



# DISK IMAGING Gets a Makeover

ALTIRIS DEPLOYMENT SOLUTION IS PACKED WITH FEATURES AND SYMANTEC'S GHOST IS HOT ON ITS HEELS. BRING ON THE BROKEN DESKTOPS! BY CORNELL W. ROBINSON III

If there's a more miserable job than schlepping to dozens of individual workstations to update software images, it's trying to restore a user's desktop that's been trashed inexplicably. Many organizations have made these tasks easier by implementing disk-imaging systems. If you haven't, now's

the time. The products we tested save you time, money and aggravation by minimizing your desktop visits; they also give you more control over users' workstations.

We deployed four imaging solutions in our Syracuse University Real-World Labs®: Altiris Deployment Solution; Symantec's Ghost 7.5; Microsoft's Remote Installation Service (RIS), which is part of Windows 2000 Server; and PowerQuest's DeployCenter 5.01.

Most IT departments have moved away from the conventional imaging model, which requires bootable floppy disks and CD-ROMs. Now, they use the LAN to clone users' PCs, and after testing these imaging tools, we can see why. A network-based distribution model is the secret sauce behind faster disk imaging and fewer trips to users' desktops. Driving it is Intel's Wired for Management PXE (Pre-Execution Environment), a standards-based technology you should insist on when buying new NICs and PCs. PXE lets client machines boot using their NICs, connect to the network, and execute

programs that reside on a server. The solutions we tested leverage this technology, along with DHCP and TFTP, and eliminate the need for IT personnel to tote disks around (read more about PXE in "Make Your Boots Shine With PXE," at [www.nwc.com/columnists/1101colron.html](http://www.nwc.com/columnists/1101colron.html)).

Multicasting is another advantage of network-based image distribution. For networkwide multicast-

## GLOSSARY

**PXE**: As described by Intel, the PXE protocol operates by having a client broadcast a *DHCPDISCOVER* containing an extension that identifies the request as coming from a client that implements PXE. The client then discovers a boot server and receives the name of an executable file. The client uses TFTP to download the executable and initiates execution of the downloaded image. **Find more** at [ftp://download.intel.com/labs/manage/wfm/download/pxespec.pdf](http://download.intel.com/labs/manage/wfm/download/pxespec.pdf).

ing to be successful, however, you need an up-to-date network architecture, where the majority of your switches support multicasting. Also, you should do mass deployments only when network activity is low. Microsoft Windows 2000 Server's RIS doesn't support multicasting, but the other products we tested include this timesaving perk. In our tests, the imaging server started a session and all the clients attached to it, one by one. Upon completion of the transfer, the clients were rebooted and began loading the newly obtained image.

With PXE, you no longer have to carry around disks, but you still might have to visit client machines to boot them. To further lighten the load, Altiris, PowerQuest and Symantec let you manage imaging operations from a server console via a hidden partition. You accomplish this with an optional piece of client software installed on each system. For all three products the client software can be installed in a pull fashion, but Altiris and Symantec Ghost go the extra mile, letting you push the software onto the client remotely. When using this method we didn't have to visit the test clients at all.

The hidden partition works like a virtual floppy disk. Whenever we needed to make an image of a client machine, we used the console to tell the client to set the hidden partition to active and reboot. When the client machine rebooted it loaded the hidden partition, which contains a version of PC or MS DOS, network drivers and some additional executables that let the client connect to the imaging server. As instructed, the client connected to the network, made a connection with the imaging server, and began transferring the image data. The same process is used to restore a malfunctioning client PC.

## To Clone or Not To Clone?

**HOW MUCH TIME** do your helpdesk personnel spend troubleshooting end-user PC problems? Let's face it: Today's desktops are extremely complex. A multitude of things can go wrong, and if a problem is taking an unreasonable amount of time to fix, why bother? All four products we tested come equipped with migration tools that automate the process of gleaning a user's personal data—including document files, desktop settings, e-mail and favorites—then transferring a clean installation of the operating system and reinstalling the personal data. The system can be back up and running in a little more than eight minutes. With tools this simple we recommend you adopt a policy that says, "If our staff can't figure out what's wrong with a user's PC in 15 minutes, we'll just reinstall and start over."

