Intel® NUC

Installing Microsoft Windows* 7 from USB Flash Drives onto USB 3.0 Computers

1 Introduction

1.1 Document Scope

The following document details the installation of a non-xHCI operating system (ex. Windows 7) on Intel platforms which do not include EHCI controllers (e.g. Intel® NUC Kits NUC5PPYH and NUC5CPYH). The document is intended for the end user.

1.2 Overview

As computer platforms become more efficient, the need for legacy controller logic becomes less beneficial. Many PCs now include xHCI USB controllers which allow for the support of USB 3.0 and higher USB speeds. This inclusion of xHCI controllers has lessened the need for EHCI USB controllers within platforms. However, legacy operating systems (OS) may not natively recognize xHCI controllers. This document is designed to aid in the USB-based installation of non-xHCI legacy operating systems on PCs without EHCI USB controllers.

1.3 Intended Usage

This document is intended to aid end users in the USB-based installation of Windows* 7 OS on platforms which do not support EHCI USB controllers. Other non-Windows 7 OSes are not covered in this document. Web-based or HDD/SSD-based OS installations do not require this solution and are outside of this document's functional scope.

1.4 Terminology

Term	Description
EHCI	Enhanced Host Controller Interface
HDD	Hard Disk Device
SSD	Solid State Device
xHCI	Extensible Host Controller Interface
DISM	Deployment Image Servicing and Management tool
DISM GUI	DISM tool with a Graphical User Interface

2 Functionality

2.1 Functional Overview

The process to install Windows 7 from a USB flash drive includes:
- Creating a USB flash drive installer from a Windows 7 DVD or ISO image
- Obtaining the proper USB 3.0 drivers for your platform
- Optionally, downloading the *DISM GUI** tool
- Modifying *install.wim* installation image with USB 3.0 drivers. This will add them to the Windows 7 operating system image that is ultimately installed to the target computer
- Modifying *boot.wim* boot image with USB 3.0 drivers. This will add them to the installation environment so USB mouse and keyboard will function during the installation procedure
- Committing changed images to the USB flash drive.

Assumptions:
- You have a valid copy of Microsoft Windows 7 on ISO or DVD
- Your administrator console system is running Windows 7 or later
- You have administrator access to the system running as administrator console
- If using the optional *DISM GUI* tool, your administrator console system has .NET Framework 4.0 installed
- You have at least 10GB of free disk space on your administrator console system
- You are familiar with Windows Administrator Tools and Accessories.

2.2 Functional Steps

2.2.1 Create USB Flash Drive Installer
- Use your Windows 7 DVD or ISO image to create a bootable USB flash drive. Instructions on how to do this may be found on Microsoft's website: https://www.microsoft.com/en-us/download/windows-usb-dvd-download-tool
- Leave the flash drive connected to your administrator console system.

2.2.2 Copy *install.wim* and *boot.wim* to Console
- Create a temporary working directory on your administrator console, such as C:*WIM*.
- Create a mount point under your working directory: *C:\WIM\MOUNT*.
- Locate the *boot.wim* and *install.wim* image files in the *sources* directory on your Windows 7 flash drive.
- Copy both these files to your working directory. It is strongly recommended that, if you have disk space (approximately 3GB), to make a second unmodified copy of these files.

2.2.3 Obtain USB 3.0 Drivers
- Download USB 3.0 drivers to your administrator console. The latest USB 3.0 drivers for Intel NUC Kits NUC5PPYH and NUC5CPYH may be downloaded from Intel Support's Download Center: https://downloadcenter.intel.com/
- Extract but do not install the USB 3.0 drivers. You will need both the Host Controller and USB Hub drivers appropriate for the image type of your Windows 7 image, either 32-bit (*x86*) or 64-bit (*x64*). Create a folder in your working directory and copy the *x86* or *x64* folders to that location (e.g., *C:\WIM\USB3\x86* or *C:\WIM\USB3\x64*).

2.2.4 Launch *DISM* or *DISM GUI* (optional)

The following steps may be performed from the command line in an Administrator Command Prompt window or with an optional graphical interface tool called *DISM GUI*, available for download from: https://dismgui.codeplex.com/

- Launch an Administrator Command Prompt window, or run *DISM GUI* as administrator.

