OEM logo for System Control Panel, 172 x 100 pixels, bitmap image
 12. OEM logo for OOBE, a 32-bit portable network graphics (.png) file; 240x100 pixels
 13. Custom background image for **Windows Welcome**.

Note: This image must be sized appropriately for the resolution of the computer screen and must not exceed 250 kilobytes (kb). For a custom image to be used, the directory %WINDOWS%\System32\OOBE\Info\Backgrounds must contain either an image that is specified as the default image, or an image that matches the screen resolution. If a default image is used, the default filename must be:

- backgroundDefault.jpg

The filenames for images to be used for specific screen resolutions are:

- background768x1280.jpg
- background768x1360.jpg
- background900x1440.jpg
- background960x1280.jpg
- background1024x768.jpg
- background1024x1280.jpg
- background1280x768.jpg

- background1280x960.jpg
- background1280x1024.jpg
- background1360x768.jpg
- background1440x900.jpg
- background1600x1200.jpg
- background1920x1200.jpg

14. Custom user tile which must be a bitmap (.bmp) file and the size should be 128 x128 pixels.

1.1: Install Windows OPK tools

In this step, you will install the Windows OPK tools onto your designated technician computer.

Important: You must uninstall any previous version of the Windows OPK.

1. From your running technician computer, insert the **Windows 7 OPK**. Windows should automatically start the OPK setup program.

Note: If the OPK setup does not start, you can manually start the installation. From the **Run** command type **D:\StartCD.exe** where **D:** is your DVD-ROM drive.

By default, Setup creates the following directory structure:

```
C:\Program Files\Windows OPK\Docs\  
C:\Program Files\Windows OPK\Recovery\  
C:\Program Files\Windows OPK\Samples\  
C:\Program Files\Windows OPK\SDKs\  
C:\Program Files\Windows OPK\Tools\
```

1.2: Create a Distribution Share on the Technician Computer

The following procedures will create a distribution share used to store the custom installation files and the Windows Vista installation files. For ease of network access in a closed network environment, these procedures configure permissions for the share and security of the distribution folder to allow access to everyone. For your environment, configure the permissions for the share and security of the distributions share appropriately.

To create a distribution share, complete the following:

1. Click **Start**, click **All Programs**, click **Microsoft Windows OPK**, and then click **Windows System Image Manager**.
2. In the **Distribution Share** pane of the Windows System Image Manager, right click on the **Select a Distribution Share**.
3. Click on **Create Distribution Share**.

4. Navigate to the folder you want to use as a distribution share or type in the path to the folder name you want to use as a distribution share.

Note: Throughout this document, we'll reference **C:\WinBits** as the name of our distribution folder.

If the folder doesn't exist, the folder will automatically be created.

5. Click **Open**.

1.3: Add Drivers to your Distribution Share (Optional)

In this step, you will add any out-of-box drivers needed for your custom installation. There are three types of driver installations supported through an answer file: In-box and out-of-box (.inf, .exe or .msi). In this step, you add an out-of-box (.inf) driver to your new distribution share under the **\Out-of-box drivers**.

To learn more about distribution shares, see the "*Understanding Distribution Shares and Configuration Sets*" topic in the **OPK.chm**.

1. Create an empty distribution share structure where you will add any custom out-of-box drivers. The name will be **\Winbits**.
2. Copy the out-of-box driver files (.inf) to

C:\Winbits\Out-of-Box Drivers\<Driver Folder>.

Note: Copy only .inf based drivers to this folder.

The <Driver Folder> designates the folder name of your driver. If you have multiple drivers to add to this directory, it is recommended that you create subdirectories for each driver. This ensures that there are no conflicts for drivers with the same file name.

1.4: Add Microsoft Office 2010 to your Distribution Share

In this step, you will add Microsoft Office 2010 to the distribution share. You will copy the Office 2010 bits to your configuration set.

To add Microsoft Office 2010 to your distribution share, complete the following steps:

1. On the technician computer, start **Windows Explorer**, and navigate to c:\WinBits\%OEM% Folders.
2. Using **Windows Explorer**, create the following folder structure:

c:\WinBits\%OEM% Folders\%1\Office 2010

1. Insert the Office 2010 OPK DVD into the DVD drive of your technician computer.
2. Open a command prompt with administrative privileges elevated.

3. Change directory to the location of the Office 2010 OPK DVD.
4. From the Office 2010 OPK root directory, execute copytoserver.bat <destination>.

Example:

```
copytoserver "c:\WinBits\$OEM$ Folders\$1\Office 2010"
```

Note: This will take some time copying the Office 2010 OPK bits to your distribution share.

5. Using **Windows Explorer**, navigate to the c:\WinBits\\$OEM\$ Folders\\$1\Office 2010\Office14 folder.
6. Delete the x64 folder.

Note: Microsoft recommends to preinstall the 32-bit version of Office 2010 for both 32-bit and 64-bit Windows 7 Operating Systems for ego system compatibility with 3rd party add-ins. In addition, by removing the x64 folder, you will reduce the overall footprint thus reducing deployment time.

1.5: Add your Company Logo and customization files to your Distribution Share

In this step, you will add your company logo to the distribution share. You will also add a custom background image and a custom user tile. You can create these files yourself. The following procedures will use the sample files from the Microsoft Windows OPK. These files are located in the following paths once you have installed the Microsoft Windows OPK:

| Filename | Path |
|-----------------------|--|
| backgrounddefault.jpg | C:\Program Files\Windows OPK\Samples\OOBE\info |
| usertile.bmp | C:\Program Files\Windows OPK\Samples\OOBE\info |
| fabrikam.png | C:\Program Files\Windows OPK\Samples\OOBE\fabrikam |

It's recommended to use the sample files so you can see how they look.

You'll need to provide an OEM logo for System Control Panel, 172 x 100 pixels, bitmap image. In our example, we'll reference fabrikam.bmp for this logo.

To add your OEM logos and custom images to your distribution share, complete the following steps:

1. On the technician computer, start **Windows Explorer**, and navigate to the distribution share (in our example, this is c:\WinBits\\$OEM\$ Folders).
2. Using **Windows Explorer**, create the following folder structure:

```
C:\WinBits\$OEM$ Folders\$$\system32\oobe\info
```

3. Copy your OEM logo for OOBE to the

C:\WinBits\%OEM\$ Folders\\$\$\system32\oobe\info folder.

Note: In our example, the logo filename is **fabrikam.png**, a 32-bit portable network graphics (.png) file; 240x100 pixels.

- Using **Windows Explorer**, create the following folder structure:

C:\WinBits\%OEM\$ Folders\\$\$\system32\oobe\info\ backgrounds

- Copy the **backgrounddefault.jpg** file to the **C:\WinBits\%OEM\$ Folders\\$\$\system32\oobe\info\backgrounds** folder.
- Copy the **usertile.bmp** file to the **C:\WinBits\%OEM\$ Folders\\$\$\system32\oobe\info** folder.
- Copy your OEM logo for the System Control Panel to the **C:\WinBits\%OEM\$ Folders\\$\$\system32\oobe\info** folder.

Note: In our example, the logo filename is **fabrikam.bmp**, 172 x 100 pixels, bitmap image.

Step 2.0: Design a Windows 7 Installation

In this step, you will design a custom Windows 7 installation using Windows System Image Manager (Windows SIM). The installation will include several OEM customizations and will also boot into audit mode, which will allow you to further customize your installation. The key tools you will use in this step are Windows System Image Manager (SIM), an answer file and Oobe.xml.

Disk Configuration Support

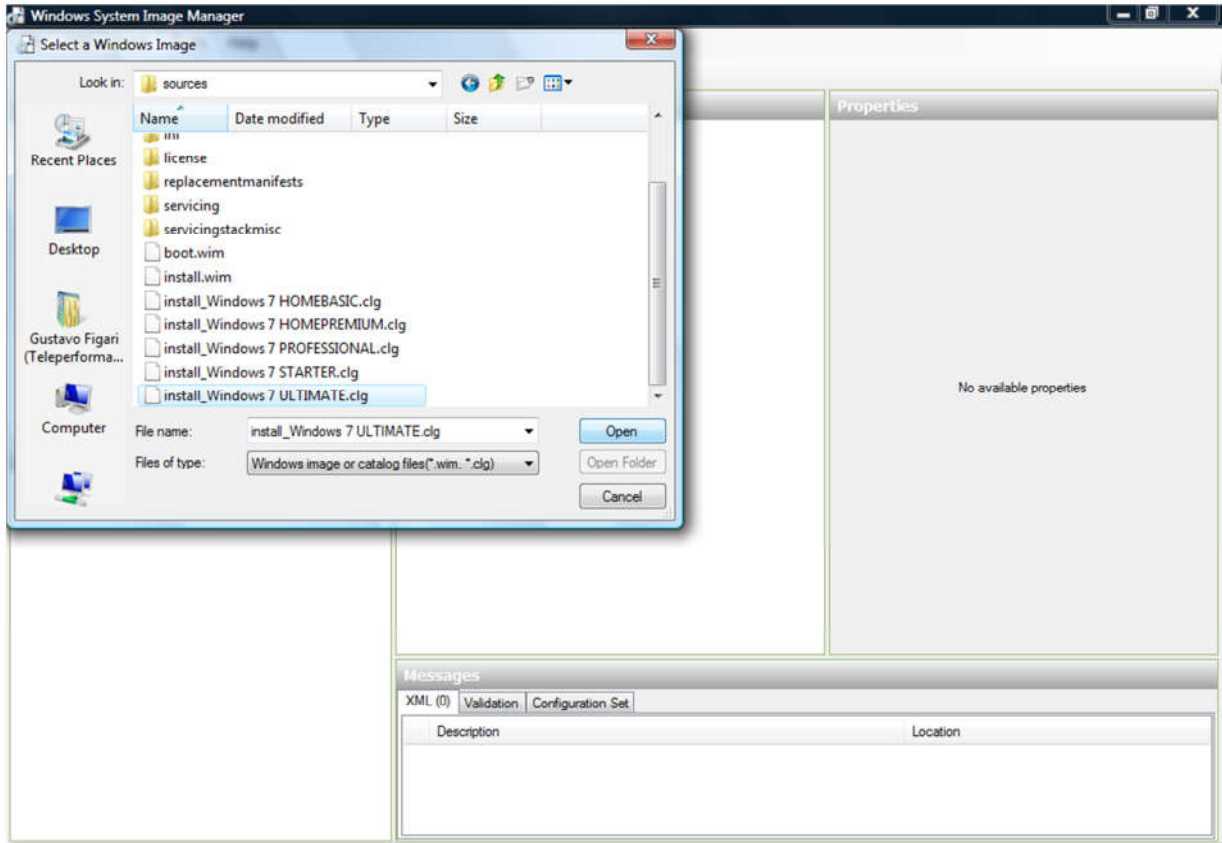
For Windows 7, Windows Setup now supports creating multiple partition types. By default, Windows Retail Setup will create two partitions: a system partition and an operating system partition. This configuration provides support for Windows BitLocker™ Drive Encryption as well as other performance benefits in Windows 7. For this step, you will build a single partition installation and later deploy the image onto a two-partition configuration (three partitions if Windows Recovery is included).

