

# **Disk Cloning Technology for the Overburdened IT Professional**



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## Overview

The goals of this paper are to:

- Provide an introduction to disk cloning and present its benefits to IT professionals and users.
- Examine the cost-saving opportunities inherent in adopting disk cloning in several key market segments.
- Provide a comparative survey about the products currently available.
- Provide an industry reference guide on disk cloning technology.

## **The Benefits of Disk Cloning**

Even as the price of hardware continues to drop, IT Managers are looking more closely than ever at the bottom line when it comes to deploying PCs within a department or across the enterprise. The issue of total cost of ownership has surfaced on radar screens everywhere. IT Managers have come to accept as fact that, in many cases, the balance of the cost equation has shifted to outlays related to installing, configuring, tuning, and supporting new PCs. The situation is similar for managers looking to upgrade existing PCs, or those who need to revert a machine to a known initial state.

In many environments, the goal of the IT Manager is to create an identical installation across a set of computers, thereby reducing training as well as maintenance and support costs. Traditionally, however, this has been a manual process, fraught with the likelihood of error and frustration, especially when the process is performed over and over again on hundreds or potentially thousands of machines. In a measure of time alone, one survey suggests that it takes from two hours to up to a full day to fully install and configure a new computing system manually.

One solution that reduces much of the associated pain, as well as cost and time, is disk cloning software. Disk cloning has come a long way since the early days of DOS when a manager would use the XCOPY command to move entire directory trees from one computer to another. Today's technology enables managers to create fully standardized hardware and software environments, based on a single PC installation that has already been fully configured and tested. The resulting savings in cost and time when using disk cloning software can be dramatic, reducing PC roll out time to as little as five minutes.

### **How It Works**

Disk cloning software works by creating an exact image of a PC's hard drive, effectively taking a "snapshot" of all the files—both hidden and visible—that make up the operating system, applications, and configuration settings. Most users start with a clean, freshly formatted system on which the operating system is installed. Following this, the standard suite of formally approved applications is installed. If the "source" PC is not new, it will likely first be cleaned of viruses, defragmented files, extraneous files, and any other material that could impact its reliable operation. Once the system installation and configuration has been thoroughly tested, a disk image is created.

This image can then be copied to any number of PCs, thereby creating completely identical installations. Time saved from the drudgery of manual PC installation and configuration means more time for your IT staff to provide professional, high-level support and other services. From the user's perspective, working with a thoroughly tested environment means less frustration, greater productivity, and less chance of data loss due to system incompatibilities.

These reasons alone make disk cloning software an essential part of any IT professional's toolkit. And as companies continue the process of migrating to newer application and operating environments, disk cloning is fast becoming a "must have" tool to remain competitive.

## **Norton Ghost—Advanced Capabilities**

Norton Ghost is a disk and/or partition copying program that enables IT professionals to perform the following important tasks:

- Copy the entire contents of one hard drive to another.
- Create an image file of one drive, and use this image to create clones of the original.
- Copy the contents of one partition to another.
- Create an image file of a drive partition that can be used as a template to create other partitions.

Norton Ghost further lightens the burden by automatically taking care of some of the most time-consuming aspects of installing and configuring PCs, including dynamically resizing FAT12, FAT16, FAT32, and NTFS partitions as needed, and performing disk formatting “on the fly.” Manual procedures involving the FDISK and FORMAT commands are a thing of the past. Likewise, when the source and target disks are different sizes, Norton Ghost adjusts the position and size of the partitions automatically.

By using an advanced image compression system, Norton Ghost significantly reduces the amount of space required to store an image file. In fact, images may be compressed by up to 70%, depending on the compression method selected as well as the contents of the partition or disk. Norton Ghost performs a Cyclic Redundancy Check (CRC) on the files to detect any corruption and is capable of verifying that a replicated disk contains the same files as the original. Image files can also be password protected for additional security.

Depending on the needs of the organization, image files can easily be saved to local or network drives, as well as removable storage devices such as JAZ drives, ZIP drives, CD-ROM, or other removable media. Norton Ghost cleverly permits a disk or partition image to be split across multiple volumes, prompting the user to insert another disk (or other media), or permitting the selection of an alternate location. Norton Ghost images can also be saved to, and loaded from, SCSI tape systems, providing an ideal means for implementing a robust disaster recovery solution.

Norton Ghost also excels in its user interface, offering both a GUI interface for interactive operation, as well as a powerful batch mode for automating repetitive tasks, such as when image files must be downloaded to a large number of workstations.