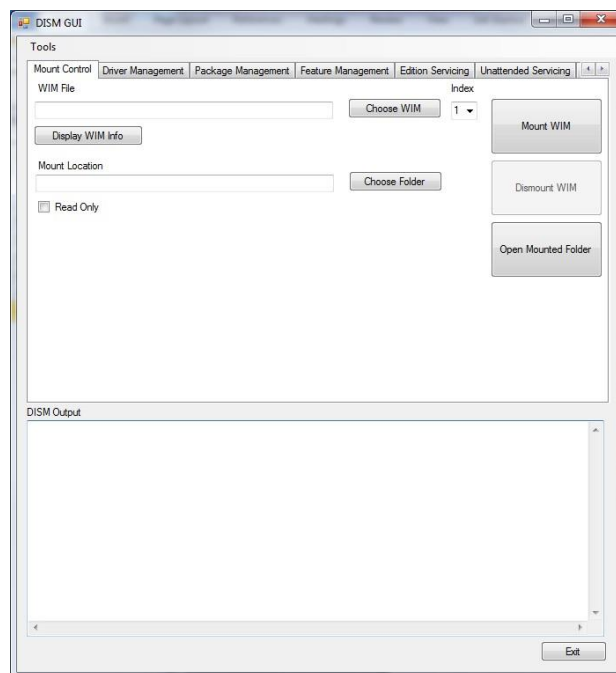**Figure 1. Administrator Command Prompt**

Figure 2. *DISM GUI*

*Note: The *DISM GUI* tool only supplies a graphical interface for the version of *DISM* already resident on your administrator console system. For the purposes of this guide, the version of *DISM* that is supplied with Windows 7 Enterprise (6.1.7600.16385) was used for all examples. Your results may vary depending upon the version of *DISM* you are using.

2.2.5 Mount *install.wim* Image

Navigate to *C:\WIM*. Mount the *install.wim* image with write permissions.

- From the Administrator Command Prompt:

```
DISM /Mount-WIM /WimFile:"C:\wim\install.wim" /index:4 /MountDir:"C:\wim\mount"
```

  *Note: Set `/index`: to `1 – 4` depending on the version of Windows 7 you are using:
  - `1`   = Home Basic
  - `2`   = Home Premium
  - `3`   = Professional
  - `4`   = Ultimate

- From *DISM GUI*:
  A.   Under the **Mount Control** tab, click on the **Choose WIM** button. Navigate to where you copied *install.wim* (*C:\WIM* in the example) and click **Open**.
  B.   Choose the proper index number (listed above) from the drop-down menu under **Index.**
  C.   Click on the **Choose Folder** button for the **Mount Location**. Browse to the proper folder (C:\WIM\MOUNT in the example) and click **OK**.
  D.   Verify the **Read Only** checkbox is clear and click on the **Mount WIM** button.
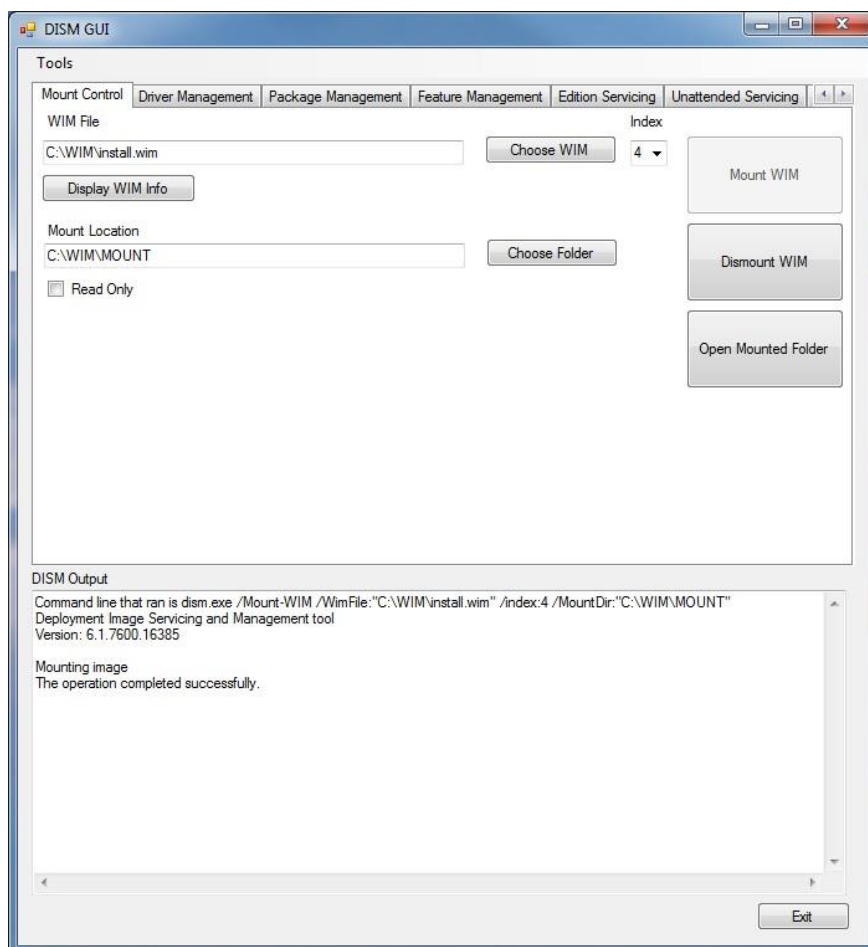

Figure 3. Mounting *install.wim* with *DISM GUI*

The mounting process may take a few minutes, depending upon the speed of your administrator console system and the size of the *install.wim* file.