2.1: Create an answer file

In this step, you will create a new answer file. For this step, a Windows 7 catalog is necessary. A catalog file (.clg) is a binary file that contains the state of all the settings and the packages in a Windows image.

- On your technician computer, click **Start**, point to **Programs**, point to **Microsoft Windows OPK**, and then click **Windows System Image Manager**.
- On the **File** menu, click **Select Windows Image**.
- In the **Select a Windows Image** dialog box, select **Catalog files** from the **Files of type** list.

4. Browse the DVD to **\Sources** folder, select **Install_Windows 7 Ultimate.clg** and then click **Open**.



5. On the **File** menu, click **New Answer File**.

2.2: Open a Distribution Share

In step 1.0, a sample distribution share was created on your local hard drive (**C:\Winbits**).

1. In Windows SIM, click **Select a Distribution Share**.
2. Browse to **C:\Winbits**.
3. Click **Open**.

2.3: Add and configure Windows settings

In this step, you will define the basic disk configuration.

1. In the **Windows Image** pane of Windows SIM, expand the **Components** node to display available settings.
2. On the expanded list of components, add the following components to your answer file by right-clicking the component and then selecting the appropriate configuration pass.

| Component | Configuration Pass |
|---|--------------------|
| Microsoft-Windows-Deployment\Reseal | oobeSystem |
| Microsoft-Windows-International-Core-WinPE | windowsPE |
| Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition | windowsPE |
| Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition | windowsPE |
| Microsoft-Windows-Setup\ImageInstall\OSImage\InstallTo | windowsPE |
| Microsoft-Windows-Setup\UserData | windowsPE |

3. All the settings that you added must appear in the **Answer File** pane. Select and configure each setting as specified below. **This is an example; you can modify what you want.**

| Component | Value |
|---|---|
| Microsoft-Windows-International-Core-WinPE | InputLocale = en-US SystemLocale = en-US UILanguage = en-US UserLocale = en-US |
| Microsoft-Windows-International-Core-WinPE\SetupUILanguage | UILanguage = en-US |
| Microsoft-Windows-Setup | UseConfigurationSet = True |
| Microsoft-Windows-Setup\DiskConfiguration | WillShowUI = OnError |
| Microsoft-Windows-Setup\DiskConfiguration\Disk | DiskID = 0 WillWipeDisk = true |
| Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition | Extend = true Order = 1 Type = Primary |
| Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition | Active = true Format = NTFS Label = WIN7_OS Letter = C Order = 1 PartitionID = 1 |
| Microsoft-Windows-Setup\ImageInstall\OSImage\ | WillShowUI = OnError |

| | |
|--|---|
| Microsoft-Windows-Setup\ImageInstall\OSImage\InstallTo | DiskID = 0 PartitionID = 1 |
| Microsoft-Windows-Setup \UserData | AcceptEula = true |
| Microsoft-Windows-Setup \UserData\ProductKey | Key = Note Use a product key to determine which edition of Windows is installed on a system. Royalty OEMs will use assigned product keys for the edition of Windows 7 they are assigned too and System Builder can use a product key from their Windows inventory which corresponds to the edition of Windows to be installed. The purpose to enter a product key is to automate the installation of Windows and to avoid being prompted to enter a product key. You must not activated this product key if you use one from existing Windows inventory in order for it to be sold. WillShowUI = OnError |
| Microsoft-Windows-Deployment\Reseal | ForceShutdownNow = false Mode = Audit |

2.4: Add OEM Customizations

In this step, you will define a collection of customization allowances that take advantage of some differentiation, performance, and monetization opportunities. You'll also add a command to preload Microsoft Office 2010. To implement customizations you will add additional unattend settings to your answer file. In addition, you must create a custom content file called oobe.xml to include the following customizations:

- System Properties (Shell-Setup component)
 - Performance Information and Tools (PerfCenterCPL component)
 - Internet Explorer (IE_InternetExplorer component)
 - Desktop Background (Shell-Setup component)
 - OEM Welcome Center (Shell-Setup component)
1. In the **Windows Image** pane of Windows SIM, expand the **Components** node to display available settings.
 2. On the expanded list of components, add the following components to your answer file by right-clicking the component and then selecting the appropriate configuration pass.

| Component | Configuration Pass |
|---|--------------------|
| Microsoft-Windows-Deployment\RunSynchronous\RunSynchronousCommand | auditUser |

| | |
|---|------------|
| Microsoft-Windows-Deployment\RunSynchronous\RunSynchronousCommand | auditUser |
| Microsoft-Windows-IE-InternetExplorer\FavoritesList\FavoriteItem | Specialize |
| Microsoft-Windows-IE-InternetExplorer\StartPages\StartPage | Specialize |
| Microsoft-Windows-IE-InternetExplorer\StartPages\StartPage | Specialize |
| Microsoft-Windows-PerfCenterCPL\WindowsExperienceIndexOemInfo | oobeSystem |
| Microsoft-Windows-Shell-Setup\OEMInformation | Specialize |

3. All the settings that you added must appear in the **Answer File** pane. Select and configure each setting as specified below. **This is an example; you can modify what you want.**

| Component | Value |
|---|---|
| Microsoft-Windows-Deployment\RunSynchronous\RunSynchronousCommand | Description = Microsoft Office 2010 Order = 1 Path = c:\Office 2010\oemsetup.en-us.bat WillReboot = Never |
| Microsoft-Windows-Deployment\RunSynchronous\RunSynchronousCommand | Description = Microsoft Office 2010 Cleanup Order = 2 Path = cmd.exe /c rd /s /q "c:\Office 2010" WillReboot = Never |
| Microsoft-Windows-IE-InternetExplorer\FavoritesList\FavoriteItem | FavID = Favorite1 FavTitle = Fabrikam FavURL = http://www.fabrikam.com |
| Microsoft-Windows-IE-InternetExplorer\StartPages\StartPage | StartPageKey = Home page 1 StartPageURL = http://www.fabrikam.com |
| Microsoft-Windows-IE-InternetExplorer\StartPages\StartPage | StartPageKey = Home page 2 StartPageURL = http://www.fabrikam.com/support |
| Microsoft-Windows-Shell-Setup\OEMInformation | HelpCustomized = false Logo = c:\Windows\System32\OOBE\Info\fabrikam.bmp Manufacturer = <company name> SupportHours = <support hours> SupportPhone = <support number> SupportURL = <support URL> |
| Microsoft-Windows-PerfCenterCPL\WindowsExperienceIndexOemInfo | HardwareUpgradeURL = http://www.fabrikam.com/upgrade Logo = c:\Windows\System32\OOBE\Info\fabrikam.png |

Note: The parameter descriptions for the oemsetup.//cc.bat file are shown in the following table. The //cc is the two-letter abbreviation for the language and country or culture. In our example we are preloading Microsoft Office 2010 in United States, English. For more information on preloading Microsoft Office 2010, refer to the Microsoft Office 2010 OPK.

| Parameter | Description |
|-------------------------------|---|
| Referral= <i>ReferralCode</i> | Stores the provided OEM referral code in the registry. |
| NoOfficeStarter=1 | Prevents copying Office Starter 2010. Use this option only when necessary. For more information, contact your Microsoft account manager. |
| NoOffice=1 | Prevents copying of Office 2010. Use this option only when necessary. For more information, contact your Microsoft account manager. |
| x64 | Preloads the Office 2010 64-bit edition instead of the 32-bit version. Caution: Do not preload the 64-bit version unless that version is specifically required. |

2.5: Customize Windows Welcome (OOBE)

In this step, you will customization Windows Welcome. You will create a custom content file called oobe.xml. Oobe.xml is a content file that you can use to collect text, images, and settings for customizing Windows Welcome, the out-of-box experience for Windows 7. The Oobe.xml file can also be used to define OEM-specified images for the first user tile and for the desktop background.

