

Windows XP Professional

Chapter 2 - Automating and Customizing Installations

For organizations with many computers, automating the installation of Microsoft® Windows® XP Professional is more efficient and cost effective than using the interactive Setup program. You can use Windows XP Professional tools to add specific files and applications and to distribute customized installations with little or no user interaction.

In This Chapter

Overview of Automated and Customized Installations
 Choosing an Automated Installation and Customization Tool
 Preparing for the Installations
 Customizing the Installations
 Installing the Operating System
 Additional Resources

Related Information

- For more information about installing Windows XP Professional by using the interactive Setup program, see "Supporting Installations" in this book.
- For more information about planning Windows XP Professional deployments, see "Planning Deployments" in this book.

Overview of Automated and Customized Installations

Windows XP Professional includes several tools that enable you to design and deploy automated and customized installations. These tools provide different types of functionality for a variety of deployment scenarios. Each tool has specific strengths and limitations that you can evaluate to determine which tool is most appropriate for your environment. For more information about the baseline requirements for each of the tools, see "Choosing an Automated Installation and Customization Tool" later in this chapter.

Windows XP Professional includes the following automated and customized installation tools:

- **Unattended Installation (unattended Setup).** The two unattended installation tools, Winnt32.exe and Winnt.exe, are in the \i386 folder on the Microsoft® Windows® XP Professional operating system CD.
- **System Preparation Tool (Sysprep).** Sysprep is in the Deploy.cab file in the \Support\Tools folder on the Windows XP Professional operating system CD.
- **Remote Installation Services (RIS).** RIS is included in Microsoft® Windows® 2000 Server.

You can also use Systems Management Server (SMS) to deploy Windows XP Professional. For information about Systems Management Server (SMS), see the Microsoft Systems Management Server link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

An automated installation runs with minimal or no user interaction. During an automated installation, the Setup program uses configuration information provided by an answer file. Answer files are text files containing settings that would otherwise be manually provided by end-users. Answer files provide answers to questions that the Setup program asks during installation. In addition, answer files can contain instructions for running programs and applications.

A custom installation is a modification of a standard Windows XP Professional installation that supports specific hardware and software configurations and meets specific user needs. You can customize an installation by modifying the answer file to provide the Setup program with specific answers and instructions. You can also design a custom installation to add custom files, applications, and programs to the distribution folder.

You can automate and customize a Windows XP Professional installation to include applications, additional language support, service packs, and device drivers.

Design an Automated and Customized Installation

Windows XP Professional provides several tools for automating and customizing installations for a variety of software and hardware configurations. Before you choose a tool, assess your current configuration and evaluate your needs. With this information, you can choose the deployment tool that is most appropriate for your organization. The tool you choose also affects the customization options that you use and the procedures you must follow to implement your deployment scenario.

You can automate and customize how you install Windows XP Professional by following this process:

- **Assess your current configuration and plan your deployment.** Before you choose a tool, collect information about the types of users in your company and their needs, about the desktop environments of your users, and about your network. For information about planning Windows XP Professional deployments, see "Planning Deployments" in this book.
- **Choose an automated installation and customization tool.** The automated installation and customization tools support a variety of installation scenarios. Each of the tools is designed to take advantage of specific environments. Evaluate the tools to determine which tool or combination of tools best fits your organization. For more information about evaluating the tools, see "Choosing an Automated Installation and Customization Tool" later in this chapter.
- **Prepare for the installations.** Verify that you have the software and hardware you need, create a distribution folder, and use Setup Manager to create an answer file. For more information about software and hardware preparation, see "Preparing for the Installations" later in this chapter.
- **Customize the installations.** Design the Windows XP Professional desktop by adding hardware devices, device drivers, support information, passwords, custom language options, and applications. For more information about customizing answer files and installing applications, see "Customizing the Installations" later in this chapter.
- **Install the operating system.** Test the customized installation of Windows XP Professional. After successful testing, conduct the full-scale deployment. For more information about operating system installation, see "Installing the Operating System" later in this chapter. For more information about testing your installation before actually deploying it, see "Planning Deployments" in this book.

Windows Product Activation

To help prevent software piracy, you must use Windows Product Activation for each installation of Windows XP Professional that is not covered by a volume license or that is not preactivated by an original equipment manufacturer (OEM). You can set Windows Product Activation by using a unique product key for each computer in a bulk deployment. Create a separate answer file for each computer and then assign a unique value to ProductKey in the [UserData] section of each individual answer file. (ProductKey is a new name for the ProductID key that was used in Microsoft® Windows® 2000.)

For an automated installation, you can add Autoactivate = Yes to the [Unattended] section of the answer file to make product activation occur automatically. If your computer is connected to the Internet through a firewall on a network that does not support Web Proxy Autodiscovery Protocol, you can also add AutoactivateProxy = Proxy to the [Unattended] section of the answer file. The

AutoactivateProxy key enables you to configure the proxy setting so that activation by using the HTTPS protocol can traverse a firewall.

If you add AutoactivateProxy = Proxy to the [Unattended] section of the answer file, you can also add an optional [Proxy] section to the answer file. The [Proxy] section can contain keys and values as shown in the following example:

```
[Proxy]
Proxy_Enable = 1
Use_Same_Proxy = 1
HTTP_Proxy_Server = myproxyserver:80
Proxy_Override = <local>
```

If you specify a proxy setting in the answer file, you must also specify a branding value, as shown in the following example:

```
[Branding]
BrandIEUsingUnattended = Yes
```

You can also use a Uniqueness Database File (UDF) to provide information that is specific to a single client computer, such as the value specified in the ProductKey key. The .udf file provides information that overrides and replaces a section of the answer file or appends additional sections to an existing answer file.

To support disk imaging as a deployment option, Windows Product Activation also adds activation rollback to the standard System Preparation tool (Sysprep) and the standard Remote Installation Preparation tool (Riprep). However, activation rollback is not supported for evaluation media or for MSDN media.

For more information about Windows Product Activation, see "Planning Deployments" in this book. For more information about activation rollback, see "How Sysprep Works with Windows Product Activation" and "Using the Remote Installation Preparation Tool" later in this chapter. You can also perform automated activation after you install Windows XP Professional by using the Windows Management Instrumentation (WMI) provider in Windows Product Activation.

Dynamic Update

Microsoft regularly provides reliability and compatibility improvements, and also provides emergency fixes for security issues. Some of these updates might not be available on the Windows XP Professional operating system CD.

Updates are assembled into Dynamic Update packages, which are available on the Windows Update Web service. You can access Dynamic Update packages by selecting **Yes, download the updated setup files** on the **Get Updated Setup Files** screen of the Windows Setup wizard. Setup then downloads and installs the updated files instead of using the equivalent files on the Windows XP operating system CD.

For more information about downloading Dynamic Update packages, see the Dynamic Update link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

If a Dynamic Update package is available and you downloaded the package during setup, expand the downloaded package to display the .cab files. The package can contain one of the four .cab files shown in Figure 2.1. Figure 2.1 shows the structure of the network share folder and the relative location of each subfolder.

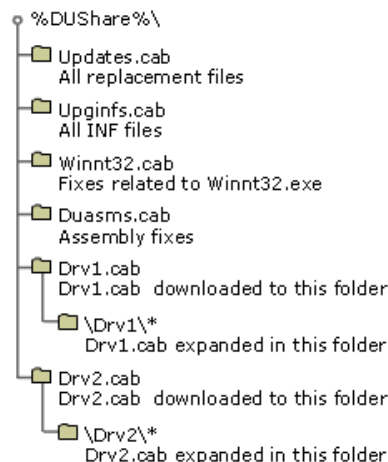


Figure 2.1 Network share folder structure

Processing Dynamic Update .cab files and driver .cab files on the network share

To process the Dynamic Update .cab files and all the driver .cab files that you downloaded from Windows Update, run Winnt32.exe with the **/DUPPrepare** parameter pointing to the location of the downloaded .cab files, as shown in the following example:

```
Winnt32 /DUPPrepare: path to CAB files
```

Installing the dynamic update package

To install Windows XP Professional and use the processed Dynamic Update .cab files, you can run Winnt32.exe with the **DUShare** parameter, or you can specify in your answer file where Setup can find the processed .cab files. When you run Winnt32.exe with the **/DUShare** parameter, the Dynamic Update wizard is not displayed to the user and no attempt is made to connect to Windows Update.

The update files are copied from the share into the appropriate folders under %windir%\Setupupd. Setup searches the installation media for device drivers. If a device driver is not found, Setup searches the driver folder in the Dynamic Update share. Setup finds and installs a device driver.

To run Setup and connect to the Dynamic Update Share

- At the command line, type:

```
Winnt32 /DUShare:path to dynamic update share
```

When you run Setup in unattended mode and specify a dynamic update share to connect to, dynamic update is disabled by default; the Dynamic Update wizard is not displayed to the user, and no attempt is made to connect to Windows Update.

To specify a Dynamic Update share in Unattend.txt

- In the [Unattend] section of the Unattend.txt answer file, include the following key and value:

```
[Unattend]
DUShare = "Path to dynamic update share"
```

Choosing an Automated Installation and Customization Tool

The following questions and guidelines help you determine which of the automated installation and customization tools is most appropriate for your environment. The guidelines describe baseline requirements for each of the tools.

Do the client computers have the same Hardware Abstraction Layer (HAL) as the reference computer?

Before you can determine which tool to use, you have to find out if the client computers have Hardware Abstraction Layers (HAL) that are compatible with the reference computer. If the client and reference computers do not have compatible HALs, you cannot use Sysprep or the Remote Installation Preparation tool (Riprep.exe), which is a component of RIS. For example, if the reference computer has a Standard PC HAL, the destination computer must have the same Standard PC HAL. If the reference computer has an Advanced Configuration and Power Interface (ACPI) PC HAL, the destination computer must have the same ACPI PC HAL.

Note Standard PC and ACPI PC are the names of HALs that are detected during the initial phase of a Windows XP Professional installation, before Sysprep.exe or Riprep.exe are run.

Do the client computers have a fast and reliable network connection?

If the client and reference computers have compatible HALs, you have to determine if the network connections are fast and reliable enough to enable you to use RIS. If the client computers are not connected to a network, you cannot use RIS. If the network connections are not fast and reliable, RIS is not the appropriate tool to use.

Determine whether there is a Windows 2000 Server–based network infrastructure in place. Identify existing network protocols. Determine the speed of network links.

Table 2.1 lists key issues related to assessing your network infrastructure and describes how these issues can help you determine which tool to use.

Table 2.1 Some Important Issues for Assessing the Network Infrastructure

Issue	Effect on Your Plan
Network infrastructure	Network protocols determine how you customize the networking sections of the answer file, including [NetAdapters], [NetProtocols], and [NetServices].
Network bandwidth	Network bandwidth might affect your choice of installation tool and method. For example, locations that do not have a high-bandwidth connection to a network server might use a CD-ROM or other local installation method instead of RIS for clean installations.
Windows 2000 Server network infrastructure	Remote Installation Services (RIS) is a good option if you have an existing Windows 2000 Server infrastructure that is combined with the following: <ul style="list-style-type: none"> · High-bandwidth network connections. · Client computers that have remote boot-compliant network adapters that support Pre-Boot eXecution Environment (PXE) technology. You can use a Windows 2000 Server that is configured as a RIS server to copy and automatically distribute customized images of a Windows XP Professional installation to client computers over a network connection.

Do you want to upgrade an existing installation of the operating system?

If you are planning to perform a clean operating system installation on the client computers, you can use any of the installation tools. However, if you are planning to perform an operating system upgrade to the client computers, you cannot use RIS or Sysprep. Client computers running Microsoft® Windows® 3.x and Microsoft® Windows 95 cannot be upgraded to Windows XP Professional. You must perform clean installations on these client computers. Windows XP Professional supports upgrades from the following operating systems:

- Microsoft® Windows NT® Workstation, version 4.0
- Microsoft® Windows® 2000 Professional
- Microsoft® Windows® 98
- Microsoft® Windows® Millennium Edition (Windows Me)

Choosing to perform a clean installation is a good course of action if you plan to standardize the desktop computers across your organization. If you decide to perform a clean installation, you cannot migrate customized settings from the currently installed operating system.

Depending on the status of your deployment, you might have to upgrade many of your computers in addition to installing Windows XP Professional on new computers. If you plan to use currently installed applications on existing hardware, you must perform an upgrade.

Table 2.2 provides a brief overview of tool support for upgrades and clean installations.

Table 2.2 Tool Support for Upgrades and Clean Installations

Tool	Upgrade	Clean Installation
Unattended Installation	•	•
System Preparation Tool (Sysprep.exe)		•
Remote Installation Services (RIS)		•
Systems Management Server (SMS)	•	

Do you plan to deploy and maintain a large number of client computers?

The number of client computers in a deployment can help you determine which installation tool to use. For example, if you have a large number of computers, Remote Installation Services (RIS), Systems Management Server, or third-party disk-imaging utilities in conjunction with Sysprep are good choices. For a small number of computers, using the Winnt.exe or Winnt32.exe Setup tool in unattended mode might be sufficient.

Unattended Installation

Unattended installations use setup scripts to answer installation questions and to automate the Setup process. This simplifies the installation of the operating system. Use Setup Manager to create or customize answer files that contain setup scripts.

Winnt32.exe

You can use Winnt32.exe on computers that are running Windows 98, Windows Me, Windows NT Workstation 4.0, Windows 2000, or Windows XP Professional. Use Winnt32.exe to automate the upgrade process for numerous computers without user intervention.

Winnt.exe

Winnt.exe is a less versatile tool than Winnt32.exe. You cannot use Winnt.exe to perform an operating system upgrade, and you can only use Winnt.exe from within the MS-DOS preinstallation environment. To use Winnt.exe from a network boot floppy disk, run **winnt /u:unattend.txt /s:source path**.

When to Use Unattended Installation

Use the Winnt32.exe unattended installation tool to upgrade a large number of client computers that have different hardware and software configurations. Unattended installation uses an answer file called Unattend.txt. You can rename Unattend.txt to reflect different installation configurations.

Advantages of Unattended Installation

Unattended installations save time and money because users do not have to attend to each computer and answer questions during installation. Unattended installations can also be configured to enable users to provide input during the installation process. You can perform unattended installations to upgrade many computers at once or to automate clean installations of the operating system.

Disadvantages of Unattended Installation

You cannot use the unattended installation tools (Winnt32.exe and Winnt.exe) to create reference configurations that include applications and that replicate the configurations across your client computers.

Unattended installation must be initiated by someone who has direct access to each client computer.

Using a Windows XP Professional Operating System CD to Perform Unattended Installations

Use a Windows XP Professional operating system CD to initiate the installation of Windows XP Professional on client computers that are not connected to a network or on computers in low-bandwidth environments.

When to use a Windows XP Professional operating system CD to perform unattended installations

You can use a Windows XP Professional CD to install the operating system, fully configured for a network, on client computers that are not connected to a network.

Advantages of using a Windows XP Professional operating system CD to perform unattended installations

Using a Windows XP Professional Operating System CD is fast. It can save the time that is required for downloading system files from a network. Using a Windows XP Professional CD simplifies deployment of the operating system on computers that do not have high-speed connectivity.

Disadvantages of using a Windows XP Professional operating system CD to perform unattended installations

To use a Windows XP Professional operating system CD to initiate the installation of Windows XP Professional on client computers, you must be able to implement the following configuration requirements:

- The client computers must support the El Torito No Emulation CD boot specification.
- Installation must be initiated by someone who has direct access to each client computer.
- You must name the answer file Winnt.sif and place the Winnt.sif file in the root directory of a floppy disk. You must insert the floppy disk in the floppy disk drive of the client computer as soon as the computer starts from the CD.

System Preparation Tool

Disk imaging, which is also referred to as cloning, is a timesaving way to deploy Windows XP Professional. To clone a system, first configure a reference computer with the operating system, standard desktop settings, and applications that users need; then make an image of the reference computer's hard disk. Next, transfer the image to other computers, installing the operating system, settings, and applications quickly and without the need to configure each computer.

The System Preparation tool (Sysprep.exe) prepares the reference computer for cloning. Sysprep creates a unique security identifier (SID) for each cloned client computer, which makes this process secure. Sysprep detects Plug and Play devices and adjusts for systems with different devices.

You can run Setup Manager to select the screens you want displayed during Windows Welcome (Msoobe.exe) or during MiniSetup (if you use the **-mini** parameter).

These screens can be used to solicit user-specific information, such as user name or time zone selection. You can also provide these answers by using an answer file to deploy fully automated installations.

Important Sysprep performs the preparation of the system image; however, a cloning utility from a third party is required to create the image.

When to Use Sysprep

Use Sysprep to deploy clean installations in large organizations where hundreds of computers need the same applications and desktop configurations. Use Sysprep if the computers in your organization have only a few standard hardware configurations, rather than many custom configurations.

Sysprep enables you to duplicate a custom image from a reference computer to destination computers. The reference computer and the destination computers must have the same Hardware Abstraction Layer (HAL).

Advantages of Sysprep

Sysprep greatly reduces deployment time because nearly every component, including the operating system, applications, and desktop settings, can be configured without user interaction. The reference image can be copied to a CD and physically distributed to client computers, saving the time and network capacity required to load files across a network. Using Sysprep to deploy Windows XP Professional on numerous desktops in a large organization enables you to implement standardized desktops, administrative policies, and restrictions. Additionally, by default, Sysprep does not perform full hardware Plug and Play redetection, reducing this part of the installation process to just a few minutes (instead of 20 to 30 minutes for each computer).

Note Sysprep detects any new Plug and Play hardware during the MiniSetup Wizard; however, Sysprep does not detect hardware that is not -Plug and Play.

Disadvantages of Sysprep

If you use a third-party disk-imaging utility with Sysprep to copy a reference image onto physical media, you must be able to distribute the physical media to remote client computers. The size of the reference image is limited by the capacity of the CD (approximately 650 MB). Sysprep cannot be used to upgrade earlier versions of the operating system. To preserve existing content, you must arrange to back up data and user settings prior to the installation, and then restore the data and user settings after the installation.

Remote Installation Services

Remote Installation Services (RIS) enables you to perform a clean installation of Windows XP Professional, or a clean installation of any

version of Windows 2000 except Microsoft® Windows® 2000 Datacenter Server, on supported computers throughout your organization. You can simultaneously deploy the operating system on multiple clients from one or more remote locations.