In fact, using Norton Ghost is as simple as performing the following steps:

- Identify what type of cloning needs to be performed. Do the requirements call for disk duplication, partition duplication, disk or partition image file creation, or some other variation? Also, how many computers will be involved?
- Select how the image file will be transferred. This can include removable media, network drives, peer-to-peer connections using the LPT printer port or NetBIOS over a network, as well as Multicast TCP/IP.
- Ensure that the removable media or network connections are functioning properly.
- Start Norton Ghost and select the desired options, along with the source and destination. After checking the selections, all that's left is to start the cloning procedure.

That's it. Norton Ghost is designed to be the most efficient and simple-to-use disk cloning solution anywhere. Norton Ghost is all about helping IT professionals complete their work efficiently, quickly, and without error.

## **Who Benefits from Disk Cloning?**

Disk cloning is suitable for a wide range of corporate and academic situations that require a standardized, consistent, and properly tested computing environment to be loaded on two or more PCs. In fact, the value of disk cloning technology multiplies as the number of PCs in the organization increases. This makes the technology suitable for a wide spectrum of users, ranging from small professional service firms to the largest members of the Fortune or Global 100.

At the same time, different organizations will realize different advantages. For example, the most common corporate application involves the roll out of standardized and tested PCs using a proven hard disk image. A corporate computer training lab, however, may use disk cloning to “reset” dozens of PCs to a known configuration just before the start of each test session. The procedure is the same in both cases; however, the benefit is as varied as the way the computers themselves are used.

Here are some of the more common uses for disk cloning:

### **Corporations**

Corporate IT professionals are often charged with installing a consistent and tested environment on hundreds and perhaps even thousands or tens of thousands of PCs. Disk cloning makes this task both manageable and reliable, translating to greater productivity and lower support costs.

### **VARs**

Systems Integrators/VARs reduce installation time and increase customer satisfaction by replicating a customer-defined VAR's image(s) on all PCs being installed. Not only does this translate to lower support costs, but the VAR may also sell Norton Ghost to an organization's MIT staff, enabling them to restore the computer to its original configuration should a hard drive fail. VARs may also elect to offer this service to organizations that wish to outsource this activity.

### **Academic Institutions**

Computer labs are, by nature, a place of exploration and experimentation. Disk cloning enables administrators to permit students to have reasonable privileges using shared PCs, while still enabling support staff to ensure that when an operating environment breaks, it can be brought back online with minimal disruption. Disk cloning is also an effective way of stopping a virus dead in its tracks before it spreads throughout the campus in addition to removing other unauthorized software and files from computer systems.

### **Training Centers**

PC training centers use disk cloning to provide each student with a consistent and well-defined environment as defined by the instructor. This means that students are free to follow the instructor in an interactive fashion using the computer in front of them, without worry of spoiling the environment for the next class. Likewise, disk cloning can be used to load different environments on the same set of PCs, allowing each instructor to tailor the PCs to match his or her individual curriculum.

### **Testing Labs**

By their nature, testing labs are designed to stress the applications and environments being tested. Using disk cloning permits quality assurance and test engineers to quickly recover from crashed and corrupted environments, returning to precisely the same disk image as before the tests began. This level of consistency permits the tester to more accurately determine whether the environment or the test application is at fault.

## **Help Desks**

Help desk professionals can use disk cloning to correct a corrupted system, replacing the hard disk with a refreshed image or perhaps even using the opportunity to upgrade the user to a newer configuration.

## **PC Manufacturers**

System vendors are critically aware that their installation of the operating system and value-added application software must work the first time, in all cases. A consistent environment also reduces the costs associated with both phone and Web-based technical support. By including the original PC image on CD, together with a read-only version of Norton Ghost, PC manufacturers enable customers to recover a failed PC, saving the significant expense of the PC being returned or forcing a technician visit.

## **More Productivity, Better Service**

Customers today rightfully demand that their software be powerful, flexible, convenient, and easy to use. Norton Ghost offers this and more. Norton Ghost combines the power and flexibility of a command line interface with the ease of use of an advanced graphical user interface. This makes the tool equally suitable for the power user, who looks for the greatest degree of control and automation capability, as well as the IT or help desk professional who needs to complete tasks with minimal training.

