ACCELERATING OS DEPLOYMENT WITH MICROSOFT WINDOWS DEPLOYMENT SERVICES

By David Waggoner

Microsoft® Windows® Deployment Services (WDS) provides an accessible, flexible way to perform mass deployments of current and legacy Windows operating systems. Using customized answer files and taking advantage of scripting and other tools with WDS can help dramatically reduce the time to perform highly configured mass deployments with minimal infrastructure impact.

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First introduced in the Microsoft Windows Server® 2003 OS around the time of the Service Pack 2 (SP2) release, Windows Deployment Services (WDS) is now the standard mass deployment tool in Windows Server 2008. It is flexible and capable enough that some IT departments may use it to roll out Microsoft Windows Vista® or Windows Server 2008 platforms throughout their enterprise, while those with considerable investments in Microsoft Systems Management Server or System Center Configuration Manager can use WDS in enclosed lab environments for testing or for creating deployment images and scenarios. This article discusses key differences between Windows Server 2003 and Windows Server 2008 installations and delves into some of the specific WDS options and customizations—including customized answer files and WDS support for scripting and hardware tools—that can help simplify and accelerate Windows Server 2008 deployments.

EVOLUTION OF WINDOWS MASS DEPLOYMENT

WDS is the latest in a line of Microsoft mass deployment tools that has previously included Remote Installation Services (RIS), introduced in Windows 2000 and refined for Windows Server 2003, and Automated Deployment Services (ADS), introduced later for Windows Server 2003. While WDS does not incorporate every feature of both RIS and ADS, it replaces them as the simple, supported deployment tool at no additional cost, and can be very effective in this role for Windows Vista and Windows Server 2008 deployments. (For more information on the differences between RIS, ADS, and WDS for previous Windows operating systems, see the "Comparing RIS and ADS with WDS for legacy OS deployments" sidebar in this article.) Figure 1 shows the WDS graphical user interface (GUI).

WDS IN WINDOWS SERVER 2003 AND WINDOWS SERVER 2008

The Windows Server 2003 and Windows Server 2008 versions of WDS are very similar in function and features. In fact, the Windows Server 2008 version is a superset of the Windows Server 2003 version, offering additional features such as multicast support and enhanced Trivial FTP (TFTP) performance, which can help reduce the impact on networks configured to support multicast.

Multicast works in two modes: ScheduledCast and AutoCast. ScheduledCast is a timed event that only sends to those systems that are configured before the event. AutoCast functions like a normal multicast. The
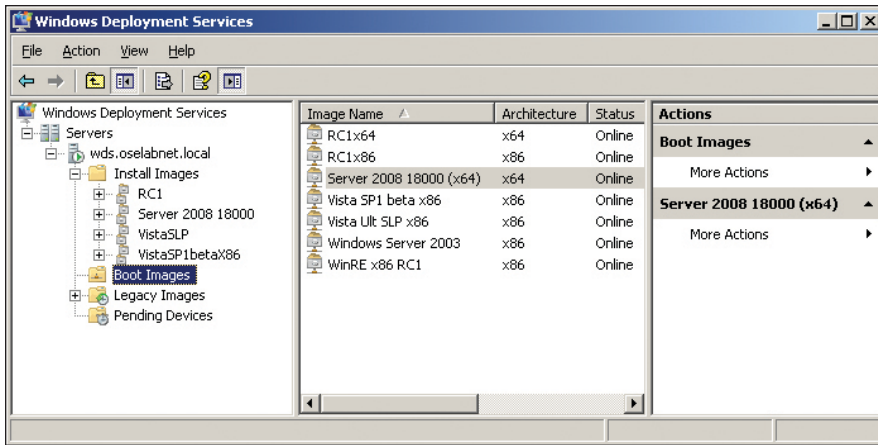
Figure 1. *Microsoft Windows Deployment Services GUI*

target systems can "subscribe" to the image as it is streaming and then keep track of the necessary bits. If the system that initiated the download stream is already 20 percent complete when a second system joins, both systems will get the same bits after that first 20 percent; then, after the first system is complete, the second system gets the 20 percent that it had missed previously. This approach helps feed many systems the same image while only utilizing the bandwidth of a single stream. The TFTP changes help improve network performance by allowing the network stack to negotiate increased time windows to communicate before an acknowledgment packet is sent.

One other difference is that the Windows Server 2008 version of WDS can automatically detect whether a target system supports 64-bit operating systems and can show those operating systems on the WDS installation list. Administrators must manually configure the Windows Server 2003 version to perform the architecture detection; otherwise, 64-bit operating systems may not be offered to that target system.

CUSTOMIZED ANSWER FILES

Customizing deployments of Windows Vista and Windows Server 2008 is far more straightforward than customizing deployments of previous OS versions. The various unattended installation answer files have been combined into a single unattend.xml file, and many more options are available than have been in the past.

A key component used to create these files, the Windows System Image Manager (SIM), is part of the Windows Automated Installation Kit (AIK) available as a complimentary download from the Microsoft Web site.[1] While its exact configuration and operation are beyond the scope of this article, the Windows SIM can be used to create detailed, customized unattend.xml files that can be applied to OS images within WDS, or can be placed on USB drives for individual use. If the unattend.xml file is applied to the image within WDS, it is applied to each installation performed with that image. Without an unattend.xml file, administrators or other IT staff would go through the normal GUI installation process; alternatively, they could put the unattend.xml file at the root of a USB drive inserted into the target system, with the system then using the configuration settings in that file.