Important To deploy Windows XP images from Windows 2000 RIS Servers, you must install the Windows 2000 Remote Installation Services update. For more information about the Windows 2000 Remote Installation Services update, see the Microsoft Knowledge Base link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>. Search the Microsoft Knowledge Base using the keywords *Risetup.exe*, *RIS Servers*, and *Windows XP Images*.

System administrators can use RIS to create and store one or more images of a supported operating system on a RIS Server. A RIS image can then be downloaded over a network connection by a client computer that supports the Pre-Boot eXecution Environment (PXE). You can completely automate the installation of the downloaded RIS image or you can require users to provide input by typing a computer name or an administrator password, for example.

To use Remote Installation Services, Windows 2000 Server must be deployed with Active Directory™ configured. Then, you can deploy Windows XP Professional by using the Pre-Boot eXecution Environment (PXE) technology that enables computers to boot from their network adapters. Administrators working with a RIS server can make a preconfigured image of Windows XP Professional available for installation on a client computer.

For computers that do not support Pre-Boot eXecution Environment (PXE) technology, Remote Installation Services includes a tool called the Remote Boot Floppy Generator (RBFGen.exe) that you can use to create a remote boot disk to use with RIS. You can use the RIS remote boot disk with supported network adapters that comply with the Peripheral Component Interconnect (PCI) specification.

When to Use Remote Installation Services

Use Remote Installation Services (RIS) on desktop computers that are newly added to a network or on which you want to perform a clean installation of the operating system. Use RIS when you want to standardize a Windows XP Professional configuration on new desktop computers or on computers with an existing operating system that you want to replace with Windows XP Professional.

Advantages of Remote Installation Services

Remote Installation Services offers a simple way to replace the operating system on a computer. RIS uses the Single Instance Store (SIS) method to eliminate duplicate files and to reduce the overall storage that is required on the server for system files. You can also use the Riprep option to install and configure a client computer to comply with specific corporate desktop standards.

The following list describes some of the important advantages of using RIS:

- You can standardize your Windows XP Professional installation.
- You can customize and control the end-user installation. You can configure the end-user Setup Wizard with specific choices that can be controlled by using Group Policy. For more information about Group Policy, see "Connecting Clients to Windows Networks" in this book.
- You do not need to distribute physical media, and image size is not constrained by the capacity of distributed physical media.

Disadvantages of Remote Installation Services

You can use Remote Installation Services only on client computers that are connected to a network that is running Windows 2000 Server with Active Directory. RIS is restricted to working on computers that are equipped with PCI-compliant network adapters that are enabled for PXE technology, or with the Remote Boot Floppy Generator (Rbfgen.exe) that is used to create a remote boot disk that can be used with supported PCI-compliant network adapters. RIS only works with images that have been created from drive C, and RIS cannot use images of other partitions on a hard disk. You cannot use RIS to upgrade an operating system; you can only use RIS for clean installations.

Systems Management Server

Systems Management Server (SMS) includes an integrated set of tools for managing Windows-based networks consisting of thousands of computers. Systems Management Server includes desktop management and software distribution tools to automate operating system upgrades.

When to Use Systems Management Server

In organizations that already use Systems Management Server to manage computers from a central location, SMS provides a convenient means for administrators to upgrade computers to Windows XP Professional.

You can only use Systems Management Server for upgrades of Windows-based client computers; you cannot use SMS for clean installations. For information about how administrators can plan for and implement a Windows XP Professional deployment by using Systems Management Server, see the Microsoft Systems Management Server link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

Advantages of Systems Management Server

You can upgrade computers in a locked-down or low-rights environment, and even upgrade computers after hours, without the user being logged on. Systems Management Server enables you to set deployment policies for specific client computers. Automatic load balancing between distribution points accommodates many concurrent upgrades.

As a primary advantage, Systems Management Server offers centralized control of the upgrade. For example, you can control when upgrades take place, which computers to upgrade, and how to apply network constraints.

Disadvantages of Systems Management Server

Systems Management Server is an efficient deployment tool for Windows XP Professional only if SMS is already being used within your network.

Where to Find the Tools and Related Information

Table 2.3 provides the locations of the tools and related information.

Table 2.3 Where to Find the Windows XP Professional Installation Tools and Documentation

Tool or Documentation	Go To
Winnt32.exe	\i386 on the Windows XP Professional operating system CD.
System Preparation tool (Sysprep.exe)	Deploy.cab in the\Support\Tools folder on the Windows XP Professional operating system CD. You can use Windows Explorer or you can run Extract.exe to extract Setupmgr.exe.
Remote Installation Services	Included in Windows 2000 Server.
Systems Management Server	Systems Management Server product CD.

Setup Manager (Setupmgr.exe)	Deploy.cab in the \Support\Tools folder on the Windows XP Professional operating system CD. You can use Windows Explorer or you can run Extract.exe to extract Setupmgr.exe.
Microsoft Windows XP Preinstallation Reference (Ref.chm)	Deploy.cab in the \Support\Tools folder on the Windows XP Professional operating system CD. You can use Windows Explorer or you can run the Extract.exe command to extract and view the Ref.chm file.
Microsoft Windows Corporate Deployment Tools User's Guide (Deploy.chm)	Deploy.cab in the \Support\Tools folder on the Windows XP Professional operating system CD. You can use Windows Explorer or you can run Extract.exe to extract and view the Deploy.chm file.

Preparing for the Installations

To prepare for an automated installation and customized deployment, compare the requirements of your design to the availability of the necessary software and hardware. In addition, learn how to create a distribution folder that can accommodate a variety of client computer configurations.

- **Verify hardware and software requirements.** There are distinct environmental baseline requirements for deployments that are built around each of the automated installation and customization tools. Make sure that you have evaluated the baseline requirements for the tool that you plan to use. Verify that your hardware and software configurations are capable of supporting these baseline requirements.
- **Create a distribution folder.** A distribution folder is a key component in designing a robust and versatile automated installation and customized deployment. You can create a single distribution folder for all your client computers, and you can design a distribution folder that all your answer files can reference.

Verify Hardware and Software Requirements

To determine whether the hardware components in your organization are compatible with Windows XP Professional, see the Hardware Compatibility List link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

Use the following guidelines to verify that your deployment scenario meets all of the hardware and software requirements.

Sysprep requirements

If you want to use Sysprep, your configuration must comply with the following guidelines:

- The reference and destination computers must have compatible HALs.
- You must have third-party disk-imaging software that can create binary images of a hard disk.

For more information, see "Requirements to Run Sysprep" later in this chapter.

RIS requirements

To use RIS, you must have a configuration that complies with the following guidelines:

- To use the Remote Installation Preparation (Riprep) component of RIS, the reference and destination computers must have compatible HALs.
- You must have a configuration that includes a Windows 2000 Server, the Dynamic Host Configuration Protocol (DHCP) service, Domain Name System (DNS), Active Directory, and RIS. The RIS server does not have to be the sole DNS/DHCP server or a domain controller for the domain, but it must be a member of the same domain as the client computers.
- The RIS server must contain a second partition separate from the boot partition. The second partition is required to install the Remote Installation Services. To accommodate the operating system installation images, you might want to dedicate an entire hard disk specifically to the RIS directory tree.

For more information, see "Remote Installation Services" later in this chapter.

Systems Management Server

You must have a current version of Windows 2000 Server installed and configured with Systems Management Server.

For more information about using Systems Management Server to upgrade the operating system, see the Microsoft Systems Management Server link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

Create a Distribution Folder

A distribution folder is structured hierarchically and contains the Windows XP Professional installation files, as well as any device drivers and other files that are required to customize the installation. Distribution folders typically reside on a server to which the destination computers can connect. Use Setup Manager to create distribution folders.

A distribution folder provides a consistent environment for installing Windows XP Professional on multiple computers. You can use the same distribution folder for all the client computers. For example, if you install Windows XP Professional on various models of similarly configured computers, all your answer files can reference the same distribution folder. In this scenario, the distribution folder must contain all the necessary device drivers for the different client computers. Then, if a hardware component changes, you can simply copy a device driver for the new hardware component to the appropriate location within the distribution folder. You do not need to change the answer file.

You can create distribution folders on multiple servers to help load balance the servers during unattended installations of Windows XP Professional. Creating distribution folders on multiple servers also improves the performance of the file copy phase of unattended installation. This enables you to run Winnt32.exe with up to eight source file locations.

Distribution Folder Structure

Figure 2.2 shows the distribution folder structure and the relative location of each subfolder.

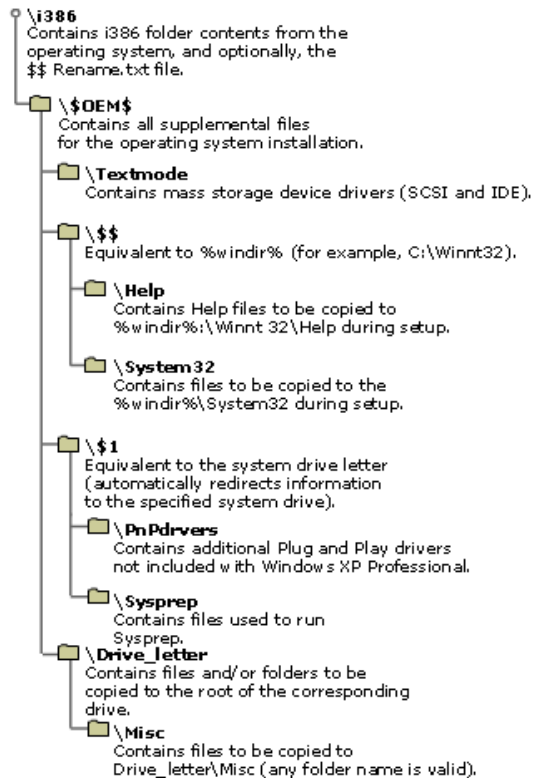


Figure 2.2 Distribution folder structure

Note The structure of a RIS distribution folder varies slightly from the folder structure depicted in Figure 2.2. In a RIS distribution folder, the \OEM\$ folder must be created at the same level as the i386 folder.

\i386 folder

The distribution folder that includes the i386 folder contents from the operating system and the following files and folders.

\\$\$Rename.txt file

An optional file that Setup uses during installations started in MS-DOS to convert specified file names from short to long. Each subfolder in the distribution folder that contains file names that you want to convert from short to long must have its own \$\$Rename.txt file.

\OEM\$

A folder that contains all the additional files required to complete the installation. If you use the OemFilesPath key in the [Unattended] section of the answer file, you can create the \OEM\$ folder outside the distribution folder.

Important The OemPreinstall = Yes statement must appear in the [Unattended] section of the answer file if you are using the \OEM\$ folder to add any more files to the system, or if you are using Cmdlines.txt.

You can instruct Setup to automatically copy directories, standard 8.3 format files, and any tools required for your automated installation to the \OEM\$ folder.

One of the additional files that you can add to the \OEM\$ folder is Cmdlines.txt. This file contains a list of commands that Setup carries out during its GUI mode. These commands can, for example, run an .inf file, an application installation command, or another executable file. For more information about the Cmdlines.txt file, see "Adding Applications" later in this chapter.

Note The graphical user interface (GUI) phase of Setup is referred to as "GUI mode," and the text phase of Setup is referred to as "text mode."

If the \OEM\$ folder is in the root of the distribution folder, Setup copies all the files to the temporary directory that is created during the text phase of Setup.

\OEM\$\Textmode

A folder that contains the hardware-dependent files that Setup Loader and text-mode Setup install on the destination computer during text-mode setup. These files can include original equipment manufacturer HALs, mass storage device drivers, and the Txtsetup.oem file, which directs the loading and installing of these components. These files must also be listed in the [OEMBootFiles] section of Unattend.txt.

\OEM\$\\$\$

A folder that is equivalent to the %systemroot% or %windir% environment variables. You can use \OEM\$\\$\$ to store additional files that you want copied to the folders in the Windows XP Professional system directories. For example, if you want to copy a file to the \Windows\System32 folder, place the file in \OEM\$\\$\$\System32.

You can also use \OEM\$\\$\$ to place files in a new directory (under %windir%) that is not part of the default Windows XP Professional directory structure. For example, if you want to copy OEM Plug and Play device drivers to a directory called \Windows\PnPDrivers, place the device drivers in \OEM\$\\$\$\PnPDrivers.

\OEM\$\\$\$\Help

A folder that contains the OEM Help files to be copied to C:\Windows\Help during setup.

\OEM\$\\$\$\System32

A folder that contains files to be copied to the C:\Windows\System32 folder during setup.

\OEM\$\1

A folder that is equivalent to the SystemDrive environment variable. For example, if the operating system is installed on drive C, \OEM\$\1 refers back to drive C. The use of a variable enables rearranging drive letters without creating errors in applications that point to a hard-coded drive letter.

\\\$OEM\$\\$1\PnPdrvrs

A folder that contains additional Plug and Play drivers that are not included with Windows XP Professional. You can replace the name of the folder (\\PnPdrvrs) with any made up of eight or fewer characters. Make sure the name of this folder matches the name used in the OemPnPDriversPath entry in Unattend.txt.

Note Microsoft® Windows® NT Workstation 4.0 used Display and Net folders to perform the \\\$OEM\$\\$1\PnPdrvrs folder function.

\\\$OEM\$\\$1\Sysprep

An optional folder that contains the files required to run Sysprep. Most users do not have to run Sysprep at the end of an unattended installation. For more information about Sysprep, see "System Preparation Tool" later in this chapter.

\\\$OEM\$\Drive_letter

Each \\\$OEM\$\Drive_letter folder contains a folder structure that is copied to the root of the corresponding drive in the destination computer during text-mode Setup. For example, files you put in an \\\$OEM\$\C folder are copied to the root of drive C. You can also create subfolders in these folders. For example, \\\$OEM\$\D\Misc creates a \Misc folder on drive D.

Using Setup Manager to Create a Distribution Folder

The easiest way to create a distribution folder for a Sysprep, RIS, or unattended installation is to use Setup Manager, which is available on the Windows XP Professional operating system CD in the Deploy.cab file of the \Support\Tools folder. Use the **Create a Distribution Folder** option to create a distribution folder including required Windows XP Professional source files on the network shared drive. You can also use Setup Manager to add files that you want to copy or to supply additional device drivers for use with Windows.

For more information about using Setup Manager, see "Customizing Unattended Installations" later in this chapter.

Copying a Folder to the System Drive of the Computer

You can copy an additional folder to the system drive during the customization process. For example, you might want to copy a folder containing additional device drivers.

To copy a folder to the system drive

1. In the \\\$OEM\$ folder of the distribution share, create a folder called \\\$1. This folder maps to SystemDrive, which is the destination drive for the Windows XP Professional installation.
2. In the \\\$1 folder, copy the folder containing the files.
3. Verify that the following statement is in the [Unattended] section of the Unattend.txt answer file:

```
[Unattended]
OemPreinstall = Yes
```

Customizing the Installations

After you create a distribution folder, customize the installation by creating answer file(s) and adding devices, device drivers, applications, Help files, support information, and other components. Depending on what you want to customize, use Setup Manager to perform either or both of the following tasks:

- Add entries in the answer file to provide specific instructions to be carried out by Setup during installation.
- Populate the distribution folder by adding files, programs, and applications.

The tools you can use to customize Windows XP Professional depend on your choice of methods to install the operating system.

Table 2.4 shows the customization tools that are covered in the "Using Windows XP Professional Customization Tools" section.

Table 2.4 Customization Tools

Tool	Installation Method	Description
Unattended Installation (Winnt32.exe)	Unattend.txt	Supplies an answer file that you can either modify or use as is.
	Setup Manager	Use to create and modify answer files and distribution folders.
System Preparation (Sysprep.exe) tool	Sysprep.inf	Supplies an answer file that you can either modify or use as is.
	Sysprep Factory Mode	Use to customize the Setup for the destination computer.
	MiniSetup Wizard	Displays a configurable collection of Setup screens to gather information that has not been preconfigured in the answer file. Use Setup Manager (setupmgr.exe) to preconfigure the MiniSetup Wizard screens or Windows Welcome (Msoobe.exe). Oobe is an acronym for out-of-box experience. MiniSetup starts the first time a computer starts from a disk that has been duplicated using Sysprep.
Remote Installation Services (RIS)	Setup Manager	Use to create and modify answer files, distribution folders, and the MiniSetup Wizard.
	RIS template answer file (Ristndr.sif)	Supplies an answer file that you can either modify or use as is.
	RIS Client Installation Wizard	Provides basic functionality for installing client computers.
Manually create an answer file	Setup Manager	Use to create and modify answer files and distribution folders.
	Notepad or other text editor	Use to create a new answer file or to modify an existing one.

You can customize features and components in Windows XP Professional. The examples provided at the end of this section demonstrate the following:

- Adding hardware devices, including storage devices, Plug and Play devices, and hardware abstraction layers (HALs). When adding hardware devices to the distribution folder and specifying the devices in the answer file, consider mass storage devices such as Small Computer Systems Interface (SCSI) hard drives. Windows XP Professional Setup detects and installs most hardware devices automatically. However, to install a SCSI device that is not supported by Windows XP Professional, you must add the device drivers for that SCSI device and its Txtsetup.oem file to the distribution folder (in the \$OEM\$\Textmode folder). To access that SCSI controller during text mode, the [MassStorageDrivers] section of the answer file must be modified with the appropriate device driver entries.

Note Ensure that hardware on the destination computer meets the minimum requirements listed in "Planning Deployments" in this book. Also to ensure that the individual components are compatible with Windows XP Professional, see the Hardware Compatibility List link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

- Setting passwords for local user accounts. You can also force all users or certain users to change their passwords when they log on after an upgrade from Windows 98, or Windows Me.
- Setting options for language and multilingual support, and setting key descriptions for other regional and language options, such as language-specific keyboard layouts.
- Setting time zones.
- Specifying display settings to ensure that Setup automatically detects a computer's display resolution.
- Specifying file system settings to automatically convert FAT16 and FAT 32 file systems to NTFS during installation.
- Using the \$\$Rename.txt file to automatically convert short file names to long file names.
- Adding applications during the GUI-mode phase of Setup using Cmdlines.txt.
- Adding applications when the user logs on for the first time using [GuiRunOnce].
- Using batch files and packaging applications to be used with the Windows Installer service.

