

# User's Guide

## Diskeeper<sup>®</sup> for Windows<sup>®</sup>

March 2002

This document describes the installation and operation of Executive Software International's Diskeeper, *The Standard in Entire Network Defragmentation<sup>™</sup>* for Microsoft<sup>®</sup> Windows. It is intended primarily for Windows system managers.

Revision/Update Information:	This is a revised manual
Software Versions:	Diskeeper 7.0 Server Diskeeper 7.0 Workstation
Operating Systems:	Windows XP Professional Windows 2000 Server Windows 2000 Professional Windows NT 4.0 Server (SP 3 or higher) Windows NT 4.0 Workstation (SP 3 or higher) Windows Millennium Edition (Me) Windows 98 Windows 95 (OSR 2 or higher)

Executive Software International, Inc., Burbank, California, USA



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March 2002

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# Preface

## What This Book is About

Welcome to the Diskeeper User's Guide. We realize software manuals tend to be one of the least-favorite pieces of reading material around, so we intend to make this one as painless as possible. This book will first help you get Diskeeper quickly installed and running. Next, it describes the various Diskeeper features and how to use them. Finally, it explains about disk fragmentation on your Windows system.

## Structure of This Book

- Chapter 1 describes how to install Diskeeper.
- Chapter 2 explains how to start using Diskeeper and how to see the amount of fragmentation on your disk volumes.
- Chapter 3 gives a brief overview of Diskeeper.
- Chapter 4 explains the various features of Diskeeper in detail.
- Chapter 5 presents the theory of Diskeeper operation.
- Appendix A provides answers to frequently asked questions.
- Appendix B explains how to contact your Executive Software Customer Service Representative for Support Services.
- Appendix C gives instructions for distributed installation, using the Diskeeper Remote Install feature or the Microsoft System Management Server (SMS).
- Appendix D explains how to run Diskeeper as a cluster-aware application on a cluster server.
- The Glossary provides definitions of technical terms used in this manual.

## Introduction

As used in this manual, the term *disk fragmentation* means two things:

- a condition in which pieces of individual files on a disk volume are not contiguous, but rather are broken up and scattered around the disk; and

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- a condition in which the free space on a disk volume consists of little pieces of space here and there rather than a few large free spaces.

The effects of excessive fragmentation are twofold as well:

- file access takes longer because a file must be collected in pieces here and there, requiring several disk accesses instead of just one; and
- file creations take longer because space for the file must be allocated in little pieces here and there instead of just one contiguous allocation.

The bottom line—fragmentation slows Windows system performance. The longer you wait to defragment your disk volumes, the slower your computer runs.

With Diskkeeper, all the disks in a Windows operating system can be kept defragmented indefinitely. Diskkeeper cleans them up and keeps them that way. This includes disks with compressed, encrypted and sparse files on NTFS volumes.

Running either invisibly as a background job or as a manual defragmenter, Diskkeeper carefully rearranges files and free space on a disk volume so they consist of as few pieces as possible. Because Diskkeeper runs online, there is no need to lock users off a disk while it is being defragmented.

Diskkeeper is the complete “Set It and Forget It”<sup>®</sup> solution to the loss in system performance caused by disk fragmentation!

## Other Important Products

Executive Software is known throughout the computer industry for its focused development of system management tools. If you are running Windows NT or Windows 2000, you should also use:

### **Undelete<sup>®</sup> for Windows NT/2000**

Instantly recover files that have been accidentally deleted *anywhere* on your network. Undelete sets up a Recovery Bin that caches *all* deletions—even versions created between backups—and saves you the time and money of wading through backups. Undelete also includes a recovery tool for files that have been deleted *before* Undelete was installed. Data is your business. Complete your data protection solution with Undelete, available from your local reseller or directly from Executive Software.

## Chapter 1

# Diskeeper Installation

This chapter provides information you need before, during, and after installing Diskeeper.

## Before the Installation

### Windows Versions and Platforms Supported

**Diskeeper 7.0 Server** is supported on Windows XP Professional, Windows 2000 Professional and Server, as well as on Windows NT 4.0 Server and Workstation operating systems.

**Diskeeper 7.0 Workstation** is supported on Windows XP Professional, Windows 2000 Professional, Windows NT 4.0 Workstation, Windows Me, Windows 98 and Windows 95.

Note that Service Pack 3 or higher is required on Windows NT 4.0 systems and OEM Service Release 2 (OSR 2) or higher is required on Windows 95 systems.

An earlier version, Diskeeper 1.09, is available on request for Windows NT 3.5 and 3.51 systems running with Service Packs 0 through 4.

Diskeeper runs on the Intel<sup>®</sup> x86 platform (including Pentium<sup>™</sup> and compatible CPUs from other manufacturers) running Windows XP Professional, Windows 2000 Professional or Server, Windows NT 4.0 Workstation or Server, Windows Me, Windows 98, or Windows 95 (OSR 2).

### File Systems Supported

Operating System	File Systems
Windows 2000/XP	NTFS, FAT16 and FAT32
Windows NT	NTFS and FAT16
Windows 95 (OSR 2 or higher) /98 /Me	FAT16 and FAT32

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Note that the 12-bit FAT file system is not supported. (The 12-bit FAT file system is used on FAT volumes smaller than 16 megabytes in size, such as floppy disks). In addition, NTFS volumes formatted with a cluster size larger than 4 kilobytes are not supported (except on Windows XP, which supports cluster sizes up to 64 KB).

## Disks Supported

Diskeeper supports a wide range of SCSI and IDE disks, including:

- Primary Partitions
- Extended Partitions
- Logical Drives
- Volume Sets
- RAID Arrays
- Mirrored Disks

## Resource Requirements

The disk space requirements for Diskeeper depend on several factors. On Windows 2000/XP systems, Diskeeper Server version will need 26 megabytes and Diskeeper Workstation version about 6.5 MB. Allow about 10 MB of extra free space for temporary files during the installation. If Internet Explorer is not present on your computer, some other needed files (hhupd.exe, 50comupd.exe, and windist.exe) may be added. Further, your system may require a new or updated version of DCOM (less than 3 MB) and/or MMC (less than 6 MB).

## Additional Software Requirements

On Windows NT 4.0 computers, Service Pack 3 is required for Diskeeper to function properly.

Diskeeper relies on both the Distributed Component Object Model (DCOM) and the Microsoft Management Console (MMC).

DCOM is used for communication between the various components that make up Diskeeper. For example, when a Diskeeper defragmentation operation is scheduled to begin, the Diskeeper controller module uses DCOM to send a message to the defragmentation engine to begin the defragmentation process.

The MMC provides a single point of control for system utilities such as Diskeeper. The MMC is used as a central location for a variety of Microsoft and third party administrative tools.

**Note:** In most cases, Windows 95 systems are not running either DCOM or the MMC by default. On Windows 98/Me and Windows NT/2000/XP systems, DCOM is installed by default when the operating system is installed. The MMC normally has to be installed separately, except on Windows 2000/XP, where it is already built into the operating system. The Diskeeper setup process will automatically install DCOM and/or the MMC on your computer, if needed.

## Installation Overview

Diskeeper is installed by the **SETUP.EXE** program supplied on the Diskeeper CD-ROM. The **SETUP.EXE** program:

- Confirms that you have Administrator privileges (on Windows NT/2000/XP systems).
- Determines which Windows version you are running.
- Checks for sufficient space on the disk for the installation.
- Detects and removes any previously installed Diskeeper software.
- Copies the Diskeeper files to the destination directories, updates the Windows registry, starts the Diskeeper service, and creates a new Program Group for Diskeeper.
- On Windows NT/2000/XP systems, allows you to change certain default settings for Diskeeper.

## Installation Procedure

Diskeeper can be installed from a CD-ROM, or it may be downloaded from the Web. This procedure applies to both methods. Before you start the installation, please note the following:

- Windows 95 machines must have OSR 2 or higher installed.
- Windows NT 4.0 machines must have Service Pack 3 or higher installed
- On Windows NT 4.0 machines, if you have previously installed Diskeeper Lite on your computer, Executive Software recommends that you uninstall it before proceeding with the installation of Diskeeper. If, however, you decide to leave Diskeeper Lite on your system, be aware that uninstalling Diskeeper Lite after the installation will remove certain Windows NT registry entries used by Diskeeper, and you will need to re-install Diskeeper. Use the Add/Remove Programs applet in Control Panel to uninstall Diskeeper Lite.
- On Windows 2000/XP machines, installing Diskeeper will not remove the built-in defragmenter, but Diskeeper will automatically become the default defragmenter.

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- To install the Windows NT/2000/XP version of Diskeeper, you must be logged into an account that is a member of the Administrators group.

This installation procedure assumes you are installing from CD-ROM. If the Diskeeper software was downloaded from the Web, double-click the executable file in the directory into which it was downloaded and go directly to step 3.

1. Insert the Diskeeper CD-ROM into the appropriate drive on your computer.
2. The Windows AutoPlay feature automatically determines the computer platform you are using. A demo will begin to play that will allow you to install Diskeeper or choose from an assortment of Trialware versions of Executive Software products.

If you have disabled the AutoPlay feature, simply double-click the **Demo32.exe** file in the root-level folder on the CD-ROM and follow the instructions displayed.

3. Skip this step if you are installing a full version of Diskeeper, or you are installing an Upgrade version of Diskeeper over an earlier full version of Diskeeper.
  - If you do not have a full version installed, but have an ESD (Electronic Software Distribution) version of Diskeeper on your system, you will be asked for its location. This must be the only file located in the folder location. When Setup has verified the version is valid, the installation will continue.
  - If you do not have a full version installed but have a CD of a full version, you will be asked to insert the CD. After Setup checks the CD, you will need to re-insert the CD you are installing the new version from. Press the SHIFT key when inserting the older CD as well as the newer CD, to disengage the AutoPlay feature.

4. Click **Next** when the welcome message appears.
5. After you have read and accepted the license agreement, click **Next** to continue.
6. As an option, you can change the destination location for the Diskeeper files. By default, Diskeeper is installed in one of the following locations on your Windows system volume, depending on the version installed:

```
\Program Files\Executive Software\DiskeeperServer  
\Program Files\Executive Software\DiskeeperWorkstation  
\Program Files\Executive Software\Diskeeper9X
```

You can choose a different disk volume or directory for the installation as follows:

- a) Select the **Custom** option button and click **Next**.

- b) You can check if there is sufficient disk space for Diskeeper on any of your local volumes by clicking on **Disk Usage**.
  - c) Click **Change**, make the desired changes to the destination and click **Next** to accept the new destination. If the directory you specify does not exist, a new directory will be created.
7. If Internet Explorer 4.01 or higher is not installed on your computer, another installation program is started and a package of necessary components is installed on your computer. Microsoft Management Console (MMC), which is the interface for Diskeeper, requires these components. These components are a small subset of Internet Explorer—not the complete Internet Explorer product. Installing these components (hhupd.exe, 50comupd.exe, and wintdist.exe) will not affect your current web browser. Note that you must restart your computer after installing Diskeeper.
8. If the MMC is not installed on your computer, the MMC Setup program is started automatically. After the MMC files are installed, the Diskeeper Setup program resumes.
9. The Setup program checks to confirm DCOM is installed on your computer. If it is not, the DCOM Setup program is begun. After a short period of copying files, the DCOM installation is complete.
10. Setup detects and removes any previously installed Diskeeper software. (“Set It and Forget It” settings are normally saved.)
11. After the Diskeeper files have been copied to your system, you are presented with the opportunity to register Diskeeper online.
12. If you are installing the Server version of Diskeeper, you are next given the opportunity to perform a Remote Install of Diskeeper Workstation version on one or more computers in your network. If you prefer, this can also be done at a later time. See Appendix C for more information on Remote Install. Click **Install** to start the Remote Install procedure, or click **Next** to skip it at this time.
13. On a Windows 2000/XP system, after Setup is complete, you can immediately start Diskeeper (and optionally select to view the Readme.txt file) by clicking **Finish**. On Windows 95/98/Me/NT systems, you may be required to restart your computer before running Diskeeper.
14. To run Diskeeper, click the Windows **Start** button, select **Programs**, and then **Executive Software Diskeeper**.
15. If you installed the Server version of Diskeeper and want to run the Diskeeper Remote Install feature, click the Windows **Start** button, select **Programs**, and then **Diskeeper Remote Install**.

