

Windows Unattended Installation Methods and Tools

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The latest version of the CompTIA A+ examination 220-802 requires the testing candidate to be familiar with various ways to install an operating system. The test objects referred to items such as *creating an image*, *deploying an image*, *unattended installation* and *remote network installation*.

Installing a Windows operating system from a DVD is fine for single or limited number computer installations, but for large number of installs such as the corporate environment or an educational institution, a more efficient method must be used.

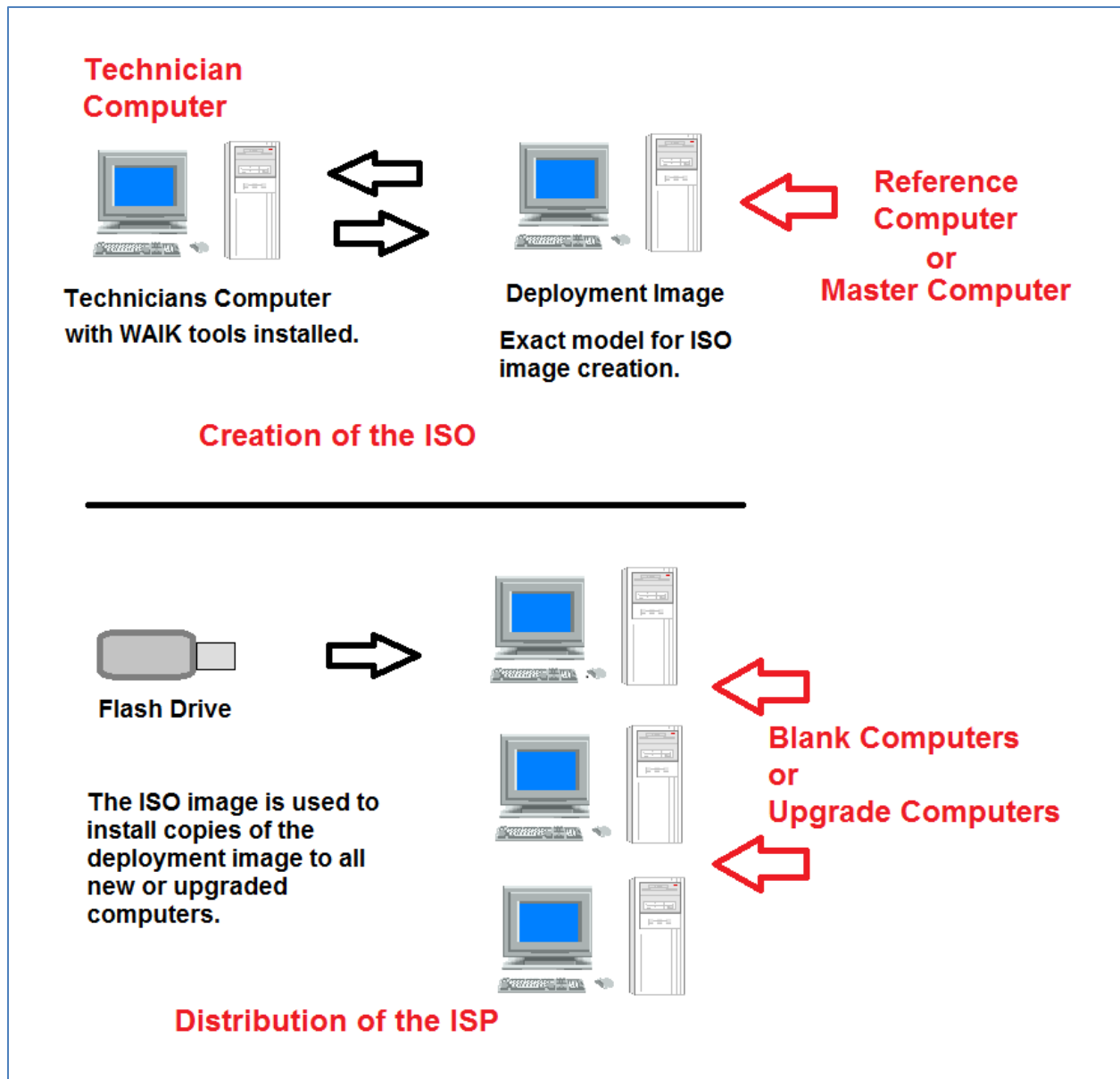
Installing individual copies on each machine, with a technician in attendance is not cost effective. Thankfully, Microsoft provides a complete set of tools designed for installing multiple copies of the operating systems, as well as application software onto multiple computers installs which is the most efficient manner, typically in a network system. Microsoft refers to the operation of massive installation as “deployments.”

