

## Introduction

The Windows® Automated Installation Kit (Windows AIK) is designed to help IT professionals deploy the Windows operating system. This same toolkit is used to deploy Windows Thin PC.

This document demonstrates a basic example of how to configure and deploy a Windows Thin PC image. At the end of this process, you will have a valid answer file, a bootable Windows Preinstallation Environment (Windows PE) CD, and you will have deployed your first custom Windows Thin PC image. After creating this basic answer file, you can modify it to include additional customizations. You can also automate parts of the process by scripting some of the manual steps in this scenario. For a comprehensive description of all the tools and deployment methods, see the Windows Automated Installation Kit (Windows AIK) User's Guide (Waik.chm) or <http://go.microsoft.com/fwlink/?LinkId=121503>.

In this example, you build a basic answer file, and then install Windows Thin PC using that answer file. This process includes:

- Step 1: Building an Answer File
- Step 2: Building a Reference Installation
- Step 3: Creating Bootable Windows PE Media
- Step 4: Capturing the Installation onto a Network Share
- Step 5: Deploying from a Network Share

## Requirements

To complete this scenario, you need the following:

- **Windows Thin PC product DVD disc**
- **Windows AIK DVD disc.**

You can download the Windows AIK .iso file from <http://go.microsoft.com/fwlink/?LinkId=136976>.

- **A technician computer**

A *technician computer* can be any computer on which you will install the Windows Automated Installation Kit (Windows AIK). The technician computer must be running Windows Server® 2003, Windows Vista®, or Windows 7 (32-bit recommended). This computer also requires a network adapter, a working network environment, a DVD-ROM drive, and a CD-R/RW-capable drive (or a combination drive that supports both).

- **A reference computer**

A *reference computer* is a fully assembled computer on which you install a customized installation by using the Windows Thin PC product DVD and an answer file. Once installed, you capture and store an image of the installation on a network share. There are no software requirements for this computer. Both technician and reference computers require a network adapter and a working network environment.

### Note

The disk-partition requirements are different between BIOS-based and UEFI-based computers. This guide describes how to create an answer file for BIOS-based computers. Most 32-bit and many 64-bit computers are BIOS-based.

- **Network connectivity**
- **A USB flash drive (UFD)**
- **CD-ROM burning software**
- **One blank CD-R/RW disc**
- **Optional: a destination computer**

The *destination computer* is the computer that you intend to deploy to an end user. After you build a reference installation, you will capture and store an image of that installation on a network share. You will then deploy the image from the network share onto the destination computer.

### Note

For this example, you can reuse the reference computer as your destination computer. After you capture and store an image of the reference installation, you can then reformat the hard drive of the reference computer, returning it to a blank state. The computer will then become your destination computer.

## Install the Windows AIK

To install the Windows AIK:

1. Insert the Windows AIK DVD into the technician computer's DVD-ROM drive.  
The Setup program automatically starts.
2. Follow the online instructions.

### Note

If the Setup program does not start automatically, in Windows Explorer, browse to the DVD drive containing the Windows AIK DVD, and then click **StartCD.exe**. Click **Windows AIK Setup** to begin the installation.

## Step 1: Building an Answer File

The first step in creating a custom installation is to build an answer file. You use an answer file to configure Windows Thin PC settings during installation. For example, you can configure the default Internet Explorer settings, networking configurations, and other customizations. Additionally, the answer file contains all of the settings that are required for an unattended installation. During installation, you will not be prompted with user interface pages.

In this section, you will create an answer file using Windows System Image Manager (Windows SIM), a utility for creating and modifying unattended answer files and configuration sets. A simple answer file includes basic Windows Thin PC Setup configuration and minimum Windows Welcome customizations. This example does not import any special drivers, applications, or packages.

After you install the Windows AIK on your technician computer, a sample of this answer file, `Corp_autounattended_sample.xml`, will be available at `C:\Program Files\Windows AIK\Samples`.

