

# MIGRATING REMOTE INSTALLATION SERVICES TO WINDOWS DEPLOYMENT SERVICES IN MICROSOFT WINDOWS SERVER 2003

BY SANKARI N.  
MANJUNATH NARAYANAN  
GOBINATH KRISHNAMOORTHY



**Microsoft® Windows® Deployment Services, the successor to Microsoft Remote Installation Services, provides administrators with a simple, fast, flexible way to deploy the Microsoft Windows Vista™ OS, the forthcoming Windows Server® 2008 OS (code-named “Longhorn”), and multiple legacy Windows operating systems.**



**M**icrosoft Remote Installation Services (RIS), originally included with Microsoft Windows 2000 Server and then carried forward into Windows Server 2003, enables administrators to install multiple Microsoft operating systems simultaneously from a remote location. It also allows administrators to customize these installations to include drivers and specific configuration settings, mixes unattended setup with network installations through Preboot Execution Environment (PXE) boot, and can integrate applications for the deployed OS using the Remote Installation Preparation (RIPrep) wizard, an extension of RIS.

As part of Windows Server 2003 Service Pack 2 (SP2), Microsoft replaced RIS with Windows Deployment Services (WDS). WDS supports Windows Preinstallation Environment (WinPE) deployment of Windows Vista and Windows Server 2008 (code-named “Longhorn”)—which use the Windows Imaging (WIM) file format and are not supported through RIS—and extends backward compatibility by supporting legacy RIS image deployment.

By deploying SP2 and upgrading RIS to WDS, administrators can take advantage of the WDS support for both current and legacy operating systems to increase deployment flexibility. This article explores how they can use WDS to deploy Windows Vista, Windows Server 2008, and a variety of legacy operating systems.

## Migrating to Windows Deployment Services

Installing Windows Server 2003 SP2 on a system that previously had RIS configured brings multiple changes to that system:

- WDS replaces RIS in the Add/Remove Windows Components wizard. If RIS was not already configured, then WDS is instead listed in Add/Remove Programs and must be manually installed. After the installation, a restart is necessary to install the Single Instance Store file system filter (Sis.sys) needed for compatibility with RIS.
- In the service management Microsoft Management Console (MMC), WDS Server replaces “Remote installation.”
- WDS and WDS Legacy replace RIS Setup under Start > Programs > Administrative Tools. In this context, WDS is the wdsmgmt MMC used to manage OS images in the WIM format (such as those of Windows Vista and Windows Server 2008). WDS Legacy is a WDS snap-in that replaces the RIS configuration tool and supports legacy OS images that are not in the WIM format.
- The WDSUTIL utility is installed, enabling administrators to manage WDS from the command line. The command `WDSUTIL /?` provides additional information on the syntax and use of this utility.

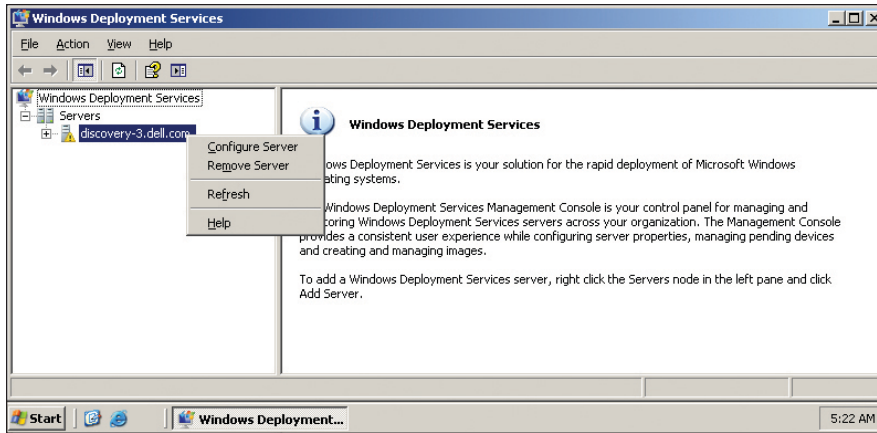
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**Figure 1.** Configure Server option in Microsoft Windows Deployment Services

Once installed, WDS can operate in three different modes: legacy mode, mixed mode, and native mode. *Legacy mode* is functionally equivalent to RIS, and is backward compatible with RIS. Running the WDS Legacy tool performs cross checks to help ensure the necessary services are running and that the server is authorized by the Dynamic Host Configuration Protocol (DHCP) server. The mechanism for capturing and deploying both RIS and RIPrep images is the same as that used in RIS installation. If a server uses only RIS images, it works only in legacy mode.