You can customize many Windows XP Professional features after installation, such as wallpaper, screen saver settings, Active Desktop, custom toolbars and taskbars, and new Start and Programs menu options. For more information about post-installation customization, see "Managing Desktops" in this book.

Using Windows XP Professional Customization Tools

Use Setup Manager (setupmgr.exe) to create answer files or use a simple text editor (such as Notepad) to manually create them.

You can use a network connection to a RIS server to download one or more operating system images (including Windows XP Professional). If you use a RIS server to download an operating system image, RIS provides answer file templates and a Client Installation Wizard (CIW).

You can use Sysprep to distribute operating system images using removable media. Sysprep provides an answer file (Sysprep.inf) that you can customize.

Customizing Unattended Installations

An answer file or setup script is a text file that follows a specific format and syntax and contains all of the information Setup must have to automate and customize an installation. The Setup program uses this customized script to provide values for all of the settings that are required during installation.

Typically, the answer file for Winnt32.exe is named Unattend.txt; however, you can use any valid file name (for example, Sales.txt, Test.txt, and Support.txt). You must use the **/Unattend** parameter and the correct file name when you run Setup from the command line (for example, **/Unattend:filename.txt**). By using descriptive names to differentiate different versions of an answer file, you can build and maintain a variety of unique answer files for the workgroups within your organization.

The answer file provides Setup with the necessary information to enable interaction with the distribution folders and files that you have created.

Creating an Answer File by Using Setup Manager

You can use Setup Manager to create an answer file for an unattended installation, an automated installation using Sysprep, or an automated installation using RIS. Setup Manager is available on the Windows XP Professional operating system CD in the Deploy.cab file of the \Support\Tools folder. Setup Manager helps you create and modify an answer file by providing prompts for the information that is required and then creating the answer file. Setup Manager can create a new answer file, import an existing answer file for modification, or create a new answer file based on the configuration of the computer on which it is running.

Table 2.5 lists the parameters that you can configure with Setup Manager. The parameters are listed in the order in which they are presented. After you configure the parameters, Setup Manager generates the results as answer file keys.

Table 2.5 Setup Manager Parameters

Parameter	Description
Set user interaction	Sets the level of user interaction that is appropriate during the setup process. For example, you can select Provide defaults to display the configurable values supplied in the answer file, or Fully automated to create a setup process that does not prompt the user to review or supply configuration values.
Set default user information	Specifies an organization or user name.
Define computer names	When you enter multiple names during the setup process, Setup Manager automatically generates the Uniqueness Database File (UDF) that is required to add those unique names to each computer during setup. If the administrator imports names from a text file, Setup Manager converts each name to a Uniqueness Database File. The administrator can also set an option to generate unique computer names.
Set an administrator password	Setup Manager can encrypt the administrator password in the Unattend.txt answer file. This prevents the password from being readable if the answer file is viewed in a text editor. Setup Manager can also be set to prompt the user for the administrator password during setup. If the Administrator Password box is left blank, you can use the AutoLogon feature to log on to the client computer as an administrator. To disable AutoLogon, type a value in the Administrator Password box when you run Setup Manager.
Display settings	You can automatically set the display color depth, screen area, and refresh frequency display settings.
Configure network settings	Any custom network-setting option that can be configured from the desktop can be configured remotely using Setup Manager. The interface for setting network settings in Setup Manager is the same interface that the user sees on their desktop. Using Setup Manager, you can also add computers to a domain or workgroup, or automatically create accounts in the domain.
Set time zone and regional options	Sets the correct time zone using the same property sheet that a user would access to change the time zone locally. Specifies regional and language options such as date, time, numbers, character sets, and keyboard layout.
Set Internet Explorer settings	Performs the basic setup for Internet connections, such as connecting to proxy servers. If your

	organization wants to customize the browser, the administrator can use Setup Manager to access the customization tool that is part of the Internet Explorer Administration Kit (IEAK), available from http://www.microsoft.com .
Set telephony settings	Sets telephony properties, such as area codes and dialing rules.
Add Cmdlines.txt files	Files used to install additional components, such as applications. For example, the administrator can add the command line to run Microsoft® Office setup by including the command line for Office setup in the Cmdlines.txt file.
Create an installation folder	Uses the default installation folder, \\Windows, to generate a unique folder during setup or to set a custom folder.
Install printers	Sets up multiple printers as part of the installation process.
Add commands to the Run Once section	Sets up commands that run automatically the first time a user logs on. These might include running an application setup program or changing security settings.
Run commands at the end of setup	Specifies commands that run at the end of the setup process and before users log onto the system, such as starting an application setup file.
Copy additional files	Specifies additional files to be copied to the user's desktop, such as device driver libraries, and their location.
Create a distribution folder	Creates a distribution folder on the network that includes the required Windows XP Professional source files. You can also add files that you want to copy or supply additional device drivers for use with Windows XP Professional.

Setup Manager cannot perform the following functions:

- Specify system components, such as Internet Information Services.
- Create Txtsetup.oem files.
- Create subfolders in the distribution folder.

To copy Setup Manager from the Windows XP Professional CD

1. In the \Support\Tools folder, double-click the **Deploy.cab** file.
2. Copy Setupmgr.exe to a folder on the hard disk.

To run Setup Manager

- Double-click **Setupmgr.exe**. The Setup Manager Wizard helps you create an answer file and a distribution folder.

Example of an Unattend.txt Answer File

Listing 2.1 displays a typical Unattend.txt answer file. This file automates the installation or upgrade of Windows, enabling the Setup program to run without requiring user input. Comments within the answer file describe most sections, keys, and values.

Listing 2.1 Example of an Unattend.txt Answer File

```
[Unattended]
UnattendMode = FullUnattended
TargetPath = Windows
FileSystem = LeaveAlone
OemPreinstall = Yes
OemSkipEula = Yes

[GuiUnattended]
; Set the TimeZone. For example, to set the TimeZone for the
; Pacific Northwest, use a value of "004." Be sure to use the
; numeric value that represents your own time zone. To look up
; a numeric value, see the Deploy.chm file on the Windows XP Professional CD.
; The Deploy.cab file is in the \Support\Tools folder.
TimeZone = "YourTimeZone"
OemSkipWelcome = 1
; The OemSkipRegional key allows Unattended Installation to skip
; RegionalSettings when the final location of the computer is unknown.
OemSkipRegional = 1

[UserData]
; Tip: Avoid using spaces in the ComputerName value.
ComputerName = "YourComputerName"
; To ensure a fully unattended installation, you must provide a value
; for the ProductKey key.
ProductKey = "Your product key"

[LicenseFilePrintData]
; This section is used for server installs.
AutoMode = "PerServer"
AutoUsers = "50"

[Display]
BitsPerPel = 16
XResolution = 800
YResolution = 600
VRefresh = 60

[Components]
; This section contains keys for installing the components of
; Windows XP Professional. A value of On installs the component, and a
; value of Off prevents the component from being installed.
iis_common = On
iis_inetmgr = Off
iis_www = Off
iis_ftp = Off
iis_doc = Off
iis_smtsp = On
```

```

; The Fp_extensions key installs Front Page Server Extensions.
Fp_extensions = On
; If you set the TSEnabled key to On, Terminal Services is installed on
; a current version of Windows Server.
TSEnabled = On
; If you set the TSclients key to On, the files required to create
; Terminal Services client disks are installed. If you set this key
; to On, you must also set the TSEnabled key to On.
TSclients = On
Indexsrv_system = On
Accessopt = On
Calc = On
Charmap = On
Chat = Off
Clipbook = On
Deskpaper = On
Dialer = On
FreeCell = Off
Hypertrm = On
Media_clips = On
Media_utopia = On
Minesweeper = Off
Mousepoint = Off
Mplay = On
Mswordpad = On
Paint = On
Pinball = Off
Rec = On
Solitaire = Off
Templates = On
Vol = On

[TapiLocation]
CountryCode = "1"
Dialing = Pulse
; Indicates the area code for your telephone. This value must
; be a 3-digit number.
AreaCode = "Your telephone area code"
LongDistanceAccess = 9

[Networking]

[Identification]
JoinDomain = YourCorpNet
DomainAdmin = YourCorpAdmin
DomainAdminPassword = YourAdminPassword

[NetOptionalComponents]
; Section contains a list of optional network components to install.
Snmp = Off
Lpdsvc = Off
Simptcp = Off

[Branding]
; This section brands Microsoft® Internet Explorer with custom
; properties from the Unattended answer file.
BrandIEUsingUnattended = Yes

[URL]
; This section contains custom URL settings for Microsoft
; Internet Explorer. If these settings are not present, the
; default settings are used. Specifies the URL for the
; browser's default home page. For example, you might use the
; following: Home_Page = www.microsoft.com.
Home_Page = YourHomePageURL
; Specifies the URL for the default search page. For example, you might
; use the following: Search_Page = www.msn.com
Search_Page = YourSearchPageURL
; Specifies a shortcut name in the link folder of Favorites.
; For example, you might use the following: Quick_Link_1_Name =
; "Microsoft Product Support Services"
Quick_Link_1_Name = "Your Quick Link Name"
; Specifies a shortcut URL in the link folder of Favorites. For example,
; you might use this: Quick_Link_1 = http://support.microsoft.com/.
Quick_Link_1 = YourQuickLinkURL

[Proxy]
; This section contains custom proxy settings for Microsoft
; Internet Explorer. If these settings are not present, the default
; settings are used. If proxysrv:80 is not accurate for your
; configuration, be sure to replace the proxy server and port number
; with your own values.
HTTP_Proxy_Server = proxysrv:80
Use_Same_Proxy = 1

```

Customizing Sysprep Installations

This section provides information about the components of Sysprep 2.0, including:

- The Sysprep.inf File
- The MiniSetup Wizard
- Factory Mode
- Audit Boot Mode

- Reseal Mode
- The **-msoobe** parameter (Windows Welcome)

Using Sysprep.inf

Listing 2.2 displays an example of a Sysprep.inf answer file. If you are running Sysprep with the **-mini** parameter, you can use the Sysprep.inf answer file to automate the MiniSetup process. It uses the same .inf file syntax and key names (for supported keys) as Unattend.txt. Place the Sysprep.inf file in the %SystemDrive%\Sysprep folder or on a floppy disk. If you use a floppy disk, insert it into the floppy disk drive after the Windows startup screen appears. Note that if you do not include Sysprep.inf when running Sysprep, the MiniSetup Wizard requires user input at each customization screen.

If you provided a Sysprep.inf file on the reference computer and want to individually change Sysprep.inf on each destination computer, use the floppy disk method.

Listing 2.2 Sample Sysprep.inf Answer File

```
[Unattended]
; Prompt the user to accept the EULA.
OemSkipEula = No
;Use Sysprep's default and regenerate the page file for the system
;to accommodate potential differences in available RAM.
KeepPageFile = 0
;Provide the location for additional language support files that
;might be required in a global organization.
InstallFilesPath = c:\Sysprep\i386

[GuiUnattended]
;Set the time zone.
TimesZone = 20
;Skip the Welcome screen when the system starts.
OemSkipWelcome = 1
;Do not skip the Regional and Language Options dialog box so that users can
;indicate which options apply to them.
OemSkipRegional = 0

[UserData]
ComputerName = XYZ_Computer1

[Display]
BitsPerPel = 16
XResolution = 800
YResolution = 600
VRefresh = 60

[GuiRunOnce]
"%systemdrive%\sysprep\file name.bat" = "path-1\Command-1.exe"
"path-n\Command-n.exe"
"%systemdrive%\sysprep\sysprep.exe -quiet"

[Identification]
;Join the computer to the domain ITDOMAIN.
JoinDomain = ITDOMAIN

[Networking]
```

For more information about answer file keys and values, see the Deploy.chm in the Deploy.cab file on the Windows XP Professional operating system CD. The Deploy.cab file is in the \Support\Tools folder.

Using MiniSetup

If you are running Sysprep with the **-mini** parameter, the MiniSetup Wizard appears the first time a computer starts from a disk that was duplicated by using Sysprep. The MiniSetup Wizard gathers information that is required to customize the destination computer. If you do not use Sysprep.inf or if you leave some sections of the file blank, the MiniSetup Wizard displays screens to collect the required information that has not already been provided. The displayed screens can include:

- Welcome to Windows XP Professional Setup Wizard.
- End-User License Agreement (EULA).
- Regional and Language Options.
- User name and company.
- Product key. This screen is always displayed unless you prepopulate the system preparation procedure with product key information.
- Computer name and administrator password.
- Telephony application programming interface (TAPI) settings screen. This screen is only displayed if a modem or a new modem device exists on the computer.
- Date and time settings.
- Networking settings.
- Workgroup or computer domain.

For more information about bypassing these screens, see Table 2.6.

Note Because Setup detects optimal settings for display devices, you no longer see the Display Settings screen when Setup or the MiniSetup Wizard is running. You can specify the settings in the [Display] section either in the answer file that is used for your reference computer or in the Sysprep.inf file used for your destination computer. If settings in the [Display] section are in the answer file that is used for your reference computer, Sysprep retains those settings unless Sysprep.inf contains different settings or unless a video adapter or monitor is detected that requires settings different from those of the reference computer.

Table 2.6 Parameters in Sysprep.inf for Bypassing the MiniSetup Wizard

Parameter	Section, Key, and Value
Set regional options	[RegionalSettings] LanguageGroup = 15,7,1

	SystemLocale = 00000409 UserLocale = 00000409 InputLocale = 0409:00000409 [GuiUnattended] OemSkipRegional = 1
Define user name and company	[UserData] FullName = "User Name" OrgName = "Organization Name"
Define computer name and administrator password	[UserData] ComputerName = W2B32054 [GuiUnattended] AdminPassword = ""
Set TAPI settings	[TapiLocation] AreaCode = 425
Set network settings	[Networking]
Set server licensing (Windows server only)	[LicenseFilePrintData] AutoMode = PerServer AutoUsers = 5
Define time zone selection	[GuiUnattended] TimeZone = "Index"

If you use the [RegionalSettings] section to add additional language support, make sure the language files are available. Also, make sure the C:\Sysprep\i386\Lang folder contains the files in the \i386\Lang folder on the Windows XP Professional CD. In addition, make sure the following entries appear in the Sysprep.inf file:

```
[Unattended]
InstallFilesPath = "C:\Sysprep\i386"
```

Using Sysprep Factory Mode

You can use Sysprep Factory Mode, **sysprep -factory**, to preconfigure installation options and reduce the number of displayed MiniSetup or Windows Welcome (Msoobe.exe) screens. Factory Mode enables you to prepopulate information in the [Factory] section header of the Sysprep answer file, WinBom.ini. You can prepopulate information, such as address, time zone, existing ISP, and locale. You can also use Factory Mode to update other .ini or answer files, such as Sysprep.inf, OOBEinfo.ini, or .isp and .ins files.

Factory Mode enables you to add additional device drivers and applications to the image after the computer restarts when you are running Sysprep.exe. You typically run Sysprep.exe as the final step in the preinstallation process to prepare the computer for delivery. When restarted, the computer displays the MiniSetup or Windows Welcome screens. By clicking the **Factory** button on the **OEM Reset Reminder** dialog box, or by running **Sysprep -factory** from the command line (using the **-factory** parameter), the computer restarts in a network-enabled state without starting MiniSetup or Windows Welcome. In this state, Factory.exe processes WinBom.ini and performs the following tasks:

1. Copies device drivers from a network source to the computer.
2. Starts Plug and Play enumeration.
3. Copies applications from a network source to the computer.
4. Adds customer data.

In this state, the computer can be audited. When complete, run Sysprep with the **-reseal** parameter to prepare it for delivery.

When you use Factory Mode with disk-imaging (or cloning) software, you can reduce the number of required images. You can create a reference computer image with a minimal set of device drivers, and then copy the image to the destination computers. For any destination computer that requires additional device drivers, you can run Factory Mode to update the installed image with the required drivers.

Table 2.7 lists the sections in a WinBom.ini file.

Table 2.7 WinBom.ini Sections

Section	Description
[ComputerSettings]	Configures end-user settings on the destination computer.
[Factory]	Includes entries for performing a factory installation of Windows XP Professional.
[NetCards]	Includes entries for configuring the network adapter on the destination computer if a network connection is required.
[OEMLink]	Adds a graphic and text to the Start menu to provide end users with easy access to an OEM's .htm file.
[OEMRun]	Runs external applications and command shell scripts while the Sysprep -factory command is running. Commands are processed asynchronously. Each application runs in the order listed in this section, but the application does not wait for a previous application to finish before it runs. These executable files or command shell scripts are the last processing performed by the Sysprep -factory command.
[OEMRunOnce]	Includes entries for controlling the running of external applications and command shell scripts during the running of the Sysprep -factory command.
[Section_name]	Preinstalls an application as specified in the [OEMRunOnce] section.
[PnPDriverUpdate]	Includes entries for updating device drivers on the installed image prior to installing the drivers with Plug and Play.
[PnPDrivers]	Lists the updated device drivers to be copied on to the computer.
[Shell]	Customizes the appearance of the Windows desktop and Start menu.
[SetupHomenet]	Sets up a firewall on a computer that uses a preconfigured Internet connection.
[StartMenuMFUlist]	Prepopulates the Most Frequently Used programs list on the Start menu with shortcuts to

	preinstalled applications.
[UpdateSystem]	Updates any of the computer's files or registry entries.
[UserAccounts]	Includes entries for controlling the creation of user identities on the destination computer.
[UserDefined]	Creates a user-defined section that can contain branding information or any other data for other processes.

Using Sysprep Audit Boot Mode

To test and verify installations, you can use Audit Boot Mode to quickly restart the computer before you are ready to use Reseal Mode. You can invoke Audit Boot Mode by clicking the **Audit Boot** button in the **OEM Reset Reminder** dialog box.

Using Sysprep Reseal Mode

When you have made modifications in Factory Mode, you can use Reseal Mode to prepare the computer for delivery. When the computer restarts from Factory Mode, you can invoke Reseal Mode by clicking the **Reseal button** on the **OEM Reset Reminder** dialog box, or by running **Sysprep -reseal** from the command line (using the **-reseal** parameter). To display the Windows Welcome screens on the first restart after you reseal the image, use the **-msoobe** parameter.

