
Lab LW01

Windows Deployment – Sysprep and the Windows Preinstallation Environment (Windows PE)

Objectives

After completing this lab you will be:

Able to run Sysprep and have an understanding of required switches and optional switches

Familiar with Windows PE

Familiar with diskpart and format use within Windows PE

Able to launch an unattended setup from within Windows PE

Able to run third-party imaging applications to install a disk image from within Windows PE

Prerequisite

Before working on this lab, you may find it useful to have basic familiarity with unattended setup.

Lab Setup

Before working on this lab, you will need to have a properly configured VMWare virtual machine, with a partition to install to, the preconfigured partition to install from, and the Windows PE ISO image.

Estimated time to complete this lab: 50 minutes

Exercise 1

Running Sysprep

Scenario

You have decided to use disk-based duplication, often referred to as “imaging” or “cloning”, to distribute Windows XP to within your enterprise. To do so is a multi-step process, beginning with configuring the source system, including installing applications and configuring system settings, and running Sysprep on it. Sysprep prepares a Windows system for disk-based duplication, and needs to be run from within Windows every time it is going to be imaged. Sysprep configures the operating system to use Windows Welcome (Windows XP only – Windows Server 2003 does not have this functionality) or Mini-Setup to run the first time the end user starts the newly imaged computer. This shortened form of GUI-mode Setup takes five or six minutes instead of the usual 45 to 60 minutes, and it prompts the end user only for required and user-specific information, such as accepting the End-User License Agreement (EULA) and entering the Product Key, user name, and company name. Rather than having a user click through each screen, you can use a Sysprep.inf file, an optional answer file that you can use to automate Mini-Setup. If a Sysprep.inf is present in the Sysprep directory, the information in it will be used to automate Mini-Setup. By using Sysprep.inf, you can have Mini-Setup prompt the end user for certain information, or you can create a completely automated installation that does not prompt the end user for any information at all. Now let’s learn to use Sysprep when running it.

Goal

From within Windows XP, launch Sysprep to prepare Windows for disk-based duplication (imaging).

Tasks	Detailed Steps
1. Boot Windows XP and prepare to run Sysprep	<ul style="list-style-type: none"> a. Power on the Windows XP virtual machine (do not press any key when prompted to boot from CD), and b. Once Windows XP has finished booting, go to the Start Menu, and select Start and then select Run. c. Type d:\Scripts\Prepare.bat, and select OK. This script will copy Sysprep from the tools disk (D:) to the local disk (C:), so Sysprep (and Mini-Setup) can run.
2. Run Sysprep	<ul style="list-style-type: none"> d. Once it has copied the files, open My Computer, and browse to the C:\Sysprep directory. Note the presence of four files: e. Sysprep.exe f. Setupcl.exe g. Sysprep.inf and h. Factory.exe <p>Sysprep and setupcl are always required when running Sysprep. Sysprep.inf is required (as noted above) if you are automating any part of Mini-Setup. Factory.exe is not used here, but would be if you were running Sysprep in Factory mode (see the deploy.cab located in the Support\Tools\ directory on a Windows XP or Windows Server 2003 CD for more information). In that case an additional file (winbom.ini) would also be necessary. You can open the Sysprep.inf in notepad if you would like to examine its basic structure. Note that it is a subset of</p>

	<p>the fields used in a normal unattended setup file (unattend.txt or winnt.sif).</p> <ol style="list-style-type: none">i. Close Explorer. At this point you would have configured the system exactly as needed (see KB article 307543 for an answer to a common issue), adding icons to the desktop, adding applications, etc. Now you can run Sysprep.j. From the Start Menu, select Start and then select Run.k. Type c:\Sysprep\sysprep.exe -reseal -quiet -mini, and select OK. The -reseal switch tells Sysprep to prepare the system for capturing. The -quiet switch prevents any user interface from being displayed while Sysprep is running. The -mini switch specifies to Sysprep to use Mini-Setup rather than Windows Welcome.l. Sysprep will begin running, and will complete its first phase, followed by a system shutdown in preparation for duplication.m. Once Sysprep has completed, power off the virtual machine. Your system is now ready to be duplicated (using third-party imaging software, or using Windows PE and xcopy to a Windows NTFS file share).
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Notes