*Mixed mode* allows the use of both WDS and RIS images on a single WDS server. Administrators can use the WDS Legacy tool to add or deploy a legacy OS. This mode uses a wizard that is very similar to that used in RIS.

*Native mode* applies to servers only using WDS images in the WIM format, without any RIS images. In this mode, WDS Legacy is not available as an administrative tool, administrators can only deploy WIM images to clients, and the option to choose the OS is not available.

### Configuring the Windows Deployment Services server

The first time administrators use WDS, they must configure the WDS server. To do so, they should first open WDS from Start > Programs > Administrative Tools. If no servers are listed, they should right-click on the Servers item in the left pane and add the desired server. To configure a server, they can right-click on it and select Configure Server (see Figure 1).

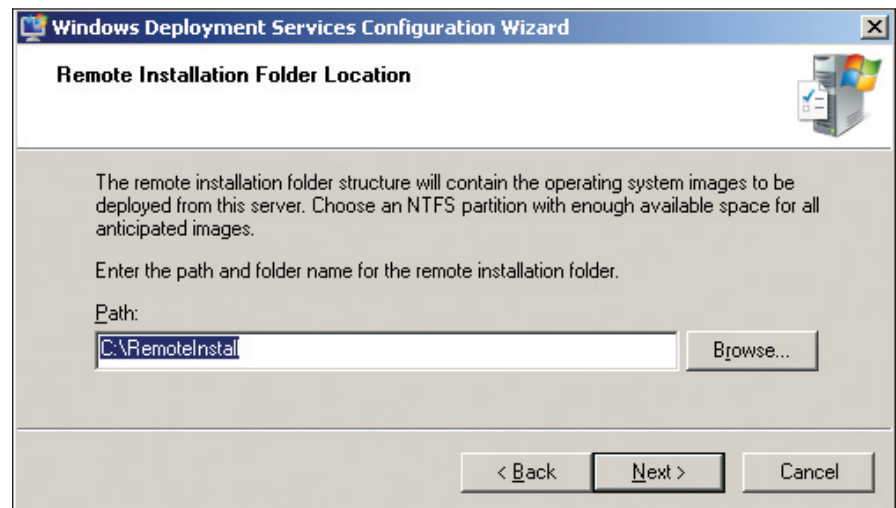
Once the configuration wizard has launched, administrators should first read the prerequisites and confirm that they are all met, then click the Next button. They should then enter the path and folder name of the remote installation folder (see Figure 2). If the server was previously an RIS server, this folder structure already exists, and WDS can use the same structure.

In the next step, administrators choose how the server responds to PXE client requests on the network (see Figure 3). They should only choose “Do not respond to any client computer” if they do not want the server to answer client requests. “Respond only to known client computers” requires additional configuration steps, such as adding systems to the Microsoft Active Directory® domain with the globally

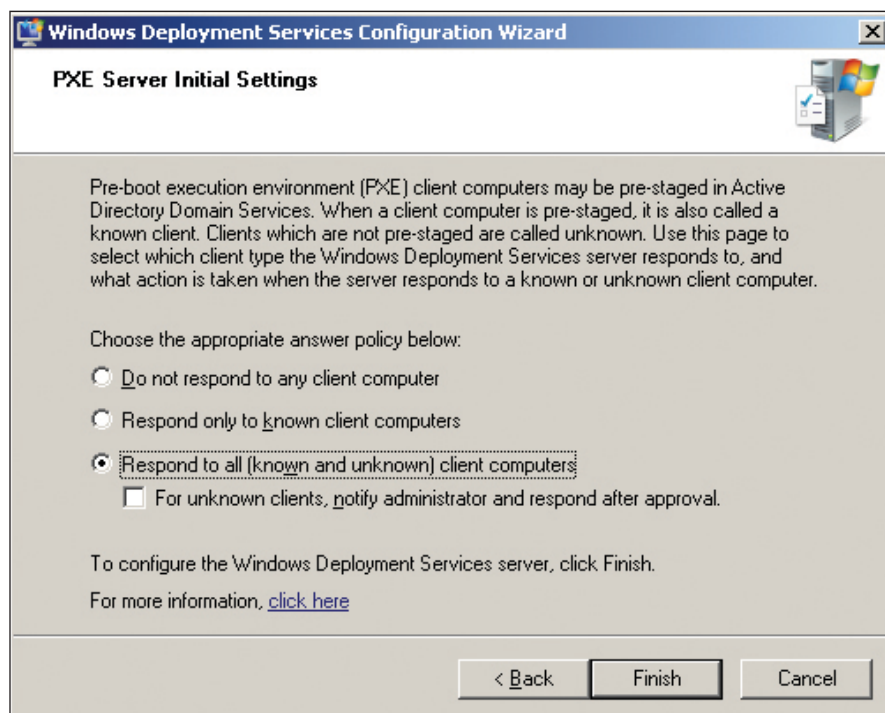
unique identifier specified. “Respond to all (known and unknown) client computers” is the default option. Checking the “For unknown clients, notify administrator and respond after approval” box for this option forces unknown clients to wait for an administrator to approve the request. Because this setting helps prevent any system that can PXE boot from potentially installing any available image, administrators typically should check this box; in a secure environment or for testing purposes, however, it may not be necessary.