Customizing RIS Installations

Remote Installation Services (RIS) is a tool that enables you to perform a clean installation of a pre-configured image of a supported operating system on a client computer. You can use RIS to install the operating system over a network connection on a computer that supports the Pre-Boot eXecution Environment (PXE). You can also use RIS with the Remote Boot Floppy Generator (Rbfg.exe) to create a remote boot disk that can be used with a variety of supported PCI-based network adapters.

Using RIS Answer Files

The Remote Installation Services answer file guides the installation of the operating system. When you install RIS on a computer running a current version of Windows 2000 Server and then run Risetup.exe, a standard answer file is created and named Ristndrd.sif. You can modify this RIS answer file to perform an installation with minimal or no user intervention and place the computer account object in the domain in which the RIS server resides. Ristndrd.sif also contains the description that is displayed during the CIW when the user at the client computer selects an operating system image to install.

Listing 2.3 displays an example of a RIS answer file, Ristndrd.sif.

Listing 2.3 Sample Ristndrd.sif Answer File

```
[Data]
Floppyless = "1"
MsDosInitiated = "1"
OriSrc = "\\%SERVERNAME%\RemInst\%INSTALLPATH%\%MACHINETYPE%"
OriTyp = "4"
LocalSourceOnCD = 1

[SetupData]
OsLoadOptions = "/noguiboot /fastdetect"
SetupSourceDevice = "\Device\LANmanRedirector\%SERVERNAME%\RemInst\%INSTALLPATH%"

[Unattended]
OemPreinstall = No
FileSystem = LeaveAlone
ExtendOEMPartition = 0
TargetPath = \WINDOWS
OemSkipEula = Yes
InstallFilesPath = "\\%SERVERNAME%\RemInst\%INSTALLPATH%\%MACHINETYPE%"
LegacyNIC = 1

[UserData]
FullName = "%USERFIRSTNAME% %USERLASTNAME%"
OrgName = "%ORNAME%"
ComputerName = %MACHINENAME%

[GuiUnattended]
OemSkipWelcome = 1
OemSkipRegional = 1
TimeZone = %TIMEZONE%
AdminPassword = "*"

[Display]
BitsPerPel = 16
XResolution = 800
YResolution = 600
VRefresh = 60

[Networking]

[NetServices]
MS_Server = params.MS_PSched

[Identification]
JoinDomain = %MACHINEDOMAIN%
DoOldStyleDomainJoin = Yes

[RemoteInstall]
Repartition = Yes
UseWholeDisk = Yes

[OSChooser]
Description = "Microsoft Windows XP Professional"
Help = "Automatically installs Windows Professional without prompting the user for input."
LaunchFile = "%INSTALLPATH%\%MACHINETYPE%\templates\startrom.com"
ImageType = Flat
Version = "5.1"
```

Customizing the RIS Client Installation Wizard

After you install RIS on a computer that is running a current version of Windows 2000 Server, you have access to a default set of Client Installation Wizard (CIW) screens, which provide basic functionality for installing clients. You can modify the CIW screens to meet the needs of your organization. The files are simple text files (with an .osc extension) that are in the OSCML format. CIW screens are also referred to as Operating System Chooser (OSC) screens. They have the .osc file name extension and are modeled on the HTML 2.0 format.

Note The CIW screens are modeled on HTML 2.0; they are not a subset of the HTML 2.0 specification.

OSCML does not support Microsoft® Visual Basic® Scripting Edition, Microsoft® JScript®, or Java.

Table 2.8 describes the screens that are displayed when a user logs on to the client computer during a RIS installation of the operating system.

After the summary screen appears, the user exits the Client Installation Wizard and proceeds to the automated installation process. The automated installation process is similar to installing the operating system from a CD, but instead of accessing the installation media locally, the client computer accesses operating system files that are stored remotely on a RIS server. Depending on the speed of your network and the load on the RIS server, this process can be much faster than an installation from a CD-ROM drive.

Table 2.8 Client Installation Wizard Screens

Screen	Description
Logon screen (Login.osc)	Requires a user to log on. The user logs on to the network by using an existing user account, password, and domain. After the user successfully logs on, RIS uses these credentials to determine which installation options to display on the Setup Options screen. If the process is not successful and the logon account, password, or domain is not recognized, the user is prompted to log on again.
Setup Options screen (Choice.osc)	Displays installation options to the user, including: Automatic provides the easiest operating system installation path. If there is already a computer account object in Active Directory with a Globally Unique Identifier (GUID) that matches the client computer's GUID, the existing computer account is reused. If a matching GUID is not found in Active Directory, the client computer is named based on the automatic naming format configured in the properties of the RIS server, and a new computer account is created in the location specified by the RIS server. Custom allows users to override the automatic computer naming process, as well as the default location within Active Directory where client computer account objects are created. The Custom Setup option is similar to the automatic option, but you can use it to set up a client computer for a subsequent user (for example, to install an operating system on a client computer within the enterprise) before delivery to a user. If either the computer name or computer location is left blank on the Custom Setup screen, the automatic name or location is used. Restart a Previous Setup Attempt restarts the operating system installation process by using the information entered during the previous attempt. If the installation process fails or network connectivity is disrupted during the initial text-mode phase of setup (before completing the file copy phase), a Restart Setup command is available for optional display to the user the next time the computer is started. Maintenance and Troubleshooting provides access to maintenance and troubleshooting tools, such as system flash BIOS updates and computer diagnostic tools that can be used prior to operating system installation. The degree to which this screen and its options are displayed is controlled by means of RIS Group Policy settings.
Duplicate GUID detection screen (Osauto.osc)	This screen is not displayed to users. Osauto.osc determines if a computer account object already exists in Active Directory with the same GUID as the computer running the Client Installation Wizard. If a duplicate GUID is found, DupAuto.osc is displayed. If no duplicate GUID is found, OSChoice.osc is displayed.
Error screen (Dupauto.osc)	Displayed if a duplicate GUID is found in Active Directory. Instructs the user to contact the network administrator.
Operating system choice screen (Oschoice.osc)	Displays the list of operating system images on the RIS server that are available to a user who is logged-on. If only one image is available for the user to install, that image is automatically selected and the user does not see this screen.
Warning screen (Warning.osc)	Displays a warning message that the hard disk will be formatted. The user is cautioned that an operating system will be installed on the computer, a process that requires the hard disk to be repartitioned and formatted, erasing all data currently on the disk.
Summary screen (Install.osc)	Displays information about the computer including computer name, computer GUID, and the RIS server to be used for downloading the image. Pressing any key begins the installation process. At this point, the RIS server has created a computer account object in Active Directory for the computer and can look up the computer and its computer name and other settings if the computer is reinstalled. If you were running the Client Installation Wizard to prestage the computer for another user, you can now shut down the computer and return it to the end user. The end user must have reset password permissions on the newly created computer account object in Active Directory.
Custom Setup screen (Custom.osc)	Prompts the user for a computer name and the Organizational Unit (OU) in which to create the computer account.

Using the Client Installation Wizard

Typically, when a remote boot-enabled client computer using RIS to install an operating system is turned on for the first time, the client computer contacts the boot server, and the user is prompted to press the F12 key on the keyboard of the client computer to initiate the download of the Client Installation Wizard (CIW). After the CIW is downloaded to the client computer, the Welcome screen appears and the user is prompted to log on to the network with an existing user account, password, and logon domain. After the logon process is established, RIS checks to see what installation options the user has access to based on the Group Policy settings that are applied to

the user. The CIW displays a menu with the appropriate installation options tailored to the specific user. RIS has been configured so that a user is not presented with installation options by default. The Automatic setup option is automatically chosen.

Startrom.com and Startrom.n12 are two of the RIS boot files in the \RemoteInstall\OSChooser\i386 folder of the RIS hard disk partition on a RIS server.

Startrom.com

The default RIS boot file that can be sent in response to a client computer request to initiate the operating system installation procedure. If you use the default RIS boot file, the client computer prompts the user to press the F12 key to download the Client Installation Wizard (CIW).

Startrom.n12

The alternate RIS boot file that you can rename and use to streamline the process of initiating the installation of the operating system. If the client computer has a new, clean hard disk and if it is configured to boot from the network, use this alternate RIS boot file. The RIS server automatically starts downloading the CIW to the client computer. The client computer does not prompt the user to press the F12 key.

The \RemoteInstall\OSChooser\i386 folder is created and populated when you run Risetup.exe on a computer that is running Windows 2000 Server. The default Startrom.com file is the boot file that can be sent, in response to a client computer request, from a RIS server to a client computer. This default Startrom.com file prompts the user to press the F12 key to initiate the download of the CIW screens and to start the process of installing the operating system.

If you are installing Windows XP Professional on a new client computer that has a clean hard disk, you can use the Startrom.n12 file instead of the default Startrom.com file on the RIS server to eliminate the need to press the F12 key from the client computer. To do this, perform the following tasks from the RIS server:

1. In the \RemoteInstall\OSChooser\i386 folder of the hard disk partition that is used for RIS installations, change the name of the Startrom.n12 file to Startrom.com.
2. Change the boot order of the client computer so that it starts from the hard disk first and from PXE second.

The first time the client computer attempts to start from the hard disk, the boot process fails because the operating system is not yet installed on the hard disk. The client computer then starts from PXE without requiring a user to press the F12 key. After you successfully complete the operating system installation, subsequent restarts are performed by using the operating system that is now installed on the hard disk. It is necessary to perform step two in the preceding task because the client computer initiates a RIS installation on every restart if PXE is first in the boot order.

Creating an Answer File Manually

You can use a text editor, such as Notepad, to manually create an answer file. An answer file consists of section headers, keys, and values for those keys. Note that you do not have to specify all possible keys in the answer file if the installation does not require them. Invalid key values cause errors or faulty performance after Setup. Listing 2.4 displays an example of a manually created answer file.

Listing 2.4 Example of a Manually Created Answer File

```
[Section1]
; Sections contain keys and corresponding values for the keys.
; Keys and values are separated by equal signs.
; Values with spaces usually require double quotes.
; Text (like this) following semi-colons are comments.
Key = Value
```

```
[Section2]
Key = "Value with spaces"
```

Winnt.sif is the answer file that is used for performing an unattended clean installation from a CD. Listing 2.5 displays an example of a fully unattended Winnt.sif answer file.

Note When you use Winnt.exe to perform a clean installation from a bootable CD on a computer with multiple hard disks or partitions, specify the exact location of the destination hard disk or partition to which you are installing. Add AutoPartition = 1 to the [Data] section of the Winnt.sif file to specify the location.

Listing 2.5 Sample Winnt.sif Answer File

```
[Data]
AutoPartition = 1
MsDosInitiated = 0
UnattendedInstall = Yes

[Unattended]
UnattendMode = FullUnattended
OemSkipEula = Yes
OemPreinstall = No

[GuiUnattended]
AdminPassword = *
OEMSkipRegional = 1
TimeZone = 85
OemSkipWelcome = 1

[UserData]
FullName = USERNAME
OrgName = MS
ComputerName = COMPUTERTNAME

[Identification]
JoinWorkgroup = WORKGROUP

[Networking]
InstallDefaultComponents = Yes
```

Customizing Components and Features

This section describes the tools you can use and the procedures you can perform to manually customize the components and features of a Windows XP Professional installation. You also have the option of using Setup Manager Wizard to customize components and features for a Windows XP Professional installation.

Adding Hardware Device Support

The following topics describe how to add hardware device support to your installation:

- Mass Storage Devices
- Hardware Abstraction Layers
- Driver Signatures
- Plug and Play Devices

Mass Storage Devices

In Windows XP Professional, Plug and Play installs most hardware devices that can be loaded later in the setup process. However, mass storage devices, such as hard disk controllers, must be properly installed for full Plug and Play support to be available during the GUI mode of Setup. For this reason, the installation of mass storage devices is handled differently from the installation of other hardware devices.

To add small computer system interface (SCSI) devices during text-mode Setup (before full Plug and Play support is available), you must provide a Txtsetup.oem file that describes how Setup needs to install the particular SCSI device. For more information about Txtsetup.oem, see the Microsoft® Windows XP Professional Device Driver Kit.

To install a mass storage device

1. In the distribution folder, create the Textmode folder in the \%OEM\$ folder.
2. Copy the following files into the Textmode folder. These files are available from the device vendor. In the list below, replace *Driver* with the appropriate driver name:
 - *Driver.sys*
 - *Driver.dll*
 - *Driver.inf*
 - *Driver.cat*
 - Txtsetup.oem

Note A catalog file, for example *Driver.cat*, might not be required.

Most SCSI drivers do not ship with dynamic-link library files (DLLs).

Catalog files (.cat) are not used during text-mode setup.

The required files are specified in the Txtsetup.oem file. Make sure that all the files listed in Txtsetup.oem appear in the textmode directory and that the files are specified in the [OEMBootFiles] section of the Unattend.txt file.

You must also copy the driver files to the *PnPDrivers* location that you specified for the *OemPnPDriversPath* key in the answer file. For example:

```
\%OEM%\$1\PnPDrivers\Storage
```

Some drivers, such as SCSI miniport drivers, might not include a DLL file.

You must include a catalog file, for example, *Driver.cat*, with the mass storage device drivers if the catalog file is listed in Txtsetup.oem. For more information about catalog files, see the Hardware Development link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

3. In the answer file, create a [MassStorageDrivers] section, and include the driver entries that you want to include. If you are using two mass storage devices, one to control the hard disk, and the other to control the CD-ROM drive, a possible entry in the [MassStorageDrivers] section is shown in the following example:

```
"Adaptec 2940..." = "OEM"
"Adaptec 2940..." = "retail"
```

Information for this section can be obtained from the Txtsetup.oem file, which is provided by the hardware manufacturer.

4. In the answer file, create an [OEMBootFiles] section, and include a list of the files in the \%OEM%\Textmode folder. A possible entry to the [OEMBootFiles] section is shown in the following example:

```
[OEMBootFiles]
Driver.sys
Driver.dll
Driver.inf
Txtsetup.oem
```

Replace the word "Driver" with the appropriate driver name.

Important Only add driver entries to the [MassStorageDrivers] and [OEMBootFiles] sections for bootable mass storage devices. Do not include references to secondary mass storage devices. For secondary mass storage devices, add the drivers to the *PnPDrivers* folder specified in the *OemPnPDriversPath* key of the answer file.

If your mass storage device is a Plug and Play device, verify that a Hardware Identification Section and a reference to the catalog file for the driver (*Driver.cat*) exist in the Txtsetup.oem file. For more information, see the Driver Development Kits link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

5. In the Txtsetup.oem file, verify that a section named [HardwareIds.Scsi.yyyyy] exists. If not, create it by using the following format:

```
[HardwareIds.scsi.yyyyy]
id = "xxxxx" , "yyyyy"
```

In the preceding example, xxxxx is the device identifier and yyyyy is the device service name. For the Symbc810 driver, which has a device ID of PCI\VEN_1000&DEV_0001, you can create the section shown in the following example:

```
[HardwareIds.scsi.symbc810]
id = "PCI\VEN_1000&DEV_0001" , "symbc810"
```

Hardware Abstraction Layers

To specify Hardware Abstraction Layers (HALs) for installation, you must have a Txtsetup.oem file and the HAL files that are provided by the vendor. Use the same Txtsetup.oem file if you are installing mass storage device drivers. Only one Txtsetup.oem file can be used; therefore, if you have to install HALs and mass storage device drivers, combine the entries into one file.

To use third-party drivers, you must make appropriate changes to the answer file. For more information about answer file syntax, see the Deploy.chm in the Deploy.cab file on the Windows XP Professional operating system CD. The Deploy.cab file is in the \Support\Tools folder.

To install a HAL

1. If you have not already done so, create a Textmode folder in the \OEM\$ folder.
2. Copy the files that you receive from the device vendor to the Textmode folder.
3. In the answer file, edit the [Unattended] section for the HAL, and add any drivers that you want to install. A possible entry for the ComputerType key is shown in the following example:

```
[Unattended]
ComputerType = "HALDescription", OEM
```

You can obtain information about the *HALDescription* from the [Computer] section of the Txtsetup.oem file, which is provided by the hardware manufacturer.

4. In the answer file, create an [OEMBootFiles] section, and enter the names of the files in the \OEM\$\Textmode folder.

Driver Signatures

Before using updated drivers, verify that they are signed correctly. If drivers are not correctly signed, they might not be installed. To verify that drivers are correctly signed, contact the vendor.

In the answer file, the DriverSigningPolicy key in the [Unattended] section specifies how nonsigned drivers are processed during installation.

Important Microsoft strongly advises against using DriverSigningPolicy = Ignore unless you have fully tested the device driver in your environment and are sure that it works correctly. Using unsigned drivers increases the risk of device driver problems that can affect the performance or stability of your computer.

If you are using DriverSigningPolicy = Ignore and you attempt to install a newer, unsigned copy of a driver that is protected by Windows XP Professional, the policy level is automatically updated to Warn.

For more information about driver signing policy, see the Deploy.chm in the Deploy.cab file on the Windows XP Professional operating system CD. The Deploy.cab file is in the \Support\Tools folder.

Plug and Play Devices

Windows XP Professional automatically installs most Plug and Play device drivers; however, you need to can easily add Plug and Play device drivers if necessary. When you are creating your reference installation image, check the Windows XP Professional product CD to determine if the drivers for the Plug and Play devices you are installing are listed. You can add Plug and Play device drivers that are not included on the Windows XP Professional operating system CD by performing the procedures in this section. This method works for all Plug and Play device drivers. You can also use this method to update existing Plug and Play device drivers.

The following procedures illustrate how you can add Plug and Play to these installation methods:

- Unattended Installation
- Sysprep images
- Risetup images

To add Plug and Play device drivers to an Unattended Installation

1. In the \OEM\$ folder of the distribution folder, create subfolders for any special Plug and Play drivers and their .inf files, as shown in the following example:
2. Copy the driver files for the devices into the folders created in the previous step.
3. In the answer file, edit the [Unattended] key for Plug and Play and add the path to the list of Plug and Play search drives, as shown in the following example:

```
[Unattended]
OEMPnPDriversPath = "PnPDrvrs"
```

The folders must contain all of the files that are required to install the specific devices: drivers, catalog, and .inf files. You can store multiple devices.

Directories are not traversed; therefore, if you have files in both \Pnpdrivers\Video and in \Pnpdrivers\Audio, they both need to be explicitly named in the OemPnPDriversPath key.