Having a variety of configurations detailed in individual unattend.xml files allows administrators or other IT staff to choose the installation configuration and walk away, without requiring the intervention of a WDS administrator. If they can use the Windows SIM, they would have

COMPARING RIS AND ADS WITH WDS FOR LEGACY OS DEPLOYMENTS

A key difference between Remote Installation Services (RIS) and Windows Deployment Services (WDS) is that WDS deploys legacy operating systems (such as Windows Server 2003, Windows XP, and others) only as images—meaning that it functions similarly to a traditional imaging server such as Symantec Ghost. Automated Deployment Services (ADS) works similarly to WDS, but uses different technology that is not supported for use with Windows Vista and Windows Server 2008.

RIS installations go through text-mode setup and the standard installation process to help ensure proper hardware detection, driver loading, and setup. WDS captures an image of a configured system and typically deploys that image much more quickly than RIS can, even if the RIS system is fully automated. RIS infrastructures are typically much more difficult to configure and maintain than WDS infrastructures, and have a reputation for being fragile because of this complexity.

RIS systems can be more efficient than WDS in environments with significant variation between systems or in environments that have many different architectures that require a large number of hardware abstraction layers and drivers. Generally, however, organizations tend to standardize on a few server types or on closely related systems, and in this type of environment, WDS is typically much more efficient than RIS because of the minimal number of Windows Server 2003 images that must be managed.

It is possible to have both RIS and WDS functioning on the same Windows Server 2003 system, making it easy to add the functionality of WDS to a fully configured RIS system. For more information on configuring a mixed-mode deployment server, visit technet2.microsoft.com/WindowsVista/en/library/9e197135-6711-4c20-bfad-fc80fc2151301033.mspx.

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[1] The Windows AIK download is available at www.microsoft.com/downloads/details.aspx?FamilyID=c7d4bc6d-15f3-4284-9123-679830d629f2.

virtually unlimited access to the available configuration options. Additional details are available from the WDS help menu and within the components of the Windows AIK.

WINDOWS PREINSTALLATION ENVIRONMENT

In versions of Windows prior to Windows Vista and Windows Server 2008, OS installation was initiated in *text-mode setup*; this setup performed disk partitioning and formatting, and enabling a system to see a disk controller that did not have a driver on the OS CD required loading a driver from a floppy disk by pressing F6 within a certain window of time. Many work-arounds were developed to support this requirement, including using virtual floppy drives and specially formatted USB drives mimicking a floppy drive.

In Windows Vista and Windows Server 2008, Microsoft has shifted to using Windows Preinstallation Environment (WinPE), which generally avoids the need for these work-arounds and helps significantly simplify installation and increase flexibility. WinPE has existed for several years through various iterations, but has not previously been as broadly available and as well supported as it is now. It is a core component of WDS, used to prepare target systems and download files onto the hard drive in the standard WDS configuration. Administrators can customize WinPE using a one-line command to inject drivers, enabling rapid support for new storage controllers or network interface cards (NICs). WinPE customization includes not only injecting drivers, but also adding scripts and applications to the image using tools available in the Windows AIK.

WinPE supports command-line scripting natively, enabling certain vendor tools to flash firmware or configure specific settings and then begin the OS installation. For example, a NIC vendor's tool might be scripted to check for a certain firmware version, flash it, and then configure it to point to a specific Internet SCSI (iSCSI) target. WinPE could then lay down an image on

that iSCSI logical unit (LUN), resulting in a configured system ready to boot. Although this is a complex example, it shows some of the flexibility of an environment that supports scripting and disk provisioning tools.

The ability to map a network drive and run various tools from that drive while writing logs or other files makes WinPE incredibly flexible. Microsoft has based the official Windows disaster recovery application, Windows Recovery Environment (WinRE), on a customized version of WinPE. Dell provides a customized version of WinRE on factory-installed Windows Server 2008–based systems at no additional cost. WinRE can also be placed on WDS, so that administrators have a recovery GUI available to help them recover a failed system or restore a previous backup. WinPE can also be used to boot from a USB drive or a CD, and by default provides a command-line prompt that helps simplify mapping drives or running other applications. Administrators can use custom tools written for specific hardware to extract logs that are inaccessible when the device is in use, helping make problem isolation as simple as network booting and choosing a particular image, which would run the automated tools and copy the logs to a disk share.

A major upgrade in the Windows Server 2008 version of WinPE (2.1) compared with the Windows Vista version (2.0) is the ability of an x86 version of WinPE to deploy both x86 and x86-64 operating systems. During installation, administrators need only inject a single boot.wim file with drivers to support new hardware, rather than needing to maintain separate versions for each architecture. For more information, tips, and walk-throughs on customizing WinPE, visit the Dell Enterprise Technology Center wiki at www.delltechcenter.com/page/Windows+Server+2008.

FLEXIBLE ONE-TO-MANY DEPLOYMENTS

Windows Deployment Services represents a substantial improvement over the previous

mass deployment tools included (or provided as a complimentary download) with Microsoft Windows operating systems. It can support a large number of systems, and in Windows Server 2008 it can support a large number of simultaneous installations on an optimized network without affecting other applications.

The flexibility of WDS is evident in its ability to support legacy OS images and deploy them quickly and efficiently while providing fast, highly customizable installations for Windows Vista and Windows Server 2008. Administrators can easily customize WDS by adding modified WinPE images that can perform an enormous variety of tasks. It typically works well in lab or test environments, where installing exact configurations can be time-consuming and keeping track of media can be a challenge. WDS is one of the most accessible mass deployment tools ever produced by Microsoft, and can help fill the deployment requirements of organizations of all sizes, from those who need to deploy only a few servers to those with large data centers requiring a significant investment in a managed systems architecture. ⏻

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