Administrators can change these and other settings later by right-clicking on the WDS server and selecting Properties. The default settings in the Properties window are typically appropriate for production environments without requiring significant changes. If administrators want to provide an answer file for an unattended installation, they can do so by selecting the Clients tab, then browsing for the location of the unattended installation file.

Once they have completed the server configuration, administrators must next add the images. They must add two types of WIM images before deploying an OS with WDS: a boot image (boot.wim, which enables the WDS server as a PXE server and loads WinPE) and an installation image (install.wim, the actual OS image). Microsoft includes both with the Windows Vista and Windows Server 2008



**Figure 2.** Remote Installation Folder Location screen in the Microsoft Windows Deployment Services Configuration wizard



**Figure 3.** PXE Server Initial Settings screen in the Microsoft Windows Deployment Services Configuration wizard

DVDs in the sources directory of the installation media.

Administrators can add the boot image in WDS by right-clicking on Boot Images under the server and selecting Add Boot Image. They can then specify the location of the boot image—typically the sources directory on the Windows Vista or Windows Server 2008 DVDs.

Deploying a 64-bit image on a client through a WDS server running a 32-bit OS typically requires administrators to run the following command on the WDS server:

```
WDSUTIL /set-server
/architectediscovery:yes
```

Administrators should keep in mind that they cannot deploy a 64-bit image using a 32-bit version of boot.wim. They should be sure to add the 64-bit boot.wim file when deploying a 64-bit image.

To add the installation image, administrators can right-click on Install Images under the

server and select Add Install Image. Then, they can create a new image group, which can be useful when sorting different images to help simplify management. To create the group, administrators can provide a group name and browse for the install.wim file. Next, they can select the stock-keeping unit (SKU) they want to add using the appropriate check box. Finally, they can continue through the wizard and make changes to the default settings as required.

If administrators want to provide an answer file for the image, they can do so after completing the wizard by right-clicking on the installation image and selecting Properties, then selecting the “Allow image to install in unattended mode” check box.

Administrators can also use WDS to perform actions on boot and installation images:

- **Disable and enable:** Disables an image if it is obsolete or not ready for deployment, or enables an image now ready for deployment

- **Export:** Exports an image for loading onto another WDS server
- **Replace:** Replaces an existing image with another file, reusing the existing entry
- **Delete:** Both removes the installation image from the console and deletes the boot.wim and install.wim files

The boot image offers two additional actions:

- **Create discover boot image:** Creates a boot image that can be saved to a file, converted into an ISO format, and burned to a CD or DVD, and then helps deploy operating systems through WDS to systems that do not support PXE boot
- **Create capture boot image:** Captures OS images from existing installations

### Creating answer files for unattended installation

Adding boot and installation images is typically sufficient for deploying Windows Vista or Windows Server 2008 on individual systems when an administrator can be present to complete the setup. In large environments, however, unattended installation may be more practical than manual installation.

Administrators can carry out this type of automated installation using an answer file. WDS uses XML for answer files, and does not support the RIS answer file format except in legacy mode. Creating a WDS answer file requires installing the Windows Automated Installation Kit (AIK).<sup>1</sup> This kit includes the Windows System Image Manager (SIM), a tool administrators can use to create answer files. Windows SIM includes detailed help files that administrators can refer to when creating these files.