*Note: As you can see in **Figure 3**, the *DISM GUI* tool will display the *DISM* command line that was used under ***DISM Output***. For the remainder of this guide we will focus on using the *DISM GUI* tool. If you wish to continue using the Administrator Command Prompt, simply copy the command found in the ***DISM Output*** window of each *DISM GUI* figure.

2.2.6   Add USB 3.0 Drivers to *install.wim* Image

A.   In the *DISM GUI* tool, select the ***Driver Management*** tab, then click on the **Choose Driver Folder** button. Select the location of your USB 3.0 drivers and click **OK**.

B.   Verify the ***Recurse*** checkbox is selected.

C.   If your drivers are unsigned, or reported to be unsigned, select the ***Force Unsigned*** checkbox.
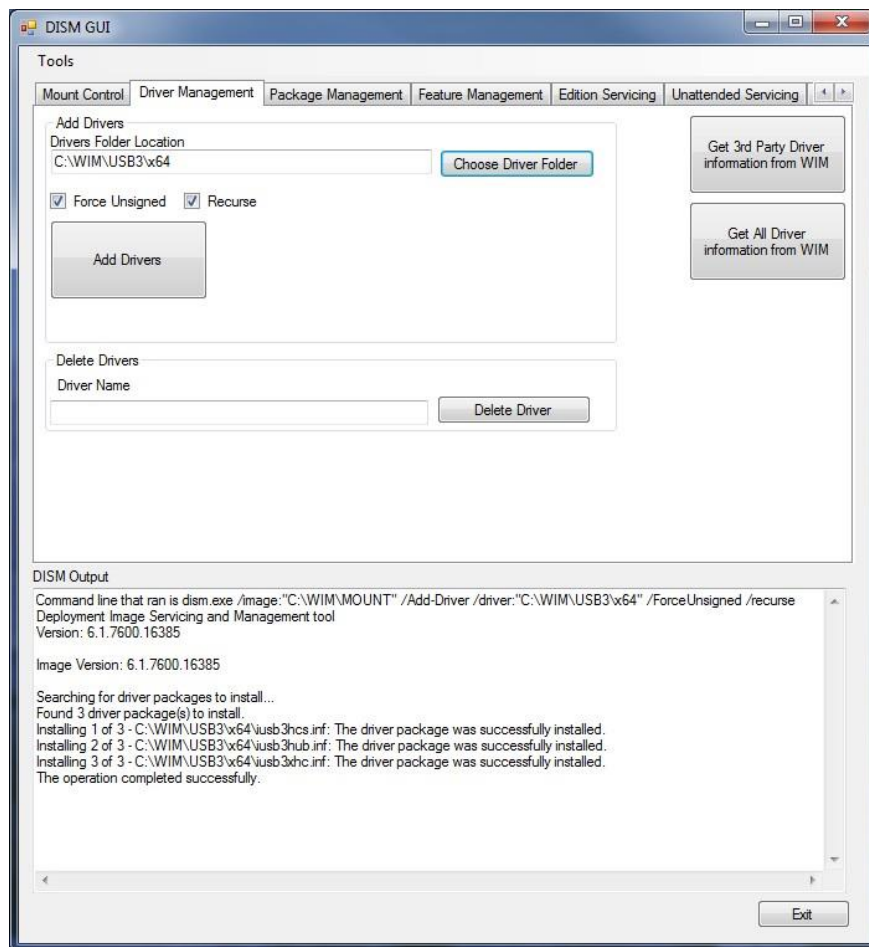
D.   Click **Add Drivers**.