## **After the Installation**

### **Registering Diskeeper**

After the Diskeeper installation is complete, you are given the option to register your Diskeeper purchase online. Alternatively, you can register Diskeeper by mailing or faxing the registration card that comes with the CD.

Be sure to register your Diskeeper purchase to receive the free 90 days of telephone support included with Diskeeper.

### **About Windows NT/2000/XP Service Packs**

Since Diskeeper uses mechanisms built into Windows NT/2000/XP that allow the safe movement of files on a disk that is actively being accessed by users, there is no need to upgrade Diskeeper each time you install a new Windows Service Pack upgrade.

### **Repairing Windows NT/2000/XP Systems**

Performing an emergency repair of a Windows NT/2000/XP system can possibly change or disable certain system information or services, which may make it necessary to reinstall Diskeeper after repairing your Windows system.

### **About the Diskeeper Service**

Diskeeper is primarily designed as a “Set It and Forget It” disk defragmenter. In order to accomplish this goal, it creates a Windows service. The service allows Diskeeper to run in the background while other applications are running. As long as your operating system is up and running, Diskeeper can defragment your disks, whether you are logged on or not.

After installation, the Diskeeper service starts automatically each time your computer is restarted. The Diskeeper service runs all the time, whether or not defragmentation is occurring. This service consumes negligible system resources, and in most cases will never need to be disabled.

### **The Windows NT/2000/XP Application Event Log**

On Windows NT/2000/XP, Diskeeper messages are placed in the Windows Application Event Log. By default, this log is 512 kilobytes in size, and is set to overwrite events older than 7 days. Diskeeper may quickly fill the log file if these default settings are used. To prevent this, perform the following steps to change the size and overwriting characteristics of the Application Event Log:

## On Windows NT 4.0

1. From the Windows NT **Start** button, choose **Programs**, then the **Administrative Tools** Program Group.
2. In the **Administrative Tools** Program Group, choose the **Event Viewer**.
3. In the **Event Viewer**, open the **Log** menu and choose the **Log Settings** option.
4. In the **Event Log Settings** dialog box, perform these steps:
  - a) Set the **Change Setting** to **Application Log**.
  - b) Set the **Maximum Log Size** to **2048 kilobytes**.
  - c) Enable the **Overwrite Events as Needed** option.
  - d) Click **OK** to return to the **Event Viewer Log**.

## On Windows 2000/XP

1. Right-click on the Windows **My Computer** desktop icon and select **Manage** on the menu that appears.
2. When the Computer Management Console is displayed, select **System Tools**, and then **Event Viewer**.
3. Expand the Event Viewer and select **Application**.
4. Next, click the **Action** menu item and then click **Properties**.
  - a) Set the **Maximum log size** to **2048 KB**.
  - b) Enable the **Overwrite events as needed** option.
  - c) Click **OK**.

Diskeeper allows you to specify what information is written to the Application Event Log. For more information, see “Logging Diskeeper Activity,” page 58.

## Event Logging under Windows 95/98/Me

Diskeeper for Windows 95/98/Me provides the option of logging Diskeeper events into a text file. When Diskeeper logs an event, the event and its message are appended to the Diskeeper log file. These events are written as a text file, which can then be viewed with Notepad, or your choice of text editor programs.

The Diskeeper log file is named **DkEventLog.txt** and it is stored by default in the directory folder where Diskeeper is installed. The file is limited to 1 MB in size. When

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it reaches this size, the log is purged completely and the event log is started from scratch. For more information, see “Logging Diskeeper Activity,” page 58.

# Remote Installation

Diskeeper can be installed simultaneously on multiple computers in a network, using either the Diskeeper Remote Install feature, or Microsoft’s System Management Server (SMS).

Remote installation can be a tremendous time saver for system administrators, especially on large networks, where they may have to install Diskeeper on hundreds, or even thousands of computers.

For more information on remotely installing Diskeeper, see Appendix C.

# Uninstalling Diskeeper

To uninstall the Windows NT/2000/XP version of Diskeeper, you must be logged into an account that is a member of the Administrators group.

Note that the controls may have slightly different names, depending on the version of Windows.

Follow these steps to completely remove and uninstall Diskeeper from your computer:

1. From the **Control Panel**, double-click **Add/Remove Programs**.
2. On Windows 95/98/Me/NT systems, click the **Install/Uninstall** tab.
3. Highlight the **Diskeeper** entry.
4. Click **Remove** (Windows 2000/XP) or **Add/Remove** (Windows 95/98/Me/NT). This removes the Diskeeper program files from your computer. In most cases, the Diskeeper installation directory will not be removed.
5. Manually delete the Diskeeper installation directory if it exists.

## Chapter 2

# Getting Started

## Introduction

This chapter explains how to analyze the fragmentation on a disk volume, save the results, defragment the volume, and do a “before and after” comparison.

Diskeeper can perform a comprehensive analysis of the fragmentation on your disk volumes. Diskeeper provides two methods by which to see the extent of the fragmentation—a graphic display giving a graphic representation of the fragmentation on your volumes and a report view showing statistical information about the fragmentation on your volumes.

The graphic display shows different-colored areas representing fragmented files, contiguous files, directories, free space, paging/swap files, and NTFS system files (on Windows NT/2000/XP only). The report view shows useful information about the extent of fragmentation on a volume.

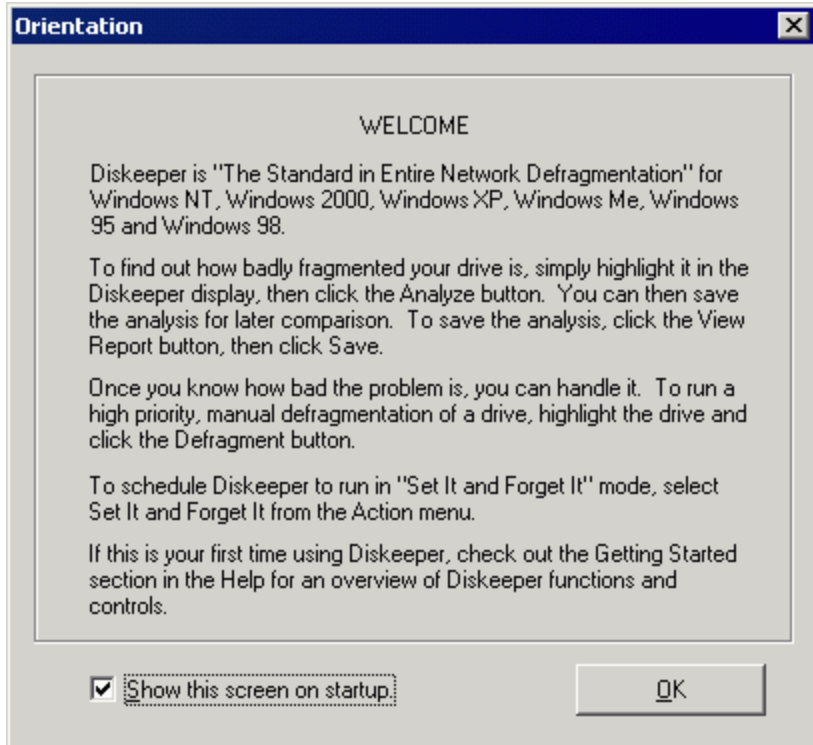
After installing Diskeeper, you are ready to start Diskeeper and begin defragmenting your disk volumes. In order to see the actual gains from defragmentation, analyze the condition of your volumes before you begin defragmenting them. By reviewing the graphic and text displays both before and after running Diskeeper, you will be able to see the actual reduction of file fragmentation.

## Seeing Results

Especially when using Diskeeper for the first time, you may want to see the results of defragmenting your disk volumes. To see the effectiveness of Diskeeper, it is important to analyze the fragmentation on your volumes *before* defragmenting them. The following section briefly describes a procedure for doing this.

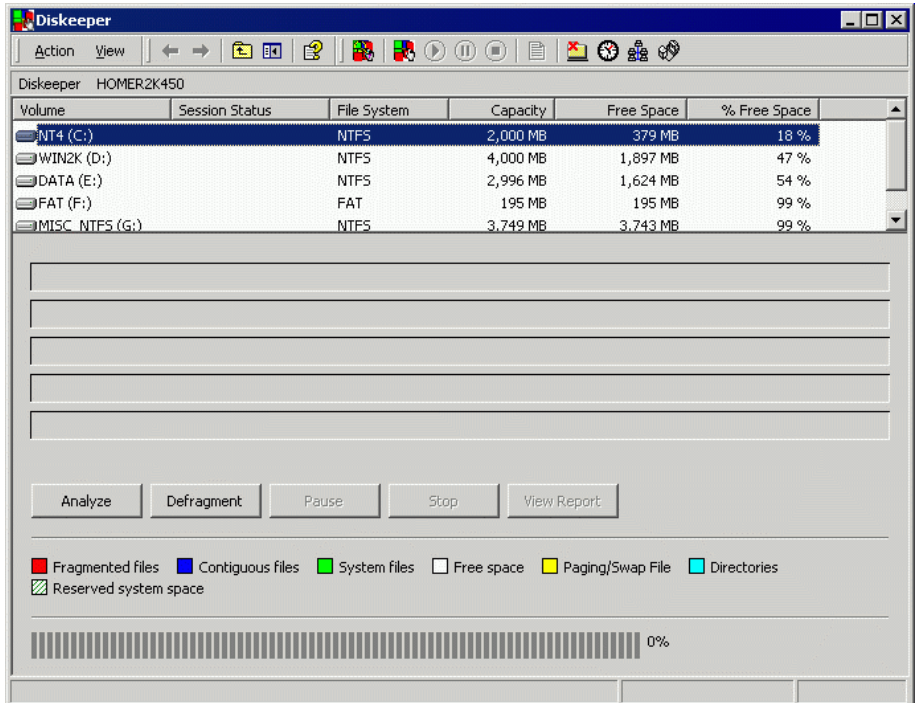
## Quick Start

When you start Diskeeper for the first time after a successful installation, you will see this welcoming message:



Read the message—it contains simple instructions on how to start using Diskeeper. After you have read the message, you may prevent it from displaying in the future by clearing the check box in the bottom left corner. Click **OK** to continue.

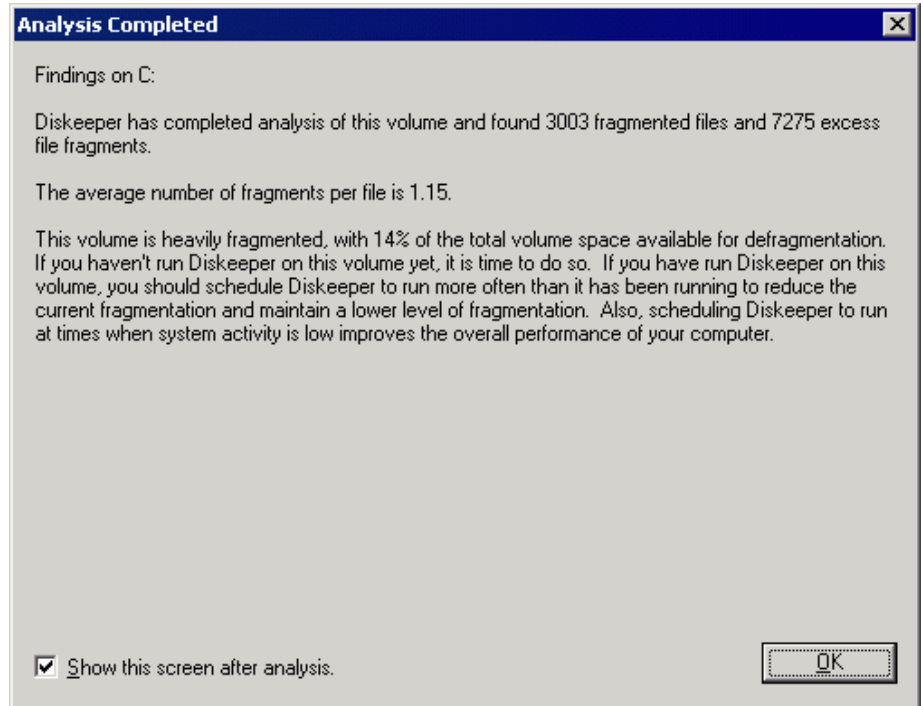
After closing the welcome message, you will see a window that looks similar to this:



To see the effectiveness of Diskeeper, it is important that you first analyze the fragmentation on your disk volumes *before* defragmenting them. To do this, click the **Analyze** button in the Diskeeper snap-in to run the analysis.