Sysprep makes the source and target computers unique from each other. It is important to note that Sysprep is *not* merely a SID-changing utility, it performs many other tasks required in order to make a disk-duplicated system unique, reliable, and secure. Sysprep *must* be a part of your imaging process in order for the resulting Windows install to be supported by Microsoft – for more details, see the following Microsoft Knowledge Base Articles:

<http://support.microsoft.com/default.aspx?scid=kb;en-us;162001>

<http://support.microsoft.com/default.aspx?scid=kb;en-us;314828>

You may want to take note of some key changes to Sysprep for Windows XP and Windows Server 2003. When you take a Windows image from a system with one mass-storage controller, and copy it to another, you should use the **-bmsd** switch (by itself) before running **Sysprep -reseal**, to prevent a stop 0x7B from occurring on target systems (see the following KB: <http://support.microsoft.com/default.aspx?scid=kb;en-us;303786> for more information). If the **[Sysprep]** section of your **Sysprep.inf** contains the entry **BuildMassStorageSection = Yes** and the **[SysprepMassStorage]** section header exists in **Sysprep.inf** then Sysprep will build the list of mass-storage devices. After using **Sysprep -bmsd**, you can delete unnecessary items from this section before running **Sysprep -reseal** or **Sysprep -factory** on this installation. Installing a smaller number of items in the critical device database reduces the time required for this image to reboot into the operating system. Once you have applied your image, run **Sysprep -clean** from within Windows, and reboot. Only the mass-storage controller that your system needs will remain in use on your system.

It's also important to note that the **-PnP** switch for Sysprep *should only be used in cases where you know you have legacy, non-Plug and Play devices*. Using **-PnP** on a system which contains only Plug and Play devices will add a considerable amount of time to the deployment process (specifically the initial boot), with no benefit to the end user.

Also important is that Sysprep is version specific. There is a version for Windows 2000, and one for Windows XP. Sysprep is often updated when Windows Service Packs are released. The most recent version of Sysprep for Windows 2000 (updated at Service Pack 3 release) and Windows XP (updated at Service Pack 1 release) are available for download from Microsoft.com.

Exercise 2

Learning Windows PE

Scenario

Windows PE (see <http://www.microsoft.com/licensing/programs/sa/sam/WinPE.asp> for licensing information) is a 32-bit preinstallation environment that is CD, DVD, hard-disk, and RIS bootable, and allows you to access TCP/IP-based networks and manipulate disks and partitions – using the same network and storage drivers as Windows XP or Windows Server 2003. Let’s move on to learn some basics of Windows PE and begin exploring Windows deployment using Windows PE.

Goal

Familiarize yourself with Windows PE and launch an unattended setup from within Windows PE

Tasks	Detailed Steps
1. Launch Windows PE	<p>a. Power on the Windows XP virtual machine again (press any key on the keyboard when prompted to boot from CD), and</p> <p>b. Windows PE is now booting. This initial process is somewhat similar to the initial phases of a RIS install or a CD-based install.</p> <p>Once Windows PE has booted, you will see the command prompt (cmd.exe) launch and run factory –winpe. Factory –winpe initializes the network card and assigns an IP address either using DHCP or a static IP from a winbom.ini. The winbom.ini can also contain information used to partition and format hard disks on the system.</p>
2. Examine your drives	<p>You will notice that you have 3 drives – the C: drive (to install Windows to), the D: drive (where the tools for this lab are located) and E:, where Windows PE is running from. For this exercise, you will completely clean the first drive (currently comprised of one partition, “C:” and recreating it again).</p>
3. Clean the partitions off of the install hard disk	<p>c. Type d:\Scripts\delpart.bat and click Enter.</p> <p>Note that the script you ran passed another script to diskpart (the command-line partitioning tool included in Windows XP and Windows Server 2003) to clean disk 0 (disks are zero-based when using diskpart). This script consisted of the following commands (you can also just use the first three letters of each word rather than the full word):</p> <ul style="list-style-type: none"> • SELECT DISK 0 (selects disk 0 – disks are zero-based with diskpart) • CLEAN (cleans all information from disk) • EXIT (exits diskpart)
4. Create a new partition to install Windows to	<p>d. Type diskpart and click Enter</p> <p>e. Run the following commands (click Enter after each entry):</p> <p>f. SEL DIS 0 (selects disk 0)</p> <p>g. CRE PAR PRI (creates one primary partition, full extent of the drive)</p>