Figure 4. Adding USB 3.0 Drivers to *install.wim*

2.2.7 Commit Changes to *install.wim* Image and Unmount

A. Under the ***Mount Control*** tab, click on **Dismount WIM** button.

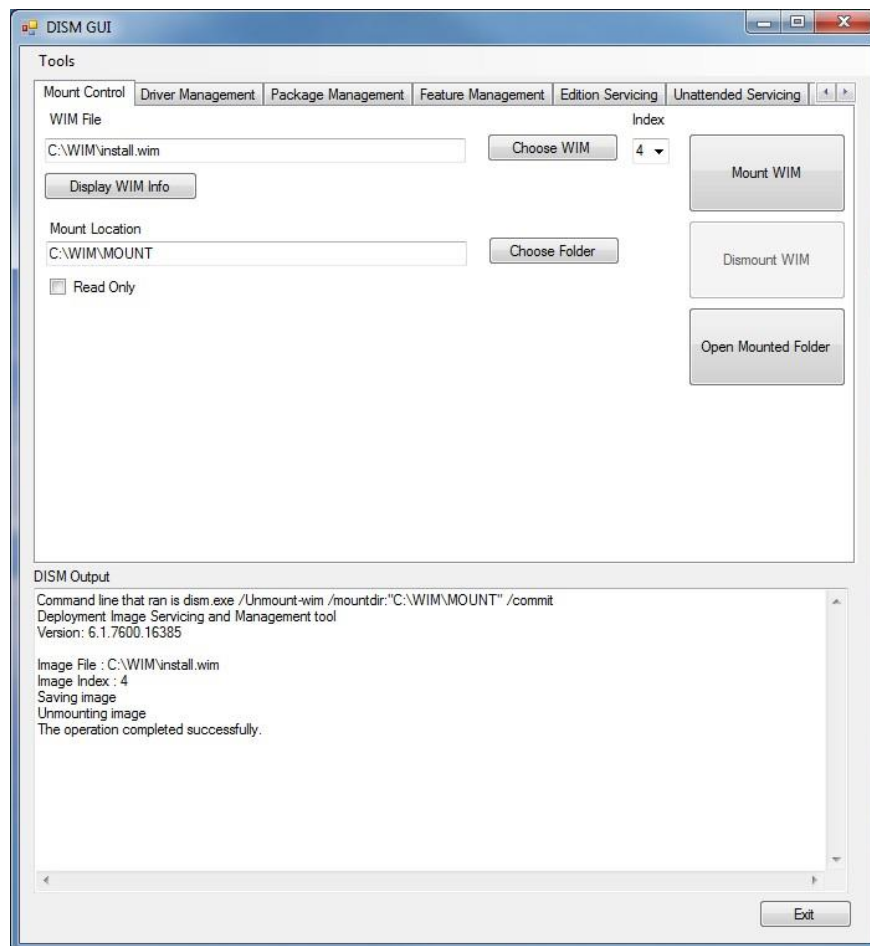B. Select **Yes** to commit the changes. This may take a few minutes.

Figure 5. Committing Changes and Unmounting *install.wim*

USB 3.0 drivers also need to be added to the *Windows PE* and *Windows Setup* indices in the *boot.wim* image for them to be part of the OS installation.

2.2.8   Mount *boot.wim* Image Index 1 (*Windows PE*)

A.   Under the ***Mount Control*** tab, click on the **Choose WIM** button. Navigate to where you copied *boot.wim* (*C:\WIM* in the example) and click **Open**.

B.   Choose index number **1** (for *Windows PE*) from the drop-down menu under ***Index.***

C.   The ***Mount Location*** should still contain the appropriate folder. If not, click on the **Choose Folder** button for the ***Mount Location***. Browse to the proper folder (C:\WIM\MOUNT in the example) and click **OK**.