When Setup searches .inf files for Plug and Play IDs during GUI-mode Setup, Setup also looks in the paths noted in the OemPnPDriversPath along with the standard default path of %windir%\Inf. The %windir%\Inf path is listed first in the search order, but if you have a device that is supported by more than one .inf file (Windows XP Professional might include a driver that offers generic functionality), Setup continues to search all paths specified in the OemPnPDriversPath entry. Even though it might find multiple matches, Plug and Play uses the .inf file that has the best match and then installs the associated device driver to support the device.

To maintain the folders to accommodate future device drivers, create subfolders for potential device drivers. By dividing the folders into subfolders, you can store device driver files by device type rather than storing all device driver files in a single folder. Suggested subfolders include Audio, Modem, Net, Print, Storage, Video, and Other. Creating an Other folder gives you the flexibility to store new hardware devices that are not currently known.

For example, if the PnPDrvrs folder contains the Audio, Modem, and Net folders, the answer file must contain the statement shown in the following example:

```
OEMPnPDriversPath = "PnPDrvrs\Audio;PnPDrvrs\Modem;PnPDrvrs\Net"
```

Adding Plug and Play devices before performing disk duplication with Sysprep

When a client computer that has been duplicated with Sysprep starts for the first time, the installer detects all non-Industry Standard Architecture ISA hardware. If a hardware device is found for which there are no device drivers in the default Drivers.cab, the installer checks the location specified in OemPnPDriversPath. If the device drivers are not in this location, then the user is prompted for the location of the device drivers.

To improve the user experience and reduce computer startup time during the first boot, you can install additional Plug and Play device drivers before running Sysprep. If you determine that you want these OEM-supplied device drivers to be available for Windows XP Professional reinstallation, copy the OEM-supplied device driver files directly onto the hard disk before you perform the installation procedure. During MiniSetup, the installer ignores the OemPnPDriversPath information, and attempts to install these device drivers directly from their original locations on the hard disk.

To add Plug and Play devices to a Sysprep Image

1. Create a folder called Sysprep on the %SystemDrive% folder.
2. On the root of the same volume, create a folder structure to hold the drivers, as shown in the following example:

```
\Drivers
```

```

\NIC
\VIDEO
\Sysprep
\Windows
    
```

- Copy the driver files for the devices into the folders created in the previous step. The folders must contain all of the files that are required to install the specific devices: driver, catalog, and .inf files.
- In the Sysprep.inf answer file, edit the [Unattended] key for Plug and Play, adding the path to the list of Plug and Play search drives. You can list multiple paths in this key by separating them with a semicolon, as shown in the following example:

```

[Unattended]
OEMPnPDriversPath = Drivers\NIC;Drivers\Video
    
```

- Save the Sysprep.inf file to the Sysprep folder.

If you do not want the OEM-supplied device drivers to remain on the volume after MiniSetup is complete, place the folder structure (that you created in the Sysprep folder) in the root volume. Adjust the OemPnPDriversPath key in the Sysprep.inf answer file to reflect this change. The Sysprep folder is automatically removed after Setup is complete. This automatic removal process also removes all of the subfolders that are subordinate to the Sysprep folder. To ensure that OEM-supplied device drivers are available if Windows XP Professional reinstallation is required, do not remove any of the OEM-supplied device drivers from the root volume.

When you run Sysprep.exe, any Plug and Play devices (including those found using the driver .inf files) are automatically installed during MiniSetup on the destination computers. You do not need to specify the **-PnP** command-line parameter unless there are existing (ISA) devices on the destination computers.

To add Plug and Play devices to a Risetup image

Important To deploy Windows XP images from Windows 2000 RIS Servers, you must install the Windows 2000 Remote Installation Services update. For more information about the Windows 2000 Remote Installation Services update, see the Microsoft Knowledge Base link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>. Search the Microsoft Knowledge Base using the keywords *Risetup.exe*, *RIS Servers*, and *Windows XP Images*.

- Create a folder structure similar to the structure shown in the following example:

```

Make sure that the \%oem$ folder is at the same level as the \i386 folder.
\RemoteInstall\Setup\%language%\Images\%risetup_image_name%\i386
\RemoteInstall\Setup\%language%\Images\%risetup_image_name%\%oem%\$1\Drivers
\NIC
\VIDEO
\Modem
    
```

- Copy the device driver files for the devices into their respective folders. Use the folder structure that you created in the previous step.
- In the Ristndrd.sif answer file, change the value of the OemPreinstall key in the [Unattended] section from No to Yes, and add the paths to the list of Plug and Play search drivers. You can list multiple paths by using semicolons to separate the path names, as shown in the following example:

```

[Unattended]
OemPreinstall = Yes
OEMPnPDriversPath = Drivers\NIC;Drivers\Video;drivers\modem
    
```

- Save the Ristndrd.sif file in the \RemoteInstall\Setup\%language%\Images\%risetup_image_name%\i386\Templates folder.

Note If one of the OEM-supplied drivers is for a network adapter, the RIS server must have this driver available when booting into text-mode Setup.

- Copy the network adapter driver and the associated .inf file to the \RemoteInstall\Setup\%language%\Images\%flat_image_name%\i386 directory.
- If the device driver that you are adding is an updated version of a driver that is already in this directory, you must delete the associated .pnf file from the \RemoteInstall\Setup\%language%\Images\%flat_image_name%\i386 directory.
- Stop and restart the Boot Information Negotiation Layer (BINL) service on all RIS servers on which you copied the drivers. This step is required for these changes to take effect.

Customizing Regional and Language Options

You can customize the [RegionalSettings] section of your answer file to specify the regional and language options listed in Table 2.9

To use this section of your answer file, you must add, as a minimum, the **/copysource:lang** parameter to Winnt32.exe or the **/rx:lang** parameter to Winnt.exe. This enables you to copy the appropriate language files to the hard disk. For example, to copy Korean settings while installing a U.S. version of Windows XP Professional, you can specify **/copysource:lang\kor** if starting from Winnt32.exe.

Table 2.9 describes the keys in the [RegionalSettings] section of the answer file. To ensure that Setup completes without prompting for regional option information, do not provide keys or values for the [RegionalSettings] section when specifying OemPreinstall = Yes. Set OEMSkipRegional = 1 in the [GuiUnattended] section of the answer file.

Table 2.9 Keys in the [RegionalSettings] Section

Key	Description
InputLocale	Specifies the input locale and keyboard layout combinations to be installed on the computer. The first keyboard layout specified is the default layout for the installation. The specified combinations must be supported by one of the language groups defined by using either the LanguageGroup key or the default language group for the language version of Windows XP Professional being installed. If an available language group does not support the combination specified, the default combination is used for the installation. This key is ignored if the Language key is specified.
Language	Specifies the language and locale to be installed on the computer. This language must be supported by one of the language groups specified by using the LanguageGroup key. If an available language group does not support the locale, the default language for the Windows XP Professional version being installed is used. If this value is specified, the SystemLocale, UserLocale, and InputLocale keys are ignored.
LanguageGroup	Specifies the supported language group to be installed on the computer. If this key is specified, it provides default settings for SystemLocale, InputLocale, and UserLocale keys. For a list of the supported language group IDs, see the Deploy.chm in the Deploy.cab file on the Windows XP Professional operating system CD. The Deploy.cab file is in the \Support\Tools folder.

SystemLocale	Enables localized applications to run and displays menus and dialog boxes in the local language.
UserLocale	Controls the settings for numbers, time, currency, and dates.

A list of valid locales and their language groups is available at the Global Software Development Web site at <http://www.microsoft.com>.

Note The LANG folder is automatically copied into Windows XP Professional images on a RIS server; however, the LANG folder must be manually copied into Windows 2000 images. The LANG folder must exist within images to enable locale changes.

To use [RegionalSettings] for multilingual support during MiniSetup

1. Create a folder named \i386 under \%OEM%\\$1\Sysprep\ in the distribution folder.
2. To copy files from the \i386 folder of the Windows XP Professional operating system CD to the \i386 folder in the Sysprep folder, type the following at the command prompt:

```
*.nl?
kbd*.dl?
*.fo?
agt*.dl?
agt*.hl?
conime.ex?
wbcache.*
noise.*
wdbase.*
infosoft.dl?
f3ahvoas.dl?
sylfaen.tt_
c_is*.dl_
\Lang\...
```

You can also use Setup Manager to add the necessary files and folders to the \i386 folder. However, any settings specified here are not kept if Sysprep is run on the computer.

3. In Sysprep.inf, add the InstallFilePath key to the [Unattended] section, as shown in the following example:

```
InstallFilePath = %systemdrive%\Sysprep\i386
```

For more information about the InstallFilePath key, see the Deploy.chm in the Deploy.cab file, which is on the Windows XP Professional operating system CD. The Deploy.cab file is in the \Support\Tools folder.

If you specify a regional setting in the image, you must also specify the same setting in the Sysprep.inf file. In addition, you must copy the correct file to the \Sysprep\i386 folder.

The \i386 folder and its contents are only required if the end user needs language support from one of the language groups provided in that folder. The \i386 folder is deleted after MiniSetup runs on the end user's computer. If you perform an audit or if a reseller further customizes the computer, you must recreate \Sysprep\i386 and then rerun Sysprep.exe before the image is installed to allow the end user to specify the necessary regional and language options.

Presetting Time Zones

You can specify the time zone of the computers in your organization by using the TimeZone key in the [GuiUnattended] section of your answer file or the Sysprep.inf file. If the TimeZone key is not present, the user is prompted for a time zone specification during setup.

To preset time zones

- In the [GuiUnattended] section of your answer file, add the statement shown in the following example:

```
[GuiUnattended]
TimeZone = "Index"
```

In the preceding example, *Index* specifies the time zone of the reference computer. Unless the TimeZone key is specifically set in the RIS answer file, client computers that are installed with RIS use the same time zone setting as the RIS server.

For a list of valid TimeZone indexes, see the Deploy.chm in the Deploy.cab file on the Windows XP Professional operating system CD. The Deploy.cab file is in the \Support\Tools folder.

Detecting Video Mode for Computer Displays

You can customize the [Display] section of the answer file to ensure that Setup automatically detects a computer's display resolution. Specify the optimal settings (you must know the valid settings) for the keys listed in Table 2.10. If the settings that you specify are not valid, Setup finds the closest match to the selected settings, which might not be optimal.

Table 2.10 Keys in the [Display] Section

Keys	Description
BitsPerPel	Specifies the valid bits per pixel for the graphics device being installed. For example, a value of 8 implies 256 colors; a value of 16 implies 65,536 colors.
Vrefresh	Specifies a valid refresh rate for the graphics device being installed.
Xresolution	Specifies a valid x resolution for the graphics device being installed.
Yresolution	Specifies a valid y resolution for the graphics device being installed.

To ensure the video mode is properly detected by Setup

1. Check that the computer BIOS supports the set of Video ACPI extensions.
2. Check that the drivers for the video cards and displays are included in the \%1\PnPdrvrs path.
3. In the [Unattended] section of the answer file, set the OemPnPDriversPath key to the \%1\PnPdrvrs path.
4. In the [Display] section of the answer file, set the optimal settings for your computer.

To determine whether the hardware components in your organization are compatible with Windows XP Professional, see the Hardware Compatibility List link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

Automatically Converting FAT32 to NTFS

When upgrading, you can customize the [Unattended] section of your answer file to convert FAT32 file systems automatically to NTFS.

To automatically convert FAT32 partitions to NTFS

- In the [Unattended] section of your answer file, add the statement shown in the following example:

```
[Unattended]
FileSystem = ConvertNTFS
```

When the FileSystem key is specified, Setup automatically converts your drive just before the GUI mode of Setup starts. You must add the FileSystem = ConvertNTFS entry to the [Unattended] section if the ExtendOEMPartition entry appears in the [Unattended] section of the answer file.

For more information about the differences between the NTFS, FAT16, and FAT32 file systems, see "File Systems" in this book.

Converting Short File Names to Long File Names (\$\$Rename.txt)

If you are starting Setup from MS-DOS, you can convert short file names to long names by creating a file called \$\$Rename.txt and putting that file in the folder of the distribution folder that also contains the files that you want to convert. If you are starting Setup from any other operating system, they are converted automatically.

Setup uses the list of files that you specify in \$\$Rename.txt to convert short names to long names during the installation process. Each folder that contains a file, or files, that you want to convert must also contain a \$\$Rename.txt file.

The \$\$Rename.txt file changes short file names to long file names during Setup. \$\$Rename.txt lists all of the files in a particular folder that must be renamed. Each folder that contains short file names to be renamed must contain its own version of \$\$Rename.txt.

To convert short file names to long file names

- Create a \$\$Rename.txt file by using the sections, keys, and values shown in the following example:

```
[Section_name_1]

Short_name_1 = "long_name_1"
Short_name_2 = "long_name_2"
Short_name_x = "long_name_x"

[Section_name_x]
Short_name_1 = "Long_name_1"
Short_name_2 = "Long_name_2"
Short_name_x = "Long_name_x"
```

Table 2.11 describes the variables in the preceding example.

Table 2.11 Converting Short File Names to Long File Names

Section or Key	Description
[Section_name_x]	This section name indicates the path to the folder that contains the files. A section does not have to be named, or it can have a backslash (\) as a name, which indicates that the section contains the names of the files or folders that are in the root directory of the drive.
Short_name_x	This key is the short name of the file or folder within the folder indicated by the section name. The short name must not be enclosed in quotation marks.
Long_name_x	This key is the long name of the file or folder. This name must be enclosed in quotation marks if it contains spaces or commas.

Tip If you are using MS-DOS to start the installation, and your MS-DOS-based tools cannot copy folders with path names longer than 64 characters, use short file names for the folders and then use \$\$Rename.txt to rename them later.

Adding Applications

Use any of the following methods to add applications to your installation:

- Cmdlines.txt to add applications during the GUI mode of Setup.
- Customized answer files. For example, customize the [GuiRunOnce] section of the answer file to install applications when the user logs on for the first time.
- Application installation programs.
- Batch files.
- Windows Installer.

Using Cmdlines.txt

The Cmdlines.txt file contains the commands that GUI mode runs when installing optional components, such as applications that must be installed immediately after Windows XP Professional installation. If you plan to use Cmdlines.txt, place it in the \$OEM\$ folder of the distribution folder. If you are using Sysprep, place Cmdlines.txt in the \$OEM\$\1\Sysprep\\$oem\$ folder.

Use Cmdlines.txt under the following circumstances:

- You are installing from the \ \$OEM\$ folder of the distribution folder.
- The application that you are installing:
 - Does not configure itself for multiple users (for example, Microsoft® Office 95).
 - Is designed to be installed by one user and to replicate user-specific information.

The section and keys for Cmdlines.txt is shown in the following example:

```
[Commands]
"Command_1"
"Command_2"
.
.
"Command_x"
```

Keys are defined as follows:

- "Command_1," "Command_2," and "Command_x" refer to the commands that you want to run (and the order in which you want to run them) when GUI mode calls Cmdlines.txt. Note that all commands must be within quotation marks.

When you use Cmdlines.txt, be aware of the following:

- When the commands in Cmdlines.txt are carried out during setup, there is no logged-on user and there is no guaranteed network connectivity. Therefore, user-specific information is written to the default user registry, and all users receive that information.
- Cmdlines.txt requires that you place the files that you must have to run an application or tool in directories that you can access

during the setup process. This means that the files must be on the hard disk.

Important Applications that can be installed by using Windows Installer cannot be added by using Cmdlines.txt.

To specify a Cmdlines.txt file during the MiniSetup portion of Sysprep

1. Create a Sysprep.inf file to be used by Sysprep. This is a requirement and cannot be bypassed. The Sysprep.inf file must be named Sysprep.inf and must be located in the Sysprep folder on the root of the volume that contains the folder %systemroot%.
2. Place the following statement in the [Unattended] section of the Sysprep.inf file:

```
InstallFilesPath = drive:\path
```

In the preceding example, *path* is any folder you want to use. It is recommended that you use *drive* as the volume containing the %systemroot% folder.

3. Create the folder *drive:\path*. You can use any folder name, but it must match the location that you specified in Sysprep.inf.
4. In the *drive:\path* folder, create a folder named \$oem\$, and then place the Cmdlines.txt file in this folder. This file is processed at the end of MiniSetup, before saving any settings.

Using the [GuiRunOnce] Section of the Answer File

The [GuiRunOnce] section of the answer file contains a list of commands that run the first time a user logs on to the computer after Setup has run. To configure the application installation program so that it starts automatically, you can add the statement shown in the following example to the [GuiRunOnce] section of the answer file:

```
[GuiRunOnce]
"%systemdrive%\appfolder\appinstall -quiet"
```

If you plan to use the [GuiRunOnce] section to initiate an installation, consider the following additional factors:

If an application forces a restart, determine how to suppress the restart.

This is important because any time the system restarts, all previous entries in the [GuiRunOnce] section are lost. If the system restarts before completing entries previously listed in the [GuiRunOnce] section, the remaining items are not run. If there is no way within the application to suppress a restart, you can try to repack the application into a Windows Installer package. Third-party products are available to provide this functionality.

Windows XP Professional contains Iexpress.exe. You can use Iexpress.exe to package .inf files into executable files. These executable files can then be included in either Cmdlines.txt or [GUIRunOnce].

Important If you are adding an application to multiple localized language versions of Windows XP Professional, it is recommended that you test the repackaged application on the localized versions to ensure that the files are copied to the correct locations and the required registry entries are written appropriately.

If an application requires a Windows Explorer shell to install, the [GuiRunOnce] section does not work because the shell is not loaded when the Run and RunOnce commands are carried out.

Check with the application vendor to determine if there is an update that you can download that enables the application to install. If not, repack the application as a Windows Installer package or use another means of distribution.

Applications that use the same type of installation mechanism might not run correctly if you do not use a-wait parameter.

This can happen when an application installation is running and starts another process. When Setup is still running, initiating another process and closing an active process might cause the next routine listed in the RunOnce registry entries to start. Because more than one instance of the installation mechanism is running, the second application usually fails.

Using Application Installation Programs

The preferred method for adding an application is to use the installation routine supplied with the application. You can do this if the application that you are adding can run in quiet mode (without user intervention) by using a **-q** or **-s** parameter. These parameters vary depending on how the application is written. For a list of parameters supported by the installation mechanism, see the application documentation.