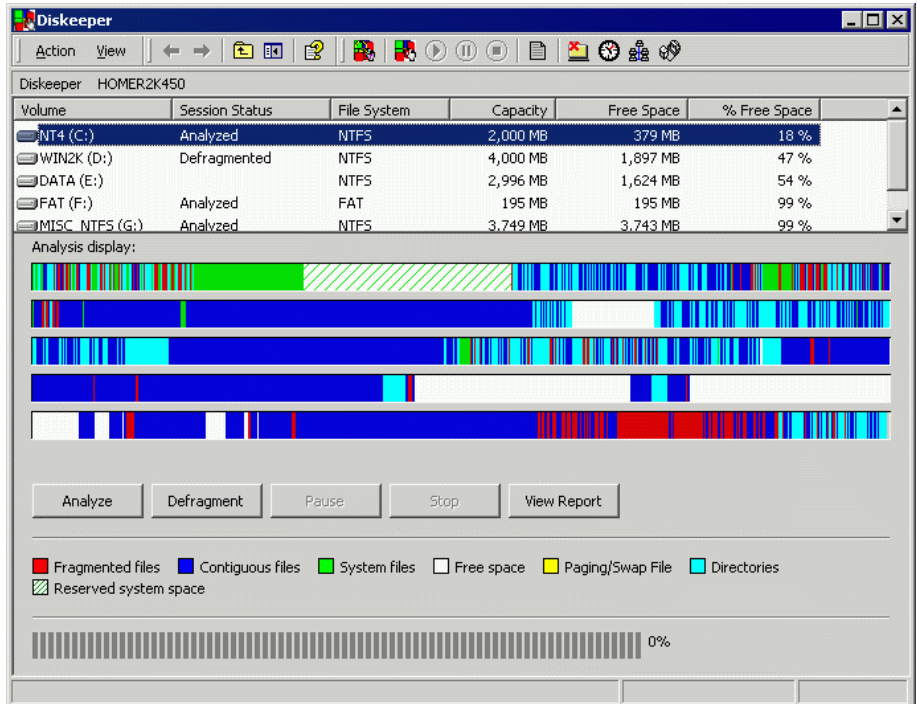
## 12 Getting Started

After the analysis is complete, a summary message similar to this will display:



Like the welcome message, this summary message may be disabled in future analyses by clearing the check box in the bottom left corner. (If you later want to enable it again, you can do so from the **View** menu).

After you have read the Analysis Completion message and clicked **OK**, you will see a graphic display similar to this:

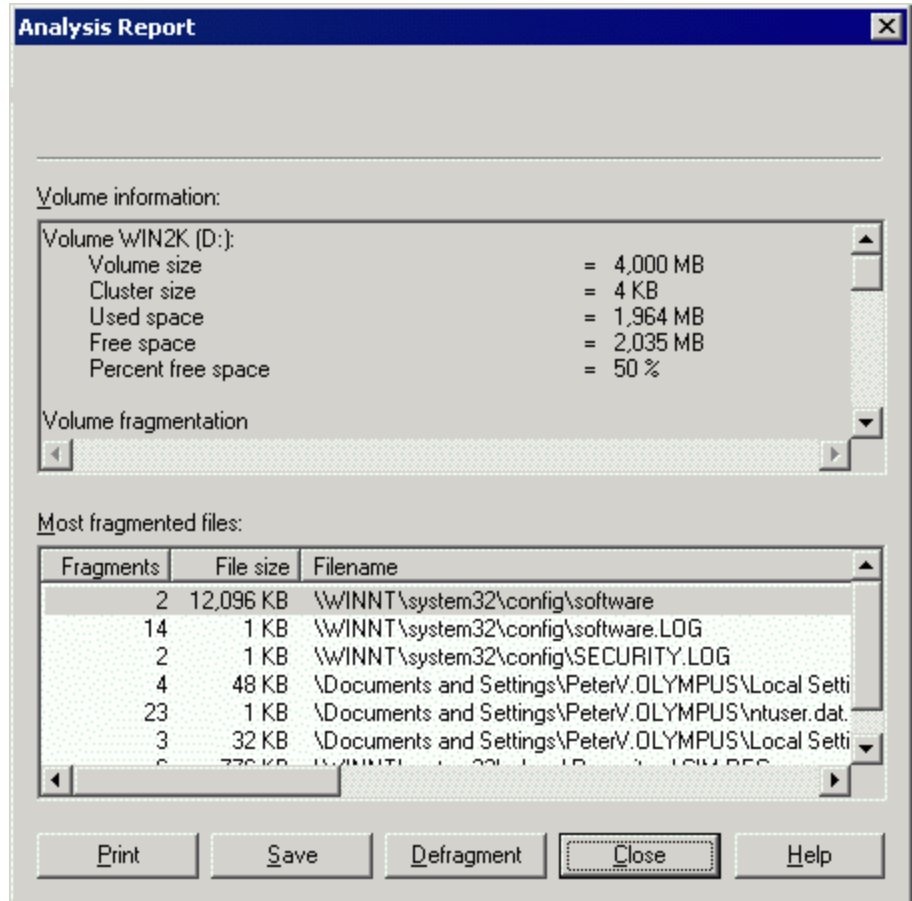


If the graphic display shows a lot of red, you have a heavily fragmented disk volume. The meanings of the various colors in the graphic analysis display are indicated in the legend near the bottom of the Details Pane. For a more detailed explanation, see “What the Colors Mean,” page 24.

To see the text version of the analysis results so you can save them for later comparison, click the **View Report** button.

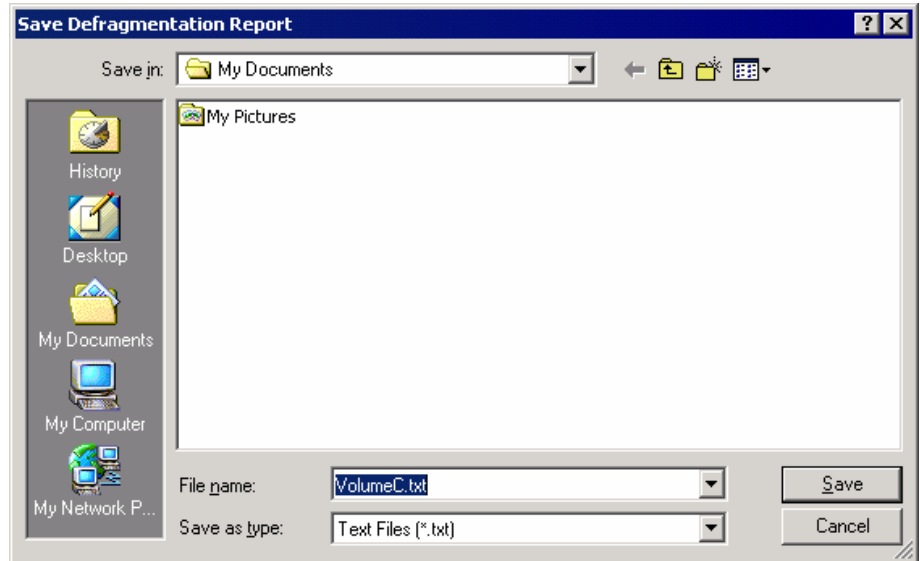
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After you click the **View Report** button in the Diskeeper snap-in, you will see the Analysis Report window, which looks similar to this:



The Analysis Report window contains much useful information, the details of which are explained in “Analysis Report Display,” page 26. When you have finished studying the information in the Analysis Report, click **Save**.

Clicking the **Save** button in the Analysis Report window will display a window similar to this:



Change the directory name and/or file name if desired and then click **Save**. The analysis information is now saved and you are returned to the Analysis Report. Click **Close** in the Analysis Report to return to the graphical Analysis window.

Click the **Defragment** button to start defragmenting the disk volume you just finished analyzing. The defragmentation can take considerably longer than the analysis if the disk volume is heavily fragmented.

The defragmentation, like the analysis, displays a summary screen reporting the results of the operation, which may be disabled in the future if you prefer. The graphic display should have less red in it if Diskeeper had enough free space into which to move the defragmented files.

To save the results of the defragmentation, click **View Report** and then save the information under a *different* file name, to avoid overwriting the analysis information you saved earlier.

The saved reports can be viewed and optionally printed with any text editor, such as Notepad. An analysis or defragmentation report may also be printed directly by clicking the **Print** button in the Analysis Report window. By comparing the “before and after” results, you can see the effectiveness of Diskeeper.

Now, if you set up and start scheduled “Set It and Forget It” defragmentation jobs for your disk volumes, Diskeeper can maintain the defragmented state of your disks automatically by running occasionally in the background, without further

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intervention from you! For more information, see “Set It and Forget It Scheduling,” page 35.

## Chapter 3

# Overview of Diskkeeper

This chapter provides important general information about Diskkeeper.

## Diskkeeper Features

### Overview

The following list summarizes the most important Diskkeeper features:

- Two versions of Diskkeeper are available—one for Servers and one for Workstations<sup>1</sup>.
- The Server version of Diskkeeper can also be installed and run on Windows 2000/XP Professional or Windows NT 4.0 Workstations, allowing you to control defragmentation of the disk volumes on all the computers in your network from a single computer, either a Server or a Workstation
- On Windows NT/2000/XP systems, the Diskkeeper Frag Guard feature can be activated to minimize MFT and paging file fragmentation online and to provide an automatic boot-time defragmentation option.
- Diskkeeper relies on both the Distributed Component Object Model (DCOM) and the Microsoft Management Console (MMC), both of which are available for Windows 95 and Windows 98. MMC is built into Windows 2000/XP. DCOM is built into Windows 2000/XP and Windows NT 4.0. For more information about DCOM and the MMC, see the Glossary.

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<sup>1</sup> Diskkeeper requires Windows 2000/XP, Windows NT 4.0 with Service Pack 3 or higher, Windows 95 with OEM Service Release 2 (OSR2) or higher, Windows 98 or Windows Me. An earlier version, Diskkeeper 1.09, is available on request for Windows NT 3.5 and 3.51 systems running with Service Packs 0 through 4.


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- With Diskeeper, you can analyze the fragmentation of a volume (with a graphic display or text report view), as well as defragment the volume.
- More than one analysis or defragmentation operation can be performed at a time. You can analyze or defragment disk volumes independently of each other.
- When running Diskeeper in the online mode, you can run other tasks while defragmentation is occurring.
- When Diskeeper runs at higher priority levels, performance of other active processes will usually be affected.
- When Diskeeper runs at lower priority levels, defragmentation may take longer, since Diskeeper “backs off” for higher-priority processes, including screen savers.
- In the online mode, Diskeeper runs as a Windows Service and it optionally logs useful defragmentation information into either the Windows Application Event Log (under Windows NT/2000/XP) or to a text file (under Windows 95/98/Me).
- Diskeeper can be uninstalled in the standard manner using the Add/Remove Programs applet in the Windows Control Panel. For more information, see “Uninstalling Diskeeper,” page 8.
- Due to limits built into the Windows NT/2000 systems, in its online, Set It and Forget It and Manual Defragmentation modes, Diskeeper cannot defragment files on NTFS volumes with a cluster size greater than 4K (4096 bytes). This limitation has been removed in Windows XP, where Diskeeper can defragment NTFS volumes with cluster sizes of up to 64 kilobytes.
- You must be logged into an account that is a member of the Administrators group to run Diskeeper on Windows NT/2000 Server or a Windows 2000/XP Professional or Windows NT 4.0 Workstation systems.