### Capturing images

Administrators can use the default install.wim image to deploy the basic OS, but if they must also install additional applications, this approach requires them to visit each system to

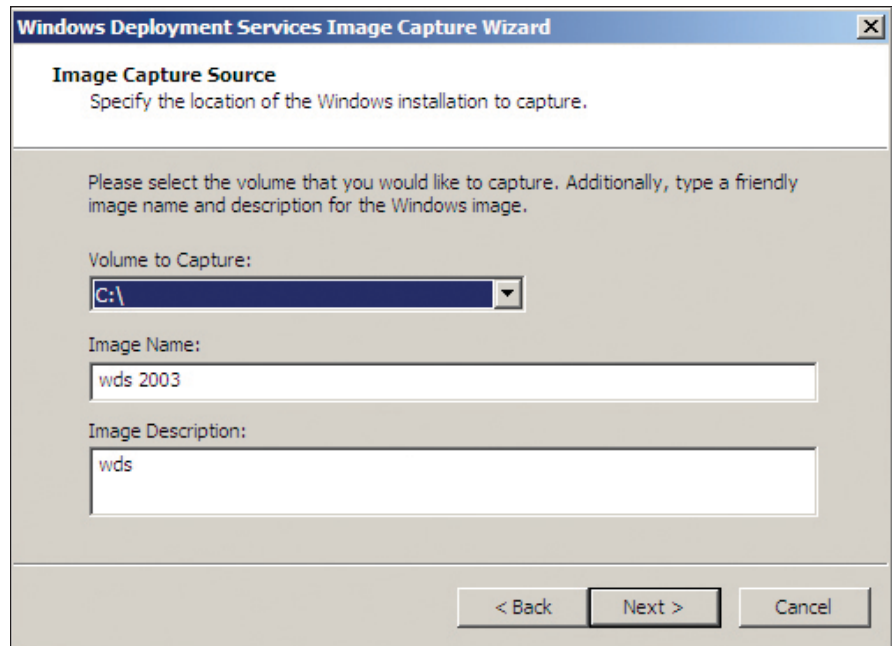
<sup>1</sup>The Windows AIK is available for download at [www.microsoft.com/downloads/details.aspx?familyid=c7d4bc6d-15f3-4284-9123-679830d629f2](http://www.microsoft.com/downloads/details.aspx?familyid=c7d4bc6d-15f3-4284-9123-679830d629f2).

manually perform that installation. To help simplify this process, administrators can also use WDS to capture a system image with both the OS and additional applications installed, then deploy this image to other systems on the network. WDS can capture images of systems running Windows XP with SP2, Windows Server 2003 with SP1 or SP2 and Windows Server 2003 Release 2 (R2), Windows Vista, and Windows Server 2008. Optionally, they can also use ImageX—part of the Windows AIK—to capture an image from WinPE.

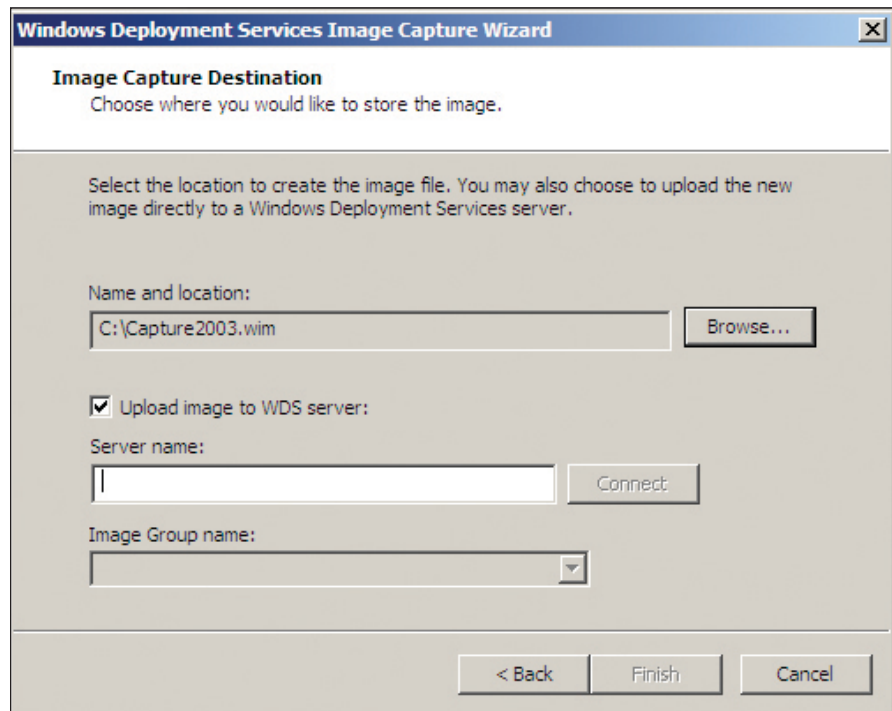
Before capturing an image, administrators should run the Sysprep tool on the OS to remove system-specific attributes and enable the image to be deployed on different platforms. The Sysprep tool is available after the extraction of the deploy.cab file, located in the support/tools folder of the Windows Server 2003 installation media. Administrators can run this tool to prepare the system using the command `Sysprep /reseal /reboot`.