The powerful multicasting capability of Norton Ghost permits the IT professional to perform mass image installation and updates using IP-based local area networks or high-speed dedicated wide-area networks. This translates to savings in both cost and time independent of whether a company's computers are located in a single building, within a campus, across the nation, or around the world. The Norton Ghost multicasting feature reduces traffic over the network by transmitting a single image to multiple workstations concurrently. Rather than sending a large image file to 500 computers sequentially, the file is sent only once to all PCs. Its ability to leverage the power and convenience of IP broadcasting is part of what makes Norton Ghost the leading choice among Fortune 500 companies.

Norton Ghost also excels in flexibility, featuring the ability to store an image on another hard drive, network drive, CD-ROM, or JAZ or ZIP drive. The software supports every important file system in use today, including FAT12, FAT16, FAT32, NTFS, HPFS, UNIX® and Novell.

## **Complementing Your Existing Toolkit**

One of the best aspects of selecting Norton Ghost is how easily it fits into an IT professional's existing toolbox of network, remote, and system administration applications. In one sense, IT managers can think of Norton Ghost as simply another component of their toolkit. For example, Norton Ghost functions as a complementary solution to standard electronic software distribution systems.

Symantec also offers a range of products for optimizing the value of Norton Ghost. These include:

- Norton AntiVirus™—the most up-to-date, state-of-the-art family of virus protection products. Norton AntiVirus can perform the critical duty of checking a disk image for viruses and assuring workstations remain free of viruses after a roll out or upgrade.
- Norton Utilities™—the industry-standard utility suite that can be used to ensure system integrity before creating a disk image, and to assure fully functional workstations after a roll out or upgrade. Components of Norton Utilities include Norton Space Wizard, a powerful and flexible tool used to optimize file use on computer systems, removing unnecessary and duplicate files; Norton Speed Disk, which defragments a hard drive; and Norton Disk Doctor, used to diagnose and repair hard drive problems.
- pcANYWHERE™—the best-selling remote-control and file-transfer application that enables IT staff to remotely control a PC via modem or via the Internet. pcANYWHERE is ideal for providing post-installation customization and support to individual workstations.

Here's an example of how these tools work together to make an IT professional's job easier. After installing and configuring the operating system and applications that will constitute a particular disk image, the IT professional uses Norton AntiVirus and Norton Utilities to ensure that the image is free of viruses, is defragmented for maximum efficiency, and contains no extraneous files.

After the roll out is completed using Norton Ghost, the IT professional uses pcANYWHERE to remotely visit any PC that requires special modification or other attention. Once operational, PCs throughout the enterprise can be kept virus-free and operating at peak efficiency using Norton AntiVirus and Norton Utilities on a regular basis.

## Save Hundreds of Hours and Thousands of Dollars!

### Rolling out 500 new PCs Operating System and Application Installation

- Manually—takes 125 days
- Norton Ghost—takes 2 days
- **Total savings: 123 days and \$15,000**

*Conservative estimate assumes 3 IT junior staff members with annual salaries of \$36,000.*

*Multicasting allows the IT professional to roll out the image to 500 PCs in approximately 7 minutes.*

## Microsoft Endorses Disk Cloning

As the primary developer of the Windows family of operating systems, including Windows® 95, Windows 98, and Windows NT®, Microsoft's position regarding disk cloning is important. Microsoft initially had concerns about how customers would manage their licensing agreements with the company, in addition to supporting cloned systems. But as customer demand increased, Microsoft has reassured itself that both issues are resolvable, and has outlined guidelines on how customers can use disk cloning products while still maintaining secure and reliable systems without invalidating the support agreement.

Microsoft has now publicly endorsed the cloning of PCs running Windows 98 and Windows NT 4.0, and has stated that support for disk cloning in Windows NT version 5.0 is expected. In order to help ensure the security and reliability of cloned systems, Microsoft offers a System Preparation Utility (for Windows NT) and an Image Preparation Tool (for Windows 98). Due to differences in the security models offered by the two operating systems, each utility performs a slightly different set of tasks.

In particular, the System Preparation Utility for Windows NT performs the following:

- It provides each cloned PC with a unique security identifier (SID), ensuring that user and group-level security is maintained across a network.
- It provides a clear marker for Microsoft technical support to determine if the PC has been cloned.

Likewise, the Image Preparation Tool for Windows 98 removes any hardware-specific information from the Windows Registry, information that normally gets inserted when Plug and Play hardware is installed. This information, which may even include hardware serial numbers, will be unique in environments that have not standardized on PC hardware and peripherals. These utilities are available free of charge from Microsoft beginning this month. Visit the Microsoft Web site for more information.