## Defragmentation Modes

Diskeeper is designed to operate in three different ways. The Manual Defragmentation and “Set It and Forget It” modes run while your disk volumes are online and available to other users. The Boot-Time Defragmentation mode runs only when you restart your Windows NT/2000/XP computer.

- **Manual Defragmentation**—Manual Defragmentation gives you direct control over Diskeeper operation. You have control over which disk volumes are defragmented, when defragmentation is started and stopped, and the priority at which Manual Defragmentation jobs run. (You can also change the priority of Set It and Forget It.)


Highlight the disk volume of your choice and then click **Defragment**  in the Diskeeper toolbar, to do a manual defragmentation. (Alternatively, you can click

the **Defragment** button in the Diskeeper snap-in display, use the **Defragment** option in the **Action** menu, or right-click the highlighted disk volume and select **Defragment**.)


Click **Pause**  to interrupt, **Resume**  to continue, or **Stop**  in the Diskeeper toolbar if you want to stop manual defragmentation at any time. These options are also available in the **Action** menu. For more information, see “Graphic Analysis Display,” page 23.

- **Set It and Forget It**—“Set It and Forget It” allows Diskeeper to run automatically in the background, either after hours or while users and other processes are active on the system, according to a predetermined schedule you set.

- a) **Disk Volume Scheduler**—The Disk Volume Scheduler allows you to specify the times or days of the week that Diskeeper will (or will not) be allowed to run.

To select this option, click **Disk Volume Scheduler**  in the Diskeeper toolbar, or select **Disk Volume Scheduler** from the Set It and Forget It option in the **Action** menu. For more information, see “Disk Volume Scheduler,” page 35.

- b) **Network Scheduler**—This feature is available only in the Server version of Diskeeper. It allows you to easily set the same “Set It and Forget It” schedule for all the disk volumes on one or more computers at a time.

This option is selected by clicking **Network Scheduler**  in the Diskeeper toolbar, or by selecting **Network Scheduler** from the Set It and Forget It option in the **Action** menu. For more information, see “Network Scheduler,” page 38.

- c) **Smart Scheduling**—This feature is available with both the Disk Volume Scheduler and the Network Scheduler. Smart Scheduling allows Diskeeper to automatically determine the optimum defragmentation schedule for your disk volumes.

- **Boot-Time Defragmentation**—The Boot-Time Defragmentation feature is only available on the Windows NT/2000/XP versions of Diskeeper. It is selected by clicking the **Boot-Time Defragmentation** option in the **Action** menu. (Or, you can click the Boot-Time Defragmenter tab in the select Disk Volume Scheduler window.) Boot-Time Defragmentation has three main parts:
  - a) **Directory Consolidation**—In Windows NT (and FAT volumes in Windows 2000/XP), a directory is actually a file, which cannot be moved safely while the Windows NT/2000/XP operating system is active. These directory files are usually scattered over the disk volume, presenting a barrier to effective defragmentation. Directory

## 20 Overview of Diskeeper

Consolidation, done at boot-time, before Windows NT/2000/XP starts up, moves directories to a single location on the disk, which frees up larger portions of the disk for defragmenting.

- b) In Windows 2000/XP, NTFS directories can safely be moved online, but FAT file system directories still need to be defragmented at boot-time.
- c) **Paging File Defragmentation**—The paging file is a file that the Windows NT/2000/XP operating system uses and cannot be defragmented safely while Windows NT/2000/XP is active, but it *can* be defragmented at boot-time, using the Boot-Time Paging File Defragmentation feature. For more information, see “Boot-Time Defragmentation” page 44.
- d) **MFT Defragmentation**—The Master file Table (MFT) is another file that cannot be defragmented safely while Windows NT/2000/XP is active, but it *can* be defragmented at boot-time, using the Boot-Time MFT Defragmentation feature. For more information, see “Boot-Time Defragmentation” page 44.


## Frag Guard

Frag Guard<sup>®</sup> is a breakthrough feature available in Diskeeper for Windows NT/2000/XP. Frag Guard not only adds MFT defragmentation, but also provides two unique approaches to defragmentation:

- The prevention of MFT and paging file fragmentation online.
- The automatic scheduling of boot-time defragmentation. For more information, see “Frag Guard,” page 50.

## Exclusion List

In some cases, you may have files or directories of files you do not want to defragment. For example, you may not want to defragment temporary files that will soon be deleted. Any files or directories can be excluded from Diskeeper processing by adding them to the exclusion list.

To activate this feature, click **File Exclusion List**  in the Diskeeper toolbar, or select **Exclusion List** from the **Action** menu. For more information, see “Setting an Exclusion List,” page 50.

## Priority

The default priority for scheduled “Set It and Forget It” defragmentation jobs is “Lowest.” while Manual Defragmentation jobs run at “Normal” priority. You can change the priority independently for both “Set It and Forget It” and “Manual

Defragmentation” jobs. If you raise the priority, defragmentation runs tend to complete faster, but may also slow down the users on the system. Lowering the priority will have the opposite effect. Use the **Priority** option in the **Action** menu to change the priority at which Diskeeper defragmentation jobs run. For more information, see “Setting Diskeeper Priority,” page 57.


## Event Logging

Diskeeper allows you to record information about its activity in a log file. Use the **Event Logging** option in the **Action** menu to alternately enable or disable the logging of various events to the Diskeeper Event Log. The logging method varies, depending on the version of Windows you are using. For more information, see “Logging Diskeeper Activity,” page 58.

## Select Computer

**Please note:** This option is only available in the Server version of Diskeeper.

The Server version of Diskeeper can analyze fragmentation and control the defragmentation of disk volumes on computers connected to your network or volumes on your local computer. You must specifically connect to a computer before using Diskeeper on that machine. A copy of Diskeeper must also have been licensed and installed on the remote machine.

Click **Select Computer**  in the Diskeeper toolbar, or choose **Select Computer** from the **Action** menu, to connect to a remote computer. For more information, see “Diskeeper on a Network,” page 67.

## Command Line Interface

Diskeeper may be activated from the MS-DOS command line. To defragment your local disk volume C:, for example, you would enter this at the command prompt:

```
diskeeper C:
```

Diskeeper informs you when the defragmentation starts and completes. Press CTRL+C if you want to stop Diskeeper before it completes the defragmentation run.

## Getting the Most from Diskeeper

Diskeeper provides a variety of features, all of which are designed to help you get the best performance from your computer. While there are no “hard and fast” rules governing the use of Diskeeper, here are some general guidelines that will help you get the most from Diskeeper.

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- When you first install Diskeeper, analyze all the disk volumes on your computer. This gives you good information about the extent of fragmentation on your computer.
- After you have analyzed your volumes, defragment them by running Diskeeper in its Manual Defragmentation mode. This provides the fastest method for defragmenting the files and free space on your volume. For more information on how to analyze and defragment manually, see “Quick Start,” page 10.

If you are running the Windows NT/2000/XP version of Diskeeper, you should next prepare for Boot-Time Defragmentation to consolidate the disk directories that are scattered all over your volumes and to defragment MFTs and paging files. To do this, use the Diskeeper Boot-Time Defragmentation feature. Since directories or paging files cannot be moved while your operating system is up and running, the Boot-Time Defragmentation operation defragments the paging file and/or consolidates the directories on your volumes while your computer is booting.

It is recommended you run the Boot-Time Defragmentation operation on one disk volume at a time, because it can be time consuming and the computer cannot be used for any other purpose while the boot-time program is running.


- It is important to defragment your volumes before running the Boot-Time Defragmentation in order to create a contiguous free space for your directories and/or paging files to be moved into. For more information, see “Boot-Time Defragmentation” page 44.
- Schedule Diskeeper to run in the background in Set It and Forget It mode. Running in the Set It and Forget It mode, Diskeeper works in the background, keeping your disks in prime condition. For more information, see “Set It and Forget It Scheduling.” page 35.
- Finally, on a Windows NT/2000/XP computer, set up Frag Guard to keep the MFT(s) and paging file(s) defragmented. For more information, see “Frag Guard,” page 50.

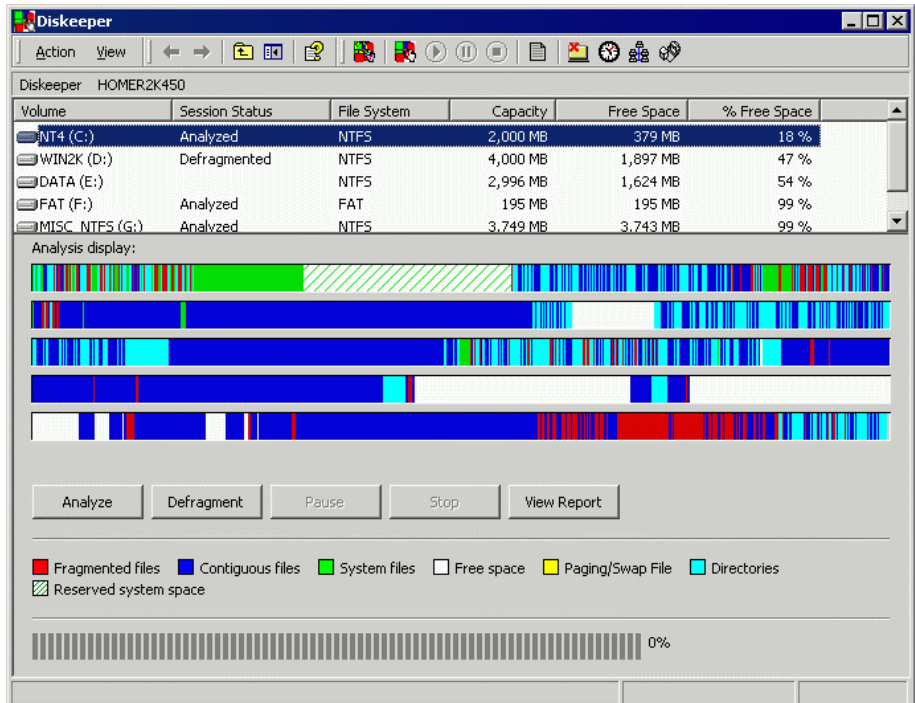
## Chapter 4

# Diskeeper Operation

## Graphic Analysis Display

The Diskeeper graphic display gives a good overall view of the fragmentation on your disk volume. See below for an example of a typical Diskeeper graphic analysis display. (This example shows a highly fragmented volume).

To view, highlight the volume you want to analyze and then click **Analyze**  in the Diskeeper toolbar, the **Analyze** option in the **Action** menu, or the **Analyze** button at the bottom of the Details Pane. (Or, you can right-click the highlighted volume and select **Analyze** on the menu that appears.)



## What the Colors Mean


The group of horizontal bars in the Diskeeper Details Pane gives a graphic representation of the fragmentation of your disk volume. The colors of the display indicate the type and condition of the data on your volume.

- Green areas show unmovable files. On Windows NT/2000/XP systems, green areas particularly show the Master File Table (MFT), but also several other unmovable files. These files cannot be moved safely by Diskeeper (or any other defragmenter), except at boot-time. Keep in mind, however, these are not the files that make up the Windows NT/2000/XP operating system (which Diskeeper can successfully defragment online)—they make up the NTFS file system. The green areas of the display appear only on NTFS volumes.
- Green-striped areas (on Windows NT/2000/XP systems only) show space on the volume reserved for expansion of the MFT. This space is reserved when a volume is formatted, and cannot be used by applications, including Diskeeper. Windows NT/2000/XP, however, will write files to this area when the volume becomes extremely full and no other free space is available. Windows NT/2000/XP provides the capability for Diskeeper to move files *out* of this reserved area, but does not allow Diskeeper to move files *into* it. These areas appear only on NTFS volumes.
- Yellow areas show the paging file (for Windows NT/2000/XP) or the swap file (for Windows 95/98/Me) if it exists on the volume.
- Light blue areas show the directories on the volume.
- Red areas show fragmented files.
- Dark blue areas show contiguous (non-fragmented) files.
- White areas show free space on the volume.