After running the Sysprep tool, administrators can capture an image in WDS by performing the following steps:

1. In the WDS console, right-click on an appropriate boot image and select **Create Capture Boot Image**.
2. Enter the boot image details and the path for the temporary folder to store the new boot image.
3. Once the existing boot image has been exported and the new boot image created, right-click on **Boot Images** and select **Add Boot Image**.
4. Choose the temporary folder where the new boot image is stored and complete the wizard.
5. PXE boot the client system and choose the new boot image (added as in step 2) from the list of boot options.
6. In the WDS Image Capture wizard, choose the volume to capture and enter the name of the new installation image and a description (see Figure 4).
7. Choose where to store the image (see Figure 5). If selecting a location, provide



**Figure 4.** Image Capture Source screen in the Microsoft Windows Deployment Services Image Capture wizard



**Figure 5.** Image Capture Destination screen in the Microsoft Windows Deployment Services Image Capture wizard

the name and location. (One simple method is to attach a USB drive to the client to temporarily store the image, then import this image into the WDS server

later.) If uploading the image to the WDS server, provide the server name along with the username and password if required.

	Storage controllers that lack native drivers	NICs that lack integrated drivers
PowerEdge 1750	PERC 4/Di	Broadcom BCM5704
PowerEdge 800	CERC 2s (RAID mode)	Broadcom NetXtreme BCM5721
PowerEdge 1800	CERC 2s (RAID mode)	Intel PRO/1000 MT
PowerEdge 1850 and PowerEdge 2800	—	Intel PRO/1000 MT
PowerEdge 6850	—	Broadcom BCM5704
PowerEdge 1900, PowerEdge 1950, PowerEdge 2900, PowerEdge 2950, and PowerEdge 6950	PERC 5/e, PERC 5/i, SAS 5/i, SAS 5/iR, and SAS 5/e	Broadcom NetXtreme II BCM5708

Figure 6. Storage controllers and NICs that lack native drivers in specific Dell PowerEdge servers

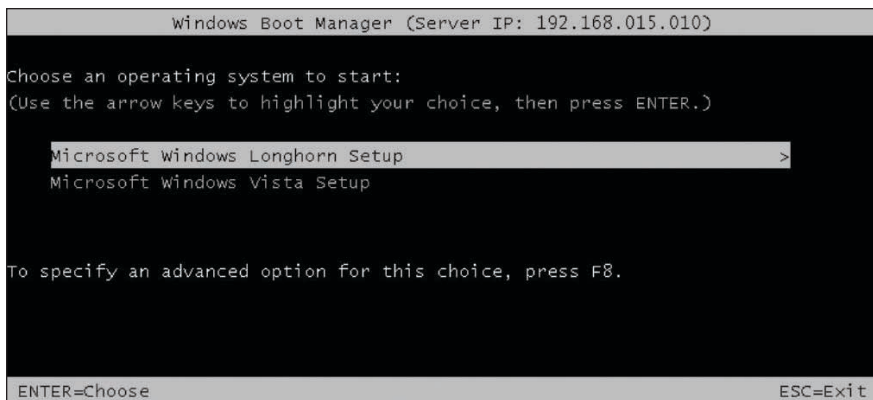


Figure 7. Windows Boot Manager screen listing available boot images

After the image has been captured, the system automatically reboots. On the WDS server, administrators should disable the boot image that was used to capture the OS. They should then add the captured image to the Install Image folder in wdsmgmt, where it is ready to deploy along with the original boot image, and can be selected when PXE booting a client system.