	<p>h. ACTIVE (marks the new partition as active)</p> <p>i. ASSIGN LETTER=C (assigns letter C to the new partition)</p> <p>j. EXIT (exits diskpart)</p>
5. Format the partition you just created	<p>k. Type format C: /Q /Y /FS:NTFS and click Enter</p> <p>The /Q specifies a quick format, the /Y is used to proceed without confirmation from the user. The /FS:NTFS specifies to format the disk using the NTFS file system.</p> <p>Notice the speed difference of performing a repartition and format under Windows PE versus the same operation in MS-DOS (if you have performed that task before). Another advantage is that Windows PE can recognize NTFS formatted partitions inherently, and has the same disk and partition limitations as Windows XP or Windows Server 2003 (Windows PE can be created from both).</p>
6. Launch Windows XP unattended setup	<p>l. Type D: and click Enter</p> <p>m. Type CD Microsoft\Windows XP\I386 and click Enter</p> <p>n. Type winnt32 /syspart:C: /tempdrive:C: /dudisable /unattend:unattend.txt /makelocalsource and click Enter</p> <p>Note the switches above. /syspart: and /tempdrive: followed by the drive letter of the partition you created in step 4 tell Windows where to put the temporary files, and where to install to (without these switches setup will fail to find partitions to install to on a newly partitioned system). /dudisable prevents Windows XP from attempting to run Dynamic Update. /unattend: followed by the name of the unattend file specifies the unattended setup file to use. /makelocalsource brings all source files local, and prevents re-prompting for a CD during setup. Type winnt32 /syspart:C: /tempdrive:C: /dudisable /unattend:unattend.txt /makelocalsource and click Enter</p> <p>o. Setup (Winnt32.exe) will begin applying files to continue to the next phase of setup. To save time let this phase of setup conclude, and then this exercise will conclude (you will not completely install Windows to the system). You could have encapsulated all of the steps above into one script:</p> <ul style="list-style-type: none"> • Partitioning • Formatting • Windows unattended setup • And the command EXIT – this quits Windows PE and reboots the system to continue into the next phase of setup in a completely automated manner. <p>p. Once Winnt32 setup has concluded, do not power down the virtual machine. Should you accidentally do so, please restart it and press a key when prompted, to proceed to Windows PE for exercise 3.</p>

Notes

Windows PE allows you to remove DOS from your deployment infrastructure. Windows PE can also have Windows Script Host (WSH) and HTML Applications (HTA) added to it using tools provided with it. By using these tools, you can build a rich automated deployment solution (using batch or WSH scripts) or HTA or a shell of your own design (if a more UI-driven model is what is

required in your scenario). The native 32-bit support, native network and storage drivers, and TCP/IP networking and disk configuration tools allow you to create a solution that meets your specific deployment requirements.

2003. When you take a Windows image from a system with one mass-storage controller, and copy it to another, you should use the **-bmsd** switch (by itself) before running **Sysprep – reseal**, to prevent a stop 0x7B from occurring on target systems (see the following KB: <http://support.microsoft.com/default.aspx?scid=kb;en-us;303786> for more information). If the [Sysprep] section of your **Sysprep.inf** contains the entry **BuildMassStorageSection = Yes** and the [SysprepMassStorage] section header exists in **Sysprep.inf** then Sysprep will build the list of mass-storage devices. After using **Sysprep –bmsd**, you can delete unnecessary items from this section before running **Sysprep -reseal** or **Sysprep -factory** on this installation. Installing a smaller number of items in the critical device database reduces the time required for this image to reboot into the operating system. Once you have applied your image, run **Sysprep –clean** from within Windows, and reboot. Only the mass-storage controller that your system needs will remain in use on your system.