- Using a text editor, like Notepad, create a file called **Oobe.xml**. Enter the following text:

```
<?xml version="1.0" encoding="utf-8" ?>
<FirstExperience>
  <oobe>
    <oem>
      <name>Fabrikam</name>
      <logopath> c:\Windows\System32\OOBE\Info\fabrikam.png</logopath>
      <OutOfBoxBackground>true</OutOfBoxBackground>
      <usertilepath> c:\Windows\System32\OOBE\Info\usertile.bmp</usertilepath>
    </oem>
  </oobe>
</FirstExperience>
```

- Save the Oobe.xml to the **C:\Winbits\%OEM\$ Folder\\$\$\System32\OOBE\Info** folder.

For more information on **Oobe.xml** customization options, refer to the OEM Preinstallation Kit (OPK) User's Guide.

2.6: Validate the answer file

In this step, you will validate the settings in your answer file and save them.

1. In Windows SIM, click **Tools**, and then click **Validate Answer File**.
The setting values in the answer file are compared with the available settings in the Windows image.
2. If the answer file validates successfully, a "success" message appears in the **Messages** pane. Otherwise, error messages appear in the same location.
3. If an error occurs, double-click the error in the **Messages** pane to navigate to the incorrect setting. Change the setting to fix the error, and then revalidate by returning to step one.
4. On the **File** menu, click **Save Answer File**. Save as c:\unattends\Win7Recovery.xml.

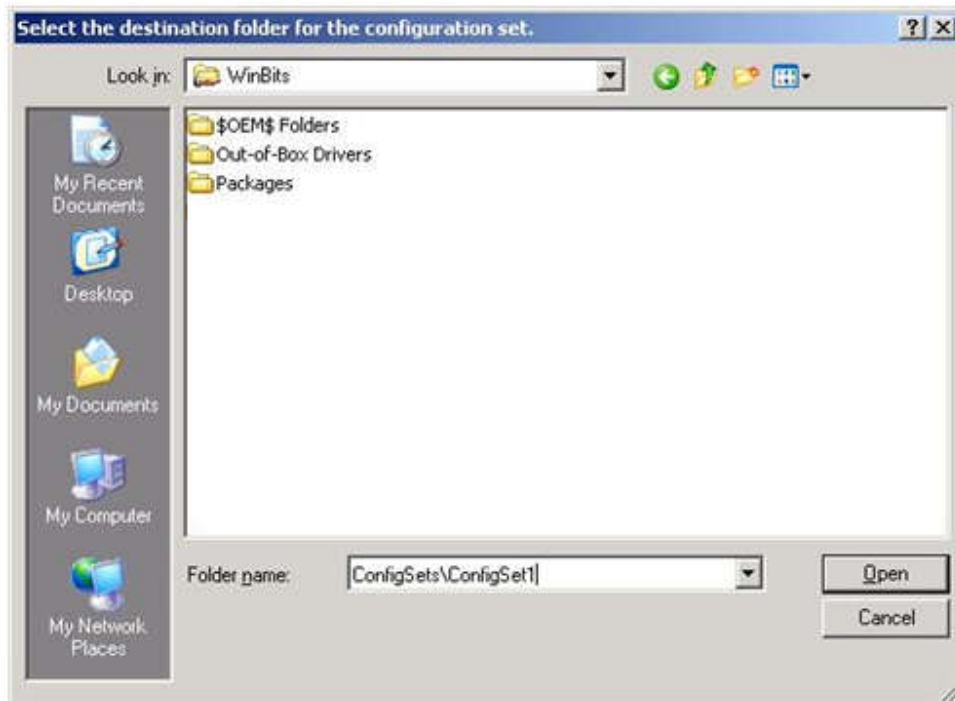
2.7: Create a configuration set

In this step, you create a configuration set that will gather all the resource files that you specified in your answer file into one location.

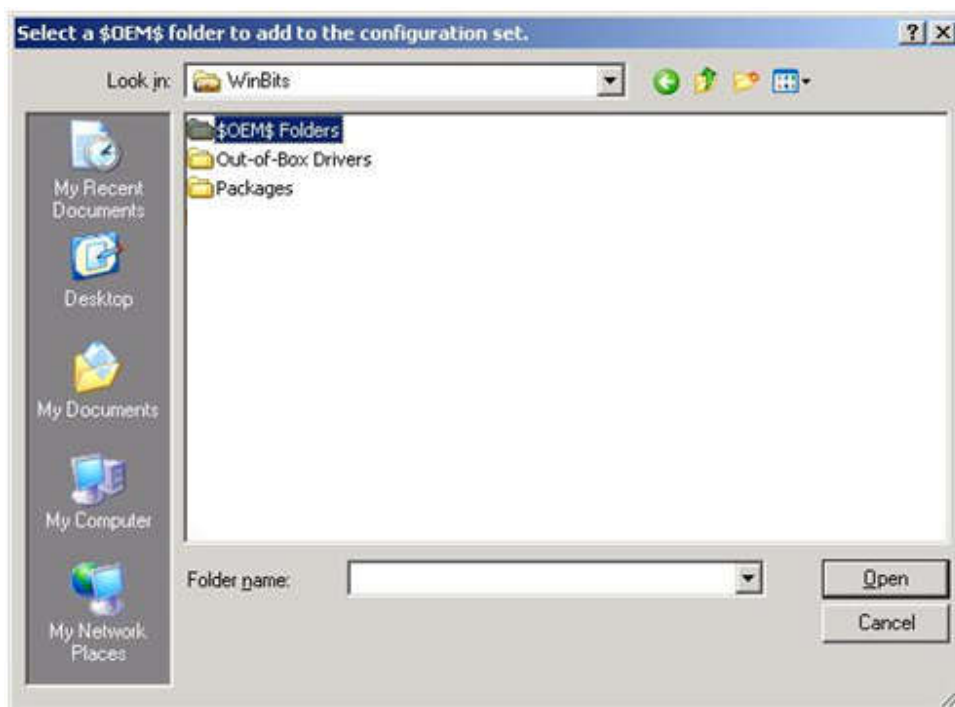
1. In Windows SIM, on the **Tools** menu, select **Create Configuration Set**.
The **Create Configuration Set** window opens.



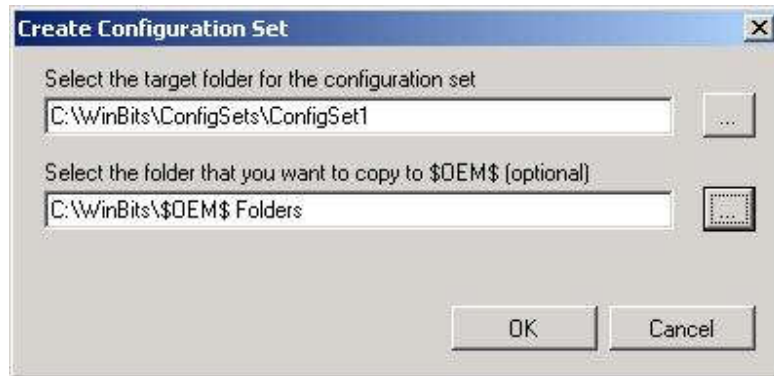
2. For the target folder, browse to C:\WinBits, then type ConfigSets\ConfigSet1, and then click **Open**.



3. For the OEM folder, browse to C:\WinBits\\$OEM\$ Folders and click Open.



4. In the Create Configuration Set window, click OK.



5. Click **Yes** when asked if you want to create the folder.



6. Click **OK**.



Windows SIM will create the following configuration set folder structure on your C:\WinBits\ConfigSets\ConfigSet1 directory.

\$oem\$

AutoUnattend_Files

AutoUnattend.xml

Important: Whenever you make a change to the \$OEM\$ Folders, Out-of-Box Drivers, Packages, or the Win7Recovery.xml answer file, you'll have to recreate the configuration set in order for changes to take effect.

Step 3.0: Build a Reference Computer

In this lab, you will build a reference computer using the Windows 7 Product DVD and your configuration set created in Lab 2.0. A reference computer is a fully assembled computer that represents the computer you want to deploy in your manufacturing environment. After Windows Setup completes the installation, the computer will reboot into Audit Mode. In Audit Mode, you have the option to add additional customizations. The key tools you will use in this lab are Windows Setup, Sysprep, Windows PE and ImageX.

Why Use Sysprep?

As an OEM, you are required to reseat the new installation by using the System Preparation ([Sysprep](#)) tool. The Sysprep tool removes system-specific information and resets the computer, so that the next time the computer starts, your customers can accept the Microsoft Software License Terms and add user-specific information.

Important: If you intend to transfer a Windows image to a different computer, you must run the **sysprep** command with the **/generalize** option, even if the computer has the same hardware configuration. The **sysprep /generalize** command removes unique information from your Windows installation, which enables you to reuse that image on different computers. If you want to install a Windows image to computers that have the same hardware configuration, you can preserve the device-drivers installation in a Windows image by using the `PersistAllDeviceInstalls` setting in your answer file. For more information, see the Unattended Windows Setup Reference ([Unattend.chm](#)).

Why Use Audit Mode?

There are two modes that Windows can boot to during an unattended installation: audit mode and Windows Welcome (also called Out-of-Box Experience). Audit mode is the ideal environment for you to make additional changes and configurations to a Windows installation before shipping that computer to its final destination. Audit mode enables you to install additional applications, device drivers, run scripts, or apply updates to a Windows installation. After you complete your additional configurations in audit mode, you can configure the computer to boot to Windows Welcome on next boot by using the Sysprep command-line tool. Windows Welcome is designed for end users to configure their computer, according to their requirements. Audit mode also allows pending actions, like language pack installation, to complete potentially saving time during Windows Welcome.

3.1: Copying the Configuration Set to the USB Flash Drive

In this step, you will prepare the USB flash drive with the answer file to perform an unattended installation of Windows 7 including the OEM customizations and Microsoft Office 2010.