### To create an answer file

In this step, you copy a Windows image file (.wim) as well as the image catalog file (.clg) to your technician computer and create an answer file.

1. On your technician computer, insert the Windows Thin PC product DVD.
2. Navigate to the `\Sources` directory on your DVD-ROM drive and copy the `Install.wim` and `ThinPC.clg` files from the Windows Thin PC product DVD to a location on the computer.
3. To open Windows SIM, click **Start**, click **All Programs**, click **Microsoft Windows AIK**, and then click **Windows System Image Manager**.
4. On the Windows SIM **File** menu, click **Select Windows Image**.
5. In the **Select a Windows Image** dialog box, navigate to the location where you saved `ThinPC.clg` in Step 1, and then click **Open**.  
If you are prompted to approve the program by a **User Account Control** window, you can select to allow the program or cancel the installation.
6. On the **File** menu, click **New Answer File**.  
An empty answer file appears in the **Answer File** pane.

## Add and Configure Windows Settings

In this step, you define basic disk configuration and Windows Welcome settings.

1. In the Windows SIM **Windows Image** pane, expand the **Components** node to display available settings.
2. On the expanded list of components, add the components in the table below to your answer file by right-clicking the component, and then selecting the appropriate configuration pass. This action adds the component to your answer file in the specified configuration pass, or phase, of installation. Adding the optional components allows you to more easily test your installation in Step 2, Building a Reference Installation.

### Note

Expand the component list in the Windows Image pane until you see the lowest child node from the table below. For example, expand `Microsoft-Windows-Setup` to see the `DiskConfiguration` node. Expand the `DiskConfiguration` node until you see the `Disk` node. Continue expanding the tree under `Microsoft-Windows-Setup` until you see the `CreatePartition` node listed in the table below. Add this `CreatePartition` node to your answer file. This shortcut adds the setting and all parent settings to your answer file in one step.

Component	Configuration pass
Microsoft-Windows-Deployment\Reseal	oobeSystem
Microsoft-Windows-International-Core-WinPE\SetupUILanguage	windowsPE
Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	windowsPE
Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	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
Microsoft-Windows-Shell-Setup\OOBE	oobeSystem
Optional: Microsoft-Windows-IE-InternetExplorer	specialize

\* This example uses a two-partition configuration. Add a second CreatePartition and a second ModifyPartition component to your answer file by right-clicking the component in the Windows SIM **Windows Image** pane, and then by selecting the appropriate configuration pass. This action adds a second instance of the CreatePartition and ModifyPartition components to your answer file.

3. All of the settings you added must appear in the Windows SIM **Answer File** pane. Under **Settings**, select the appropriate setting and, in the right-hand column, enter the appropriate value as specified in the following table.

**Configuration Pass: WindowsPE**

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\DiskConfiguration	WillShowUI = <b>OnError</b>
Microsoft-Windows-Setup\DiskConfiguration\Disk	DiskID = 0 WillWipeDisk = <b>true</b>
Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	Order = 1 Size = 200 Type = <b>Primary</b>
Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	Extend = <b>true</b> Order = 2 Type = <b>Primary</b>
Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	Active = <b>true</b> Format = <b>NTFS</b> Label = <b>System</b> Order = 1 PartitionID = 1
Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	Format = <b>NTFS</b> Label = <b>Windows</b> Order = 2 PartitionID = 2

Component	Value
Microsoft-Windows-Setup\ImageInstall\OSImage	InstallToAvailablePartition = <b>false</b> WillShowUI = OnError
Microsoft-Windows-Setup\ImageInstall\OSImage\InstallTo	DiskID = <b>0</b> PartitionID = <b>2</b>
Microsoft-Windows-Setup\UserData	AcceptEula = <b>true</b>
Microsoft-Windows-Setup\UserData\ProductKey	Key = <product key> WillShowUI = <b>OnError</b>