Of course, there are a few caveats. Cloning a machine connected to your LAN is one thing; supporting telecommuters is a different challenge. Sending images over low-bandwidth connections can be time-consuming, so be prepared. Another fly in the "just start over" ointment is that distributing a user's operating system, applications and personal data is not all there is

to worry about in a Windows-based environment. You still need to address drivers, differences in hardware and those pesky System Identifiers, or SIDs, that are domain accounts for each workstation. Happily, Microsoft provides a tool, Sysprep, that can strip out unique attributes for a workstation (see "FYI," page 66). All the products we tested leverage this tool to prepare a source machine to be imaged and distributed to many clients. After Sysprep runs, your machines will reboot into the Windows setup wizard, which will redetect hardware devices and prompt for information, such as the CD key, time zone, keyboard settings and NT/2000 Domain. (To avoid hardware inconsistency issues, see "Send In the Clones?" at [www.nwc.com/1308/1308f4.html](http://www.nwc.com/1308/1308f4.html).)

In addition, Altiris, PowerQuest and Symantec offer proprietary tools to help address the SID process. We found Altiris' tool the most helpful; it saved us a significant amount of time by eliminating the need to visit each machine after cloning and walking through the Windows setup. In fact, Altiris' Deployment Solution landed our Editor's Choice award. Although it comes with a higher price tag than its rivals, it brings a slew of

## Executive Summary

# Disk Imaging

We wanted to call this review "Attack of the Disk Clones," but the products we tested—Altiris' Deployment Solution 5.5, PowerQuest's DeployCenter 2.0 and Symantec's Ghost 7.5, as well as Microsoft's Remote Installation Service (RIS), which is part of Windows 2000 Server—are far from menacing.

Based on our experience, we feel that imaging by way of bootable disks should be a thing of the past even for small organizations. Intel's PXE provides any NIC with enough smarts to boot up from the network, and the products we tested let you perform hands-off imaging. We could grab an image from a client machine or push a new one out. We did this by installing client software and a hidden partition containing everything necessary for the client to connect to the imaging server. Our Editor's Choice—Altiris' Deployment Solution—even let us push the client software, meaning no trips to users' desktops. And imaging is only one benefit of these products: They also help you troubleshoot end-user systems and migrate to new operating systems.

Altiris edged out rivals thanks to its host of unique features and 100 percent hands-off imaging capabilities. The venerable Ghost, with its strong centralized control and reasonable price, came in second. We don't consider the three specialized packages pricey in relation to their usefulness, but for the truly budget-conscious, Microsoft's RIS and User State Migration Tool are included in Windows 2000 Server and can get the job done.

unmatched client- and server-management features and makes handling those Windows NT/2000/XP SIDs a no-brainer. Ghost, priced much lower, followed closely behind. While it offers a great deal of centralized control, Ghost lacks a Web interface. PowerQuest was next on the scoreboard, held back mostly by the limited number of features that can be controlled from the server's Web console—it lets you create and distribute images from the console, but you have to perform migration, Sysprep, client installation and other operations locally. It's still a nice solution, though, with a decent Web interface and easy-to-use migration utilities.

Finally, Microsoft 2000 Server with RIS enabled receives our Best Value award. If you are concerned only with distributing operating systems and software, you're all set. Granted, it will support only Windows 2000 and XP client machines, and RIS has limited features. For example, by implementing only RIS you miss out on multicast and software distribution, making it better suited for smaller environments. But if your demands are modest, you can't beat the price, and RIS can be a great first step in supporting client OS installations. Symantec's and PowerQuest's products (but not Altiris, which has its own scripted OS installation functionality) can be integrated with RIS as your needs grow.

**ALTIRIS DEPLOYMENT SOLUTION** Deployment Solution caught our attention and kept it. Not only does Altiris offer a sound imaging solution, it nears the control and functionality of a full-blown systems-management platform. Deployment Solution is one of many tools Altiris offers in its Client Management Suite, and each can be integrated into a Web console called the Notification Server. Deployment Solution can be used on a standalone Deployment Server from a console or integrated into the Notification Server Web management platform.

Altiris was the only solution we tested that let us control multiple Deployment Servers from a single Web console. This feature would be particularly useful for a large organization that needs to centrally manage image distribution across its enterprise, including remote offices. The limits per Deployment Server are as many as 25,000 users or 50 servers.