D.   Verify the ***Read Only*** checkbox is clear and click on the **Mount WIM** button.

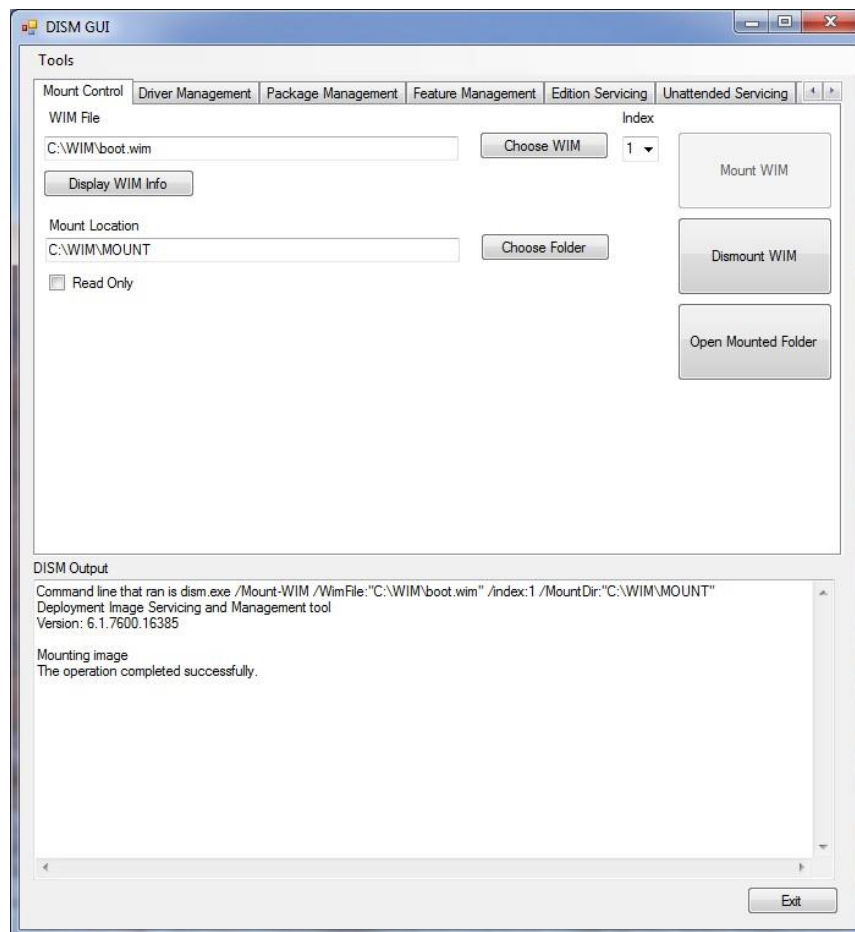The mounting process will take about ten to fifteen seconds as the image is much smaller.

Figure 6. Mounting *boot.wim* Image, Index 1 (*Windows PE*)

2.2.9 Add USB 3.0 Drivers to *boot.wim* Image

A. Select the *Driver Management* tab. Everything should still be set up from adding them to the previous image. If not, click on the **Choose Driver Folder** button. Select the location of your USB 3.0 drivers and click **OK**.
B. Verify the *Recurse* checkbox is selected.
C. If your drivers are unsigned, or reported to be unsigned, select the *Force Unsigned* checkbox.
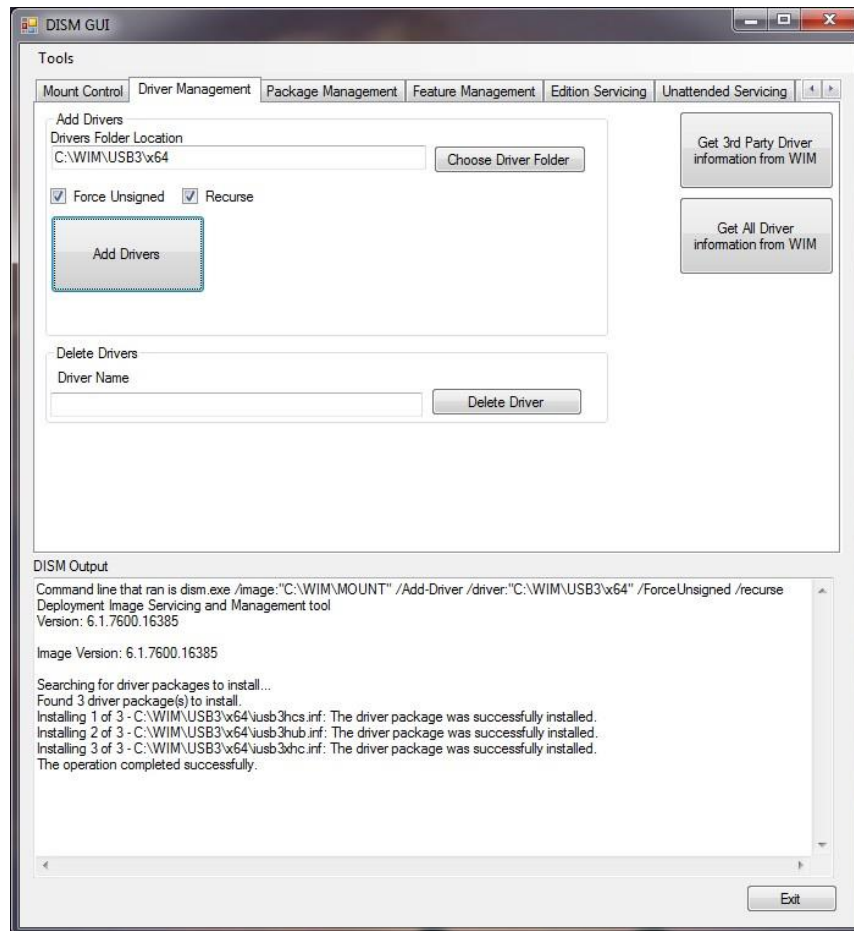D. Click **Add Drivers**.