1. On the technician computer, using **Windows Explorer**, navigate to `C:\WinBits\ConfigSets\ConfigSet1`.
2. Insert the USB flash drive (UFD) to the technician computer.

Important: Ensure the USB flash drive is formatted and empty.

3. Copy the `oem`, and `AutoUnattend_Files` folders and the `AutoUnattend.xml` file to the root directory of the USB flash drive.

3.2: Build a reference installation

In this step, you will build a reference installation using the Windows 7 Product DVD and the USB flash drive which contains the configuration set and answer file. The reference computer is the PC that you will load Windows 7 and Microsoft Office 2010. Once completed, an image of the reference PC will be captured to make available to deploy on multiple systems. The reference PC is the computer that contains your master image.

1. On the reference computer, insert the Windows 7 Product DVD and the USB flash drive then boot the computer.

Note: Ensure the BIOS boot order is set to boot from the DVD-ROM 1st. After Setup completes the system will boot into audit mode.

2. Validate that all your customizations were applied.

Note: Some OEM Customization will not appear in audit mode, for example **Windows Welcome**. You'll notice Microsoft Office 2010 is preloaded and the Microsoft Office 2010 OPK is removed from the c:\Office 2010 folder.

3.3: Add Additional Customizations

In this step, you can add additional customizations while in audit mode. Depending on the complexity of your systems, Audit Mode may be the most efficient method for adding customization such as applications that require an attended installation.

3.4: Prepare the image using Sysprep

In this step, you will run the Sysprep tool to generalize the image prior to capturing an image. By default while in Audit Mode, the System Preparation Tool dialog is started.

1. When you are done customizing the installation, reseat the computer. From the **System Preparation Tool** dialog, **System Cleanup Action** drop-down list, select **Enter System Audit Mode**.
2. Select **Generalize** checkbox.
3. From the **Shutdown Options** drop-down list, select **Shutdown**.
4. Click **OK**.

Important: You cannot capture an image unless the reference computer has been Sysprep /generalized. Refer to <http://support.microsoft.com/kb/935467> for more information.

3.5: Capture an audit image of the installation

In this step, you will capture an audit image of the new installation and store it onto your USB hard drive. This image will become your base image that will be used throughout the remaining labs.

1. On your technician computer, copy ImageX from "C:\Program Files\Windows OPK\Tools\x86\imagex.exe" to the root of the USB hard drive.
2. On the reference computer, plug in the USB hard drive.

3. Boot the reference computer using your Windows 7 OPK DVD. When the system boots, press any key when prompted to boot into Windows PE.
4. From the Windows PE command prompt, use the ImageX command with the **/capture** option to capture an image of the installation and save it to the USB hard drive.

Example: e:\imagex /capture c:\ e:\w7Audit.wim "Windows 7 Audit"
The **e:** drive is the USB hard drive in this example.

5. After capture is complete, restart the computer.

3.6: Prepare the OOBE image using Sysprep

In this step, you will run the Sysprep tool to generalize the image to OOBE in order to capture the OOBE image. The OOBE image will be used as the factory image used in the recovery solution.

1. Once the computer has reached the desktop, from the **System Preparation Tool** dialog, **System Cleanup Action** drop-down list, select **Enter System Out-of-Box Experience (OOBE)**.
2. Select **Generalize** checkbox.
3. From the **Shutdown Options** drop-down list, select **Shutdown**.
4. Click **OK**.

3.6: Capture an OOBE image of the installation

In this step, you will capture an OOBE image of the new installation and store it onto your USB hard drive. This image will become your base image that will be used throughout the remaining labs.

1. On the reference computer, plug in the USB hard drive.
2. Boot the reference computer using your Windows 7 OPK DVD. When the system boots, press any key when prompted to boot into Windows PE.
3. From the Windows PE command prompt, use the ImageX command with the **/capture** option to capture an image of the installation and save it to the USB hard drive.

Example: e:\imagex /capture c:\ e:\install.wim "Windows 7 OOBE"
The **e:** drive is the USB hard drive in this example.

4. Change directory to the USB hard drive.
5. Rename install.wim to install.txt by typing the following command:

```
ren install.wim *.txt
```
6. Type the following command from the command prompt:

```
md recovery\recovery\windowsRE
```

7. Type the following command to move recovery.txt to the recovery folder.

```
move install.txt recovery\recovery\windowsRE
```

8. Type the following command to capture recovery.txt back to a wim.

```
imagex /capture /compress fast e:\recovery e:\recovery.wim "End User Recovery"
```

Note: This will take some time to complete.

9. After capture is complete, shutdown the computer.

Step 4.0: Automating of the implementation of Windows 7 with recovery solution

In this step, you'll create batch files to deploy the images using ImageX on the USB hard drive.

1. Ensure you have the USB hard drive connected to the technician computer.
2. Execute **Notepad**.
3. Copy and paste the following text to **Notepad**:

```
@echo off
diskpart /s confighd.txt
imagex /apply w7audit.wim 1 c:\
c:\windows\system32\bcdboot.exe c:\windows
md r:\recovery\windowsre
imagex /apply recovery.wim 1 r:\
ren r:\recovery\windowsre\install.txt *.wim
copy c:\windows\system32\recovery\winre.wim r:\recovery\windowsre
c:\windows\system32\reagentc.exe /setreimage /path r:\recovery\windowsre /target
c:\windows
c:\windows\system32\reagentc.exe /setosimage /path r:\recovery\windowsre /target
c:\windows
diskpart /s configHD2.txt
```

4. Save the text to DeployWindows7.cmd and exit **Notepad**.
5. Execute **Notepad**.
6. Copy and paste the following text to **Notepad**:

```
select disk 0
clean
create partition primary size=500
select partition 1
active
format fs=ntfs label="System" quick
create partition primary size=6000
select partition 2
format fs=ntfs label="Recovery" quick
assign letter = R
create partition primary
select partition 3
format fs=ntfs label="OS" quick
assign letter = C
exit
```

7. Save the text to configHD.txt and exit **Notepad**.
8. Execute **Notepad**.

9. Copy and paste the following text to Notepad:

```
select disk 0  
select volume 2  
set ID=27  
exit
```

10. Save the text to configHD2.txt and exit **Notepad**.

Step 4.1: Deploying Windows 7 using ImageX

This step is used to deploy Windows 7 using the images you just captured from the reference computer. You will redeploy the images to the master computer. You can deploy the images to the master computer or any other computers you assemble.

In the step 4.0 you created a batch file called DeployWindows7.cmd, which will do the following:

- Clean and partition the hard drive
- Apply the Windows 7 Audit image and the Windows RE image using ImageX
- Copy the recovery.wim to the recovery partition
- Hide the recovery partition

To deploy Windows 7 with image files perform the following tasks:

1. Connect the USB hard drive to the master computer.
2. Boot the master computer using the Windows 7 OPK DVD.
3. From the Windows PE command prompt, change directory to the USB hard drive.
4. Type the following command to deploy the Windows images:

```
DeployWindows7.cmd
```

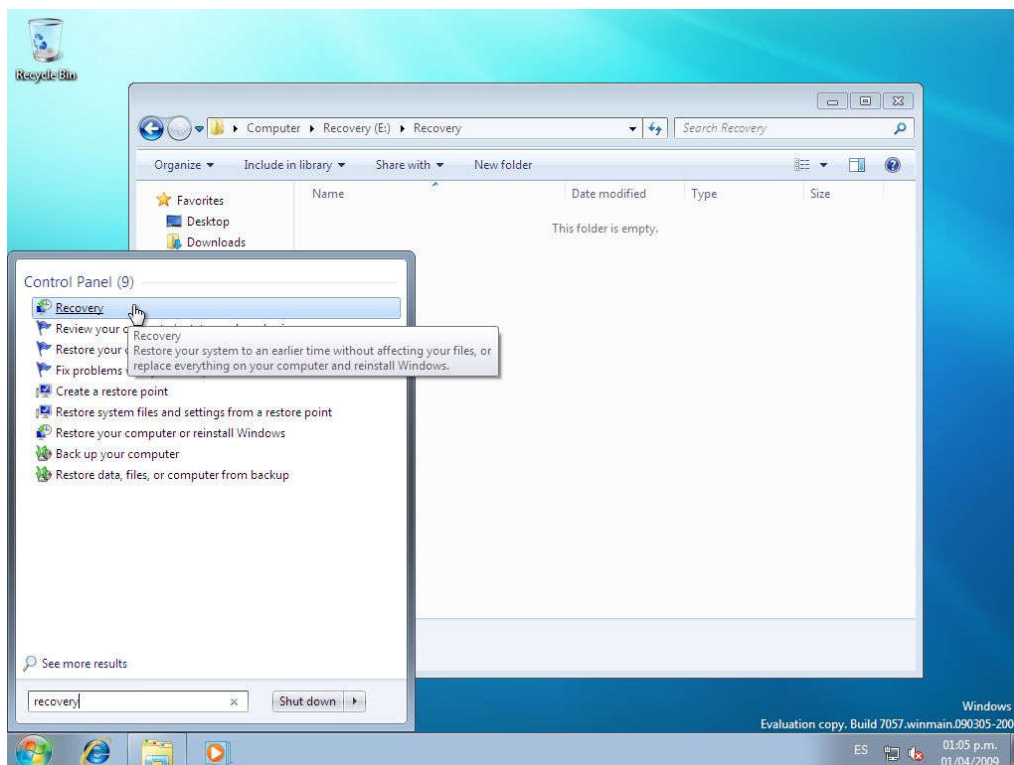
5. When the installation finish, type Exit and reboot.
6. The **PC will boot in Audit mode.**

Step 4.2: Testing the recovery solution via the Recovery in Control Panel

In this step, you will test the recovery solution via the Recovery in Control Panel. Recovery in Control Panel includes several options that can help you recover your computer from a serious error. In the Advanced recovery methods, there are two methods for recovery. The first method replaces everything on your computer, including Windows and all of your personal files, with a backup or a recovery image. The second method reinstalls Windows in its entirety. You will use the 2nd option to recover using the image you captured.