This section article will present you with an overview of the method and tools used to accomplish the task. This article will serve as a simple introduction to the method used to install multiple copies of the operating system on a large scale. In this article, you will be shown the basic tools used for large deployments (the ones you will need to be familiar with for the test).

This article will familiarize you with the installation method known as an unattended installation used for mass deployments of operating systems to multiple computers. To further enhance your knowledge and become an in-depth expert in mass deployments, please visit the Microsoft TechNet web site. There are extensive materials written about performing unattended deployments and remote network installation.

Note: Some of these tools and methods used for an unattended installation that appear on the CompTIA A+ certification examination do not require an expert level of knowledge. The unattended installation objective questions are more of a general knowledge level. In contrast, Microsoft does require expert level knowledge of unattended installation procedures for the Microsoft Windows operating system certifications.

Look at the drawing below to see the three computer designations discussed in the unattended installation process.



There will be a reference or master computer, the technician computer and the target or destination computers which contain no operating system or will contain operating systems that will be upgraded.

Reference Computer

A reference computer is a model computer representing what a typical desktop used in the organization should look like. Microsoft also refers to the reference computer as the **Master Computer** in some of their documentation. The reference computer has the operating system installed, as well as software applications such as Microsoft Windows Office and any required hardware drivers that might be needed that are not contained on a typical Windows installation DVD. The reference computer is used to create a

deployment image which is an exact copy of all the files contained on the hard disk drive of the reference computer.

Technician Computer and WAIK

The deployment image reference computer serves as the model of what the typical computer should have installed on all the numerous computers being upgraded or new installations. The technician's computer contains all the various software tools used to configured and create an ISO disc or file to be used to install an exact copy of the deployment image computer. This is the location where the Windows Automated Installation Kit (WAIK) is installed. In some system configurations, there is no need for a keyboard or monitor located at the deployment image computer. A device known as a KVM (Keyboard Video Mouse) switch can be used.



When using a KVM, two or more computers share the same monitor, keyboard and mouse.

Both the technician computer and the reference computer can be controlled by on mouse and keyboard using the KVM switch. Only one monitor is needed to view either the reference or technician computer.

The general outline for creating and performing an unattended installation is as follows.

Key Steps for creating and performing an unattended installation process:

- ✓ Download and install the Windows Automated installation kit at the designated technician computer.
- ✓ Create a reference computer (Master Computer) containing the operating system and software applications.
- ✓ Create an answer file.
- ✓ Run the system prep utility to prepare and create an ISO image of the reference computer.
- ✓ Create a bootable Windows system media such as CD, DVD, or USB flash drive or copy the image to a network location to be used for distribution of the image.
- ✓ Distribute the System Media at the destination computer, insert the distribution media and then press Ctrl-Alt-Del to boot the computer and start the unattended installation process.

While the list of key steps makes the distribution process sound simple, in reality it is not. The successful distribution of the operating system using an unattended file takes many hours of preparation, but far less time than installing the operating system on each computer using a technician at each location.

Install the Windows Automated Installation Kit

The Windows automated installation kit (**WAIK**) is a collection of tools that support the Windows deployment process. The kit is a collection of software applications that are used to make an exact copy of all content located on a computer hard disk drive. To become expert in the use of the WAIK takes many hours of training, study and practice. Microsoft provides hundreds of pages of documentation concerning Windows automated deployment strategy and deployment techniques.

Create Reference Computer

The reference computer is the model of what all the computers in the network should look like when the distribution of the operating system is finished. It will contain the operating system and other software such as Microsoft Office as well as hardware drivers.

Create Answer File

In the next step we need to complete a unattended installation is an answer file. The answer file is what truly makes an automated install process possible. The answer file is a text-based document that is used in conjunction with the sysprep tool to configure the unattended destination computer. The answer file is created by using the using Windows System Image Manager (Windows SIM) tool. The answer file contains all the answers to questions that are normally encountered during an operating system installation procedure, as well as a series of commands that will perform such activities as preparing the partition when required. The answer file can automatically supply information for the configuration such as the name of the computer, the time zone, language, and network domain and other configuration information. The answer file can make the installation possible without human interaction thus the term “unattended installation.” The answer file can also be configured to make the user answer specific questions during the first time the computer boots, like when a new owner of a computer first boots their brand new computer. Some typical new owner questions that may require user intervention are the user name and or password, language, time zone and such. The answer file can be very simple or very complex depending on the environment the computer will be in and the need of any additional driver software applications. Microsoft provides samples of answer files to make the creation of the file less complicated.

Run Sysprep and Create ISO

When the operating system is first installed on the reference computer, a user account is created and the computer is named. Also, a product key is generated and other security features, as well making the computer unique. Before copies of the reference computer can be distributed to multiple computers, all unique information must be removed. The Sysprep tool (sysprep.exe) removes all system identification and security features associated with an individual user account and computer thus creating a deployment image. The deployment image contains all the files associated with the reference computer, except the unique configuration information removed. You can think of it as a generic computer with an operating system and other software applications and drivers, but there is no user account, computer name, product key or security identifier.