Figure 7. Adding USB 3.0 Drivers to *boot.wim*

2.2.10 Commit Changes to *boot.wim* Image and Unmount

A. Under the *Mount Control* tab, click on **Dismount WIM** button.

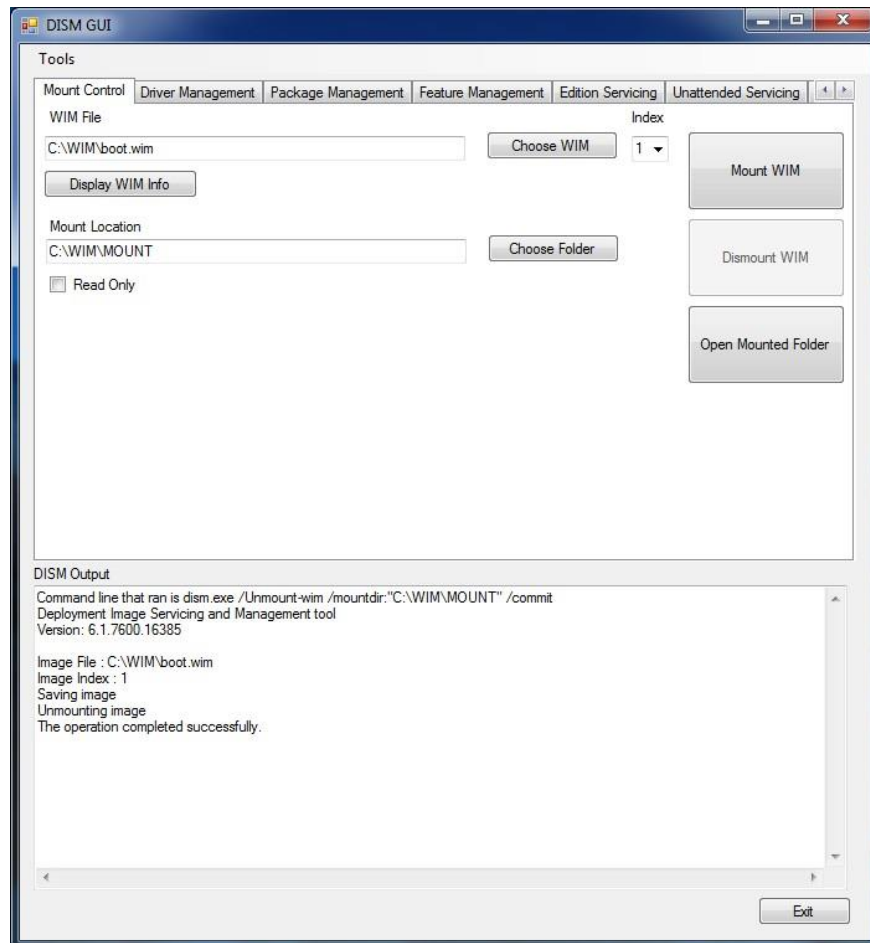B. Select **Yes** to commit the changes. This will take about 30 seconds to finish.

Figure 8. Committing Changes and Unmounting *boot.wim* Index 1 (*Windows PE*)

2.2.11 Mount *boot.wim* Image Index 2 (*Windows Setup*)

A. Under the ***Mount Control*** tab, you should see *boot.wim* still listed as the WIM file from the previous step. If not, click on the **Choose WIM** button. Navigate to where you copied *boot.wim* (*C:\WIM* in the example) and click **Open**.

B. Choose index number **2** (for *Windows Setup*) from the drop-down menu under ***Index.***

C. The ***Mount Location*** should still contain the appropriate folder. If not, click on the **Choose Folder** button for the ***Mount Location***. Browse to the proper folder (C:\WIM\MOUNT in the example) and click **OK**.