## Toolbar Buttons

**Note:** Many of the functions described in this section may also be activated from the menu that appears when you right-click on a selected disk volume.


### Analyze Button

Click **Analyze**  in the Diskeeper toolbar, the **Analyze** option in the **Action** menu, or the **Analyze** button at the bottom of the Details Pane, to begin the analysis of the selected disk volume.


## Defragment Button

Click **Defragment**  in the Diskeeper toolbar, the **Defragment** option in the **Action** menu, or the **Defragment** button at the bottom of the Details Pane, to start the “Manual Defragmentation” of the selected volume.


## Pause Button

Click **Pause**  in the Diskeeper toolbar, the **Pause** option in the **Action** menu, or the **Pause** button at the bottom of the Details Pane, to temporarily pause a fragmentation analysis or the “Manual Defragmentation” of the selected volume.


## Resume Button

Click **Resume**  in the Diskeeper toolbar, the **Resume** option in the **Action** menu, or the **Resume** button at the bottom of the Details Pane, to continue a paused Diskeeper analysis or defragmentation option.


## Stop Button

Click **Stop**  in the Diskeeper toolbar, the **Stop** option in the **Action** menu, or the **Stop** button at the bottom of the Details Pane, to stop a fragmentation analysis or the “Manual Defragmentation” of the selected volume.


## View Report Button

Click **View Report**  in the Diskeeper toolbar, the **View Report** option in the **Action** menu, or the **View Report** button at the bottom of the Details Pane, to display a text report of either a fragmentation analysis or the defragmentation of a disk volume. The text report of a Diskeeper defragmentation job can only be shown after the job has completed. For more information on this report, see “Analysis Report Display,” page 26.


## Exclusion List Button

Click **Exclusion List**  in the Diskeeper toolbar or the **Exclusion List** option in the **Action** menu to create a list of files, directories or volumes you want to be excluded from being defragmented. For more information, see “Setting an Exclusion List,” page 54.


## Disk Volume Scheduler Button

Click **Disk Volume Scheduler**  in the Diskeeper toolbar or select **Disk Volume Scheduler** from the **Set It and Forget It** option in the **Action** menu, to create a defragmentation schedule for one or more disk volumes. For more information, see “Disk Volume Scheduler,” page 35.

## Network Scheduler Button (Diskeeper Server Version Only)

Click **Network Scheduler**  or select **Network Scheduler** from the Set It and Forget It option on the **Action** menu to create a defragmentation schedule for all the disk volumes on one or more specific computers, workgroups, or domains on your network.

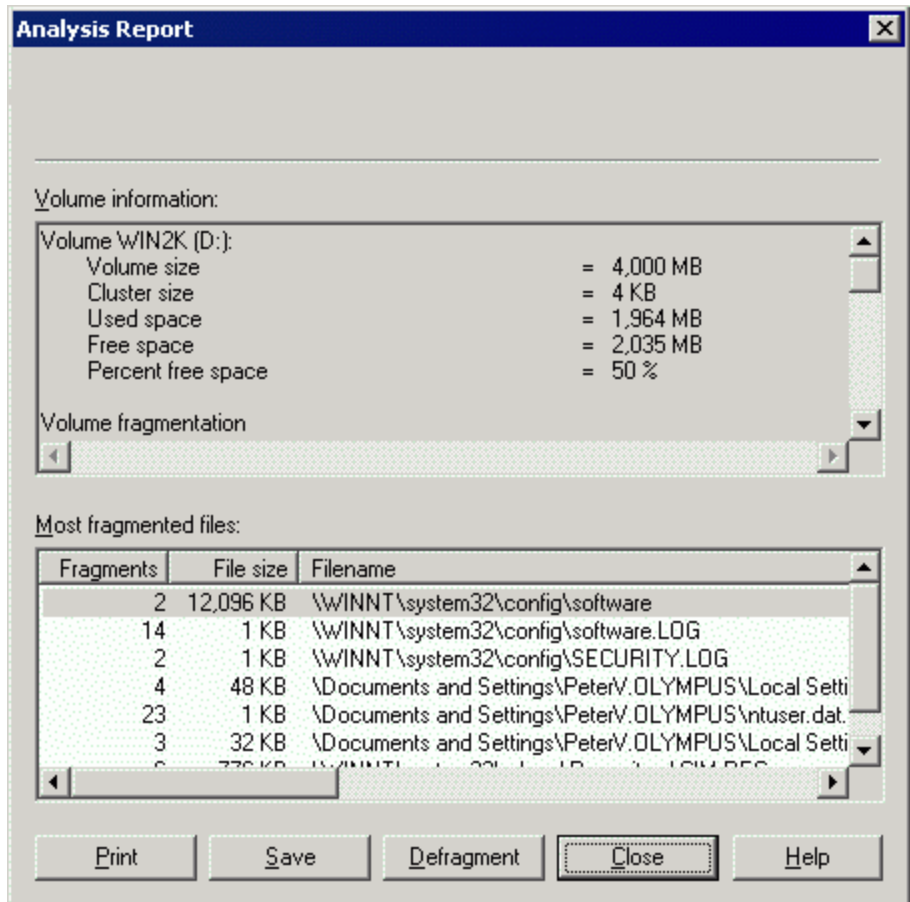
## Select Computer Button (Diskeeper Server Version Only)

Click **Select Computer**  or select **Select Computer** from the **Action** menu to select a remote computer. By default, the Diskeeper Server version connects to the local computer when it is started. After starting Diskeeper, you can use this option to connect to a different computer on your network (if it also has Diskeeper installed).

# Analysis Report Display

To view this report, click **View Report**  in the Diskeeper toolbar, the **View Report** option in the **Action** menu, or the **View Report** button at the bottom of the Details Pane. To view this report, you must first perform an analysis.

Useful information about your disk volume is shown in the Diskeeper Analysis Report display. Note that most of the information shown in the Diskeeper Analysis Report can also be recorded in the Diskeeper Event Log. For more information, see “Logging Diskeeper Activity,” page 58.



## Volume Information

### Volume

#### Volume Size

This section of the text report view or event log entry shows the total amount of space on the disk volume. This includes files and free space, as well as disk space used by the operating system (such as directory files and the Master File Table) but not reported in “Used Space.”

### **Cluster Size**

This section of the text report view or event log entry shows the cluster size for the volume. A disk cluster represents a number of disk sectors treated as a single unit. The entire disk is divided into clusters, each one a minimum increment of storage.

### **Used Space**

This section of the text report view or event log entry shows the total amount of disk space (in kilobytes) currently occupied by files. This does not include zero-length files, or certain files used by the operating system, such as directory files and the Master File Table.

### **Free Space**

This section of the text report view or event log entry shows the total amount of free space on the disk volume.

### **Percent Free Space**

This section of the text report view or event log entry shows the percentage of space on the disk volume that is free. This includes the free space in the area reserved for the Master File Table (MFT) on NTFS volumes.

### ***Additional Information***

Use the vertical scroll bar in the text display to view this additional information:

### **Volume Fragmentation**

#### **Total Fragmentation**

This section of the text report view or event log entry shows the overall percentage of fragmentation on the disk volume.

The Total fragmentation figure gives you an overall view of the fragmentation on your volume, by taking both the file fragmentation level and the free space fragmentation level into account. These two values are weighted depending on the ratio of free space to used space on the disk. The formula is:

(percentage of used clusters on the disk times the file fragmentation value) plus (the percentage of free clusters on the disk times the free space fragmentation value).

#### **Example:**

Total clusters: 100

Used clusters: 80

Free clusters: 20  
Number of free spaces: 2  
Total number of files: 10  
Fragmented files: 5  
Percent of used clusters = 80%  
Percent of free clusters = 20%

File fragmentation =  $5/10 = 50\%$   
Free space fragmentation =  $2/20 = 10\%$   
Total fragmentation =  $(80\% \times 50) + (20\% \times 10) = 42\%$

## File Fragmentation

This section of the text report view or event log entry shows the percentage of file fragmentation on the disk volume.

File fragmentation is the percentage of total file clusters that belong to files that are fragmented. On a volume where 200 out of 1000 clusters represent fragmented files, the File fragmentation figure is 20%.

## Free Space Fragmentation

This section of the text report view or event log entry shows the percentage of free space fragmentation on the disk volume.

On a FAT volume, you can have a single contiguous free space, which will mean zero percent free space fragmentation. The formula for calculating the percentage of free space fragmentation is:

$$F = \frac{T-L}{T} \times 100\%$$

Where:

- F is the Percentage Free Space Fragmentation,
- T is the total number of clusters of free space, and
- L is the largest contiguous block of free space clusters.

The calculation for percentage free space fragmentation on NTFS volumes is basically the same, but with the difference that the L figure is obtained by adding the three largest blocks of free space together. This is because NTFS volumes have at least three contiguous blocks of free space, due to the way in which NTFS volumes are organized.

## **File Fragmentation**

### **Total Files**

This section of the text report view or event log entry shows the total number of files on the disk volume. This number does not include zero-length files or (in most cases) files less than one cluster in size on NTFS volumes. Files less than one cluster in size may be included, depending on the file size and the cluster size.

### **Average File Size**

This section of the text report view or event log entry shows the average size of all the files on the disk volume. This number does not include any zero-length files or paging files.

### **Total Fragmented Files**

This section of the text report view or event log entry shows the total number of fragmented files on the disk volume.

### **Total Excess Fragments**

This section of the text report view or event log entry shows the total number of file fragments on the disk volume. Contiguous files are not counted in this total, but each additional piece of any fragmented file *is* counted.

### **Average Fragments per File**

This section of the text report view or event log entry shows the average number of fragments per file on the disk volume. This is a good index of how fragmented the files on the volume are.

If the average fragment per file figure is 1.00, the files are contiguous. If the figure is 1.10, then 10% of the files, on average, are in two pieces. 1.20 means 20%, 1.30 means 30%, etc. A figure of 2.00 means the files average two fragments each. 1.00 is the best figure attainable, indicating that all files or nearly all files are contiguous.

## **Paging File Fragmentation**

### **Paging/Swap File Size**

This section of the text report view or event log entry shows the size of the paging file (or swap file on Windows 95/98/Me systems) on the disk volume. This section displays zero when no paging file is present.

## **Total Fragments**

This section of the text report view or event log entry shows the number of fragments the paging file is broken into (if it exists on the disk volume).

## **Directory Fragmentation**

### **Total Directories**

This section of the text report view or event log entry shows the total number of directories present on the disk volume.

### **Fragmented Directories**

This section of the text report view or event log entry shows the number of fragmented directories on the disk volume.

### **Excess Directory Fragments**

This section of the text report view or event log entry shows the total number of directory fragments on the disk volume. Contiguous directories are not counted in this total, but each additional piece of any fragmented directory is counted.

## **Master File Table (MFT) Fragmentation**

### **Total MFT Size**

This section of the text report view or event log entry shows the size of the Master File Table (MFT).

Since the MFT is only used on NTFS volumes, this section is not displayed for FAT volumes in the text analysis display, and shows as zeros in the event log.

### **MFT Record Count**

This section of the text report view or event log entry shows the number of individual file records found in the Master File Table (MFT). This figure will not necessarily correspond with the number of files presently on the volume, since the file records remain in the MFT, even after a file is deleted.

Since the MFT is only used on NTFS volumes, this section is not displayed on FAT volumes.

### **Percent of MFT In Use**

This section of the text report view or event log entry shows the percentage of the Master File Table (MFT) in use.

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The MFT grows as the number of files on the volume increases, but is not reduced in size when files are deleted from the volume.

Since the MFT is only used on NTFS volumes, this section is not displayed on FAT volumes.