**Configuration Pass: Specialize**

Component	Value
<i>Optional:</i> Microsoft-Windows-IE-InternetExplorer	Home_Page = <Company Home Page>

**Configuration Pass: oobeSystem**

Component	Value
Microsoft-Windows-Deployment\Reseal	ForceShutdownNow = <b>false</b> Mode = <b>Audit</b>
Microsoft-Windows-Shell-Setup\OOBE	HideEULAPage = <b>true</b> ProtectYourPC = <b>3</b> SkipUserOOBE = <b>true</b>

**Important**

These settings outline a basic unattended installation in which no user input is required during Windows Thin PC Setup. When the installation is complete, the computer will reboot to audit mode. Audit mode is a stage of Windows Thin PC Setup that enables you to quickly boot to the desktop, install additional applications and device drivers, and test the installation. Windows Welcome does not run in audit mode, but it will run the next time the computer restarts, once you have run the **sysprep** command with the **/oobe** option. Windows Welcome, also called Machine OOBE (out-of-box experience), prompts the end user to read the Microsoft Software License Terms and to configure the computer.

For more information about audit mode, see the *Customize Windows in Audit Mode* topic in the Windows Automated Installation Kit (Windows AIK) User's Guide (Waik.chm) or <http://go.microsoft.com/fwlink/?LinkId=121506>.

For more information about Sysprep.exe, see the *Sysprep Technical Reference* topic in the Waik.chm or <http://go.microsoft.com/fwlink/?LinkId=121713>.

**Validate and Save Settings**

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

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 Thin PC image.
2. If the answer file validates successfully, a "No warnings or errors" message appears in the **Messages** pane at the bottom of the **Windows SIM** window. Otherwise, error messages appear in the **Messages** pane.
3. If an error occurs, double-click the error message in the **Messages** pane to navigate to the incorrect setting. Change the setting to fix the error, and then validate again by clicking **Validate Answer File**. Repeat this step until the answer file validates.
4. On the **File** menu, click **Save Answer File**. Save the answer file as **Autounattend.xml**.
5. Copy the Autounattend.xml file to the root directory of a USB flash drive (UFD).

You now have a basic answer file that automates Windows Thin PC Setup. For more information about building answer files, see the *Phase 3: Preparing and Customizing Your Windows Image* topic in the Waik.chm or this <http://go.microsoft.com/fwlink/?LinkId=121501>.

## Step 2: Building a Reference Installation

A reference computer has a customized installation of Windows Thin PC that you plan to duplicate onto one or more destination computers. You can create a reference installation by using the Windows Thin PC product DVD and an answer file.

### To install Windows Thin PC from the product DVD

1. Turn on the reference computer and insert the Windows Thin PC product DVD and the UFD containing the answer file you created in the previous step (Autounattend.xml).

#### Important

When using a UFD, insert the drive into the primary set of USB ports for the computer. For a desktop computer, this is typically in the back of the computer.

2. Restart the computer by pressing the CTRL+ALT+DEL keys. To boot from the DVD-ROM disc, you may have to override the boot order. During initial boot, select the appropriate function key to override the boot order. Windows Thin PC Setup (Setup.exe) will begin automatically. By default, Windows Thin PC Setup will search the root directory of all removable media for an answer file called Autounattend.xml.
3. After Setup finishes, you can validate that all customizations were applied. For example, if you set the Home\_Page setting for Internet Explorer in your answer file, you can verify it now by opening Internet Explorer.
4. Prepare the computer for the end user. Use the **sysprep** command with the **/generalize** option to remove hardware-specific information from the Windows Thin PC installation, and the **/oobe** option to configure the computer to boot to Windows Welcome upon the next restart. In the **System Preparation Tool (Sysprep)** window that is displayed on the desktop in audit mode:
  - a. Select **Enter System Out Of Box Experience (OOBE)** from the System Cleanup Action list
  - b. Select **Generalize**
  - c. Select **Shutdown** from the **Shutdown Options** list
  - d. Click **OK**

#### Note

You can also run the Sysprep tool from a command prompt by typing: `c:\windows\system32\sysprep\sysprep.exe /oobe /generalize /shutdown`

Sysprep.exe prepares the image for capture by cleaning up various user- and computer-specific settings, as well as log files. The reference installation now is complete and ready to be imaged.