### Adding nonnative drivers to an image

Some Dell™ PowerEdge™ servers may lack native drivers for various operating systems, preventing the operating systems from installing correctly if administrators do not first add these drivers to the deployment images. Figure 6 lists some of the PowerEdge Cost

Effective RAID Controllers (CERCs), PowerEdge Expandable RAID Controllers (PERCs), Serial Attached SCSI (SAS) controllers, and Broadcom and Intel® network interface cards (NICs) for specific PowerEdge models that lack native drivers.

Administrators can add nonnative drivers in one of two ways. The first method is to add the drivers to the RIS image, which requires adding both text-mode drivers and Plug and Play (PnP) drivers. Text-mode drivers, such as the driver for a storage controller, are required during the text phase of an installation. PnP drivers, such as drivers for KVM (keyboard, video, mouse) devices and other third-party hardware, can be added during the graphical user interface (GUI) phase of an installation.<sup>2</sup>

The second method is to add the drivers to a WDS image, which requires first installing the Windows AIK on the server. To add the drivers, administrators should right-click on the boot and installation images and select Export Image to export the image to the server. They can then add the drivers to the image using the following commands:

```

Imagex /mountrw image_location
           image_instance X:\mount_folder
Peimg /inf=driver_location
           X:\mount_folder\windows
Imagex /unmount /commit
           X:\mount_folder

```

In these commands, *image\_location* is the full path of the WIM file, *image\_instance* is the instance number, *driver\_location* is the full path to the driver file, *X:\* is the local drive, and *mount\_folder* is the name of the mount folder. **Note:** The drivers should be added to the second instance of the boot image and to the first instance of the installation image.

Finally, administrators can complete the process by opening the WDS console and replacing the boot and installation images that have been modified.

### Testing the deployment

After configuring the boot image, installation image, and answer file, administrators can next test the setup before using the images in a production environment. To do so, they should first boot the system to which they will deploy the OS and launch a network boot by pressing F12 during the power-on self-test. After the system PXE boots, the Windows Boot Manager screen appears and lists the available boot images (see Figure 7).


After administrators have selected the WDS image, the files load along with WinPE, and the setup proceeds to the GUI phase of the installation. In this phase, administrators first provide their location and keyboard details, then

<sup>2</sup> For more information on adding nonnative text-mode drivers, visit [technet2.microsoft.com/WindowsServer/en/library/96969653-bd0f-44d7-af4f-f95c3016d2be1033.aspx](http://technet2.microsoft.com/WindowsServer/en/library/96969653-bd0f-44d7-af4f-f95c3016d2be1033.aspx). For more information on adding nonnative PnP drivers, visit [support.microsoft.com/kb/246184](http://support.microsoft.com/kb/246184).

provide the necessary credentials for use with WDS, such as domain\username and password. Next, they select from a list of SKUs available for deployment, then configure the disk settings as required. In an attended WDS installation, administrators must then complete a secondary setup to provide information such as region and language, name, organization name, and product key. The setup then deploys the OS. (In an unattended installation, the preceding steps are automated using the answer file.)

### Deploying operating systems quickly and easily

Microsoft WDS is designed to provide a fast, simple, flexible way to deploy operating systems. By taking advantage of its enhancement over RIS, administrators can use WDS to quickly

and easily deploy both Windows Vista and Windows Server 2008 as well as multiple legacy operating systems. 

**Sankari N.** is an engineering analyst on the Windows Engineering team at the Dell Bangalore Development Center. She is the single point of contact for Microsoft Windows and OS deployment issues on new platforms. Sankari has a B.Tech. in Computer Science from the National Institute of Technology, Warangal.

**Manjunath Narayanan** is a senior engineering analyst at Dell responsible for testing legacy and future releases of Microsoft Windows Server operating systems on Dell PowerEdge servers. He has previous experience in both technical support and systems administration, and his

current interests include testing and automation. Manjunath has a diploma in Computer Science and is a Microsoft Certified Professional (MCP) on Windows NT 4.0 and a Microsoft Certified Systems Engineer (MCSE) on Windows 2000.

**Gobinath Krishnamoorthy** is a senior engineering analyst on the Windows Engineering team at Dell responsible for kernel issues when integrating Microsoft Windows Server with Dell PowerEdge servers. He has previous experience in both embedded software development and Windows kernel development, and his current interests include core OS development and low-level system programming. Gobinath has a B.E. in Electronics and Instrumentation Engineering from the University of Madras.