Create a Bootable Windows System Media.

The ISO image can be burned to a disc, or USB type flash drive or to an exterior USB storage drive, and then used for distribution to computers. The ISO file can also be stored on a network share, and used for distribution across the network to new or upgrade computers. When used for installation to new computers that contain no

operating system, the Windows PE is used to start the installation process from the new computer.

Distribute the System Media

At the destination computer, insert the distribution media, and then press Ctrl-Alt-Del to boot the computer and start the unattended installation process. You can make multiple copies of the distribution media and start the installation process at multiple locations. In most cases, you will not need to be in attendance at the computer locations while performing the installation. You can return after a period of time to retrieve the distribution media, and verify the installation was successful.

Note: Before performing the actual distribution of the system media, you should first run a test to verify the system media will install properly, and that the finished destination computer will perform as desired.

This was a short introduction to how an unattended installation is performed and you have become familiar with the general concepts. This should be sufficient for the CompTIA A+ exam. For the Microsoft certification examination, much more knowledge is required than presented in this article.

Now that you have a basic understanding to the process, it is important for you to learn the related terminology. Below, is a list of terms, along with a short narrative to help you expand your knowledge. The terminology will be presented on a little more technical level.

Windows Automated Installation Kit (WAIK) -

The Windows Automated Installation Kit (WAIK) is a collection of tools that support Windows deployment process. The kit is a collection of software applications that are used to make an exact copy of all content located on a computer hard disk drive. To become expert in the use of the WAIK takes many hours of training, study and practice. Microsoft provides hundreds of pages of documentation concerning Windows automated deployment strategy and deployment techniques.

System Preparation Tool – The System Preparation tool also known simply as **sysprep** is used to prepare an image of Windows operating system. The sysprep program is found on all Windows operating systems typically located at **C:\Windows\System32\Sysprep** on Windows 7 operating systems, and in similar locations, depending on which version of Windows operating system you are using. The sysprep tool prepares the computer image by removing unique identification features such as the computer name, user account, security identifier and more.

ImageX – A command line utility that is used to capture, modify and apply file-based disk images. Until imageX, imaging tools were sector based. A sector based imaging tool makes an image of the original hard disk drive on a sector by sector basis. The ImageX tool differs from most other image tools in the fact that it uses WIM files, and it is not sector based. Sector based images are an exact copy bit-by-bit of a collection of disc sectors located on an original disc. The WIM files are actual files rather than an exact copy of disk sectors bits. This allows the ISO images created by the ImageX tool to be modified without the need to make a brand new image file based on the original location disc sectors. This is a vast improvement over the original ISO image creation technique used previously.

ISO Image – An ISO image is a computing term which means a single continuous file representing an entire file system. The ISO image is typically formatting using the ISO 9660 Standard as defined by the International Standards Organization, hence its name ISO image.

Windows Pre-Installation Environment or Windows PE – This is a limited version of the Windows 32-bit operating system used mainly for deploying the operating system or for installing system recovery. As the name implies (Pre-installation Environment), the program is used to start the installation process, and copy the required files from the installation disc image or from a network share.

User State Migration Tool (USMT) – Used to migrate user files and settings during the deployment of Microsoft operating systems such as XP, Vista, Windows 7 and Windows 8 operating systems. The USMT captures user accounts, user files, desktop, and migrates them to the new Windows system. The USMT is used for both, side-by-side and wipe-n-load type deployments. The USMT is not needed when performing an upgrade from a Windows 7 to a Windows 8 operating system.

Windows System Image Management Tool – The Windows System Image Management tool (**Windows SIM**) is used to open images, create answer files, and manage distribution shares. The unattended answer file has a name such as Unattend.xml. The “unattended” can be any file name and the “xml” is the file extension which identifies the file as an xml format.

Deployment Image Servicing and Management – The Deployment Image and Servicing Management tool (**DISM**) is used to apply updates, drivers and language packs to images. The tool is designed so that you do not need to remake a complete

image of the system. You can simply update changes to the original image, and then automatically distribute the update across the network to all machines.

Key Management Service (KMS) – This is a service used to activate operating systems running Windows operating systems. The action is much the same as DHCP which is when a computer receives an IP address from a server that automatically issuing IP addresses to computers on a network. The key management service is required for volume license installations. For example, a company might buy a volume license for their computer systems. A volume license is used to activate individual computers on a network system that do not have individual licenses (product keys). The key management service is running on a computer which is responsible for issuing keys to computers located on the network. For example, a company may purchase 50 licenses. When the limit 50 is exceeded, the computer is not activated, and it will behave as any Microsoft computer system that is not activated. You will have a “grace period” in which to activate the computer. Messages will appear daily until you activate the computer that exceeds the number allocated with the volume license.