The nicest thing about Deployment Solution is that all its functions can be controlled from a central console. We were even able to push the client software onto our users' PCs directly from the server.

## Teach Me

**WHEN YOU'RE WORKING** with a new product, isn't it nice when it comes with a few samples that show what you can do with the software? Deployment Solution includes a folder full of sample tasks that can be used to get the hang of things and point you in the right direction. These samples include items such as executing commands, distributing software, capturing a user's personal files and settings, and starting/stopping services.



Altiris' handling of SIDs was superior as well. If you use Sysprep in conjunction with Altiris' SIDgen utility, you can distribute an image and configure Windows without a trip to the desktop.

Altiris required four reboots for an image to be successfully installed on a workstation, but when those were done, the system was immediately ready for use. The company said the imaging process could require from two to four reboots and that these were required for hardware configurations. The amount of time the PCs spent rebooting factored into our performance test but was offset by the time saved by not having to configure the clients manually after the image was installed. Plus, with the other disk-imaging products, our fingers got

## REPORT CARD DISK IMAGERS

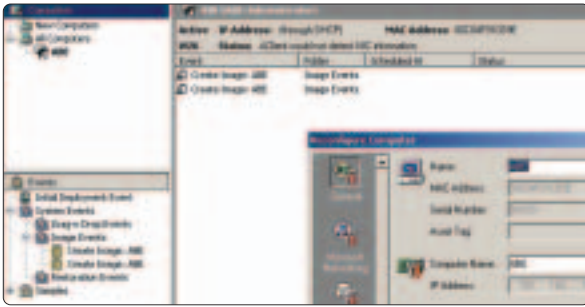
	Altiris Deployment Solution	Symantec Ghost 7.5	PowerQuest DeployCenter 5.01	Microsoft Windows 2000 Server With RIS
<b>CONFIGURATION AND MANAGEMENT (35%)</b>	<b>4.5</b>	<b>3.5</b>	<b>3</b>	<b>2</b>
<b>PERFORMANCE (25%)</b>	<b>4</b>	<b>3.5</b>	<b>3</b>	<b>2.5</b>
<b>EASE OF USE (20%)</b>	<b>4</b>	<b>4</b>	<b>3.5</b>	<b>4</b>
<b>PRICE (20%)</b>	<b>2.5</b>	<b>4</b>	<b>4</b>	<b>5</b>
<b>TOTAL SCORE (100%)</b>	<b>3.88</b>	<b>3.70</b>	<b>3.30</b>	<b>3.13</b>
<small>A≥4.3, B≥3.5, C≥2.5, D≥1.5, F&lt;1.5 A-C GRADES INCLUDE + OR - IN THEIR RANGES. TOTAL SCORES AND WEIGHTED SCORES ARE BASED ON A SCALE OF 0-5.</small>	<b>B</b>	<b>B</b>	<b>C+</b>	<b>C+</b>

**PERFORMANCE** We gave high scores for fast image distribution to a single machine and multicast to 10 machines. We also considered the time it would take to visit each user's desktop for Windows setup, when necessary.

**EASE OF USE** We considered system usability, support documentation and the level of customization necessary to use the product.

**PRICE** We looked at the overall cost of licensing for 1,000 clients.

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Altiris Deployment Solution includes a client-configuration management capability to complement its disk-imaging functions.

tired entering in the CD keys for each image we distributed. We consider multiple reboots a well-worth-it trade-off for not having to visit the client machines.

Altiris' hidden-partition functionality for remote boot of clients is called BootWorks. Altiris separates its remote-boot capabilities and the client software used for software distribution and migration into two separate client installations. From the server console we were able to remotely install the "AClient" onto our client PCs in a push or pull fashion, a perk only Altiris and Symantec Ghost offer. Once the AClient was installed we were able to manage such functions as reboot/shutdown, Wake-on-LAN, remote control and software distribution. BootWorks is used in addition to the AClient when you are creating an image of a machine or distributing images. Symantec Ghost and

PowerQuest DeployCenter keep the hidden partition and the client software in the same package, making installation a little easier. The client software and server console stand out because of the number of operations, such as inventory and system configurations, that can be performed with only a few clicks. However, there is no way to tell if BootWorks is installed unless you look at logs, which can be confusing.