#### Caution

When you run the **sysprep /generalize** command, out-of-box device drivers are removed from the Windows Thin PC image. If you add out-of-box device drivers during installation and you intend to capture the Windows Thin PC image, set the **PersistAllDevice-Installs** setting of the **Microsoft-Windows-PnpSysprep** component to **True** in the answer file. When you do this, Sysprep does not remove the detected device drivers.

You now have a computer that you can use as your reference computer. When deploying a large number of computers, it may be more efficient to capture an image of the reference installation, and then deploy that image onto other new computers. Alternatively, you can repeat Step 2 for each new computer.

To continue with this installation as a reference for image-based deployment, follow steps 3-5.

### Step 3: Creating Bootable Windows PE Media

In this step, you create a bootable Windows PE RAM disk on a CD-ROM disc by using the Copype.cmd script. Windows PE RAM enables you to start a computer for the purposes of deployment and recovery. Windows PE RAM boots directly into memory, enabling you to remove the Windows PE media after the computer boots. Once you have booted into Windows PE, you can use the ImageX tool to capture, modify, and apply file-based disk images. For more information about these tools, see the Deployment Tools Technical Reference topic in the Waik.chm or <http://go.microsoft.com/fwlink/?LinkId=121497>.

1. On your technician computer, click **Start**, point to **All Programs**, point to **Windows AIK**, right-click **Deployment Tools Command Prompt**, and then select **Run as administrator**.

The menu shortcut opens a Command Prompt window and automatically sets environment variables to point to all the necessary tools. By default, all tools are installed at C:\Program Files\Windows AIK\Tools.

2. At the command prompt, run the Copype.cmd script:

```
copype.cmd <architecture> <destination>
```

where <architecture> can be x86 or amd64 and <destination> is a path to a local directory. The script creates the following directory structure and copies all the necessary files for that architecture.

For example

```
copype.cmd x86 c:\winpe_x86 will create ISO and mount folders underneath c:\winpe_x86
```

3. Copy the WinPE boot image into the ISO\sources folder

```
copy "c:\program files\Windows AIK\Tools\PETools\<architecture>\winpe.wim"  
<destination>\ISO\Sources\boot.wim
```

where <architecture> coincides with the architecture specified in step 2 above and <destination> is a path to the local directory used in step 2 above.

For example

```
copy "c:\program files\Windows AIK\Tools\PETools\x86\winpe.wim" c:\winpe_x86\ISO\Sources\boot.wim
```

4. Copy ImageX into \Winpe\_x86\ISO. For example, type:

```
copy "c:\program files\Windows AIK\Tools\x86\imagex.exe" c:\winpe_x86\iso\
```

This will place a copy of ImageX.exe on the bootable DVD allowing you to run ImageX.exe when you boot from the CD to capture a deployed image for deployment to additional systems.

#### Note

You can create an optional configuration file called Wmscript.ini that will instruct the ImageX tool to exclude certain files during the capture operation. Wmscript.ini should be saved to the same location as the ImageX tool. For more information, see the *Create an ImageX Configuration File* topic in WAIK.chm.

5. Create a Windows PE image (.iso) file by using the Oscdimg tool from the **Deployment Tools Command Prompt**. For example, type:

```
oscdimg -n -bc:\winpe_x86\etfsboot.com c:\winpe_x86\ISO  
c:\winpe_x86\winpe_x86.iso
```

6. Burn the image (Winpe\_x86.iso) to a CD-ROM disc. Windows AIK does not include CD-ROM burning software. Use trusted third-party software to burn the image to a CD-ROM disc.

