

IMAGE-BASED INSTALLATION FOR MICROSOFT WINDOWS SERVER 2008



By Weijia (John) Zhang, Ph.D.

The image-based installation and systems management support in the Microsoft® Windows Server® 2008 OS can offer multiple advantages over conventional native installation on local and remote systems, including streamlined OS image deployment on Dell™ PowerEdge™ servers in complex, heterogeneous environments.

Complex IT environments may contain a heterogeneous set of computer platforms and operating systems that can be challenging to manage when using an image-based paradigm for OS installation. Although image-based deployment can offer a number of advantages, it generally requires the source system and the target system to be identical or similar to enable duplicating preconfigured operating systems from the source system to one or more target systems.

In the past, vendor-supplied OS media have typically been based on native installation, which requires copying files one by one from the installation media to the target system. However, the potential benefits of image-based installation—including minimal human intervention, reduced errors, and increased consistency—can make it a preferable method for locally and remotely installing operating systems and software.

The release of Microsoft Windows Server 2008 marks an important milestone in enabling wide adoption of image-based installation for local or remote deployments. In unifying the methods for installing operating systems through image-based installation, Microsoft has overcome several technical issues and built a proprietary framework to help streamline software installation and deployment processes. Administrators planning to deploy Windows Server 2008 on Dell PowerEdge servers can use this

framework for local and remote image-based installations in their environment.

The Windows Server 2008 image-based installation process described in this article is similar to the process of reproducing a photo, in which a studio takes an original image, stores it, and then develops or reproduces it in on film. This process comprises three key steps (see Figure 1):

1. Preparing the source image, which administrators can do by capturing the entire OS from a master system or porting an OS image shipped by a vendor.
2. Preparing the target systems to make them available for image deployment.
3. Deploying the images to the target systems, then making any necessary adjustments to each system's configuration.

PREPARING THE SOURCE IMAGE

Windows Server 2008 supports two basic image types: Windows® Preinstallation Environment (WinPE) images and OS images. WinPE images are normally boot.wim files designed to run in a pre-OS environment; administrators can use them to configure hardware offline and to capture and deploy OS images. OS images, in contrast, are install.wim files on the Windows Server 2008 installation media that serve as representations of an installed OS and

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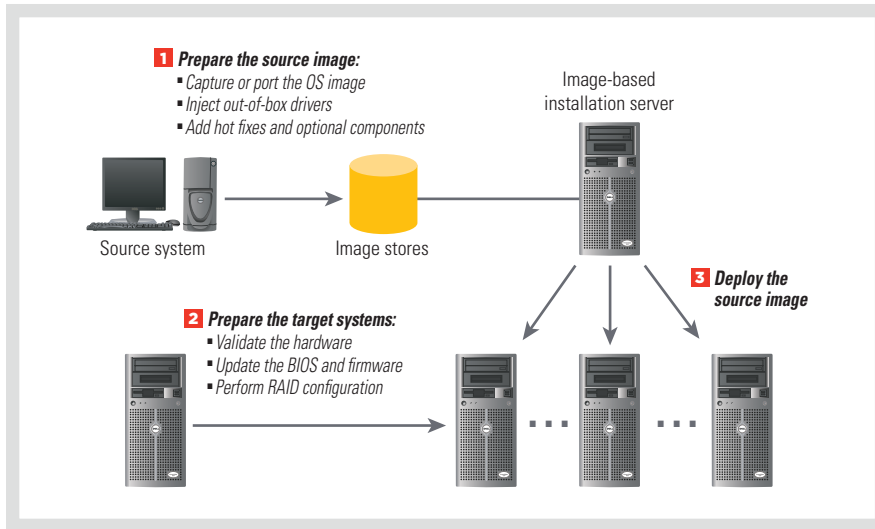


Figure 1. Image-based installation process for Microsoft Windows Server 2008

contain multiple stock-keeping units (SKUs) for supported operating systems. Administrators can capture an OS image from a source system running Windows Server 2008, then use image preparation and processing tools to process these images (see Figure 2).

Administrators using deployment tools for Windows operating systems should keep in mind that these tools typically require the source system and target system to be compatible. One enhancement to Windows Server 2008 deployment is the ability to customize images after capturing them from the source system, which allows the source image to be different from the customized images deployed on the target system.

The imagex.exe utility is a key tool when performing this customization, allowing administrators to customize a system image for specific hardware characteristics of the target systems; they can also use peimg.exe and pkgmgr.exe in the Original Equipment Manufacturer (OEM) Preinstallation Kit to customize the image offline. The peimg.exe tool, which is typically used only for handling WinPE images, can be useful for injecting drivers and optional packages into images, while the pkgmgr.exe tool is helpful for injecting applications, languages, and drivers.

PREPARING THE TARGET SYSTEMS

Windows Server 2008 does not include utilities for pre-OS processes such as RAID configuration or firmware updates. However, some preparations may be necessary before bringing a target system into the deployment environment. When preparing target systems, administrators should ensure that they meet the Windows Server 2008 system requirements for RAM, storage, optical drives, and so on. Some legacy platforms may lack the certified drivers for the storage controller and should therefore be excluded as target systems for deployment. Administrators

should also ensure that the systems have the latest BIOS and firmware versions available; if they are not configured properly, they can use Dell OpenManage™ systems management tools in the pre-OS environment to upgrade them.