To initiate the unattended installation of an application by using the application's installation program, you can add text to the [GuiRunOnce] section of the answer file that is similar to the statement shown in the following example:

```
path to setup\Setup.exe /q
```

Setup parameters vary depending on how the application is written. For example, the **-l** parameter included in some applications is useful when you want to create a log file to monitor the installation. Some applications have commands that can prevent them from automatically restarting. These commands are useful in helping to control application installations with a minimal number of restarts.

Make sure that you check with the application vendor for information, instructions, tools, and best practices information before you install any application.

Important You must meet the licensing requirements for any application that you install, regardless of how you install it.

Using a Batch File to Control How Multiple Applications Are Installed

To control how multiple applications are installed, create a batch file that contains the individual installation commands and uses the **Start** command with the **/wait** parameter. This method ensures that your applications install sequentially and that each application is fully installed before the next application begins its installation routine. The batch file is then run from the [GuiRunOnce] section.

The following procedure explains how to create the batch file, install the application, and remove all references to the batch file after the installation is complete.

To install applications by using a batch file

1. Create a batch file that uses the following syntax:

```
start /wait AppSetupProgram [AppSetupProgramParameters] [...]
```

Table 2.12 describes the syntax that is used in the preceding example.

Table 2.12 Batch File Parameters

File or Parameter	Description
<i>AppSetupProgram</i>	Specifies the path and file name for the application setup program, for example, D:\Setup.exe.
<i>AppSetupProgramParameters</i>	Specifies any available quiet-mode parameters for the setup program that you have specified.

2. Copy the batch file to the distribution folders or another location to which you have access during setup.

- Using *File name.bat* as the name of the batch file, include an entry in the [GuiRunOnce] section of the answer file to run the batch file as shown in the following example. This example is based on the assumption that the batch file was copied to the Sysprep folder on the local hard disk. However, the batch file can be in any location that is accessible to Setup during an installation.

```
[GuiRunOnce]

"path-n\Command-n.exe"
"%systemdrive%\sysprep\sysprep.exe -quiet"
```

In the preceding example, "*path-n\Command-n.exe*" and "%systemdrive%\sysprep\sysprep.exe -quiet" are fully qualified paths to additional applications, tool installations, or configuration tools. They can also be paths to batch files. These paths must be available during setup.

Using Windows Installer Service

Windows Installer Service is a Windows XP Professional component that standardizes the way applications are installed on multiple computers.

When you install applications without using Windows Installer Service, every application must have its own setup executable file or script. Each application has to ensure that the proper installation rules (for example, rules for creating file versions) are followed. This is because the application setup was not an integral part of the operating system development; therefore, no central reference for installation rules exists.

Windows Installer Service implements all the Setup rules for the operating system. To follow these rules, applications must be described in a standard format known as a Windows Installer package. The data file containing the format information is known as the Windows Installer package file and has an .msi file name extension. Windows Installer Service uses the Windows Installer package file to install the application.

The package file is a database format that is optimized for installation performance. Generally, this file describes the relationships among features, components, and resources for a specific product.

The Windows Installer package file is typically located in the root folder of the Windows XP Professional operating system CD or network image, alongside the product files. The product files can exist as compressed files known as cabinet (.cab) files. Each product has its own package file. During installation, Windows Installer Service opens the package file for the product and uses the information inside the Windows Installer package to determine which installation operations must be performed for that product.

Setting Passwords

When upgrading from Windows 98 or Windows Me, you can customize your answer files to set passwords for all local user accounts and force all users or specific users to change their passwords when they first log on. You can also set passwords for the local Administrator account.

Table 2.13 describes the types of passwords that you can set in an answer file.

Table 2.13 Types of Passwords That You Can Set in an Answer File

Section	Key	Description
[GuiUnattended]	AdminPassword	Automatically sets the password for the local Administrator account. If the AdminPassword key is used in a Sysprep.inf file, the original password on the computer must be set to null. Otherwise, any AdminPassword value in the answer file is ignored.
[Win9xUpg]	DefaultPassword	Automatically sets a password for all local accounts created when you are upgrading from Windows 98 or Windows Me.
[Win9xUpg]	ForcePasswordChange	Forces users for all local accounts to change their passwords when they log on for the first time after upgrading from Windows 98 or Windows Me.
[Win9xUpg]	UserPassword	Forces specific users to change their passwords on their local accounts when they log on for the first time after upgrading from Windows 98 or Windows Me to Windows XP Professional. Sets user passwords for local accounts after an upgrade from Windows 98 or Windows Me to Windows XP Professional. If the answer file does not contain a UserPassword key and a DefaultPassword key, a password is generated for each migrated local user account. When users log on for the first time, they are required to change their password.

Prompting the User for the Administrator Password

The administrator password is set to null by default. You can customize your answer file to prompt the user for an administrator password during installation.

Locate the following entry in the [Unattended] section of the answer file:

```
[Unattended]
UnattendMode = FullUnattended
```

If the UnattendMode key is set to FullUnattended, as shown in the preceding example, do not edit the answer file as described in the following procedure. This combination of answer file settings generates an error.

To prompt for an administrator password

- Locate the following entry in the [GuiUnattended] section of your answer file:

```
[GuiUnattended]
AdminPassword = ""
```

- Edit the entry to read:

```
[GuiUnattended]
AdminPassword = ""
```

This enables the user to type the local administrator password in GUI-mode Setup.

- To optionally put Setup in read-only mode and prevent users from changing fields (other than the Administrator password) during Setup, add the following line to the [Unattended] section of the answer file:

```
[Unattended]
UnattendMode = "ReadOnly"
```

This enables the user to type only the local administrator password in GUI-mode Setup.

An alternative to the preceding procedure is to use Setup Manager to create the answer file and supply an administrator password.

When you use Setup Manager, you can encrypt the password in the answer file so that users cannot read it.

For more information about using the RIS Client Installation Wizard to prompt users for the administrator password, see "Customizing RIS Installations" earlier in this chapter.

Setting Passwords on Local Accounts

For upgrades, you can customize your answer file to set all local account passwords to a default value.

To set passwords on all local accounts

- In your answer file, add the following entry in the [Win9xUpg] section:

```
[Win9xUpg]
DefaultPassword = "password"
```

In the preceding example, *password* is the default password that you want to set for all local users.

Note If a local account must be created for a user without a UserPassword entry and no DefaultPassword is specified, Setup creates a random password. After the first restart, the user is prompted to change the password.

For Windows 98 upgrades, you can customize your answer file to create passwords for specific local accounts. Because Windows 98 and Windows Me passwords cannot be migrated during the upgrade, Setup must create passwords for local accounts during the upgrade process. By using the DefaultPassword key, the administrator can predetermine those passwords for specific users. If a local account needs to be created for a user without a preset value for the UserPassword entry and no value is specified for DefaultPassword, Setup generates a random password.

To create passwords for specific local accounts when you are upgrading from Windows 98 or Windows Me

- In the answer file, add the following entry in the [Win9xUpg] section:

```
[Win9xUpg]
UserPassword = user,password [,user_1,password_1]
```

Forcing All Users to Change Local Account Passwords When Upgrading from Windows 98 or Windows Me

You can customize your answer file to require all users to change their passwords on their local accounts when they log on for the first time. When a user logs on for the first time, he or she is notified that his or her current password has expired and that a new password must be supplied.

To force users to change their password after upgrading from Windows 98 or Windows Me

- In the answer file, add the following entry in the [Win9xUpg] section:

```
[Win9xUpg]
ForcePasswordChange = Yes
```

Installing the Operating System

After you have chosen the method to install the operating system and have customized your answer file and the distribution folder with the appropriate files, you are ready to install the operating system.

The following installation methods are covered in this section:

- Unattended Installations
- Image-based Installations with Sysprep
- Installations with RIS

Unattended Installations

Winnt32.exe and Winnt.exe are unattended installation tools that provide a convenient and flexible method for installing the operating system. In addition, Winnt32.exe does not require additional tools. This section explains how to use Winnt32.exe.

Caution Before upgrading to the Windows XP Professional operating system, restart the computer if you have recently upgraded any applications.

Note When you run Winnt32.exe on a computer with multiple hard disks or partitions, specify the exact location of the destination hard drive or partition to which you are installing. Use the Winnt32 **/tempdrive** parameter to specify the destination.

Use Winnt32.exe to run Setup on computers running Windows 98, Windows Me, Windows 2000, Windows NT Workstation 4.0, or Windows XP Professional operating systems.

Note Winnt32.exe is also referred to as Setup.

To run Setup in unattended mode

- At the command prompt type: **winnt32 /unattend:** *answer_file*.

When you run the Setup program, it installs Windows XP Professional in three phases: File Copy, Text mode, and GUI mode.

File copy

Setup copies the Windows XP Professional program files and any additional files that you specify from the distribution folder to the computer's hard disk.

Text mode

Setup identifies the basic hardware in the computer (such as the microprocessor and motherboard type, hard disk controllers, file systems, and memory), installs the base operating system required to continue with Setup, and creates any folders that you specify.

GUI mode

Setup configures the computer's hardware (audio, video, and so on), configures network settings, prompts you to provide an Administrator password, and allows you to personalize the installation. If you use Sysprep, the Setup program goes through a different phase called MiniSetup.

Winnt32.exe Parameters

```
Winnt32
[/checkupgradeonly]
[/cmd:command_line]
[/cmdcons]
[/copydir:folder_name]
[/copysource:folder_name]
[/debuglevel:file_name]
[/dudisable]
```



```
[/dupprepare:pathname]
[/dushare:pathname]
[/m:folder_name]
[/makelocalsource]
[/noreboot]
[/s:sourcepath]
[/syspart:drive_letter]
[/tempdrive:drive_letter]
[/udf:ID,UDF_file]
[/unattend]
[/unattend:seconds][:answer_file]
```

Parameter Descriptions

To determine which parameters you want to use, refer to the following Winnt32.exe parameter descriptions:

/checkupgradeonly

Checks the current operating system for upgrade compatibility with Windows XP Professional. This is simply a verification and does not install Windows XP Professional.

/cmd:command_line

Specifies a command to be carried out after the GUI mode of Setup finishes. The command occurs before Setup is complete and after Setup has restarted your computer and collected the necessary configuration information. For example, this parameter can run Cmlines.txt, which specifies the applications to be installed immediately after Setup completes.

/cmdcons

Adds a Recovery Console option for repairing a failed installation.

/copydir:folder_name

Creates a subfolder within the folder that contains the Windows XP Professional files. For example, if the source folder contains a Private_drivers folder that has modifications just for your site, you can type **/copydir:private_drivers** to copy that folder to your Windows XP Professional folder. You can use the **/copydir** parameter multiple times.

/copysource:folder_name

Temporarily creates a subfolder within the folder that contains the Windows XP Professional files. For example, if the source folder contains a Private_drivers folder that has modifications just for your site, type **/copysource:private_drivers** to have Setup copy that folder to your Windows XP Professional folder and use its files during Setup. Unlike the **/copydir** parameter, folders created by using **/copysource** are deleted when Setup finishes.

/debug[level][:file_name]

Creates a debug log at the specified level. When you use the default setting, the program creates a log file (%windir%\Winnt32.log) that has a warning level of 2. The warning levels for the log file are as follows: 0 = severe errors, 1 = errors, 2 = warnings, 3 = information, and 4 = detailed information for debugging. Each level also includes the levels below it.

/dudisable

Prevents dynamic update from running. Without dynamic update, Setup runs only with the original Setup files. This option disables dynamic update even if you set DisableDynamicUpdates = No in the [Unattended] section of the Unattend.txt file. **/dudisable** in Winnt32.exe overrides the DisableDynamicUpdates = No setting in Unattend.txt.

/dupprepare:pathname

Prepares an installation share to be used with Dynamic Update files downloaded from the Windows Update Web site. The installation share can then be used for installing Windows on multiple client computers.

/dushare:pathname

Specifies a share on which you previously downloaded Dynamic Update files (updated files for use with Setup) from the Windows Update Web site, and on which you previously ran **/dupprepare:pathname**. When run on a client computer, **/dushare:pathname** specifies that the client installation uses the updated files on the share that is specified in *pathname*.

/m:folder_name

Instructs Setup to copy replacement files from an alternate location. It directs Setup to look at the alternate location first and to copy the files from that location (if they files are present) instead of from the default location.

/makelocalsource

Instructs Setup to copy all installation source files to your local hard disk. Use **/makelocalsource** to obtain installation files if you begin installation from a CD and the CD becomes unavailable during the installation.

/noreboot

Instructs Setup to not restart the computer after the file copy phase of Winnt32 is complete so you can execute another command.

/s:sourcepath

Specifies the source location of the Windows XP Professional files. The default is the current folder. To copy files simultaneously from multiple servers, you can specify up to eight sources. For example:

```
winnt32 /s:server1 ... /s:server8
```

If you type the option multiple times, the first server specified must be available, or Setup fails.

This functionality speeds up the file copy phase of Setup to the destination computer and provides additional load balancing capability to the distribution servers from which you run Setup.

/syspart:drive_letter

Specifies that you can copy Setup startup files to a hard disk, mark the disk as active, and install the disk in another computer. When you start that computer, Setup automatically starts at the next phase. Remember the following points when you use this parameter:

- You must always use the **/syspart** option with the **/tempdrive** option.
- Both **/syspart** and **/tempdrive** must point to the same partition of a secondary hard disk.
- You must install Windows XP Professional on the primary partition of the secondary hard disk.
- You can use the **/syspart** parameter only from a computer that is running Windows NT 3.51, Windows NT 4.0, Windows 2000 Professional, or Windows XP Professional. You cannot use this parameter from a computer that is running Windows 98 or Windows Me.

/tempdrive:drive_letter

Directs Setup to place temporary files on the specified partition and to install Windows XP Professional on that partition. Remember the

following points as you use this parameter:

- You must always use the /tempdrive option with the /syspart option.
- Both /tempdrive and /syspart must point to the same partition of a secondary hard disk.
- You must install Windows XP Professional on the primary partition of the secondary hard disk.

/udf:ID[,UDF_file]

Indicates an identifier that Setup uses to specify how a Uniqueness Database File (UDF) modifies an answer file. The UDF file overrides values in the answer file, and the identifier determines which values in the UDF file are used. For example, /udf:Roaming_user,Our_company.udf overrides settings specified for the identifier Roaming_user in the Our_company.udf file. If you do not specify a UDF file, Setup prompts you to insert a disk that contains the file \$Unique\$.udf.

/unattend

Upgrades a previous version of Windows by using unattended installation mode. Setup downloads the Dynamic Update files from Windows Update and includes these files in the installation. All user settings are taken from the previous installation. No user intervention is required during Setup.

User passwords cannot be migrated from a Windows 98 or Windows Me installation during an upgrade to Windows XP Professional; however, if you are upgrading from Windows NT Workstation 4.0 or Windows 2000, any user accounts that were defined in the local database are available after upgrading to Windows XP Professional.

Important By adding the OemSkipEula key to the [Unattended] section of the answer file, you can automate Setup to affirm that you have read and accepted the End User License Agreement (EULA) for Windows XP Professional. Before using this entry to install Windows XP Professional on behalf of an organization other than your own, you must confirm that the end user (whether an individual or a single entity) has received, read, and accepted the terms of the Windows XP Professional EULA. OEMs cannot specify this key for computers being sold to end users.

/unattend[num][:answer_file]

The specified *num* value indicates the number of seconds between the time that Setup finishes copying the files and when Setup restarts. You can use *num* on any computer running Windows 98, Windows Me, Windows NT Workstation 4.0, Windows 2000, or Windows XP.

The specified *answer_file* provides Setup with your custom specifications.

Sysprep

The System Preparation tool, Sysprep.exe, is a disk-image-based deployment tool that you can use to install identical configurations on multiple computers. You can also use Sysprep to customize and automate MiniSetup and to audit computers. You can run Sysprep as many times as you want; however, if you are using a non-volume licensed version, you can only run Sysprep.exe and the MiniSetup Wizard three times on the same operating system installation. You cannot run Sysprep a fourth time. This also applies to Riprep.

On a reference computer, install the operating system and any applications that you want installed on your destination computers, and then run Sysprep. Sysprep prepares the hard disk on the reference computer for duplication to other computers. You can then run a third-party disk-imaging application. The major advantage of Sysprep installation is speed. The image can be packaged and compressed; only the files required for the specific configuration are created as part of the image. The shortened GUI-mode Setup can take five or six minutes instead of 45 to 60 minutes and prompts the user only for required and user-specified information.

Because the reference and destination computers are required to have identical HALs and ACPI support, you might be required to maintain multiple images for your environment.

Important Before performing disk duplication, check with your software vendor to make sure that you are not violating the licensing agreement for installation of the software that you want to duplicate.

Overview of the Sysprep Process

The following steps describe the process of preparing a reference computer to use for disk duplication.

Table 2.14 describes the steps you must perform during the process of preparing a reference computer for disk duplication.

Table 2.14 Preparing a Reference Computer for Disk Duplication

Step	Description
Step 1	Install the operating system on a computer that has hardware similar to the destination computers. While preparing the computer, do not join it to a domain, and keep the local administrative password blank.
Step 2	Configure the computer. Log on as the administrator, and then install and customize Windows XP Professional and associated applications. These might include adding plug and play device drivers or productivity applications, such as Microsoft® Office, business-specific applications, and other applications or settings that you want included in a common configuration for all client computers.
Step 3	Validate the image. Run an audit, based on your criteria, to verify that the image configuration is correct. Remove residual information, including anything left behind from audit and event logs.
Step 4	Prepare the image for duplication. When the computer is configured exactly as you want it, prepare the system for duplication. If you are running Sysprep with the -mini parameter, you can prepare the system by running Sysprep with the optional Sysprep.inf file, which is described earlier in this chapter. After Sysprep runs, the computer shuts down automatically or indicates that it is safe to shut down.
Step 5	Duplicate. The computer hard disk is triggered to run Plug and Play detection, create new security identifiers (SIDs), and run the MiniSetup Wizard the next time the system is started. You can duplicate or create an image of the system by using hardware or software. The next time Windows XP Professional is started from this reference computer or from any destination computer created from this image, the system detects and reenumerates the Plug and Play devices to complete the installation and configuration on the destination computer.

Important Components that depend on the Active Directory™ directory service cannot be duplicated.

Requirements for Running Sysprep

Before you can use Sysprep, your computer hardware and related devices must meet the following requirements:

- The reference and destination computers must have compatible HALs. For example, Advanced Programmable Interrupt Controller (APIC)-based MPS (multiprocessor systems) must use the same APIC HAL. A standard HAL Programmable Interrupt Controller

(PIC)-based system is not compatible with either the APIC HAL or the MPS HAL.