### **Total MFT Fragments**

This section of the text report view or event log entry shows the number of fragments the Master File Table (MFT) is broken into.

Since the MFT is only used on NTFS volumes, this section is not displayed on FAT volumes.

## **Most Fragmented Files**

This section of the Analysis Report shows the following information about the most fragmented files on the disk volume:

### **Fragments**

Shows the number of fragments associated with the most fragmented files on your disk volume.

### **File Size**

Shows the size of the most fragmented files on your disk volume.

### **File Name**

Shows the names of the most fragmented files on your volume.

If these files are ones that users access frequently, the impact to your system performance may be worse than indicated by the Average Fragments per File figure.

In addition to the names of the most fragmented files, the Diskeeper Analysis report also shows information explaining reasons why certain files were not moved or defragmented. The following “tags” may be added to specific filenames in the Most Fragmented Files listing:

Tag	Displayed After	File System	Description
[Cannot Open]	Defragmentation Only	NTFS and FAT	This file cannot be opened (and thus moved) by Diskeeper. This is often the result of the access controls (permissions) on the file being set to prevent Diskeeper from accessing it. File permissions must allow SYSTEM to have full control of a file in order for Diskeeper to defragment it.
[Excluded]	Defragmentation Only	NTFS and FAT	This file is listed on one of the Diskeeper exclusion lists. This can be either the user-specified exclusion list or the internal exclusion list.
[Excess Allocation]	Analysis and Defragmentation	NTFS Only	With the NTFS file system, a file can be allocated more clusters than its data is actually using. On Windows NT 4 and Windows 2000, only the data portion of the allocation can be defragmented. As a result, even though a file is reported as fragmented, the data portion of the file may in fact be contiguous. This most commonly occurs with registry files and (under Windows 2000) files that have been decompressed. In some cases, files of this type can be defragmented after a system restart.

<b>Tag</b>	<b>Displayed After</b>	<b>File System</b>	<b>Description</b>
[Partially Defragmented]	Defragmentation Only	NTFS and FAT	This file has been partially defragmented. Its fragments have been reduced in number, but the file is not yet contiguous.

## Analysis Report Buttons

### Print

Click **Print** to print the information in the Analysis Report. This option sends the fragmentation analysis information to whatever printer is designated as your default printer.

This option is useful for comparing the condition of a volume before and after defragmenting the volume with Diskeeper. See the Save section below for information about saving the fragmentation analysis results.

### Save

This option is useful for comparing the condition of a volume before and after defragmenting the volume with Diskeeper. Be sure to save the analysis information before defragmenting a volume, so you can see the benefits of running Diskeeper.

By default, the analysis file is saved as a file named **VolumeX.txt** (where *X* represents the volume letter) in the **\Documents and Settings\My Documents** folder (on Windows 2000/XP), **\My Documents** folder (on Windows 95/98/Me), or the **\Personal** folder (on Windows NT 4.0). When you click **Save**, you are given the opportunity to change the file name and directory location. Note that if you are saving “before and after defragmentation” analysis files, you should use unique names for the files. This prevents the “before” analysis file from being overwritten by the “after” file.

### Defragment

Clicking the **Defragment** button will start a defragmentation run of the volume displayed in the Analysis Report.

### Close

Click the **Close** button to close the Analysis Report window and return to the Graphic Analysis Display window.

### Help

Click the **Help** button to display helpful information about the Analysis Report.


## Set It and Forget It Scheduling

The “Set It and Forget It” feature allows Diskeeper to run automatically in the background while users and other processes are active on the system.

A defragmentation schedule specifies the times or days of the week that Diskeeper will (or will not) be allowed to run. You can specify separate defragmentation schedules for individual disk volumes, or you can create a single schedule for more than one volume. For more information, see “Disk Volume Scheduler” below.


With the Server version of Diskeeper, you can create defragmentation schedules for other computers on your network (if they are also licensed to run Diskeeper). The Server version of Diskeeper even allows you to create defragmentation schedules for all the volumes on individual computers on your network. For more information, see “Network Scheduler,” page 38.

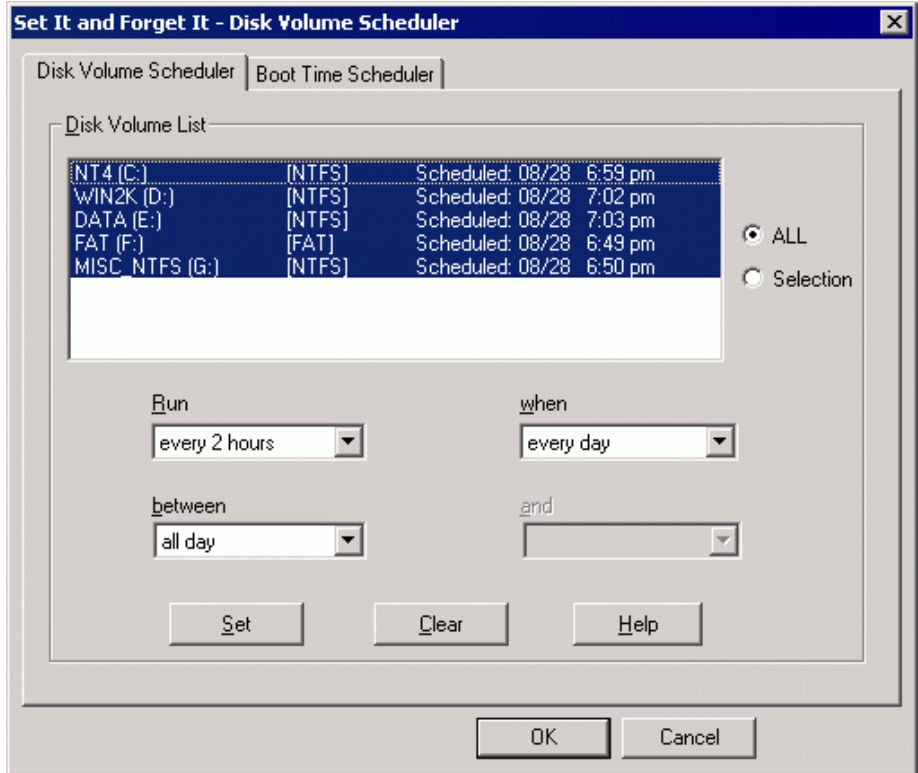
### Disk Volume Scheduler

Click **Disk Volume Scheduler**  in the Diskeeper toolbar, or select **Set It and Forget It** from the **Action** menu, to create a schedule of times when “Set It and Forget It” defragmentation jobs will be forced to run, or times they will not be allowed to run.

Schedules only affect “Set It and Forget It” defragmentation jobs. Any active defragmentation job previously started on a disk volume will complete. After it completes, the new schedule takes effect.

When you use the Disk Volume Scheduler, always select one or more volumes in the Volume List box *before* clicking any of the other Disk Volume Scheduler controls. By default, all valid local volumes are selected. To schedule fewer volumes, click the Selection option and then click on the desired volume. You can select more than one volume by holding the CTRL key while clicking on the volumes listed in the Schedule box. Or, you can hold the SHIFT key to select a contiguous list of volumes.

**Diskeeper Server Version Note:** Click **Select Computer**  in the Diskeeper toolbar, or select **Select Computer** in the **Action** menu, to set or alter a run schedule on a remote computer on your network. To do so, you must have the necessary Administrator privileges and trust relationships, as well as sufficient permissions to edit a file in the Diskeeper directory on the remote computer. For more information, see “Troubleshooting Network Connections,” page 68.



The following controls are available in the **Disk Volume Scheduler** dialog box:

### **Disk Volume List**

Use this section of the Disk Volume Scheduler display to specify one or more disk volumes for which you want to establish a defragmentation schedule.

Always select the volume(s) for which you are specifying a schedule *before* clicking any of the other Disk Volume Scheduler controls.

Any defragmentation job previously started on a volume will complete the current run before the new run schedule takes effect.

The **Disk Volume List** section of the **Disk Volume Scheduler** dialog box lists the volumes detected on the computer you are currently connected to, and indicate if they are actively being defragmented or scheduled for defragmentation by Diskeeper. This display also shows the scheduled time for the next defragmentation run for each scheduled volume.

## Run

Use this section of the Disk Volume Scheduler display to specify how often Diskeeper should run on the selected volumes. You can specify any of these run frequencies:

One Time

Continuously

Every 2 hours

Every 4 hours

Every 8 hours

Every 12 hours

Every 24 hours

Every 48 hours

Every 72 hours

Smart Scheduling (see the description of Smart Scheduling later in this chapter)

## When

Use this section of the Disk Volume Scheduler display to specify days the Diskeeper job will (or will not) be allowed to run on the selected volumes. You can specify any of these time periods to control when Diskeeper is allowed to run:

Everyday

Except Everyday

Weekends

Except Weekends

Weekdays

Except Weekdays

Mondays

Except Mondays

Tuesdays

Except Tuesdays

Wednesdays

Except Wednesdays

Thursdays

Except Thursdays

Fridays

Except Fridays

Saturdays

Except Saturdays

Sundays

Except Sundays

## Between

Use this section of the Disk Volume Scheduler display to specify the beginning of a time period the Diskeeper job will (or will not) be allowed to run on the selected volumes. You can specify any of these time periods to specify the beginning of a Diskeeper schedule period:

All Day

12:00 midnight through 11:00 P.M., in one hour increments

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### And

Use this section of the Disk Volume Scheduler display to specify the end of a time period the Diskeeper job will (or will not) be allowed to run on the selected volumes. You can specify any of these time periods to specify the end of a time period Diskeeper will (or will not) be allowed to run:

12:00 midnight through 11:00 P.M., in one hour increments

### Set

Click **Set** to accept the specified run schedule for the selected volumes. You must click **Set** for each schedule you specify.

Any defragmentation job previously started on a volume will complete the current run through the volume before the new schedule takes effect.

### Clear

Click **Clear** to clear the currently active Set It and Forget It defragmentation schedule on the selected volumes. If Diskeeper is in the process of defragmenting a volume at the time the **Clear** button is clicked, it will run to completion.

### Help

Click **Help** to view help information about using the Disk Volume Scheduler.

### OK


Click **OK** to accept your changes to the defragmentation schedule and to close the Disk Volume Scheduler window.

### Cancel

Click **Cancel** to cancel all the changes you made to the defragmentation schedule and to close the Disk Volume Scheduler window.

## Network Scheduler

**Note:** This option is only available in the Server version of Diskeeper.

Click **Network Scheduler**  in the Diskeeper toolbar, or select **Network Scheduler** from the Set It and Forget It option in the **Action** menu, to create a defragmentation schedule for all the disk volumes on one or more specific computers, workgroups, or domains on your network.

The Network Scheduler is a unique feature of Diskeeper (Server version). With the Network Scheduler you don't have to connect individually to each computer you want to schedule and then specify the schedule(s) for each volume on that computer. This action would update the Diskeeper control file on each computer. Not an easy task if you have a few hundred (or thousand) computers on your network!

The Network Scheduler feature allows you to easily set the same "Set It and Forget It" schedule for some or all of the volumes on one or more computers at a time.