Microsoft offers a number of recommendations on how best to use disk cloning software such as Norton Ghost without compromising the security of networked systems. For Windows NT, this procedure is fully documented in the "Automating Windows NT Setup Guide" available at <http://www.microsoft.com/ntworkstation/> in the Deployment Tools section.

The main issue in cloning Windows NT systems revolves around the SID, which is a unique number that identifies an account, group, workstation, or server running Windows NT. The system uses this SID above all other information to determine the identity of the entity on the network. Microsoft's concern, before the availability of the System Preparation Utility, was how to ensure that the SID of a user or workstation wasn't duplicated during the disk cloning process.

If SID duplication occurred, two or more users could inadvertently be given identical privileges to network resources, resulting in a security breach. Microsoft's System Preparation Utility solves this problem and should be used to prepare the system before it is cloned. The System Preparation Utility is designed to properly modify the SID. Norton Ghost includes an identical program called Ghost Walker, which performs the same operation.

Realizing the value and importance of disk cloning to its customers, Microsoft is working to offer even more support for disk cloning in newer versions of the Windows operating systems. And while Microsoft does not endorse disk cloning for computers running Windows 3.1 or Windows 95, Norton Ghost fully supports the reliable cloning of both of these environments.

Companies and institutions are now able to benefit from the convenience, reliability, and cost savings inherent in the use of the advanced disk cloning technology of Norton Ghost.



## Case Studies and User Profiles

### Allergan, Inc. Maintains a Catalog of Validated Computer Systems

Imagine the challenge of not only installing and configuring up to 4500 PCs, but also maintaining and providing technical support for users. Now imagine that hundreds of these PCs are in the form of laptop computers in the hands of salespeople around the country. And finally, add the FDA requirement that every system be validated to a written standard, and you have the case of Allergan, Inc.—an Irvine, California-based company that is a leader in the health care market with products such as receptor-selective retinoids, foldable intraocular lenses, and convenient contact lens care products.

To maintain its leadership position in those and other markets, Allergan devotes a substantial amount of its resources—\$131.2 million in 1997—to research and development. Investments of that magnitude pay off in the form of exciting new products—three in 1997—to address important eye and skin conditions, as well as movement disorders, pain, and cancer with products like Botox® (Botulinum Toxin Type A) purified neurotoxin complex and Alphagan® solutions.

Like many companies, Allergan has a standard suite of applications that appear on each of its computers. For the company this means Windows 95, Office 97, an anti-virus application, and dial-up software along with a few customized applications. Allergan needed a quick and cost-effective way to replicate this environment not only on new systems as they are rolled out, but also on existing systems in case of a serious problem.

For Allergan, the issue was one of total cost of ownership for each of its 4,500 computers. On top of the cost of the system, the company had to consider the cost of providing timely IT services, including installation, configuration, and technical support. Allergan turned to Norton Ghost. “Norton Ghost saves the tech from having to re-install Windows and all the other software on our standard image,” explains Paul Vincent, Senior Systems Analyst at Allergan. “It takes 8 to 9 minutes, start to finish, to clone a machine using Norton Ghost. If you were to install everything by hand, it would take at least three to four hours!”

Allergan maintains a catalog of disc images for each series of machines, so when a machine has problems in the field, technical support knows what’s on the system. According to Sheri Butman, Desktop Systems Analyst, rebuilding a system is as easy as saying, “Let’s see. You have a Compaq 123. I’m going to use the Norton Ghost program and literally take a duplicate of what was on the last 123 and put it back on your system. Then we’ll restore your data files, and voila. You’re operational again.” The catalog also helps Allergan comply with FDA requirements in which workstations must be validated. “With Norton Ghost we can recreate the environment when we ran a test, so we can prove that data was not manipulated,” Butman explains.

“Norton Ghost is absolutely ideal for our situation,” says Butman. “When you have this many workstations that potentially may need to start out fresh, it’s comforting to know that we can just clone a machine, and it will run.”

## **West Marine Lets Sales Staff Concentrate on Selling**

If you've ever lost a hard drive, you know the problem: Frustration. Programs to re-load (if you can even find the disks). Hard drive to re-configure. Wasted time. It's a bad dream. Now imagine 200 stores all over the country with two to five Point of Sale (POS) computers or registers at each store, manned by salespeople instead of computer technicians. In addition to all the usual problems, there's distance and lost sales.