- The reference and destination computers must have identical Advanced Configuration and Power Interface (ACPI) support.
- The Plug and Play devices on the reference and destination computers, such as modems, sound cards, network adapters, and video cards, do not have to be from the same manufacturer. However, the drivers for these devices must be available.
- Third-party disk-imaging software or disk-duplicating hardware devices are required. These products create binary images of a computer's hard disk and either duplicate the image to another hard disk or store the image in a file on a separate disk.
- The size of the hard disk on the destination computer must be at least the same size as the hard disk on the reference computer. If the destination computer has a larger hard disk, the difference is not included in the primary partition. However, you can use the `ExtendOemPartition` key in the `Sysprep.inf` file to extend the primary partition if it was formatted as NTFS.

How Sysprep Works with Windows Product Activation

In Windows XP Professional, Sysprep can reset Windows Product Activation a maximum of three times. When a computer running a disk image that was prepared with Sysprep is restarted, the activation timer is reset and the installation of Windows XP Professional is enabled with the full grace period for Windows Product Activation. After three resets, the activation timer is no longer reset. To prevent resets of the activation timer, run Sysprep from the command line, and include the **-activated** parameter and the **-reseal** parameter, as shown in the following example:

```
sysprep -activated -reseal
```

For more information about Windows Product Activation, see "Planning Deployments" in this book.

Sysprep Components

Run `Sysprep.exe` manually or configure Setup to run `Sysprep.exe` automatically by using the `[GuiRunOnce]` section of the answer file. `Sysprep.exe` and `Setupcl.exe` must be located in a `Sysprep` folder at the root of the system drive (`%SystemDrive%\Sysprep\`). To place the files in the correct location during an automated Setup, add these files to your distribution folders under the `OEM\1\Sysprep` folder. For more information about this folder, see "Create a Distribution Folder" earlier in this chapter.

`Sysprep.exe` and `Setupcl.exe` prepare the operating system for duplication and start `MiniSetup`. If you are running Sysprep with the **-mini** parameter, you can also include the optional answer file, `Sysprep.inf`, in the `Sysprep` folder. `Sysprep.inf` contains default keys that you can use to provide consistent responses where they are appropriate. This limits the requirement for user input and reduces potential user errors.

In addition, you can customize the destination computer by placing the `Sysprep.inf` file on a floppy disk and inserting it after the Windows startup screen appears. The floppy disk is read when the "Please Wait..." `MiniSetup` Wizard screen appears. When the `MiniSetup` Wizard successfully completes its tasks, the system restarts a final time, the `Sysprep` folder and all of its contents are deleted, and the system is ready for the user to log on.

The `Sysprep` files are defined in the following sections.

Sysprep.exe

Table 2.15 describes the optional parameters for `Sysprep.exe`.

Table 2.15 Sysprep.exe Optional Parameters

Parameter	Description
quiet	Runs Sysprep without displaying the Sysprep onscreen messages.
nosidgen	Runs Sysprep without regenerating SIDs that are already on the system. This is useful if you do not intend to duplicate the computer on which you are running Sysprep.
pnp	Forces full hardware detection when the computer is restarted. Setup actively seeks new devices on the system, whether or not they are Plug and Play. Because this mode increases the time required for <code>MiniSetup</code> , it is only useful if the computer on which the image is being loaded contains non-Plug and Play hardware that cannot be dynamically detected.
reboot	Automatically restarts the computer after Sysprep shuts it down. This eliminates the need to manually turn on the computer again.
activated	Prevents Windows Product Activation resets. If this parameter is not set, Sysprep can reset Windows Product Activation a maximum of three times.
factory	When you are running <code>Sysprep.exe</code> , enables you to add additional drivers and applications to the image after the computer restarts.
reseal	Enables you to reseal the image and prepare the computer for delivery after you have made modifications to the image in Factory Mode.
msoobe	Displays the Windows Welcome screen (<code>Msoobe.exe</code>) on the next restart of the computer.
forcshutdown	Prepares the operating system as specified by Reseal Mode, and then immediately shuts down the computer without user intervention.
mini	Runs <code>MiniSetup</code> on the next restart of the computer.

Note For more information about optional parameters for `Sysprep.exe`, see Microsoft Windows Presinstallation Reference (`Ref.chm`) in the `Deploy.cab` file in the `\Support\Tools` folder on the Windows XP Professional operating system CD. You can use Windows Explorer or you can run `Extract.exe` to extract and view the `Ref.chm` file.

Sysprep.inf

`Sysprep.inf` is an answer file that is used to automate the `MiniSetup` process. It uses the same INI file syntax and key names (for supported keys) as `Unattend.txt`. Place the `Sysprep.inf` file in the `%systemdrive%\Sysprep` folder or on a floppy disk. If you use a floppy disk, insert it into the floppy disk drive after the Windows startup screen appears. Note that if you do not include `Sysprep.inf` when running Sysprep, the `MiniSetup` Wizard requires user input at each customization screen.

For more information about `Sysprep.inf`, see "Customizing Sysprep Installations" earlier in this chapter. For details about answer file parameters and syntax, see the `Deploy.chm` in the `Deploy.cab` on the Windows XP Professional operating system CD. The `Deploy.cab` file is in the `\Support\Tools` folder.

Setupcl.exe

`Setupcl.exe` regenerates new security identifiers (SIDs) for the computer.

Sysprep User Interface

To run Sysprep from the user interface, double-click Sysprep.exe. The System Preparation Tool dialog box appears. The System Preparation Tool dialog box enables you to perform the following functions:

Factory mode

Run Factory Mode to add additional drivers and applications to the Sysprep image.

Audit Boot mode

Run Audit Boot mode to restart the computer before you are ready to use Reseal mode.

Reseal mode

When you have made modifications in Factory Mode, run Reseal mode to prepare the computer for delivery.

PnP flag

Select the PnP flag to force full hardware detection when the computer is restarted.

NoSIDGen flag

Select the NoSIDGen flag to run Sysprep without regenerating SIDs that are already on the computer.

MiniSetup flag

Select the MiniSetup flag to run MiniSetup the first time a computer starts from a hard disk that has been duplicated by using Sysprep.

Pre-activated flag

Select the Pre-activated flag to prevent resets of Windows Product Activation.

For more information about Factory Mode and about MiniSetup flag, see "Customizing Sysprep Installations" earlier in this chapter.

Running Sysprep

After you install the operating system, you can use Sysprep to prepare for the transfer of the operating system to other similarly configured computers.

To run Sysprep manually, first install the operating system, configure the computer, and install any applications you want to include, then run Sysprep without using the **-reboot** command-line parameter. After the system shuts down, duplicate the image of the hard disk to the similarly configured computers.

If you are running Sysprep with the **-mini** parameter, the MiniSetup Wizard runs when users start their duplicated computers for the first time. You can preassign all or some of the Sysprep configuration parameters by using Sysprep.inf. The Sysprep folder (which contains Sysprep.exe and Setupcl.exe) is automatically deleted after MiniSetup is completed.

To prepare a Windows XP Professional installation for duplication

1. From the **Start** menu, click **Run**, and then type:

```
cmd
```

2. At the command prompt, change to the root folder of drive C, and then type:

```
md sysprep
```

3. Insert the Windows XP Professional operating system CD into the appropriate CD-ROM drive. Open the Deploy.cab file in the \Support\Tools folder.

4. Copy Sysprep.exe and Setupcl.exe to the Sysprep folder.

If you are using Sysprep.inf, copy this file to the Sysprep folder. For Sysprep to function correctly, Sysprep.exe, Setupcl.exe, and Sysprep.inf must all be in the same folder.

5. At the command prompt, change to the Sysprep folder by typing:

```
cd sysprep
```

6. At the command prompt, type:

```
sysprep /optional_parameter
```

If you don't use **-reboot** as one of your optional parameters, click **Shut Down** from the **Start** menu when a message appears requesting that you shut down the computer. You are now ready to use a third-party disk-imaging tool to create an image of the installation.

Note You can add a Cmdlines.txt file to the Sysprep\i386\%oem% folder to be processed by Setup. This file is used to run post-setup commands, including commands for application installation. For more information about Using Cmdlines.txt, see "Adding Applications" earlier in this chapter.

Selecting Disk-imaging Tools

Use a third-party disk-imaging tool to create a Windows XP Professional image. To ensure the best outcome when you are using a third-party disk-imaging tool with Windows XP Professional, make sure the tool meets all the requirements for your environment and make sure the tool can do the following:

- Access NTFS partitions.
Make sure your disk-imaging tool is compatible with Windows XP. Disk-imaging tools that are designed for use with the version of NTFS supported by Windows 2000, might not be compatible with the version of NTFS supported by Windows XP.
- Handle long file names.
- Create packages with short file names (for server environments that cannot read long file names).
- Open packages to add/remove files (such as new/updated drivers) without having to recreate the entire package.

Reducing the Number of Reference Images

With Sysprep, you can minimize the number of images that you need to use for preinstalling Windows XP Professional from multiprocessor (MP) to uniprocessor (UP) computers or from multiprocessor to multiprocessor computers. However, this only works for APIC or ACPI APIC computers.

Note More interrupts are available with APIC systems than with programmable interrupt controller (PIC) uniprocessor systems. As a result, computers with APIC HALs have faster response times, and they can support more hardware devices than computers with PIC HALs.

You can use one of several methods to create images for installations on multiprocessor systems and deploy the images on uniprocessor systems, or to create images for installations on uniprocessor systems and deploy the images on multiprocessor systems.

Each method has advantages and disadvantages, as outlined in the following sections. Choose the method that works best for you and your preinstallation environment.

Table 2.16 illustrates the compatibility of computers based on their HAL type. One image is required for each compatibility group. In this table, multiprocessor is abbreviated MP and uniprocessor is abbreviated UP.

Table 2.16 HAL Compatibility

Compatibility	ACPI PIC	ACPI-APIC UP	ACPI-APIC MP	Non-ACPI UP PIC	Non-ACPI APIC UP	Non-ACPI APIC MP
ACPI PIC	*					
ACPI APIC UP		*	*			
ACPI APIC MP		*	*			
Non-ACPI UP PIC				*		*
Non-ACPI APIC UP				*	*	*
Non-ACPI APIC MP					*	*

Multiprocessor to uniprocessor

For this process, the image is created on a multiprocessor reference computer. This image can be used on other multiprocessor computers or on uniprocessor computers.

Advantages of multiprocessor to uniprocessor

You can create a single entry in the Sysprep.inf file that then prompts Windows XP Professional to determine, after MiniSetup is complete, if a single processor or multiple processors are running. The correct kernel files are then used.

Disadvantages of multiprocessor to uniprocessor

This process requires that, when you create the reference image, you include each of the Mp2up.inf files and other related Mp2up files in the distribution folders.

Important This image can only be used in one of the following configurations depending on the HAL type you are using:

- From an ACPI APIC MP-based reference computer for use on other ACPI APIC MP or ACPI APIC UP-based computers.
- From a non-ACPI APIC MP-based reference computer for use on other non-ACPI APIC MP or non-ACPI APIC UP-based computers.

To create a multiprocessor to uniprocessor image

1. Copy the Mp2up.inf and associated Mp2up files to the location you are using for your Plug and Play device drivers in your distribution folders, for example, %OEM%\\$1\Sysprep\Hal.
2. In Sysprep.inf, add:


```
[Unattended]
UpdateUPHAL = "hwid,%SystemDrive%\Sysprep\Hal\Mp2up.inf"
```

 In the preceding example, *hwid* is either MPS_UP or ACPI APIC_UP.
3. Install the operating system from the distribution folders to a multiprocessor computer.
4. Run Sysprep with the Sysprep.inf created in step 2.
5. Image the computer.
6. Place the image on comparable destination computers.

Uniprocessor to multiprocessor

For this process, the image is created on a uniprocessor reference computer with an APIC HAL. This image can then be used on computers with compatible hardware and compatible HALs (either APIC UP HALs or APIC MP HALs).

Advantages of uniprocessor to multiprocessor

You do not have to install the Mp2up files on the computer.

Disadvantages of uniprocessor to multiprocessor

Before the computers can be shipped, the Sysprep.inf file must be replaced depending on the type of computer being shipped: uniprocessor or multiprocessor.

Important This image can only be used in one of the following configurations, depending on the HAL type you are using:

- From an ACPI APIC uniprocessor-based reference computer for use on other ACPI APIC uniprocessor or ACPI APIC multiprocessor-based computers.
- From a non-ACPI APIC uniprocessor-based reference computer for use on other non-ACPI APIC uniprocessor or non-ACPI APIC multiprocessor-based computers.

To create the uniprocessor to multiprocessor image

1. Install the operating system on a uniprocessor computer.
2. Run Sysprep.
3. Create the image of the computer.
4. In Sysprep.inf, add:


```
[Unattended]
UpdateHAL = "hwid,%windir%\inf\hal.inf"
```

 In the preceding example, *hwid* is either MPS_MP or ACPI APIC_MP.
5. Place the image on comparable destination computers.
6. On multiprocessor computers, use the Sysprep.inf file created in step 4 to replace all previous Sysprep.inf files.

You can use any tools you normally use to manipulate files on the hard disk when creating new computers from an image.

Using Sysprep to Extend Disk Partitions

When installing Windows XP Professional, you might find it necessary to extend the partition of the destination computer. You can use Sysprep with the appropriate entries in the answer file to extend an NTFS partition. You might want to extend an NTFS partition for the following reasons:

- To create images that can be extended into larger disk partitions and take advantage of hard disks that might have greater capacity than the original hard disk on the reference computer.
- To create images on smaller hard disks.

Review the following steps and choose the method that works best for you, based on the third-party tools that you are using to create an image of the operating system.

Caution Make sure that you do not accidentally delete the Setupapi.log and Hyberfil.sys files (if applicable) when modifying the image. These files are recreated when the MiniSetup Wizard runs on the destination computer. Deleting these files on an active system can cause the system to function improperly.

When used in an answer file, the ExtendOemPartition key causes Setup to extend the destination partition into any available unpartitioned space that physically follows it on the hard disk.

The values for ExtendOemPartition are 0, 1, and *extra size in MB*

where:

- 0 Setup does not extend the partition.
- 1 Setup extends the partition to fill out the hard disk.
- *extra size in MB* Setup increases the current partition size by this amount.

ExtendOemPartition automatically leaves the last cylinder on the hard disk free to allow dynamic disk support. ExtendOemPartition can be set to a number other than 1 to indicate a specific disk size for extending the hard disk. This is useful if more than one partition is requested on a computer.

Important Only NTFS partitions can be extended. If the destination partition you plan to extend is FAT or FAT32, run *convert.exe /fs:ntfs* from the command line before running Sysprep. The file system is converted when the image is applied to the destination computer before the MiniSetup Wizard starts. Setup does not extend FAT16 and FAT32 partitions.

ExtendOemPartition can be used with both the Unattend.txt and Sysprep.inf Setup files.

When used in Sysprep.inf for imaged computers, the destination computer's hard disk must be the same size or larger than the reference computer's hard disk.

To enable the extension, the partition to be extended must have contiguous unpartitioned space available.

To extend a hard disk partition when using a third-party disk-imaging product or a hardware-imaging device that supports the version of NTFS that is used by Windows XP Professional

1. Create a partition on the reference computer hard disk that is just large enough to install Windows XP Professional with all the components and applications that you intend to add. This helps keep the size of the reference image file to a minimum.
2. If the destination partition you plan to extend is FAT or FAT32, run *convert.exe /fs:ntfs* from the command line before running Sysprep. The file system is converted when the image is applied to the destination computer before the MiniSetup Wizard starts.

Note ConvertNTFS does not work in Sysprep.inf because this is a text mode-only function and Sysprep does not go through text mode.

3. In the [Unattended] section of Sysprep.inf, include the statement:

```
ExtendOemPartition = 1
```

You can also set the additional size in megabytes to extend the partition.

4. Install Windows XP Professional on the reference computer. Sysprep shuts down the system automatically.
5. Generate the image.
6. Place the image on the destination computer where the destination computer has the same size system partition as the reference computer.
7. Restart the destination computer.

When you place the reference image on a destination computer, drive C is converted to NTFS when the computer starts. The computer then restarts and starts MiniSetup. During MiniSetup, Windows extends drive C to the rest of the unpartitioned space on the hard disk. The destination computer then restarts, and the end user can log on and begin using Windows XP Professional.

The MiniSetup Wizard starts and the partition is extended.

To extend a hard disk partition when using a disk-imaging product that does not support NTFS used by Windows XP Professional

1. In the [Unattended] section of Sysprep.inf, include the statement:

```
ExtendOemPartition = 1
```

Or additional size in megabytes to extend the partition.

2. Use Cmdlines.txt to convert short file names.
3. Run Sysprep.

The following actions occur when you restart the destination computer:

- The computer initially starts in conversion mode to convert the system partition on the destination computer to NTFS.
- The computer automatically restarts.
- The MiniSetup Wizard starts, and the partition is extended almost instantaneously.

Installing Windows XP Professional on Nonnetworked Computers

Even if you don't have a network, you can still install Windows XP Professional and various applications on client computers, one computer at a time.

To install Windows XP Professional on nonnetworked computers

1. Choose a setup method, and then start Setup.
2. Add custom information and additional files.
3. Install applications. If you have no applications to install, skip this step.

Important Each client computer must have a CD-ROM drive.

Choose a setup method and then start Setup

Setup can typically be started from an MS-DOS bootable floppy disk, from a set of Windows XP Professional Setup floppy disks that you can create from the Web, or from the Windows XP Professional operating system CD. Starting from a CD is available only on computers

that support the El Torito No Emulation CD boot specification. Choose from the setup methods provided later in this section.

Note Windows XP Professional Setup floppy disks are not provided with Windows XP Professional. To create a set of bootable floppy disks, access the Microsoft Windows Update Web site and download an application that enables you to create a set of bootable floppy disks. For more information about creating a set of bootable floppy disks, see <http://www.microsoft.com>.

To install from the Setup floppy disks

1. Start the computer by using the Windows XP Professional Setup floppy disks.
2. When Setup is complete, you can add applications and run Sysprep.

For more information about how to install applications, see "Customizing the Installations" earlier in this chapter.