The product's configuration and inventory features are comprehensive. We changed such settings as TCP/IP address, domain, OS license key and user accounts, and the inventory utility offered a comprehensive report of both software and hardware installations, including an automatic inventory schedule that let us check machines' application loads on a regular basis. You won't find this in the other products we tested.

Altiris let us perform scripted OS installations, not only of Windows but also of Red Hat Linux distributions. However, Altiris' support for Linux is limited: It does not support ext2/ext3 partitions and does not offer Linux client software for software distribution, inventory and the like. However, Altiris says it will add support for both Linux file systems soon and provide a deployment agent for Linux in Deployment Solution's Service Pack 2.

Unlike the other products, which use RIS, Altiris offers OS installations as one of its own functions. The scripting language uses the MS DOS batch-file syntax, so we had no trouble getting the hang of it. In addition, the migration abilities integrated into the console let us easily capture our users' personal data. A friendly wizard helped us

## How We Tested Disk Imagers

To test disk-imaging packages we used four Dell Computer PowerEdge Servers, each with dual 1,000-MHz Pentium III processors and 1 GB of RAM and running Microsoft Windows 2000 Server SP2. We used one server to run each product. We also used Microsoft Systems Management Server (SMS) 2.0 and a pair of 600-MHz Pentium III Dell OptiPlex servers with 512 MB of RAM for an Active Directory Domain controller. Our client machines, which represented our users' PCs, had Celeron 500-MHz processors with 256 MB of RAM, 10-GB hard disks and Intel 10/100 Pro NICs with PXE.

We tested imaging with both Windows 2000 Professional and Windows XP Professional. For client software needed by our users we installed Microsoft Office 2000 Professional, Network Associates' McAfee Virus Scan, LeapFTP (a

shareware FTP client) and Adobe Acrobat Reader. This installation required about 2 GB of disk space.

For our deployment rollout, we dedicated a single client as our staging machine. This machine maintained a pristine installation of the OS and user software. We used the staging machine for software distributions and also cloned it, dumping disk images onto each of our imaging servers. The servers later distributed that image to each of our user PCs.

To test migration, we populated one of our client machines with user data—we created document files, downloaded programs, visited Web sites, added favorites, customized the desktop and added new shortcuts. We then ran each vendor's migration utility, creating executable files that we later used to repopulate a new machine with the user data.

For our performance testing, we distributed an image of Windows XP Professional and the software mentioned above. Our first test was to send an image to a single machine, and later to 10 machines. We recorded how long the distribution process took for both scenarios, including the time it took us to enter system information, such as the CD key, name and organization, and keyboard style, which is part of the Windows setup. A factor that degraded performance for some products was the time it took to visit each cloned PC. We used multicasting with Altiris, PowerQuest and Symantec when cloning 10 machines; Microsoft RIS does not support multicasting and could not distribute to more than four machines at a time before performance degraded below acceptable levels.

retrieve files and folders like “My Documents,” capture desktop backgrounds and settings, and collect common program settings. We simply selected all the things we wanted to back up, and the wizard created an executable file that we used to restore the user’s machine.

## PXE Me

**WHEN CLIENT MACHINES CONNECTED** to the server using PXE, we were prompted with two options. One let us install a fresh copy of the operating system and the other let us execute tasks that were pending on the server—for clients that had connected to the server in the past, we could queue up tasks, and when they rebooted with PXE, we could execute those tasks.

Adding additional solutions in the Client Management Suite can bring your organization a wealth of control and management features, but we found that Deployment Solution offers more than adequate functionality for extensive disk-imaging operations. One feature that is unique to Altiris’ product—and that we were surprised to see—is a remote-control capability that let us log in and control end-user workstations. This was particularly helpful when we were preparing to migrate users from Windows 2000 to Windows XP. We were able to check locations of user data files and conduct many other investigative procedures. The remote-control feature also comes with a chat program that can be used by helpdesk personnel—with this tool we could see what the user sees on his or her desktop and determine the seriousness of a problem.

Altiris Deployment Server has the highest price tag of the products we tested—\$37 each for 1,000 clients—but we consider the cost justified by its extensive feature set. If your organization is looking not just for centralized management of disk images, but also software distribution, migration and even remote control, this product is worth the investment.