West Marine—then known as West Coast Rope—sold its first “Top Quality Rope at Factory Prices” by catalog from Sunnyvale, California, 28 years ago. Today it supplies a satisfied boating public with everything from ropes and anchors to bulkhead compasses and dinghy boats, over 34,000 separate items in all. In 1996, West Marine merged with E&B Marine and became the nation's largest specialty retailer of recreational and commercial boating supplies and apparel. The company operates 200 stores nationwide under the names West Marine and E&B Discount Marine. It also serves customers through a wholesale division named Port Supply.

West Marine's situation is a common one. When a hard drive fails on one of the POS registers, replacing the hardware simply leaves an empty hard drive with no operating system, no POS applications, and no connectivity to the company's AS400 system for retail sales processing. Salespeople trained to serve recreational and commercial boating customers were poorly equipped to deal with the task of re-loading all the software needed to create a functional system. Even with a lot of handholding from technical support over the phone, the process could end up taking 10 to 15 hours. The situation was desperate.

Then West Marine found a better way. “With just a floppy disk, we're able to get a machine up and running within an hour,” explains Jason Lauer, Technical Support Project Leader for Store Systems at West Marine. “We stick the Norton Ghost disk into a good POS register and then upload an image of that machine's hard drive onto a server,” says Lauer. “Then we take that same floppy disk, stick it in the failed machine that is now working but not configured, and download the image of the good register onto the failed machine. Then it's just a matter of re-booting the failed machine and making a few minor configuration changes.”

The result for West Marine was shrinking several frustrating, non-productive hours into just a few minutes. And because of the Norton Ghost smart cloning features, the program is able to copy all the partitions from the source to the target disk. It even automatically adjusts the position and size of the target partitions. There's no need for a salesperson to mess with tricky FDISK or FORMAT commands on the target system. Norton Ghost does it all automatically.

Norton Ghost also permits you to “create an image file of a drive and put it up on the network and then reference that image file to make other drives, replicating the POS software on other machines,” explains Lauer. You can also store the file on CD-ROM, JAZ, or ZIP drives for use later. “It's a pretty powerful tool,” Lauer declares.

## Resource Directory

### Articles and Publications

#### InfoWorld

InfoWorld is a leading resource for IT managers and professionals, and has covered numerous issues related to disk cloning over the past couple of years. On June 29, 1998, InfoWorld compared leading disk cloning solutions and declared “Ghost still tops in disk duplication.” The complete article can be found at <http://www.infoworld.com/cgi-bin/displayArchive.pl?98/26/nr01-26.68c.htm>.

Last September, InfoWorld also examined disk cloning, looking at how three different products approach the challenges. The InfoWorld article, “Ghost beats out rivals for disk replication options,” can be found at <http://www.infoworld.com/cgi-bin/displayArchive.pl?97/37/nr03-37.62d.htm>.

The article “Three methods for deploying Windows 98 provide different strengths” explores some of the alternatives for migrating an organization to a new operating system. The complete article can be found at <http://www.infoworld.com/cgi-bin/displayArchive.pl?98/24/ranalysa.dat.htm>.

“Microsoft moves to ease NT Workstation deployment” explains Microsoft’s recent endorsement of disk cloning, as well as offering a concise description of the System Preparation Tool. The article can be found at <http://www.infoworld.com/cgi-bin/displayShow.pl?980617.ehonttool.htm>.

Two InfoWorld articles describing the Symantec acquisition of Ghost can be found at:

- “Symantec buys Ghost disk-cloning software,” at <http://www.infoworld.com/cgi-bin/displayStory.pl?980625.ecghost.htm>
- “Symantec buys Ghost for disk-cloning,” at <http://www.infoworld.com/cgi-bin/displayArchive.pl?98/26/t22-26.24.htm>.

Finally, “A friendly Ghost, a helpful boot, and a little lab noir” takes a brief look at Norton Ghost and disk cloning. The complete article is at <http://www.infoworld.com/cgi-bin/displayNew.pl?loose/980427lc.htm>.

#### PC Week

PC Week is a leading weekly news magazine that focuses on PCs in the corporate environment. PC Week has also identified disk cloning as an important issue for its audience of IT professionals, and has featured numerous articles about the subject.