You now have a bootable Windows PE RAM CD containing the ImageX tool. For more information about Windows PE, see the *Windows Preinstallation Environment (Windows PE) User's Guide* (Winpe.chm).

## Step 4: Capturing the Installation onto a Network Share

In this step, you capture an image of your reference computer by using Windows PE and the ImageX tool. Then, you store that image onto a network share.

1. On your reference computer, insert your Windows PE media and restart the computer.

### Note

To boot from the CD/DVD-ROM drive, you may have to override the boot order. During initial boot, select the appropriate function key to override the boot order.

2. Windows PE starts, and then launches a **Command Prompt** window.
3. Capture an image of the reference installation by using the ImageX tool located on your Windows PE media. For example, at a command prompt, type:

```
e:\imagex.exe /capture d: d:\myimage.wim "my Win7 Install" /compress fast /verify
```

4. Copy the image to a network location. You can do this because Windows PE provides network support. For example, at a command prompt, type:

```
net use y: \\network_share\images  
copy d:\myimage.wim y:
```

5. If necessary, provide network credentials for appropriate network access.

## Step 5: Deploying from a Network Share

After you have an image of your reference installation, you can deploy the image onto new hardware.

In this step, you use the DiskPart tool to format the hard drive, and then you copy an image from the network share. For this example, you can use your reference computer as your destination computer.

1. On your destination computer, insert your Windows PE media and restart the computer by pressing the CTRL+ALT+DEL keys.

### Note

If this was your reference computer, the hard drive contains an active partition. You must override the boot order to boot from the CD/DVD-ROM drive. During initial boot, select the appropriate function key to override the boot order. If this is a newly assembled computer, the hard drive is unformatted and you can skip this step.

2. Windows PE starts, and then launches a **Command Prompt** window.
3. Format the hard drive to reflect the disk configuration requirements by using the DiskPart tool from the Windows PE **Command Prompt** window. For example, type:

```
diskpart  
select disk 0  
clean  
create partition primary size=200  
select partition 1  
format fs=ntfs label="system"  
assign letter=c  
active  
create partition primary  
select partition 2  
format fs=ntfs label="Windows"  
assign letter=d  
exit
```

**Note**

You can create a script with this information by saving it to a text file and by storing it in the same location as your image. To run the script from a Windows PE **Command Prompt** window, type:

```
diskpart /s <scriptname>.txt
```

where <scriptname> is the name of the text file that includes the Diskpart commands.

4. Copy the image from the network share to your local hard drive. For example, at a command prompt, type:

```
net use y: \\network_share\images  
copy y:\myimage.wim d:
```

5. If necessary, provide network credentials for appropriate access.
6. Apply the image to the hard drive by using the ImageX tool located on your Windows PE media. For example, at a command prompt, type:

```
e:\imagex.exe /apply d:\myimage.wim 1 d
```

7. Use BCDboot to initialize the Boot Configuration Data (BCD) store and copy boot environment files to the system partition. For example, at a command prompt, type:

```
d:\windows\system32\bcdboot d:\windows
```

8. For more information about BCDboot, see the *BCDboot Command-Line Options* topic in the Waik.chm or <http://go.microsoft.com/fwlink/?LinkId=121711>.

Your custom image is now deployed onto your destination computer. The computer is ready for customer delivery. Repeat Step 5: Deploying from a Network Share for each additional computer that you deliver.

You have now completed a basic end-to-end deployment scenario by using an image-based deployment method. You have successfully created your first answer file, a bootable Windows PE CD, and your first custom Windows Thin PC image. You also have a basic understanding of how to use Windows SIM and the ImageX and Windows PE technologies.

## Next Steps

The next step is to make additional customizations to your answer file and to expand your knowledge of the deployment tools. For more information about customizing and deploying your Windows Thin PC image, see the *Windows Automated Installation Kit Scenarios* topic in the Waik.chm or <http://go.microsoft.com/fwlink/?LinkId=120339>.