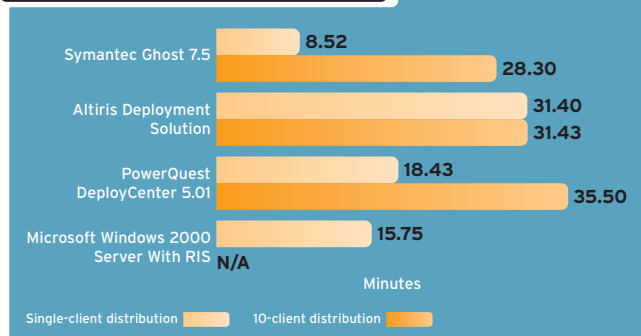
**Altiris Deployment Solution, perpetual license for 10 to 99 nodes: \$49 per node, including one year annual upgrade protection. Altiris, (888) 252-5551, (801) 226-8500. [www.altiris.com](http://www.altiris.com)**

## SYMANTEC GHOST 7.5

Symantec’s Ghost took a back seat to Altiris in our tests but certainly offers its fair share of excellent features, not to mention a much lower price—just \$12.80 per node for 500 to 1,999 nodes. Ghost was the first platform we had up and running, due in part to a great installation manual.

Starting with the virtual partition, Ghost says goodbye to floppies. We managed disk-imaging operations with ease. First, we set up a pristine staging machine, then pushed over a copy of the client program for

## Disk Imager Performance



Ghost. Once the setup program completed, the staging machine appeared on the console and we were able to dump an image of it onto the Ghost Server.

When we installed the client it automatically created the hidden partition on our target machine. Ghost includes integrated support for Sysprep, and using the server we were able to communicate with the client, instruct the staging PC to run Sysprep, reboot and send a hard-drive image over to the Ghost server. One drawback was that, after we made an image with Sysprep, the staging machine continued to boot only the virtual partition. It took us some time to figure out why this happened, but as it turns out, the only way to get the staging machine back up and running was to re-image the machine, or use control-X to escape to DOS and disable the virtual-partition application. This happens only when you are making an image with Sysprep, but it is a tedious additional step. Symantec says it plans to make these choices clearer in future versions of the product.

We later used the image we created to distribute operating systems and software to our client machines. Ghost showed strength over PowerQuest by offering good centralized management—every operation could be controlled from the server console.

Ghost was blazing fast when it came to imaging. We sent our full 718-MB compressed image of Windows XP Pro, Microsoft Office 2000 Pro, McAfee Virus Scan, Adobe Acrobat Reader and LeapFTP to a client in a little more than six minutes. This was by far the fastest of the products tested. Next, we tried multicasting, and the imaging process got even faster. We cloned 10 clients in a little more than five minutes. But the clock kept ticking because we had to visit each of the machines and set them up, thus the time it takes to re-image a particular machine or perform a new image distribution can vary.

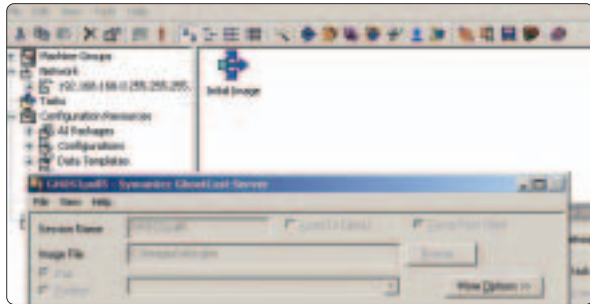
We also made use of the staging machine to create software distributions. Ghost calls its software distribution package the Auto Installation (AI) Builder. We installed AI Builder on the staging PC, then used the application’s wizard-style interface to make a snapshot



**Sysprepare To Clone:** It’s important to run Sysprep before you make an image that will be used to clone multiple workstations. You can find the Sysprep tool on the installation CD-ROM for Windows 2000 and XP in “<CDROM-DRIVE>\support\tools\deploy.cab.” You can also find updated versions for each operating system at [www.microsoft.com/Windows2000/downloads/tools/sysprep/default.asp](http://www.microsoft.com/Windows2000/downloads/tools/sysprep/default.asp).

of the staging machine. A snapshot is a process where AI Builder searches the hard drive and the registry and keeps a record of everything it finds.