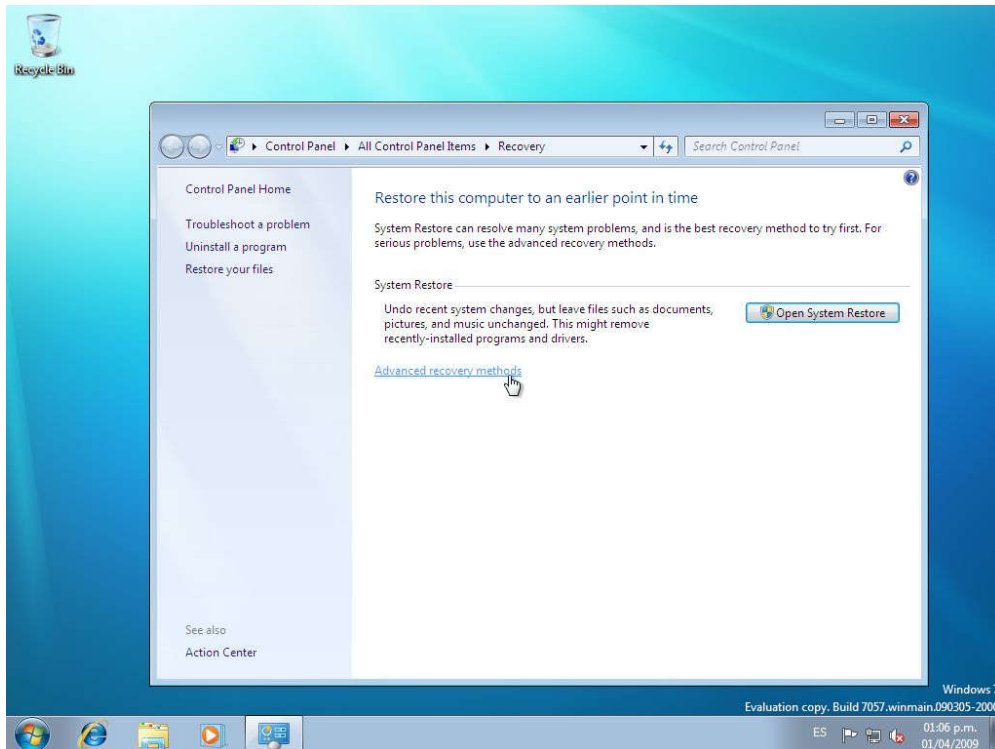
Perform the following steps to test the recovery solution via the Recovery in Control Panel:

1. On the master computer, remove the DVD-ROM and USB hard drive and start the computer.
2. Execute Sysprep with the OOBE option and restart the PC.
3. Start the destination computer and complete the Out of Box Experience (OOBE).
4. Press the **Start Button** and in the search input area, type "Recovery".

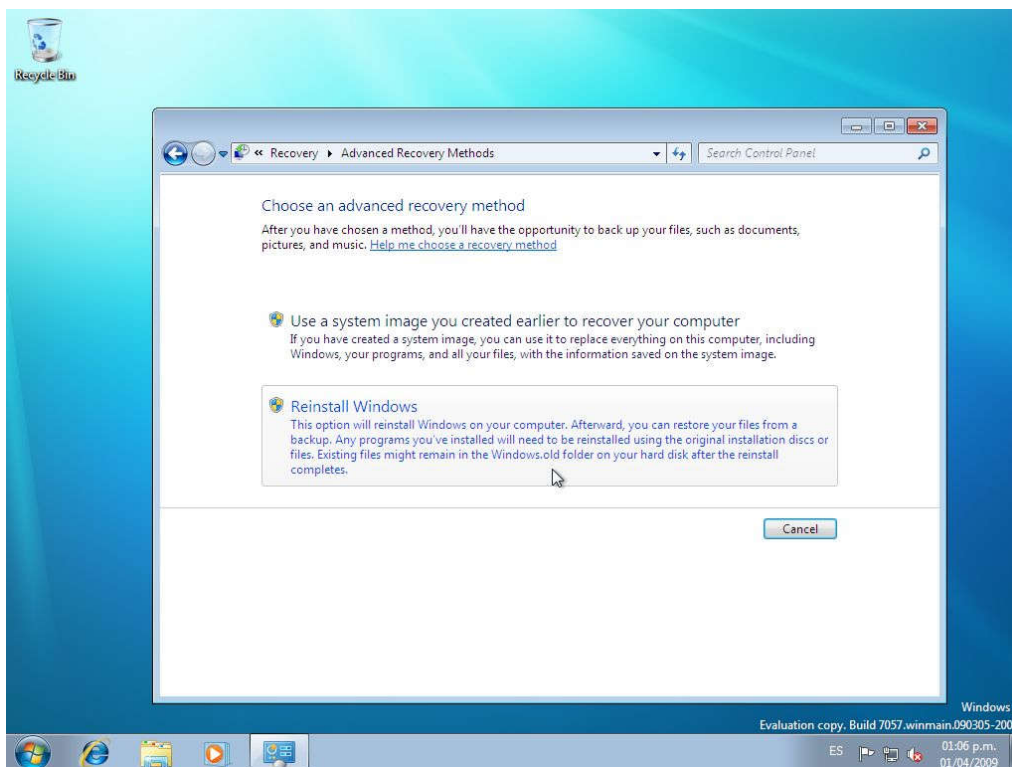


5. From the search results, launch the Recovery control applet.
6. Select the "Advanced recovery methods" option.

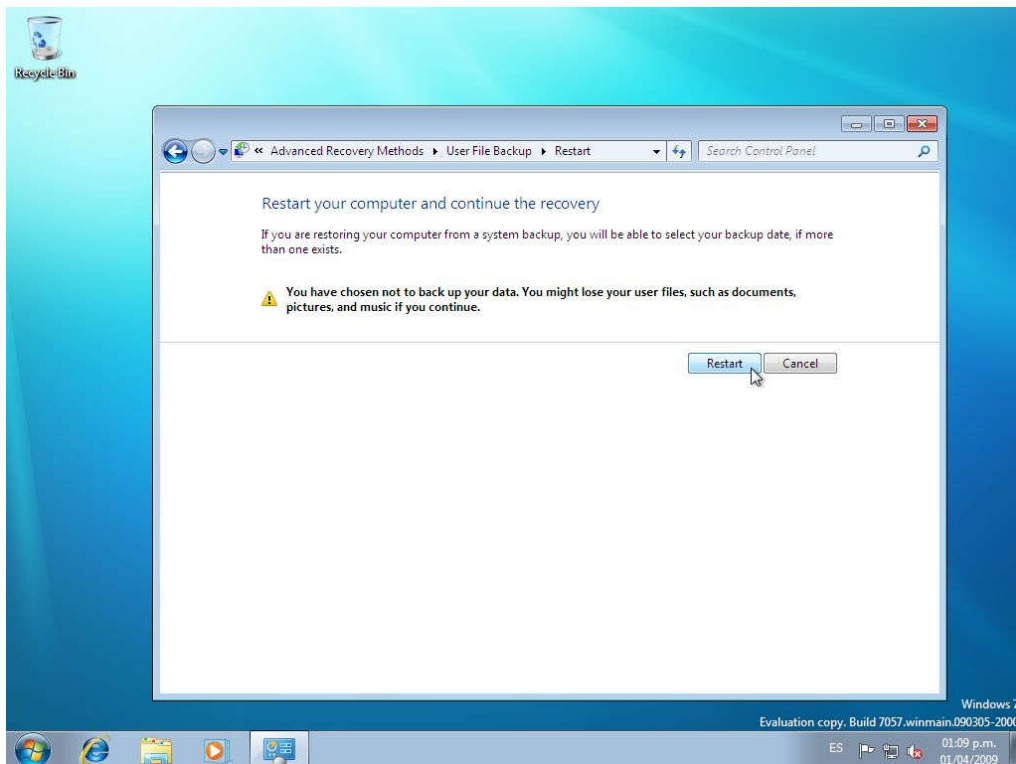
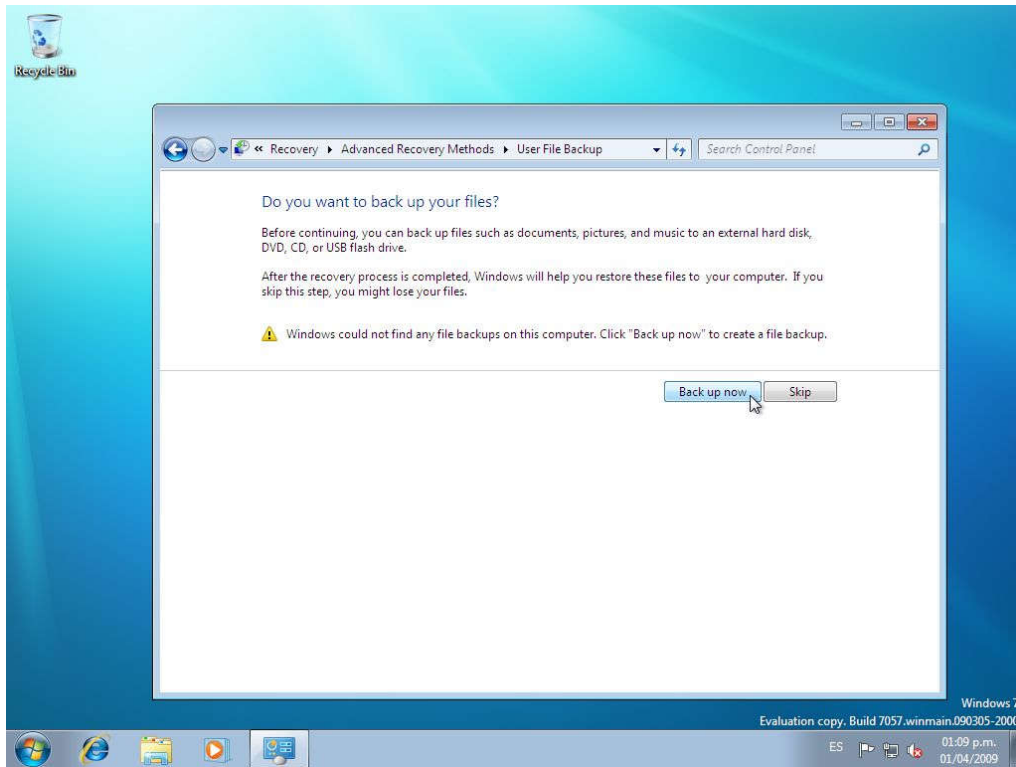
Creating a Windows 7 Hard Disk Recovery Solution