Administrators can perform RAID configuration on target systems locally using the BIOS option ROM or the Dell OpenManage systems management tools. They can perform this configuration remotely using the Dell OpenManage Deployment Toolkit combined with a deployment framework, which allows the tool to run in a pre-OS environment such as WinPE or a customized Linux® distribution.

DEPLOYING THE SOURCE IMAGE

Deploying an image requires several steps. First, administrators should use a discovery mechanism to locate and identify the target systems through a Dynamic Host Configuration Protocol (DHCP) process or through a proprietary process. After the target system is found, a Preboot Execution Environment (PXE) server may locate a small bootstrap and download it to the target system. This bootstrap can then fetch a lightweight OS kernel from the deployment server and start running it in the pre-OS environment. The kernel can run utilities to fetch the source image

	Function	Image type	Operation
peimg.exe	Injecting drivers, hot fixes, and optional components into Windows images and customizing bootable WinPE images with a comprehensive set of drivers for heterogeneous environments; supports processing both 32-bit and 64-bit images	WinPE images only	Offline
imagex.exe	Expanding, capturing, and generating Windows images; normally used to customize a source image for deployment on target systems	WinPE and OS images	Offline and online
pkgmgr.exe (Package Manager)	Injecting drivers, hot fixes, and optional components such as language packs into Windows images	OS images only	Offline and online
Windows System Image Manager	Exploring OS images and generating unattended answer files for image deployment	OS images only	Offline

Figure 2. Image preparation and processing tools for Windows Server 2008

Deployment scenario		Use case	Deployment options	
Local	Attended	One to one	Manually installing OS on a single local system	Use the Windows Server 2008 OS media combined with Dell OpenManage systems management tools.
		One to many	Manually installing OS on multiple local systems	Boot to WinPE for multiple systems and run setup.exe from a central location, or use WDS and the Windows Automated Installation Kit (AIK).
	Unattended	One to one	Using unattended setup to install OS on a single local system	Obtain out-of-box drivers from the Dell OpenManage systems management tools or from the Dell support Web site at support.dell.com, then use the Windows Server 2008 OS media and an unattend.xml file to complete the installation.
		One to many	Using unattended setup to install OS on multiple local systems	Use WDS and the Windows AIK.
Remote	Attended	One to one	Manually installing OS on a single remote system	Use the same approach as for a local, attended, one-to-one deployment, but combined with the virtual media feature for Dell servers.
		One to many	Manually installing OS on multiple remote systems	Remotely boot to WinPE for multiple systems and run setup.exe combined with unattend.xml from a central location, or use WDS and the Windows AIK.
	Unattended	One to one	Using unattended setup to install OS on a single remote system	Use the same approach as for a local, unattended, one-to-one deployment, but combined with the virtual media feature for Dell servers.
		One to many	Using unattended setup to install OS on multiple remote systems	Use WDS and the Windows AIK.

Figure 3. Multidimensional deployment scenarios for Microsoft Windows Server 2008 images

from the image server and deploy it to the target systems.

Microsoft provides a variety of methods for installing Windows Server 2008 depending on three factors: deployment scope (local or remote), deployment autonomy (attended or unattended), and deployment scale (one to one or one to many). Figure 3 outlines the eight possible installation types based on these three factors. The combination of Windows Deployment Services (WDS) and Dell OpenManage systems management tools can provide comprehensive support for deploying Windows Server 2008 on Dell PowerEdge servers.

USING LINUX TOOLS TO DEPLOY WINDOWS SERVER 2008


Administrators should keep in mind that they typically cannot use a Linux deployment framework to deploy Windows Server 2008. There are several significant obstacles to performing this type of deployment. First, the Linux environment must support modifying the Boot Configuration Data (BCD) file, which replaces the original boot.ini file that controls the OS boot process. However,

currently the BCD file can only be modified by using the bcdedit.exe tool, and Linux does not support a tool that can reliably modify the file.

Second, Windows Server 2008 only supports NT File System (NTFS), and no tool is available for using a FAT32 partition and deploying the OS to that partition. And third, because the Windows Imaging (WIM) format is proprietary, the open source community should not attempt to reverse engineer the BCD file, NTFS, and WIM format to allow a Linux tool to deploy Windows Server 2008. One possible workaround, however, may be to stage WinPE in the Linux framework and then use WinPE to deploy Windows Server 2008.

STREAMLINING WINDOWS SERVER 2008 DEPLOYMENT

Image-based installation can offer a variety of advantages over native installation, including minimal human intervention, reduced errors, and increased consistency. By allowing administrators to perform local and remote image-based deployments on Dell PowerEdge servers even in complex, heterogeneous IT environments, Microsoft Windows Server 2008

marks a significant advancement for this installation paradigm—one that may have a tremendous impact on the OS deployment methodologies used in enterprise data centers. 

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