To install from Windows 98, Windows Me, Windows NT Workstation 4.0, or Windows 2000

1. Start the computer.
2. From the **Start** menu, click **Run**, and then type:

```
path to distribution folder winnt32 /unattend:Unattend.txt
```

In the preceding path, *Unattend.txt* is the answer file that contains answers to installation questions that you want to automate.

3. When Setup is complete, you can add applications and run Sysprep to prepare for creating an image.

For instructions about how to install applications, see "Adding Applications" earlier in this chapter.

To install by using CD Boot

Start the computer from the Windows XP Professional operating system CD. Setup begins automatically.

1. When Setup displays the message that it is examining the hardware configuration, insert the floppy disk containing the Winnt.sif file.
2. When the floppy drive light goes off, remove the floppy disk. Setup begins copying files to the hard disk.

For more information about how to install applications, see "Adding Applications" earlier in this chapter.

Note The `/udf` parameter cannot be used with the CD Boot method.

Add customized information and components

During this step, you can add customized information (such as your company's name) and components (such as custom Help files and other documentation).

To add customized information and components

- Create a file called *Oeminfo.ini* and copy it to the `%systemroot%\System32` folder. The `systemroot` folder is usually `C:\Windows`.

RIS

You can use Remote Installation Services (RIS) to install Windows XP Professional throughout an organization from remote locations. Using RIS, you can direct client computers to a RIS server and install automated, customized versions of Windows XP Professional.

RIS uses PXE/DHCP-based remote boot technology to remotely install the operating system on the client computer. The RIS server contains the operating system that can be installed on the client computer using either a Risetup or a Riprep-based image. You can contact the servers by designating the network adapter as the first in the boot order of the client computer's BIOS, or by using a remote boot disk for pre-PC98 computers. When a network boot is requested, the client computer performs the following tasks:

- The client computer requests an IP address from the DHCP server.
- The client computer requests the IP address of a boot server using PXE (if the boot server is not the DHCP server).
- The client computer contacts the boot server and downloads the Client Installation Wizard (CIW).

RIS Process

When a client computer starts, it sends out a DHCP Discover packet requesting an IP address and the location of a RIS server. In this packet, the client computer also sends out its Globally Unique Identifier (GUID). If the DHCP and RIS servers are on the same computer, all of this requested information is provided in the initial reply. If DHCP and RIS are on separate computers, the client computer sends out another broadcast DHCP Discover packet to contact a RIS server after it has successfully obtained an IP address from the DHCP server.

A RIS server running on Windows 2000 Server uses the Boot Information Negotiation Layer (BINL) service to contact the Active Directory™ service to determine if the client computer is a known client. Known clients are computers that are pre-staged to Active Directory.

The RIS server checks the Active Directory™ directory service to determine which RIS server can respond to this client request. The RIS server then provides the name of the server and the file that the client computer must download to start the installation process.

After the boot process begins, the Client Installation Wizard (CIW) screens are downloaded to the client computer and the installation begins.

When the CIW runs, the user at the client computer must log on to the domain. At this point, the user can select an image to install.

Before You Use RIS

To deploy Windows XP images from Windows 2000 RIS Servers, you must install the Windows 2000 Remote Installation Services update. For more information about the Windows 2000 Remote Installation Services update, see the Microsoft Knowledge Base link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>. Search the Microsoft Knowledge Base using the keywords *Risetup.exe*, *RIS Servers*, and *Windows XP Images*.

In addition, consider the following before you design a RIS deployment:

- **RIS server.** A RIS server is a computer running Windows 2000 Server, containing a hard disk with at least two partitions, that has been configured with the Remote Installation Services Setup Wizard (*Risetup.exe*) to install and run the following services:
 - Boot Information Negotiation Layer (BINL) service in Windows 2000 Server
 - Trivial File Transfer Protocol Daemon (TFTP)
 - Single Instance Storage Groveler

The Single Instance Storage (SIS) filter driver is also installed.
- **Remote Installation client.** The remote installation client computer can be a new personal computer that has a PXE-enabled network adapter, or an older personal computer (for example, computers built prior to the PC98/99 design specification) that can install Windows XP Professional using a remote boot disk to emulate PXE for the network adapter.
- **Active Directory.** Active Directory is a requirement for RIS. RIS setup sends a query to make sure Active Directory is running. If

Active Directory is not detected on the network, RIS Setup does not continue.

- **Networking considerations.** Consider the following factors when you are designing your RIS deployment:
 - The RIS server does not have to be the domain controller for the domain.
 - You must have DNS and DHCP servers available to service the RIS client computers on the network.
 - The servers that are running DNS and DHCP do not have to be members of the same domain as the RIS server.
 - You do not have to use Microsoft DNS and DHCP services.

Table 2.17 describes the major RIS components and the users who work with each component.

Table 2.17 RIS Components, Descriptions, and Intended Users

Component	Description	User
Remote Installation Services Setup (Risetup.exe)	Sets up the RIS server. This component is not available in Windows XP Professional.	System administrator
Remote Installation Services Administrator	Configures Group Policy settings relating to RIS. This component is not available in Windows XP Professional.	System administrator
Remote Installation Preparation tool (Riprep.exe)	Creates operating system images and installs them on the RIS server. You can also use Riprep.exe to create application images to install applications with the operating system. Client computers using PXE boot ROMs or a Remote Boot Floppy Generator (RBFGE) floppy disk can then download the image. Because the client computer initiates the download, starting from the text-mode portion of Setup, Riprep allows for differences in hardware among client computers (such as the boot device).	Desktop administrator
Remote Boot Floppy Generator (Rbfg.exe)	Creates the Remote Installation Services bootable floppy disk that is required to install RIS-based operating systems on client computers that do not have a PXE-enabled boot ROM.	End user
Client Installation Wizard (Oschooser.exe)	Selects the RIS image that the user must install. This wizard is used on the client computer.	End user with rights to create computer objects in the domain

Important To deploy Windows XP Professional Riprep-based images from Windows 2000 RIS Servers, you must install the Remote Installation Preparation tool update. For more information about the Remote Installation Preparation tool update, see the Microsoft Knowledge Base link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>. Search the Microsoft Knowledge Base using the keywords *Riprep.exe*, *Setuppl.exe*, *Imirror.dll*, and *Windows XP Images*.

The following sections discuss planning for RIS from a client perspective and explain how to use the Remote Installation Preparation tool and the Remote Installation Services boot disk.

RIS enables the administrator to configure Windows XP Professional and any applications for a single group of users, and then to apply this configuration when installing the operating system on client computers. For users, the result is a simplified and timely installation and configuration of their computer and a more rapid return to productivity if a hardware failure occurs.

Administrators have two options when using RIS:

- **The Risetup option.** Similar to setting up a workstation directly from the Windows XP operating system CD; however, the source files reside across a network on RIS servers. Risetup images are created by using Risetup.exe, which is a server-only application.
- **The Riprep imaging option.** Enables a network administrator to clone a standard desktop configuration, including operating system configurations and desktop customizations. After installing and configuring Windows XP Professional, its services, and any standard applications on a workstation, the network administrator runs a wizard that prepares the installation image and replicates it to available RIS servers. Remote boot-enabled client computers can then request a local installation of the image from the RIS servers over the network.

When a network service boot is requested, DHCP provides an IP address for the client computer, and the client computer can then download the Client Installation Wizard. At this point, the wizard prompts the user to log on, and, depending on the user's credentials or security group membership, displays a menu that offers appropriate customized unattended operating system installation options. The network administrator uses Group Policy settings to determine which installation options are available to a specific user, based on the policy that has been defined for that user at the client computer that initiated the network service boot request.

If you have a Windows 2000 Server operating system infrastructure with RIS installed and a client computer with the appropriate hardware, you can install Windows XP and any applications on that client computer remotely and automatically.

Preparing for Client Configuration

To ensure that a remote installation can proceed successfully, prepare the client computer for installation from a RIS server by completing the following tasks:

- Verify the hardware compatibility of the client computer.
- Set user rights.
- Set permissions.
- Specify the installation options.
- Configure the network adapter.
- Select and restrict client computer installation options.
- Use Riprep to prepare the client image.
- Deploy RIS.

Table 2.18 lists the tasks that the server administrator performs on a RIS server versus those that the desktop administrator performs on the client computer.

Table 2.18 Tasks for Preparing a Client Computer for a Remote Installation

Task	Description	User
Verify that the client hardware meets all	The client computer must meet the requirements for Windows XP installation and have a bootable network	Desktop administrator

requirements.	adapter or be enabled for remote startup. All computers that meet the PC98 0.6 and later design specification include a PXE remote-boot ROM for RIS. For client computers that do not contain a PXE ROM, use the Remote Installation boot disk to create a floppy disk that initiates the RIS process.	
Set required permissions on the RIS server.	If users are allowed to use RIS to install an operating system on client computers, those users need correct permissions for creating computer accounts within the domain, specifically the Organizational Unit container specified in the Advanced Settings on the RIS Server. Use Active Directory Users and Computers to set permissions on a container that allows users to use RIS to install an operating system on their own computers.	Server administrator
Specify installation options on the RIS server.	On the RIS server, you can use Group Policy settings to restrict the installation options available to users during remote installation. To restrict images, set access control permissions on the folders containing the installation images.	Server administrator
Configure the network adapter on the client computer.	You must configure the network adapter of the client computer as the primary startup device within the system BIOS. This allows the client computer to request a network service startup from the RIS server on the network. Many computers with built-in PXE compliant network adapters have three settings for the network adapter in the BIOS: off, on, and on with PXE. After the network adapter is set to on with PXE, on with PXE is typically available as an option in the boot order section of the BIOS.	Desktop administrator

Using the Remote Installation Preparation Tool

The Remote Installation Preparation tool (Riprep.exe) provides the ability to prepare a Windows XP Professional installation for disk imaging and to replicate the image to an available RIS server on the network. The image can include locally installed applications and specific configuration settings. The wizard feature supports replication of a single partition (drive C only) installation. This means that the operating system and the applications included with the standard installation must reside on drive C before the wizard is run.

Important To deploy Windows XP Professional Riprep-based images from Windows 2000 RIS Servers, you must install the Remote Installation Preparation tool update. For more information about the Remote Installation Preparation tool update, see the Microsoft Knowledge Base link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>. Search the Microsoft Knowledge Base using the keywords *Riprep.exe*, *Setuppl.exe*, *Imirror.dll*, and *Windows XP Images*.

It is recommended that you use RIS to install the operating system on a client computer. After the operating system is installed, you can install any applications, including line-of-business applications. You can then configure the installation to comply with company policies. For example, you might define specific screen colors, set the background bitmap to a company logo, and configure intranet proxy server settings within Internet Explorer. After the workstation has been configured and tested, you can run Riprep from the RIS server.

The destination computer (the computer that installs the image) does not need to have hardware that is identical to the computer that was used to create the image. However, the Hardware Abstraction Layer (HAL) drivers must be the same. For example, both HALs must be ACPI-based or non-ACPI-based (see Table 2.16, earlier in this chapter). In many cases, workstation class computers do not require unique HAL drivers, as server-class computers do. During image installation, the wizard uses Plug and Play to detect differences between hardware on the source and destination computers.

Riprep-based images are usually larger than Risetup-based images because Riprep-based images are a complex copy of the client computer's hard disk that is stored on the server. Riprep-based images contain the operating system in addition to preinstalled programs and tools. To store a Riprep-based image on a RIS server, your configuration must meet the following requirements:

- You must have at least one Risetup image stored on the same RIS server as the Riprep-based image.
- The Risetup image must use the same language and it must be based on the same version of the operating system as the reference computer.

The template (.sif) file refers the client computer to the RIS server to detect and load files for the client computer's network adapter. The template (.sif) file also uses the Risetup image to provide drivers to start text-mode Setup. Setup then copies the image to the installing client computer's hard disk.

When you image a client computer by using Riprep.exe, the following requirements must be met:

- At least one Risetup image must exist on the server so the user can access system files later. The Risetup image must use the same language and be based on the same version of the operating system as the reference computer.
- Only one partition is supported.
- Client computers must use the same HAL (for example, ACPI or non-ACPI).
- Destination computers must have a local hard disk that is at least equal to the size of the partition on the imaged computer.
- When you are creating the image, the client computer must not contain any encrypted files.

To run the Remote Installation Preparation tool (Riprep)

1. Install the standard operating system on the reference computer. It is recommended that you use RIS to perform this task.
2. Install applications locally on the client computer. Configure the client computer with specific corporate standard desktop settings. Make sure the client installation is correct. After the image is replicated to the RIS server, you cannot modify the configuration.
3. Copy the profile of the user used to configure the computer to the Default User profile. You should also delete any unwanted profiles at this point.
4. Connect to a RIS server from the computer on which you want to replicate this image and run Riprep.exe. The Remote Installation Preparation Wizard starts.
5. Enter the name of the RIS server where you want to replicate the contents of the client hard disk. By default, the RIS server from which the wizard is being run is filled in automatically.

6. Type the name of the folder on the RIS server where this image is to be copied.
7. When prompted, provide a description and Help text for this image. These are displayed to users during operating system image selection. Provide enough information to allow a user to distinguish between images.
8. After you complete the Remote Installation Preparation Wizard, review your selections on the summary screen that appears, and then click **Next**.

The image preparation and replication process begins. The system is prepared and files are copied to the RIS server. When the replication of the image is complete, you can use any client computer that meets the restrictions described in the next section, "Riprep Rules and Restrictions," and is enabled for PXE/DHCP-based remote boot technology to select and install the image from the Client Installation Wizard. You can also use any client computers that use the Remote Installation Services startup disk.

Riprep and Windows Product Activation

In Windows XP Professional, Riprep can reset Windows Product Activation a maximum of three times for any images that derive from an initial image and start with the installation of the initial image. When a disk image that was prepared with Riprep is rebooted, the activation timer is reset and the installation of Windows XP Professional is enabled with the full Windows Product Activation grace period. After three resets, the activation timer is no longer reset.

For more information about Windows Product Activation, see "Planning Deployments" in this book.

Riprep Rules and Restrictions

Riprep.exe is more flexible than Sysprep.exe because it starts over the network in text-mode Setup. This allows for a greater variation of hardware platforms, such as differing mass storage disk controllers. The only item that must be the same on all client computers when you use Riprep.exe is the HAL.

By default, Riprep-based images do not perform Plug and Play enumeration. If you want Plug and Play enumeration to occur, you must use the **-PnP** command-line parameter when you create your image. For example, at the command prompt, type **riprep -pnp**. After you run this command, Plug and Play enumeration always occurs. If you want to turn off Plug and Play enumeration, you must recreate the image.

To take advantage of Riprep's added functionality, be sure to follow these guidelines:

- The hard disk of the computer you want to image can have only one partition. If the hard disk of the client computer contains more than one partition, a message appears and only the system partition (containing the Windows folder) is copied. If your boot partition and system partition are different, the image is not useable.
- A Risetup image must reside on the RIS server.
- The hard disk on the destination computer must be at least the same size as, or larger than, the reference computer.
- The destination computer must also have the same HAL as the reference computer.

Using a Remote Installation Services Boot Disk

You can use the Remote Installation Services (RIS) boot disk with client computers that do not contain a remote boot-enabled ROM. The startup disk simulates the PXE startup process for computers that lack a remote boot-enabled ROM. The boot disk is analogous to a boot-enabled ROM, which uses the floppy disk drive to install the operating system from the RIS server.

This disk enables you to use RIS to install programs on a laptop computer. Because Personal Computer Memory Card International Association (PCMCIA) network adapters do not currently support PXE, you cannot use a PCMCIA network adapter with RIS. However, you can place the laptop computer in a docking station that contains a PCI-compliant network adapter and use a boot disk that you created by running Rbfg.exe.

Note Currently, Remote Boot Floppy Generator (RBFGE) floppy disks only support PCI-compliant adapters. RBFGE floppy disks do not support PCMCIA and ISA network adapters.

You cannot add additional network adapters to the RIS boot disk. Microsoft adds additional network adapters over time and makes the updates in the Rbfg.exe tool that is available through distribution channels, such as the Web, Windows Update, and future service packs.

Understanding GUIDs

When a client computer with a PXE-enabled network adapter connects to a RIS server, the Globally Unique Identifier (GUID) of the network adapter is among the items that are exchanged before a logon screen is displayed. The GUID is a unique 32-digit number that is stored with the computer account object that is created in Active Directory. Client computers with network adapters that are not PXE-enabled cannot supply this GUID. Instead, client computers that start from the RIS boot floppy with non-PXE-enabled network adapters send the network adapter's 12 character Media Access Control (MAC) address, prepended by 20 zeroes.

To generate a GUID in Windows 2000 Server, the Boot Information Negotiation Layer (BINL) service uses the 12 character MAC address and prepends 20 zeroes. This process creates a 32-digit number that is used as the GUID. The computer account object is associated with the network adapter, not with the computer. Even if you move the network adapter to a different computer, the GUID is still associated with the network adapter and not with the computer.

Because the computer account object is associated with the network adapter, if you move the network adapter to another computer, RIS assigns the attributes of the old computer to the new computer. Therefore, the administrator must delete the GUID from the computer account object for the old computer. If a user tries to install the new computer by using a different computer name, a message appears during the CIW that displays the names of the computers on the network that already have the same GUID. GUIDs and computer account objects must have a one-to-one relationship.

The RIS boot disk can be used with a variety of supported PCI-compliant network adapters. To determine whether the hardware components in your organization are compatible with Windows XP Professional, see the Hardware Compatibility List link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

One disk is used for all network adapters. The supported network adapters are listed in the Remote Boot Floppy Generator dialog box. You can display this dialog box by running Rbfg.exe. You can use this utility to create the boot disk. When RIS installation is complete, you can find Rbfg.exe on the RIS server partition, in the \RemotelInstall\admin\i386 folder.

Additional Resources

These resources contain additional information and tools related to this chapter.

Related Information

- The Hardware Compatibility List link on the Web Resources page at <http://www.microsoft.com/windows/reskits/webresources>.

Related Tools

- For more information about answer file sections, keys, and values, see the Deploy.chm in the Deploy.cab file on the Windows XP Professional operating system CD. The Deploy.cab file is in the \Support\Tools folder. You can use Windows Explorer or run the Extract.exe command to extract and view the Deploy.chm file.

[Send feedback to Microsoft](#)

[© 2004 Microsoft Corporation. All rights reserved.](#)