D. Verify the ***Read Only*** checkbox is clear and click on the **Mount WIM** button.

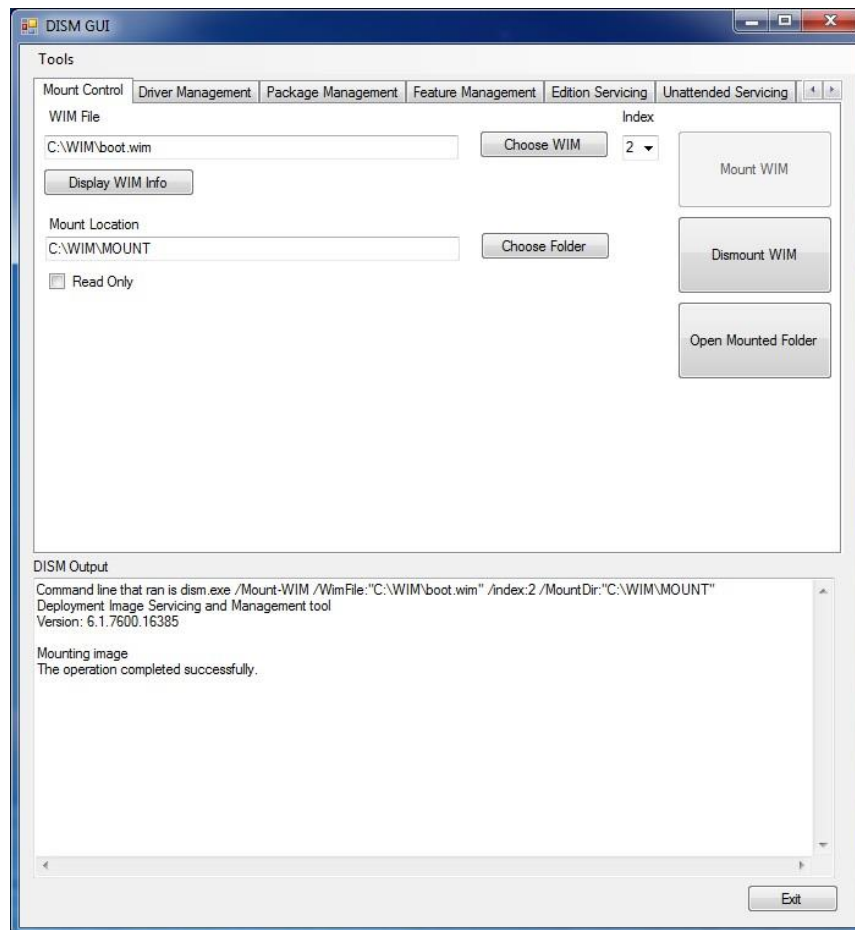The mounting process will take about ten to fifteen seconds.

Figure 9. Mounting *boot.wim* Image, Index 2 (*Windows Setup*)

2.2.12 Add USB 3.0 Drivers to *boot.wim* Image

A. Select the ***Driver Management*** tab. Everything should still be set up from adding them to the previous image. If not, then click on the **Choose Driver Folder** button. Select the location of your USB 3.0 drivers and click **OK**.

B. Verify the ***Recurse*** checkbox is selected.

C. If your drivers are unsigned, or reported to be unsigned, select the ***Force Unsigned*** checkbox.
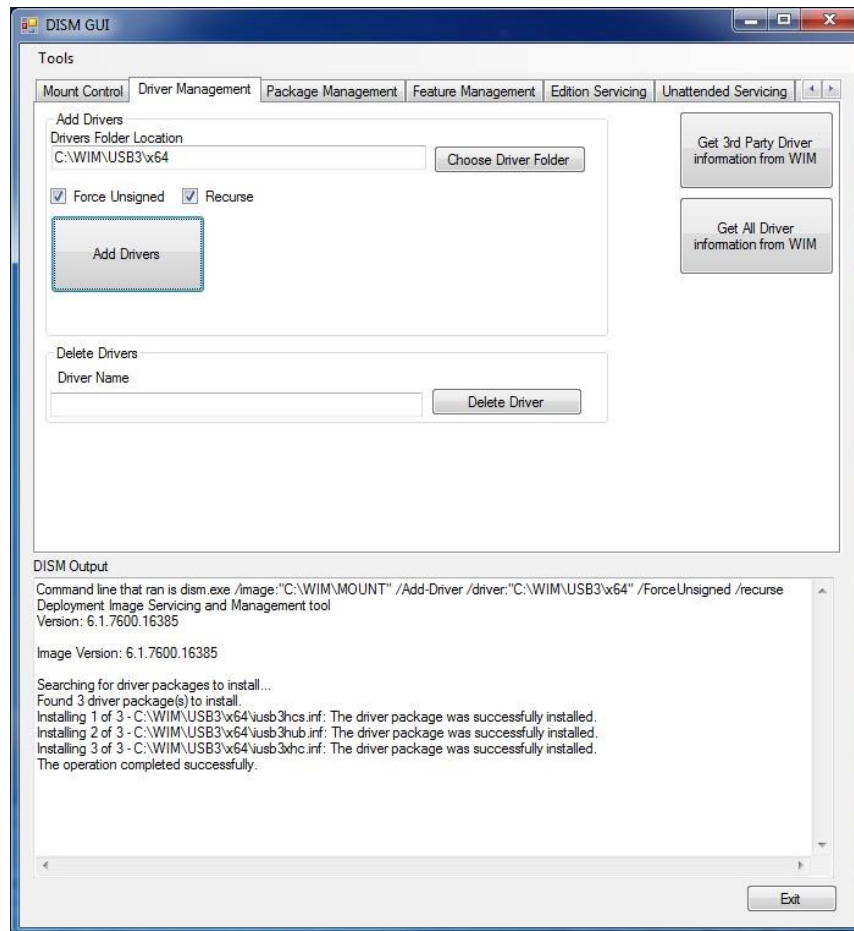
D. Click **Add Drivers**.