Next, we were prompted to install the application we wished to distribute. We then returned to the AI Builder wizard and ran a post-install snapshot. In this step the tool searches the hard drive and registry, stores a copy of any files added, and generates a script that will update registry keys. The newly installed files and the script are



Symantec Ghost 7.5 lets administrators perform disk imaging from the centralized console.

combined into an executable file that can be sent to remote PCs via the Ghost console and remotely installed on the clients' machines. The AI Builder was easy to use and very helpful. We used it to dole out the additional WinZip software that was not included in our image.

Ghost comes with software, Image Explorer, that let us browse image files stored on the server to determine how up to date they were and what software was included. We were disappointed, however, that Image Explorer did not let us edit images of NTFS partitions. We tried to edit a text file inside an NTFS image, and we could open the file and view its contents, but we could not save that file back inside of the image, as we could with Altiris Deployment Solution. Ghost also lacks a Web console. While it is possible to access the Ghost console with remote-control software, it would be more convenient to control imaging operations through a browser, as we could with Altiris' and PowerQuest's products. Symantec says it is developing a Web console for the next version of Ghost.

Ghost's migration tool is not as user friendly as those of its rivals because Symantec uses a scripting approach rather than the wizards the other products use. The tool is controlled from the server, which adds some convenience, but the script-based migration application is time-consuming. Each registry key, file and folder we wanted to capture had to be typed in as a command in our script. We had to be careful not to make any spelling errors here—always a tough task.


Ghost's PXE support is sound. The corporate edition includes a version of 3Com's Boot Services. The 3Com manual is straightforward and relevant. The only thing we don't like is that once PXE is activated, any clients

with PXE turned on will boot and run Ghost. Other products we tested prompt the user to ask if he or she wants to boot from the network before going directly into the PXE boot up.

All in all, Ghost's easy-to-use interface, reasonable price tag and centralized control make it a solid product. If you are already using Ghost, it might be time to upgrade so you can take advantage of the slick remote-boot capabilities, which are new to this version.

**Symantec Ghost Corporate Edition 7.5, starts at \$38.50 per node for 10 to 24 nodes. Symantec, (800) 441-7243, (408) 517-8000. [www.symantec.com](http://www.symantec.com)**

## POWER QUEST DEPLOYCENTER 5.01

 erQuest DeployCenter combines disk imaging, user migration, virtual floppy support, PXE services and more. If it had better centralized control and integrated Sysprep functionality, it could've been a contender.

PowerQuest has made strides in wrapping its functionality into an easy-to-use Web interface, but DeployCenter doesn't have the level of centralized management offered by its rivals. For example, to make an image that could be easily distributed, we had to use Sysprep locally on the staging machine. This meant we had to install Sysprep, execute the program, and reboot the staging machine from floppy disks or PXE to create a distribution image. PowerQuest does make this process a little easier with a utility called DeployPrep, a front-end tool that makes the Sysprep process less cumbersome via a wizard. DeployPrep asked us where the Sysprep files were located and took care of the rest.

With DeployCenter, however, we couldn't avoid the Windows setup process after distributing the image to a

**DeployCenter doesn't have the level of centralized management offered by its rivals.**

user's desktop. An administrator must make a trip to each desktop, or users must run through Windows setup.

Once the image was deployed, though, we could take advantage of DeployCenter's hidden-partition utility, called the Virtual Floppy, and a client-side tool, the PQClient, that can be used to control the clients. The hidden partition is installed as a part of the client installation, and we were asked during the setup to specify the network drivers to install. Once that was accomplished, we didn't need to travel to the client PCs to execute programs, but the fact remains that the initial rollout had to be done locally.

We used the PQClient to copy files to workstations, distribute software, create and restore images,



You can schedule remote imaging tasks using PowerQuest DeployCenter's Web interface.

and execute commands. One test we conducted was to copy a shutdown program to a client and execute that program to restart a user's PC. A single task performed both operations.

It took us a while to get used to the UNC (Universal Naming Convention) path that had to be specified for operations like copying files and specifying where to store an image. Also, the client had to be pulled down from the server—it could not be pushed out automatically, as it can be with Altiris Deployment Solution and Symantec Ghost.

We made good use of the grouping function in DeployCenter's Web console, defining groups to help us determine which machines we wanted tasks to be run on. Also, when we were multicasting, we sent an image to a group rather than individual machines, letting us image 10 machines in 12 minutes. After the image was distributed, however, we had to visit each machine and complete Windows setup, which added 23 minutes. We also used groups to represent categories of machines and departments, for example, to send an accounting application to our finance group only.