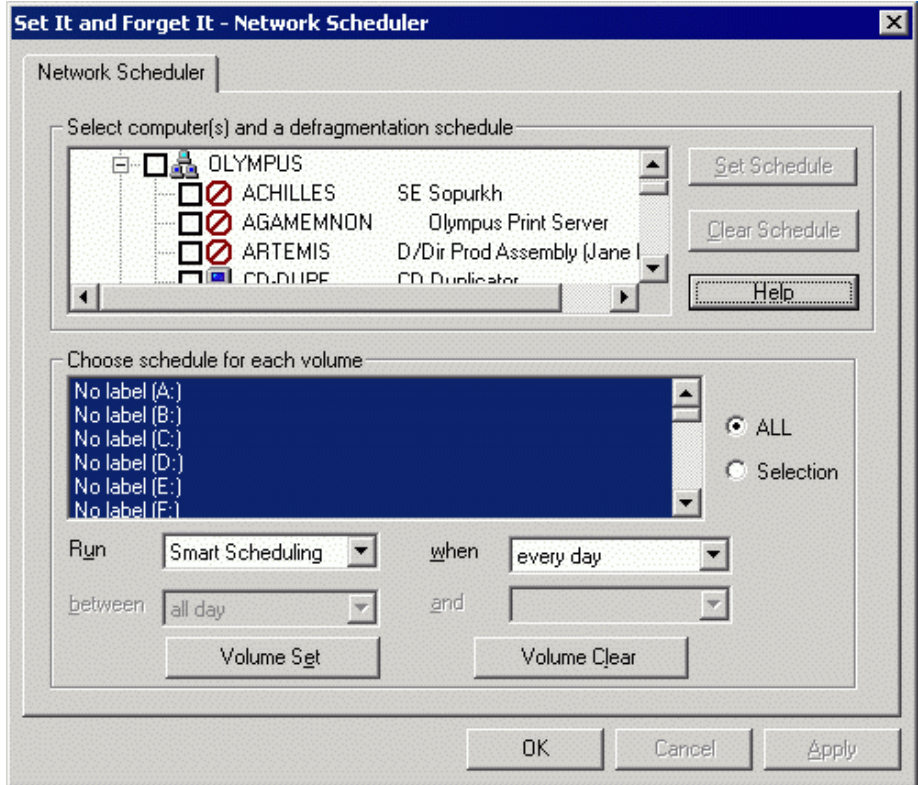
To use this feature fully, it is important to understand the method by which Diskeeper creates and controls defragmentation schedules on remote computers. When you create a schedule for a computer, Diskeeper stores all the necessary scheduling information in a control file (**Diskeep.ctl**) on the computer for which the schedule was created. Then, the Diskeeper Service periodically checks the control file to determine whether to start the Diskeeper defragmentation engine on that computer.

In the Server version of Diskeeper, the Network Scheduling Engine performs the work of updating the Diskeeper control files on one or more remote computers, without the need for you to individually connect to each computer. This is the sequence of events:

- First, the scheduling information for any selected computers is stored on the local computer from where you are creating schedules. This information is stored in the \NetScheduler folder under the folder where you installed Diskeeper. Individual files are written to this folder for each computer on which you schedule Diskeeper to run.
- Next, the Network Scheduling Engine is started, running as a separate process. The Network Scheduling Engine checks all of the machine-specific scheduling information files on the local computer each time the engine is started. If any of the files are new or changed since the last time the engine was run, it connects to each respective computer and sends the new or changed information to the Diskeeper control file on the remote computer(s).
- Then, when the Diskeeper Service on each of the individual remote computers checks its control file, it begins running as specified by the schedule. The Diskeeper Service checks its control file once a minute.

The Diskeeper Smart Scheduling option is available in the Network Scheduler feature. Smart Scheduling is available from the "Run" drop-down option list in the Network Scheduler dialog box.

**Note:** Smart Scheduling does not affect Diskeeper versions earlier than 6.0. If you try to send a network schedule to remote computers running earlier versions of Diskeeper, no schedule will actually be sent to them. For more information on the Smart Scheduling feature, see the Smart Scheduling section on page 43.



The recommended sequence for using the Network Scheduler is as follows:

1. Select one or more computers that you wish to schedule by clicking in the square box next to the icon.
2. Select the volumes for all of these computers (the **ALL** option will select all available disk volumes).
3. Select the desired schedule or Smart Scheduling and click **Volume Set**.
4. Click **Set Schedule** to prepare the schedule for the selected computers and volumes.
5. Click **Apply** to have the schedules sent to the selected computers.

The following controls are available in the **Network Scheduler** dialog box:

### **Computer List**

The **Computer List** section of the **Network Scheduler** dialog box lists the computers, workgroups, and domains detected on your network, and shows the scheduling status of each.

Use this section of the Network Scheduler display to specify one or more computers, workgroups, or domains for which you want to establish the same defragmentation schedule on all volumes.

Different icons may be displayed in the computer list, depending on the status of each computer:



Computer not scheduled.



Scheduled and applied successfully (locally or remote).



Scheduled, but not applied yet



Failed to be scheduled.

**Note:** To view the status of a particular computer on the network, move the mouse pointer over the icon that represents it. A ToolTip will display the status information for that computer.

Click any domain or workgroup name shown in the Computer List to display the computers within that group. Click the square box next to a domain, workgroup, or computer icon to select it. A check mark in the box indicates that it is selected. To deselect it, click the box a second time.

Always select the computer(s) for which you are specifying a schedule before clicking on any of the other Set It and Forget It dialog boxes.

## Choose Schedule for Each Volume

Highlight the disk volume(s) you want to schedule for defragmentation on the selected computer(s). If the **ALL** option is selected, all available disk volumes will be selected. Choose the **Selection** option if you do not want to select all disk volumes for defragmentation. When using the **Selection** option, you can select multiple disk volumes by holding down the CTRL key when clicking on a volume.

After you have selected one or more disk volumes, select the appropriate time period(s) for defragmentation and click **Volume Set**, then click **Set Schedule**, and finally click **OK** or **Apply** to send the schedule to the remote computers on the network.

## ALL / Selection

Choose **ALL** if you want to perform defragmentation on all disk volumes of the selected computers. If you do not want to defragment all volumes at the same time, choose the **Selection** option and then highlight the disk volumes you want to schedule for defragmentation.

When using the **Selection** option, you can select multiple disk volumes by holding down the CTRL key when clicking on a volume.

## **Run, When, Between, And**

These sections of the Network Scheduler dialog box provide you the same control options as their counterparts in the Disk Volume Scheduler dialog box. Use these controls to specify times when Diskeeper jobs will (or will not) be allowed to run on the selected computers.

### **Volume Set**

Click **Volume Set** to accept a defragmentation schedule for the selected disk volume(s). After doing this, you must click **Set Schedule** to create schedules for all selected computers. Finally, you must click **OK** or **Apply** to send the schedules to the selected computers.

### **Volume Clear**

Clicking **Volume Clear** clears the schedule, previously created with **Volume Set**, for the currently selected disk volumes, by creating a new, "empty" schedule.

If you want to "un-set" schedules that were previously sent to remote computers on the network (by clicking **OK** or **Apply**), select the computers whose schedule you want to clear, click **Clear Schedule**, and then click **OK** or **Apply**.

### **Set Schedule**

Click **Set Schedule** after you have selected a defragmentation schedule for one or more disk volumes on one or more computers and clicked **Volume Set**. While **Volume Set** creates a schedule for the selected disk volumes, **Set Schedule** creates a schedule for each of the selected computers. When you click **Set Schedule**, the scheduling information is written to the local computer in the \NetScheduler folder below the folder where you installed Diskeeper. A separate file is written to this folder for each computer on which you schedule Diskeeper to run.

After clicking **Set Schedule**, you must then click **OK** or **Apply** to activate the Scheduling Engine, which sends the schedule across the network to each of the selected remote computers. **OK** starts the engine and closes the dialog box. **Apply** does the same, except it does not close the dialog box.

After the engine starts, it checks the individual scheduling information files on the local computer, determines which ones are new or have changed, then sequentially connects to each respective computer and updates the Diskeeper control file on each computer.

Any defragmentation job previously started on any volume of any selected computers will complete the current run through the volume before the new run schedule takes effect.

## Clear Schedule

Use this option to clear a schedule you have previously set on the selected computer(s), after you have clicked either **OK** or **Apply**.

Much like setting a schedule, clearing a schedule also involves writing scheduling information to disk on your local computer. This information is essentially a schedule set not to run. Once this information has been stored on the local computer, send it to the remote computers by clicking either **OK** or **Apply**.

## Help

Click **Help** to view context-sensitive help information about using the Diskeeper Network Scheduler.

## OK

Click **OK** after clicking **Set Schedule** or **Clear Schedule** to start the Diskeeper Network Scheduling Engine, and to begin sending the schedule information to the remote computers. This option also closes the Network Scheduler dialog box.

## Cancel

Click **Cancel** to close the Network Scheduler dialog box without making any changes to the schedules on your remote computers.

## Apply

Click **Apply** after clicking **Set Schedule** or **Clear Schedule** to start the Diskeeper Network Scheduling Engine, and to begin sending the schedule information to the remote computers. This option is the same as the **OK** option, except that it does not close the Network Scheduler dialog box.

## Smart Scheduling

With Smart Scheduling, you no longer have to decide how often to defragment your disks—Diskeeper will automatically determine the optimum defragmentation schedule for each of your disk volumes and adjust it accordingly.

The method used to determine how often Diskeeper should run is elegant in its simplicity. When Smart Scheduling is enabled, Diskeeper keeps track of the number of files moved every time it runs on each disk volume. When the number of fragmented files moved during a defragmentation run increases, Diskeeper is automatically scheduled to run more often. When the number of files moved decreases, the time between defragmentation runs is increased.

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The Smart Scheduling option is available in both the Disk Volume Scheduler and the Network Scheduler features. Smart Scheduling is available from the "Run" drop-down option list in each of the two dialog boxes.

**Note:** Smart Scheduling does not affect Diskeeper versions earlier than 6.0. If you send a network schedule to remote computers running earlier versions of Diskeeper, no schedule will be sent to these computers.

You can also set exclusion times when the Smart Scheduling option will be prevented from scheduling a defragmentation run. When Smart Scheduling is selected, the "when" drop-down option list will be limited to these times:

- Except Everyday
- Except Weekends
- Except Weekdays
- Except Monday
- Except Tuesday
- Except Wednesday
- Except Thursday
- Except Friday
- Except Saturday
- Except Sunday

You can use the "between" and the "and" drop down lists to further define times when the scheduling of automatic defragmentation runs will not be allowed. For example, a schedule set like this:

<b>Run</b>	<b>when</b>
Smart Scheduling	Except Weekdays
<b>Between</b>	<b>and</b>
1:00 am	3:00 am

will allow Diskeeper to automatically determine how often to run, but will also prevent it from running between 1:00 am and 3:00 am on weekdays (i.e., when your nightly backup is running).

## Boot-Time Defragmentation

**Note:** This option is only available in the Windows NT/2000/XP (Workstation or Server) versions of Diskeeper.

**Important:** For best results with the Boot-Time Defragmentation feature, Executive Software strongly recommends:

1. Do a full backup of the disk volume before running any Boot-Time operations. This provides an additional level of safety in case of a disk drive failure.
2. Enable the **Run CHKDSK before defragmentation** option. This will help prevent vital files from being moved to bad disk sectors.
3. Boot-Time Defragmentation can take a long time, especially on very large disk volumes that are severely fragmented. Therefore, before running Boot-Time operations, you should:
  - a) Schedule the Boot-Time operation on weekends or other time when the machine is not needed immediately.
  - b) Schedule to perform the Boot-Time operation on only one disk volume at a time.
  - c) Make sure you have sufficient contiguous free space. Delete unneeded files and perform one or more manual defragmentation runs to defragment the volume as much as possible.

Boot-Time Defragmentation consists of three independent activities:

- **Directory Consolidation**—moves directories to a single location. Windows NT/2000/XP writes directories into random locations all over a volume. This, in effect, breaks up the free space on the volume. By grouping all the directories into a single location on a volume, larger areas of contiguous free space become available. Therefore, new files are more likely to be written to the volume in a contiguous manner. This also helps make Diskeeper more effective when it is run in either the Set It and Forget It or Manual Defragmentation modes. (Note that on Windows 95/98/Me and NTFS volumes on Windows 2000/XP systems, directories can be moved and defragmented online, which makes directory consolidation unnecessary.)

There are, however, two directories, `\Recycler` and `\Recycled`, that Windows expects to find in a particular physical location on the volume. Therefore, the Diskeeper Boot-Time Directory Consolidation excludes these two directories and does not move them.

In most cases, you should run Boot-Time Directory Consolidation shortly after the first time you use Diskeeper defragmentation on a volume, or after any operation (such as installing a new application), that creates multiple directories. By moving all the directories together, you create more contiguous free space for file defragmentation.