It's also important to note that the **-PnP** switch for Sysprep *should only be used in cases where you know you have legacy, non-Plug and Play devices*. Using **-PnP** on a system which contains only Plug and Play devices will add a considerable amount of time to the deployment process (specifically the initial boot), with no benefit to the end user.

Also important is that Sysprep is version specific. There is a version for Windows 2000, and one for Windows XP. Sysprep is often updated when Windows Service Packs are released. The most recent version of Sysprep for Windows 2000 (updated at Service Pack 3 release) and Windows XP (updated at Service Pack 1 release) are available for download from Microsoft.com.

Exercise 3

Deploying Windows XP from Windows PE using imaging software

Scenario

After the conclusion of Exercise 1, an imaging tool could be used to capture the Sysprep image you had created. You then would apply it to multiple systems, which you will learn how to do now.

Several imaging vendors have versions of their tools that are able to image systems from within Windows PE today. For this task you will run both Symantec Ghost32 and PowerQuest PQIDeploy from within Windows PE. These tools are provided for this lab courtesy of Symantec and PowerQuest, respectively. Please see the notes section immediately following this exercise for further information about their products which run on Windows PE.

Goal

Learn how to apply an image of Windows XP from within Windows PE. First you will use Symantec Ghost32, and then PowerQuest PQIDeploy, two imaging products which are available for use on Windows PE. Each of these imaging tools uses their own scripting syntax. For the purposes of this experiment the commands for each have been included in a batch script.

Tasks	Detailed Steps
1. Run Symantec Ghost32	a. Type CD \Symantec\Ghost32 and click Enter

	<p>b. Type Apply_Image.bat and click Enter</p> <p>This script runs the following command: Ghost32.exe - clone,mode=restore,src=d:\Symantec\Ghost32\WindowsXP.img,dst=1 -sure</p> <p>This command specifies running Ghost32 to do a cloning task and restore an image from the image d:\Symantec\Ghost32\WindowsXP.img to the first disk. -sure specifies to proceed with no user interaction.</p> <p>c. Note that the script above could have contained an additional line specifying to exit Windows PE, continuing on into Mini-Setup. You will continue on and image the system again using PowerQuest's imaging software.</p>
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Tasks	Detailed Steps
<p>1. Run PowerQuest PQIDeploy</p>	<p>a. Type CD \PowerQuest\PQIDeploy and click Enter</p> <p>b. Type Apply_Image.bat and click Enter</p> <p>This script runs the following command: PQIDeploy.exe /CMD=PQIDeploy_apply.pqs /IMG=WindowsXP.pqi</p> <p>This command specifies running PQIDeploy using the batch script PQIDeploy_apply.pqs with the image d:\PowerQuest\PQIDeploy\WindowsXP.img</p> <p>The pqs file, a PowerQuest script file, contains the following commands:</p> <ul style="list-style-type: none"> • SELECT DRIVE 1 • DELETE ALL • SELECT FREESPACE FIRST • SELECT IMAGE ALL • RESTORE <p>This script selects the first drive, deletes all partitions, and using the free space on the drive, applies the PQI image specified in the initial batch file</p> <p>c. Once the PowerQuest image has finished applying, exit Windows PE by typing exit and clicking Enter. Let the virtual machine reboot and restart into Mini-Setup, resulting in an install of Windows XP identical to the one you used in exercise 1.</p>

Notes

Note that both PowerQuest and Symantec imaging software numbers disks beginning with 1, versus diskpart, which numbers disks beginning with zero. This is something to bear in mind when you are developing Windows deployment scripts.

Symantec contact information (Ghost32, the first imaging demo above):

corporatesales@symantec.com or 800-745-6054

PowerQuest contact information (PQIDeploy, the second imaging demo above):

mms2003@powerquest.com

Summary

In completing this lab, you have learned to run Sysprep, gained an initial familiarity with Windows PE, become familiar with diskpart and format, learned how to launch an unattended setup from within Windows PE, and you have seen examples of third-party imaging applications installing Windows XP images from within Windows PE

Further reading

<http://www.microsoft.com/WindowsXP/deployment>

The deploy.cab on the Windows XP product CD (located in the \Support\Tools directory) contains Sysprep and the documentation needed to use it as well as to write unattended setup scripts.