PXE support is available for PowerQuest, but once the server was turned on, each time we booted a client with PXE enabled we were forced to choose whether to boot with PXE or resume a normal boot from the hard disk. During our tests we opted to disable the PXE service when we were not using it. If we absolutely needed to have PXE running, we disabled PXE on the client machines' BIOS to avoid having to choose a boot method on every reboot. The PXE service worked great—initial setup was a breeze, and it operated similar to a boot disk. We were able to edit the batch files located in a directory on the server to control what the client would do once connected to the server.

PowerQuest offers a server utility, called ImageExplorer, that let us verify an image's integrity and view its contents. However, as with Ghost, we were unable to edit the image contents—only Altiris' product let us edit the text file "boot.ini" within an image.

DeployCenter manages image updates differently from the other products, letting you create addendums that can be distributed to machines after the image is sent. These addendums can include changes to the

image that allow for incremental updates without having to create and deploy a full image. Used with the grouping function, this could be a boon to companies that change or update application packages often.

The product's migration tool has a friendly wizard interface, which was a breath of fresh air after Symantec Ghost. The Migration Manager must be installed locally on the client from which you are going to migrate, which lengthens the process of redistributing an image to a failed machine, but we were able to gather our users' files, folders, preferences and registry entries with a few clicks. Sadly, none of these utilities can be controlled from the server.

**PowerQuest DeployCenter 5.01, starts at \$19 per workstation. PowerQuest, (800) 379-2566, (801) 437-8900. [www.powerquest.com](http://www.powerquest.com)**

## MICROSOFT REMOTE INSTALLATION SERVICE AND USER STATE MIGRATION

If you want to start installing operating systems and applications on your users' PCs, and you don't need a lot of bells and whistles, don't overlook the capabilities of Microsoft 2000 Server's RIS: It lets you do scripted OS installations for Windows 2000 Professional/Server and XP and make an image of a system with all the software you want preinstalled, and it couldn't be simpler to use.

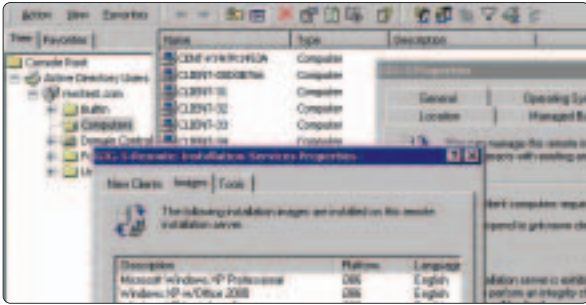
We did have to patch RIS with two separate hotfix

## MS Add-Ons

Microsoft offers a free utility that supports Windows 2000 and Windows XP migrations. You can find the User State Migration Tool (USMT) on Microsoft's Web site or on the Resource Kit CDs for Windows 2000 and XP.

USMT includes two command-line tools that can capture and restore users' personal data, facilitating migration or restoration of a workstation. To use USMT we had to create an .inf file that would define what information to capture. Unfortunately, creating the .inf file was no easy task. We spent lots of time learning the syntax, and we had to know quite a bit about the Windows registry and environment variables to pull files and registry keys from the right places. Microsoft did provide a helpful white paper, but USMT couldn't compete with migration utilities provided by specialized packages.

Windows XP features a wizard, appropriately dubbed the "Files and Settings Transfer Wizard," that made migration a lot easier. It let us migrate standard files and settings by sending them to a network share, and we could specify the files we wanted to capture based on file type, folders or specific file names. This tool is cake compared with USMT but is available only for Windows XP.



Microsoft RIS integrates with Active Directory; using directory tools to control images makes management a snap.

downloads from Microsoft's Web site to support more than just Windows 2000 Professional (the patches enabled RIS to distribute XP and Windows 2000 Server). Microsoft's RIS makes heavy use of PXE for distribution. For each OS CD that we made an image of, a new menu item was added to our PXE boot menu. Also, the menu

screens are stored as SGML-style text files on the RIS server and can be tweaked to further customize the software.

RIS lacks the hidden-partition capabilities of the other products we tested, however. To connect to a RIS server you have two options: PXE or boot disk. Boot disk support is available for clients with older NICs that do not support PXE. One nice thing about RIS' PXE implementation is that it lets clients select whether they want to boot to the network, and if they do not choose in a few seconds, the client machine will boot normally.