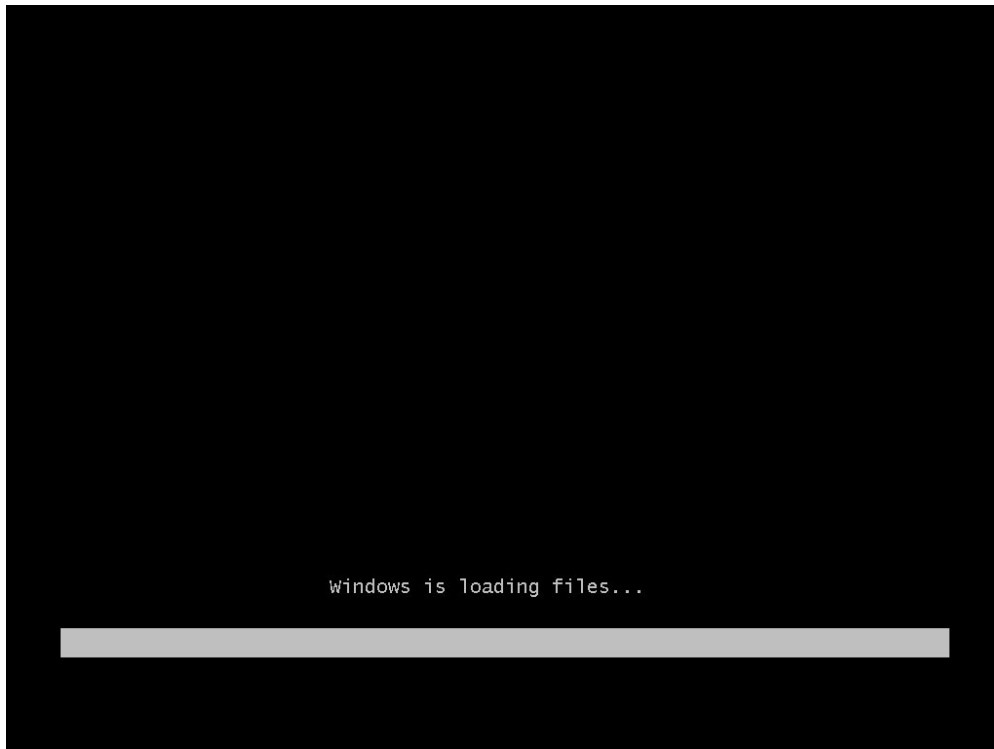
7. Select "Reinstall Windows" option.



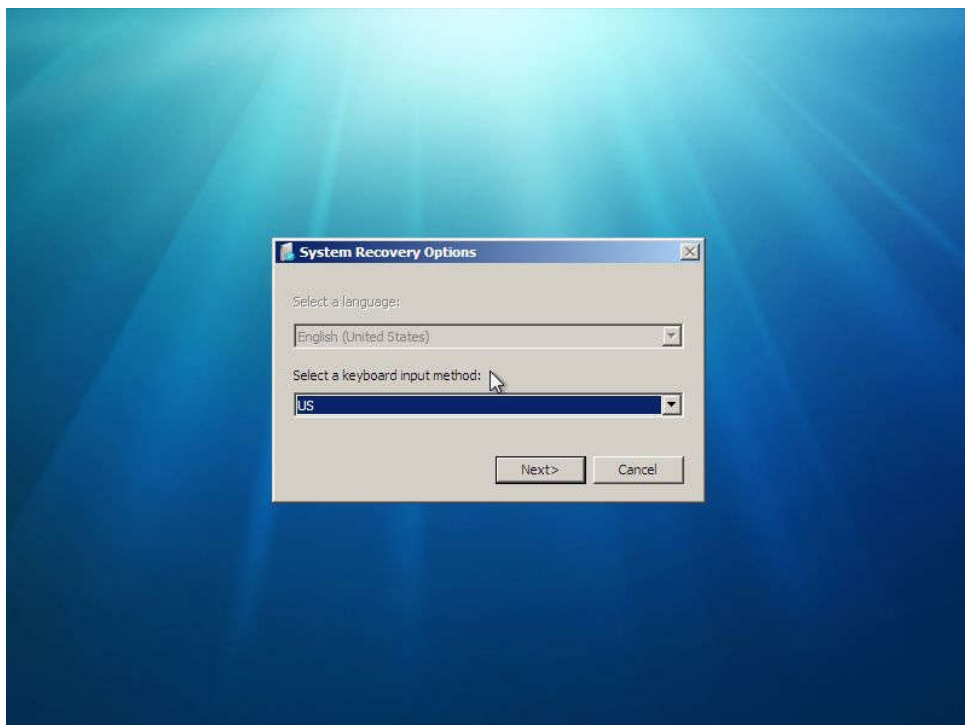
8. Follow the on-screen instructions if you want to back up your files. Then, the computer will restart.



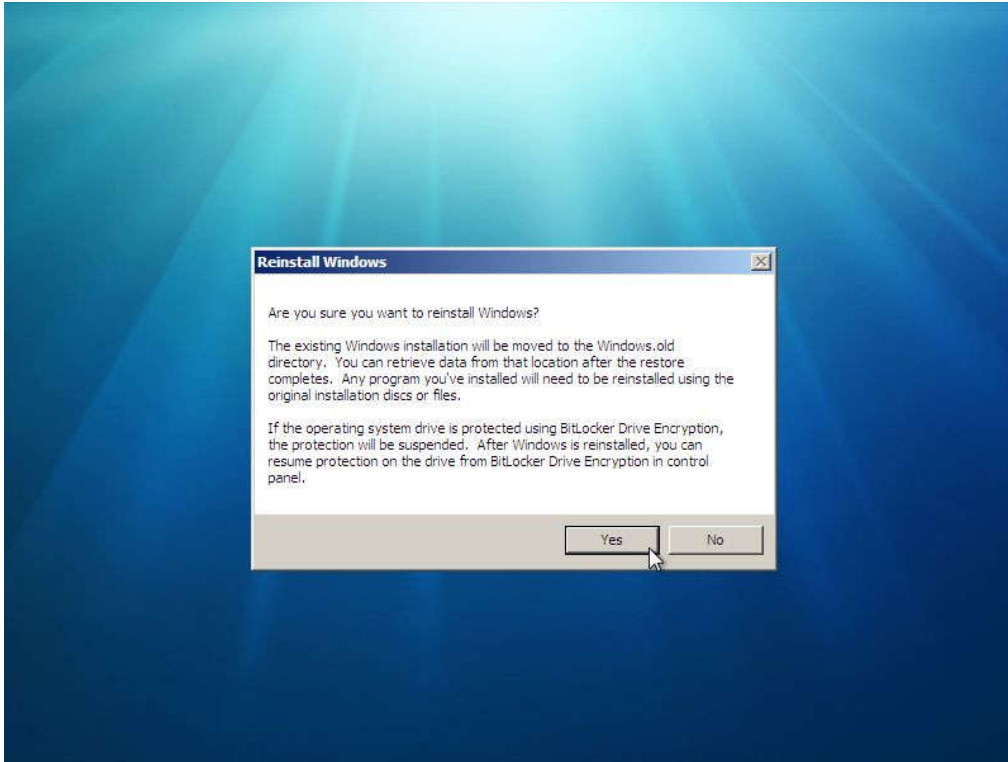
9. Verify that the computer starts in Windows RE.