Figure 10. Adding USB 3.0 Drivers to *boot.wim*

2.2.13 Commit Changes to *boot.wim* Image and Unmount

A. Under the ***Mount Control*** tab, click on **Dismount WIM** button.

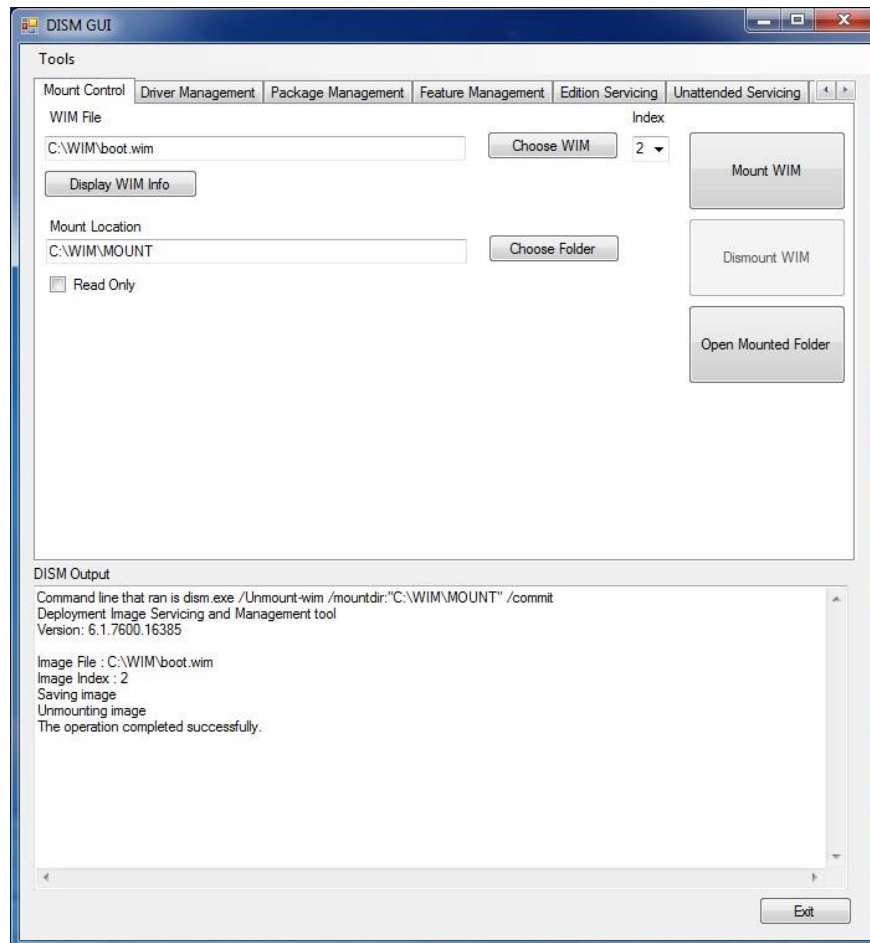B. Select **Yes** to commit the changes. This will take about 30 seconds to finish.

Figure 11. Committing Changes and Unmounting *boot.wim* Index 2 (*Windows Setup*)

2.2.14 Restore Modified WIM files to USB Flash Drive Installer

A. Copy the newly-modified *install.wim* and *boot.wim* files back to the *sources* directory of the Windows 7 USB Flash Drive Installer, overwriting the original files.

B. Eject and remove the USB Flash Drive from your administrator console system.

2.2.15 Install Windows 7

A. Insert the modified Windows 7 USB Flash Drive into the target computer.

B. Boot from the USB Flash Drive and install Windows 7 as usual.

USB mouse and keyboard functions should be present throughout the installation process, as well as when the target computer is rebooted onto the new Windows 7 installation.