First we deployed a Windows 2000 CD image using PXE to our staging machine. This simplified the installation process and let us get the complete OS installed without using a single disk. Next we added all our software to the staging machine and ran a utility called Riprep, which dumps an image of the staging



## DISK IMAGER FEATURES

	Altiris Deployment Solution	Microsoft Windows 2000 Server With RIS	PowerQuest DeployCenter 5.01	Symantec Ghost 7.5
<b>Scripted OS installation</b>	Y	Y	N	N
<b>Image compression</b>	Y	N	Y	Y
<b>Software distribution</b>	Y	N	Y	Y
<b>Multicasting</b>	Y	N	Y	Y
<b>Image-file editing</b>	Y	N	Y	Y
<b>RIS support</b>	N	N/A	Y	Y
<b>Bandwidth throttling</b>	Y	N	Y	Y
<b>Centralized-distribution-server management</b>	Y	N	N	N
<b>Configuration/management:</b>				
<b>Client OS support</b>	Windows 9x, NT, ME, 2000, XP	Windows 2000, XP	Windows 9x, NT, ME, 2000, XP, Linux	Windows 9x, NT, ME, 2000, XP, Linux
<b>Command-line execution</b>	Y	N	Y	Y
<b>Web console</b>	Y	N	Y	N
<b>Remote client installation</b>	Y	N/A	N	Y
<b>Shutdown/reboot</b>	Y	N	Y	Y
<b>Inventory</b>	Y	N	N	N
<b>File copy</b>	Y	N	Y	Y
<b>Configuration</b>	Y	N	N	Y
<b>Grouping of computers</b>	Y	Y	Y	Y
<b>Batch operations</b>	Y	N	Y	Y
<b>Remote control</b>	Y	N	N	N
<b>Chat</b>	Y	N	N	N
<b>Migration:</b>				
<b>Preferences</b>	Y	Y	Y	Y
<b>Desktop</b>	Y	Y	Y	Y
<b>Data files</b>	Y	Y	Y	Y
<b>Boot options</b>	Floppy, CD-ROM, PXE, hidden partition	Floppy, CD-ROM, PXE	Floppy, CD-ROM, PXE, hidden partition	Floppy, CD-ROM, PXE, hidden partition
<b>SID support NT/2000/XP:</b>				
<b>Sysprep from console</b>	Y	N	N	Y
<b>Alternate utility</b>	Y	Y	N	Y

Y=YES, N=NO

PC back onto the RIS server. This image was then deployed to our client machines. Once the image was installed, we visited the clients, entered the Windows setup information, and were in business. Not having to reboot to pull an image from the staging machine was interesting, but it certainly had its trade-offs. We

## While RIS is not a full-blown disk-imaging system, it is virtually free.

had to stop several services and close many programs before we were able to start the imaging process. And this is done manually—we had to open the Services applet and Task Manager to close more than 30 services and more than 10 applications, one by one.

Microsoft's RIS is not a great backup tool. The other products we tested will take exact images of a system's hard drive and store that, whereas RIS is better suited for deployment. And of course, Linux support is nonexistent.

Even though RIS does a file-by-file transfer of data, it did well in our single-client performance test, but its lack of multicast support meant that transferring more than four images at the same time bogged down our RIS server. Our 1.22-GB image test file was transferred

to a single client in a little over 15 minutes. In addition, the images folder is compressed automatically, making it less of a burden on your file server.

Still, while RIS is not a full-blown disk-imaging system, it is virtually free if you're buying Windows 2000 Server and Active Directory anyway. Microsoft does not view RIS as a competitor to specialized disk-imaging software products, however, time spent experimenting with RIS won't be wasted because RIS will integrate with Symantec Ghost and PowerQuest DeployCenter. If you do not need a full-blown imaging suite, configure your existing Win2K servers to use RIS and install the User State Migration Toolkit (see "MS Add-Ons," page 72) to ease the burden of distribution and migration tasks. It is by far the least-expensive route.

**Microsoft Windows 2000 Server Remote Installation Service and User State Migration Tool, included with Microsoft Windows 2000 Professional. Microsoft, (800) 936-5200, (425) 882-8080. [www.microsoft.com](http://www.microsoft.com) **NWC****

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