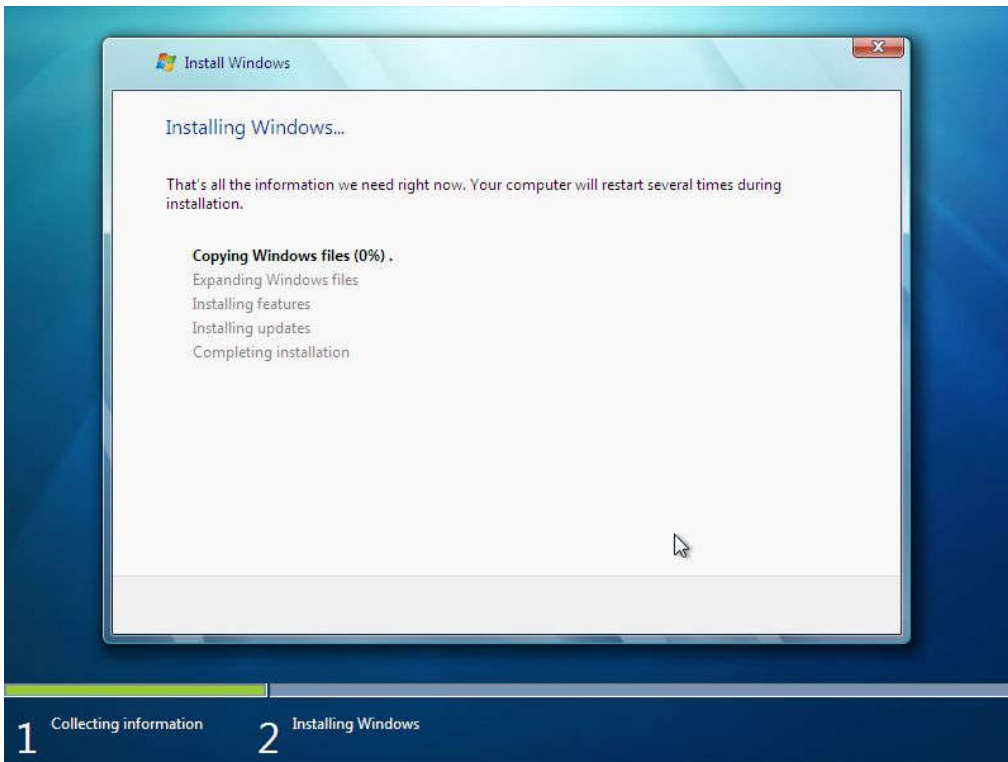
10. From the **System Recovery Options** dialog box, select a language and keyboard layout.



11. Click the **Yes** button to reinstall Windows using the image you placed in the recovery partition.

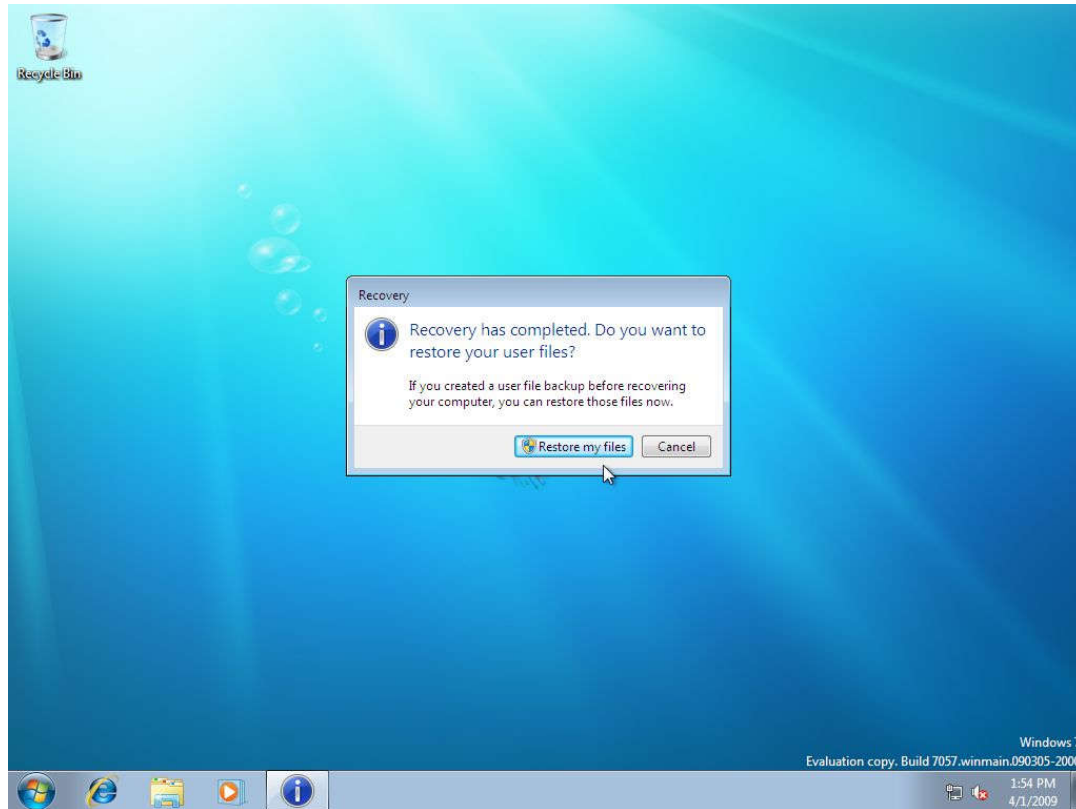


Note: By selecting Yes, Windows will begin the reinstallation of Windows using the recovery image you created.



12. Once the Windows Setup is complete, the PC will boot to OOBE. Complete **Windows Welcome**.

Note: If you create a backup prior to the restore, you'll have the option to restore the backup.

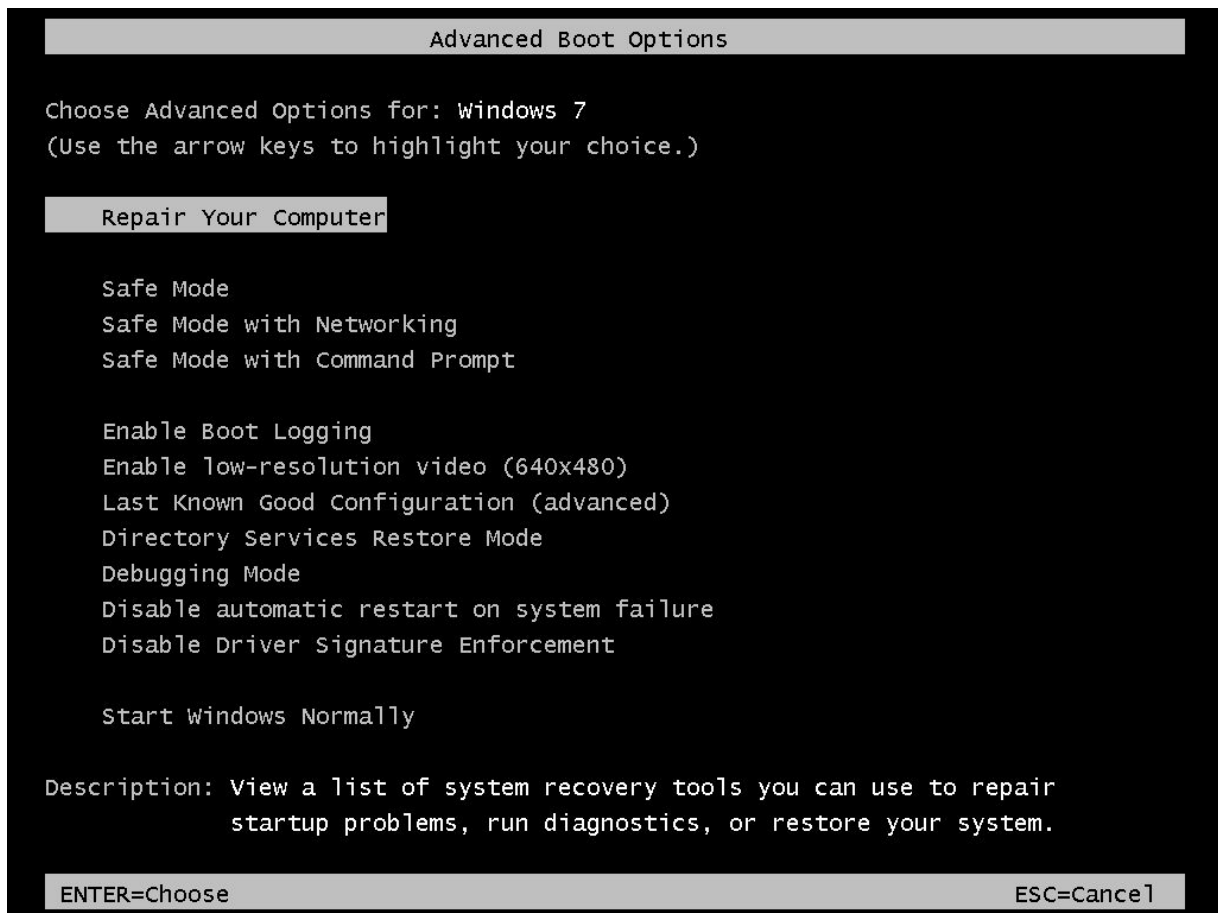


Step 4.3: Testing the recovery solution using the Advanced Boot Options

The **Advanced Boot Options** menu lets you start Windows in advanced troubleshooting modes. You can access the menu by turning on your computer and pressing the F8 key before Windows starts. Accessing the **Advanced Boot Options** menu allows access to the **Repair Your Computer** option. By selecting the **Repair Your Computer** you'll be able to reach the **System Recovery Options** menu to access the recovery options.