In “Ghost cloning gains GUI,” PC Week Labs tests Norton Ghost 5.0 and presents its findings at <http://web-e6.zdnet.com/pcweek/reviews/0706/06ghost.html>. An executive summary is available at <http://web-e6.zdnet.com/pcweek/reviews/0706/06ghost1.html>.

In the regular column Net Adviser, Neil Plotnick asks, “How fast can you build a PC?” Faster if you use Norton Ghost and clone the hard drives, says Plotnick. The complete article can be found at <http://search.zdnet.com/pcweek/opinion/0622/22neil.html>.

In their Sm@rt Edge column, David Harvey and Rich Santalesa provide an overview of Microsoft’s new Image Preparation Tool for Windows 98. The article is at <http://www.zdnet.com/sr/products/richdave/980626.html>.

PC Week also covers the acquisition in the following articles:

- “Symantec Buys Disk-Clone Market Leader,” at <http://www1.pcworld.com/pcwtoday/article/0,1510,7299,00.html>.
- “Ghost in the Machine,” at <http://www.zdnet.com/pcmag/news/trends/t980626a.htm>.
- “Symantec buys Ghost developer,” at [http://www.zdnet.com/zdnn/stories/zdnn\\_display/0,3440,332210,00.html](http://www.zdnet.com/zdnn/stories/zdnn_display/0,3440,332210,00.html).

### **PC Magazine**

The article “First Looks: Ghost Professional” provides a comprehensive summary of the features and advantages of performing disk cloning using Norton Ghost. The article is at <http://www.zdnet.com/pcmag/firstlooks/9805/t980522a.htm>.

### **WindowsPro Magazine**

WindowsPro Magazine examines the issues surrounding deploying large numbers of PCs in an organization in the article “Roll Out NT Painlessly, The Cloning Alternative.” The complete article is at [http://www.zdnet.com/windows/wpro/9809/fc\\_roll\\_out\\_03.html](http://www.zdnet.com/windows/wpro/9809/fc_roll_out_03.html).

### **Windows Sources**

In the NT Networking Help Desk column, the article “The Clone Ranger” examines how disk cloning can help IT professionals perform OS installation faster and more reliably. The article is at [http://www.zdnet.com/wsources/content/0398/hd\\_nt\\_nw.html](http://www.zdnet.com/wsources/content/0398/hd_nt_nw.html).

### **Web Links**

#### **Symantec**

The Symantec Web site provides complete and up-to-date information about all of the company's products, including Norton Ghost. The main URL is <http://www.symantec.com>. Information specific to Norton Ghost can be found at <http://www.symantec.com/ghost>.

#### **Microsoft**

Microsoft offers a series of recommendations on how best to use disk cloning software without compromising the security of networked systems. For Windows NT, this procedure is fully documented in the “Automating Windows NT Setup Guide” available at <http://www.microsoft.com/networkstation/> in the Deployment Tools section.

## **Further Reading**

This document is one of a series of papers on Symantec's software strategy and its product offerings. Additional papers include:

- Ten essential steps for telecommuting success
- Understanding and Controlling Viruses in 32-Bit Operating Environments
- Why Norton Utilities Is a Natural Complement to the Windows 95 Environment
- Managing Desktop Interfaces across the Enterprise
- A Strategy for the Migration to Windows 95
- File Management and Windows 95
- Understanding Virus Behavior in the Windows NT Environment
- Integrating Remote Communications into Enterprise Computing
- Using Outsourcing to Reduce IT Labor Costs
- Understanding and Managing Polymorphic Viruses
- Using Outsourcing to Reduce IT Labor Costs
- Understanding Symantec's Anti-virus Strategy for Internet Gateways

For copies of these papers or information about Symantec enterprise network products, call 1-800-450-9760 and ask for Code V62. Outside the United States contact the sales office nearest you (listed on the back cover). You can also find these documents on Symantec's Web site at <http://www.symantec.com>.

## **About Symantec**

Symantec Corporation is a leading software company with award-winning application and system software for Windows, DOS, Macintosh®, and OS/2 computer systems. Founded in 1982, Symantec has grown rapidly through the success of its products and a series of 16 acquisitions, resulting in a broad line of business and productivity solutions. Symantec is committed to maximizing user productivity and minimizing support from IT.

Symantec's acquisitions have strongly influenced the company's innovative organization. The company is organized into several product groups that are devoted to product marketing, engineering, technical support, quality assurance, and documentation. Finance, sales, and marketing are centralized at corporate headquarters in Cupertino, California.

## Notes



## **WORLD HEADQUARTERS**

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