Additional Tools for Deployment and Distribution

Microsoft provides additional tools that are useful to assist with large deployments. Two of the tools are Microsoft Application and Compatibility Toolkit (ACT) and Microsoft Assessment and Planning Toolkit (MAP). The main difference between the MAP and ACT is that the ACT concentrates on software issues, while MAP concentrates on hardware issues.

Microsoft Assessment and Planning Toolkit (MAP)

Microsoft Assessment and Planning Toolkit (MAP) is used to survey an existing network and create an inventory of desktop and server computers, and then generate a compatibility assessment report. The reports are generated in spread sheet fashion, as well as written reports using Windows Office Word. Examples of information collected from the entire network are, computer name, CPU, amount of RAM, Hard disk drive size, IP address, video card type, BIOS manufacturer and date, and much more. To run the Microsoft assessment and planning tool, a server with Windows Active Directory must be running in the network system. Without Active Directory service, the survey will not be conducted properly and information will be missing.

Microsoft Application Compatibility Toolkit (ACT) – is a collection of tools and documents for assessing application compatibility before deploying Windows operating system. The ACT utility inventories and identifies potential problems such as software that is incompatible with the newer operating system. After running the utility and identifying potential problems, you then determine how best to remedy each problem.

All problems should be identified before migration to a new operating system is made. When a software application is found to be incompatible, the person responsible can then then determine if a newer version of the software system has been created, or a compatible software patch exists.

To learn more about the unattended installation process and to download the very latest tools, conduct a key word search using the terms (Microsoft TechNet WAIK) or follow this link for Windows 7

[http://technet.microsoft.com/en-us/library/dd349343\(Ws.10\).aspx](http://technet.microsoft.com/en-us/library/dd349343(Ws.10).aspx) , and use this link for Windows 8.

<http://technet.microsoft.com/en-us/library/hh824947.aspx>. There is a lot of detailed information available at the Microsoft TechNet website.

Sysprep Video <http://technet.microsoft.com/en-us/windows/ee530017>

A list of references related to Windows deployment.

<http://technet.microsoft.com/en-us/library/hh825039.aspx>

The Microsoft TechNet most popular Windows 8 downloads page.

<http://technet.microsoft.com/en-us/windows/jj730248>

Sample Answer File provided by Microsoft

[http://technet.microsoft.com/en-us/library/cc749317\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc749317(v=ws.10).aspx)

Review Questions

1. What are the three computer designations in an unattended installation process?
2. What does the acronym WAIK represent?
3. Which tool is used to remove the security identifier, and computer name?
4. What does the acronym USMT represent?
5. What is imageX?
6. Which tool is designed to move user files and setting during a deployment of the operating system?
7. What is Windows PE, and what is it used for?
8. Where is the Windows automated installation kit usually installed?
9. Is the ImageX a file-based or sector-based imaging tool?
10. Is the Windows 7 pre-installation environment 32-bit or 64 bit?
11. What tool or utility is used to survey an existing network and conduct an inventory or desktop and server computers, and then generate a hardware compatibility assessment?
12. Which tool is used to conduct a network survey and identify software compatibility problems?
13. Which tool or utility is used to open images, create answer files, and manage distribution shares?

Review Question Answers

1. What are the three computer designations in an unattended installation process? There will be a reference or master computer, the technician computer and the target or destination computers.
2. What does the acronym WAIK represent? Windows Automated Installation Kit.
3. Which tool is used to remove the security identifier, and computer name? The system preparation (sysprep) tool.
4. What does the acronym USMT represent? User State Migration Tool.
5. What is imageX? A command line utility that is used to capture, modify and apply file-based disk images.
6. Which tool is designed to move user files and setting during a deployment of the operating system? USMT
7. What is Windows PE and what is it used for? A limited version of the Windows 32-bit operating system used mainly for deploying the operating system or for installing system recovery.
8. Where is the Windows automated installation kit usually installed? On the technician computer.
9. Is the ImageX a file based or sector based imaging tool? File based.
10. In the Windows 7 pre-installation environment 32-bit or 64 bit? 32-bit.
11. What tool or utility is used to survey an existing network and conduct an inventory or desktop and server computers and then generate a compatibility assessment? Microsoft Assessment and Planning Toolkit (MAP).
12. Which tool is used to conduct a network survey and identify software compatibility problems? Microsoft Application Compatibility Toolkit (ACT)
13. Which tool or utility is used to open images, create answer files, and manage distribution shares? Windows System Image Management Tool.