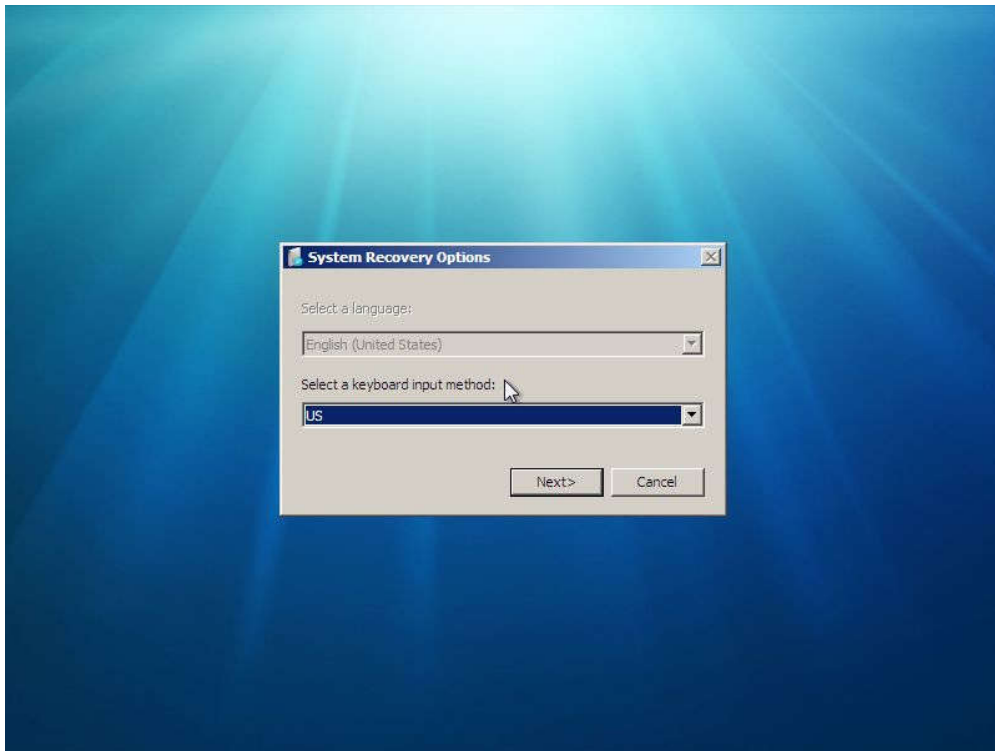
To access the **Advanced Boot Options** perform the following tasks.

1. Turn on the master computer.
2. Press F8 before Windows starts.

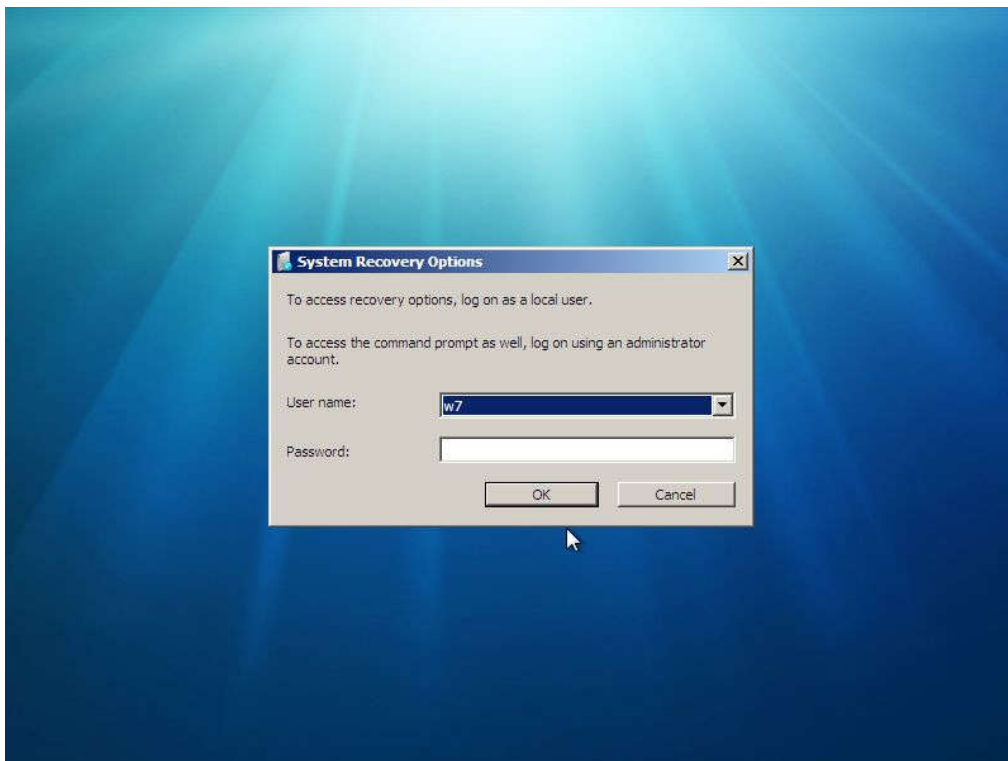


Note: If Windows starts, you did not press F8 within the appropriate time allows. Shutdown the computer and try again.

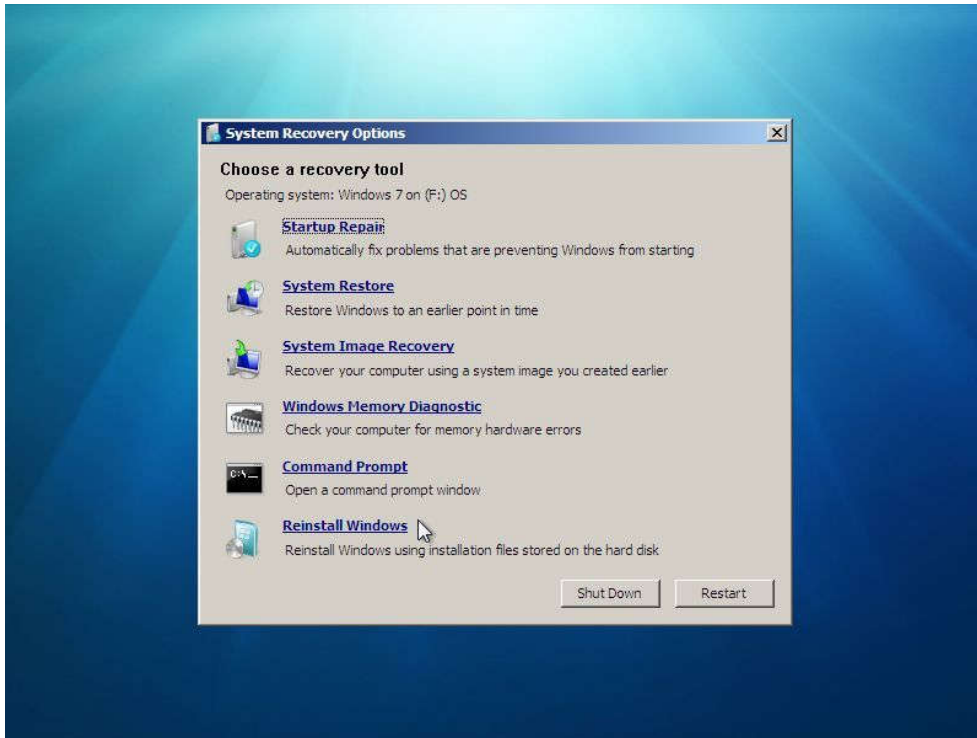
3. From the **System Recovery Options** dialog box, select a language and keyboard layout.



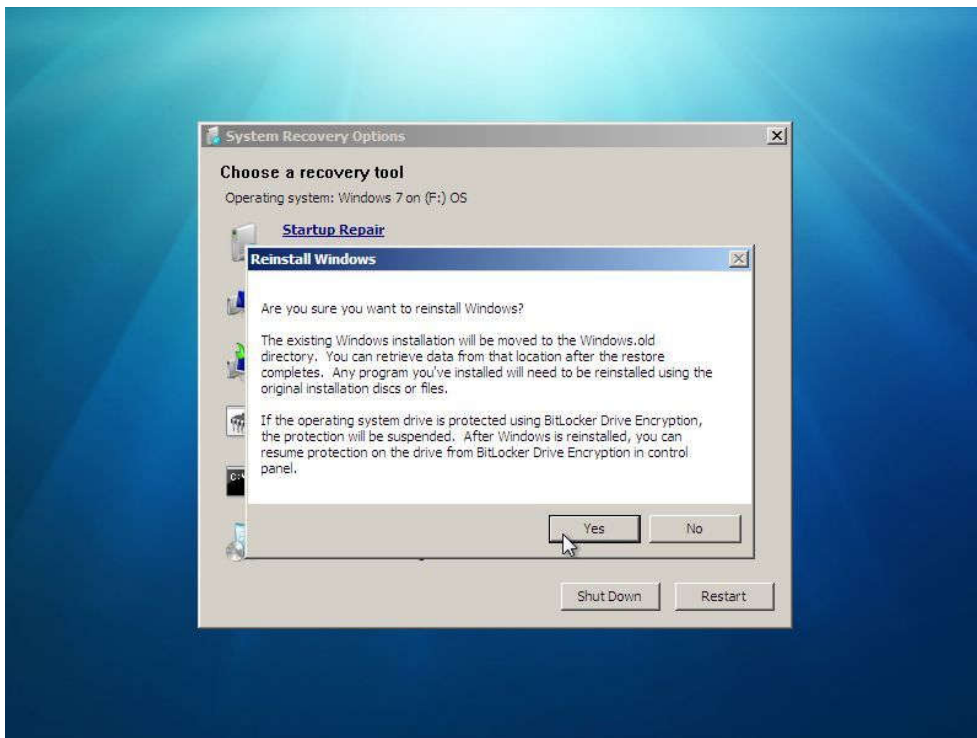
4. Select the user you created.



5. Select Reinstall Windows.



6. Click the Yes button to start the reinstallation of Windows using the image you placed in the recovery partition.



A note about Windows.old

Returning Windows to original settings doesn't completely delete everything on the computer. It deletes programs, but saves user files to the Windows.old folder on the root directory of the hard disk, which can be accessed after the reinstall completes. However, end users should still back up their files before using this method. For example, if an end user has encrypted files, they might not be able to access them after reinstalling Windows. If the end user has backed up their files and then restored them after reinstalling Windows, they can delete the Windows.old folder.