- **MFT Defragmentation**—defragments the Master File Table (MFT). The MFT is a critical section of Windows NT/2000/XP NTFS disk volumes. Since the MFT is used by the NTFS file system to locate files on a volume, fragmentation of the MFT slows the retrieval of files on the disk—whether these files themselves are

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fragmented or not. Defragmenting the MFT (and keeping it that way with Frag Guard) will improve the overall performance of the volume.

- **Paging File Defragmentation**—defragments the paging file. Fragmented paging files can slow Windows performance. They can also hurt the effectiveness of Diskeeper, since the unmovable paging file fragments break up the free space on the volume. By defragmenting your paging file, you can help maintain peak Windows performance, and help Diskeeper run better at the same time. After a paging file has been defragmented, it should remain contiguous unless its size is changed.

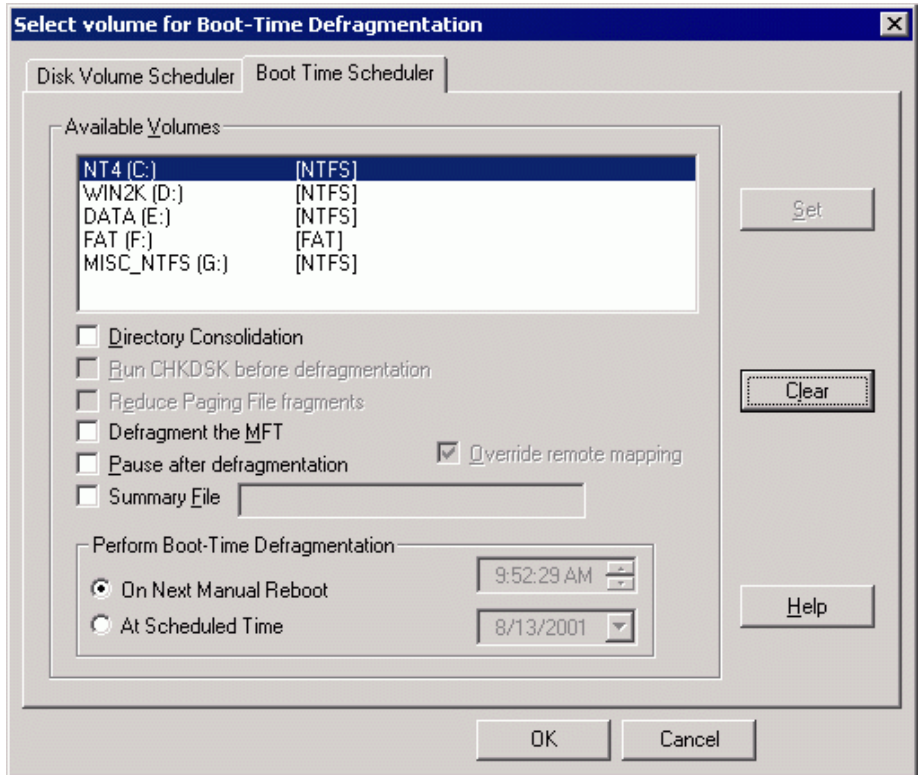
Boot-time defragmentation opens up larger areas of contiguous free space for new file creation and modification.

On Windows NT, directory consolidation, MFT defragmentation and paging file defragmentation are done at boot-time, because the directories, the MFT, and the paging file cannot be moved safely while Windows NT is active. (Note that under Windows 2000/XP, directories can be moved and defragmented online, which makes directory consolidation unnecessary.)

Several points about Boot-Time Defragmentation:

1. Boot-Time Defragmentation relies on having a contiguous free space into which to move the directories and/or paging file on your volume. Therefore, it is important to run Diskeeper in either the Set It and Forget It or Manual Defragmentation mode *before* running Boot-Time Defragmentation.
2. Boot-Time Defragmentation is a one-time operation. After it runs on a volume, it is not automatically set up to run again. You must set it each time you want it to run on a volume. However, you can set up Frag Guard for automatic MFT and paging file boot-time defragmentation whenever these files reach a certain level of fragmentation.
3. It is safe to restart your computer midway through the Boot-Time Defragmentation operation. However, if you do so, you should use the Error Checking option in Drive Properties/Tools on the volume that was being processed when you restarted your computer, and enable both the fix and the scan options, or (if you are running from the Windows Command Prompt) run CHKDSK, using the /F qualifier. This ensures the files and free space on the volume are correctly allocated.
4. After running the Boot-Time Paging File Defragmentation, use either Set It and Forget It or Manual Defragmentation to keep the volume defragmented.

When you select the **Boot-Time Defragmentation** option from the **Action** menu, the following window is displayed:



The following controls are available in the **Boot-Time Defragmentation** dialog box:

### Available Volumes

Use this section of the **Boot-Time Defragmentation** dialog box to specify the volume(s) upon which you want to consolidate the directories and/or defragment the paging file and MFT. You can select more than one volume at a time, but be aware that the volumes will be processed one at a time, and your computer will be restarted automatically after each volume is processed. This will substantially increase the time needed to complete the operation.

Always select at least one volume *before* choosing any of the other options in the **Boot-Time Defragmentation** dialog box.

### Directory Consolidation

Check this box to defragment and consolidate the directories of the selected volumes, next time your computer starts up.

### Run CHKDSK before defragmentation

Use this control to specify whether the Windows CHKDSK disk error checking utility is run (using the /F qualifier) before the directory consolidation operation. Running CHKDSK adds time to the Boot-Time Defragmentation operation, but it can correct disk errors that otherwise would hamper effective directory consolidation.

**Note:** Enabling the CHKDSK option will cause CHKDSK to run on each selected volume before the Boot-Time Defragmentation process. The time increase can be considerable and Executive Software therefore recommends performing boot-time defragmentation on one volume at a time.

### Reduce Paging File fragments

Check this box to defragment the paging file of the selected volume the next time your computer starts up.

### Defragment the MFT

Check this box to defragment the MFT of the selected volume the next time your computer starts up.

### Pause after defragmentation

When enabled, this option causes the Boot-Time operation to pause after completion. It remains in this paused state until you manually restart your computer (by either pressing the **Reset** button or turning off the power switch). If this option is not enabled, the Boot-Time Defragmentation operation pauses 15 seconds (to allow you to read any messages on the monitor screen), then automatically restarts your computer.

### Summary File

Use the Summary File option to cause a text file to be written that summarizes the Boot-Time Defragmentation operation. When this option is enabled, a default volume letter, directory, and file name are shown in the dialog box similar to this:



By default, the summary file is written to your floppy drive (A:). This dialog box can be edited to specify another volume, directory path, and filename. However, the summary file cannot be written to the volume upon which you are running Boot-Time Defragmentation. Also note that the filename should not contain any spaces.

**Note:** Some computers read the floppy drive at boot-time. We therefore recommend not writing the summary file to the A: drive, unless no other volumes are available.

## Perform Boot-Time Defragmentation

Use this section of the Boot-Time Defragmentation dialog box to specify whether a boot-time defragmentation should be done at the next manual reboot, or automatically at a scheduled date and time. This is done by selecting either **On Next Manual Reboot** or **At Scheduled Time**. When selecting a scheduled time, you must also set a date and time in the boxes provided.

About one hour before a scheduled Boot-Time Defragmentation is due, a message is broadcast at regular intervals to all users logged on to the computer, informing them that a scheduled reboot is about to take place and requesting them to log off. If at the scheduled time someone is still logged on and **Override Remote Mapping** is cleared, the computer will not reboot, but will instead perform the Boot-Time Defragmentation the next time the computer is rebooted manually. If **Override Remote Mapping** is set, however, the machine will reboot at the scheduled time, regardless of whether or not any users are logged on.

## Override Remote Mapping

When this option is set, the computer will force a reboot at the scheduled date and time, if the **At Scheduled Time** option has been selected, regardless of whether or not anyone is logged on to the machine. Users who are logged on will be notified at regular intervals, starting one hour before the scheduled reboot, to give them an opportunity to log off.

If this option is cleared, a scheduled reboot will not occur at the scheduled date and time if one or more users are still logged on when the reboot due. In that case, the Boot-Time Defragmentation run will occur the next time the machine is rebooted manually.

## Set

Click **Set** to enable Boot-Time Defragmentation of one or more selected volumes. When a volume has been set, it will be noted in the Available Volumes box. Also, use the **Set** button to change the characteristics of a previously set Boot-Time Defragmentation (such as enabling/disabling the Summary File option).

The next time the computer is restarted, Boot-Time Defragmentation will be run on any volumes that are set.

You must set a volume each time you want to run Boot-Time Defragmentation—volumes do not remain set after Boot-Time Defragmentation has been run.

## Clear

Click **Clear** to “un-set” any volumes that have been previously set for Boot-Time Defragmentation.

## **Help**

Click **Help** to view context-sensitive help about using Boot-Time Defragmentation.

## **OK**

Click **OK** after clicking **Set** to save any settings you have made and close the **Boot-Time Defragmentation** dialog box.

## **Cancel**

Click **Cancel** to close the **Boot-Time Defragmentation** dialog box without making any changes.

# **Frag Guard**

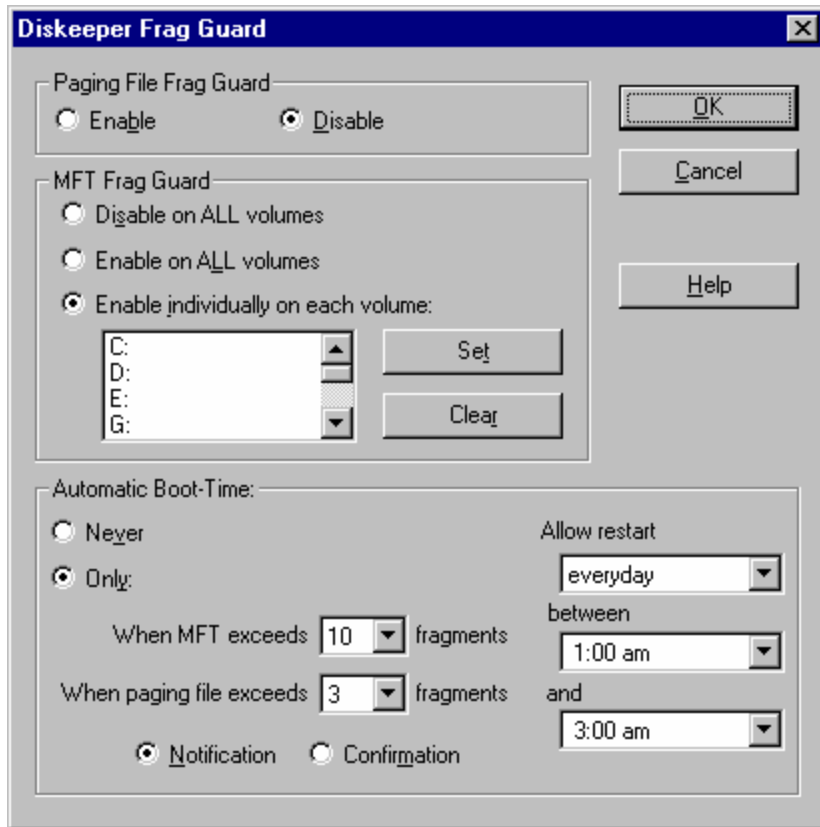
Frag Guard and the Diskeeper Boot-Time defragmentation feature combine to defragment two critical areas of Windows NT/2000/XP disk volumes—the Master File Table (MFT) and the paging file—and keep them defragmented automatically.

Frag Guard has an online mechanism that prevents MFT and paging file fragmentation, greatly reducing the need for boot-time defragmentation runs. This mechanism also monitors the fragmentation levels of the MFT and paging file, and automatically sets a boot-time defragmentation operation to run when either of these levels exceeds a threshold that you set. The boot-time defragmentation will only occur during a time period you specify.

When enabled, Frag Guard ensures the MFT and paging file can grow in a contiguous manner. If either the MFT or paging file does become fragmented, the Diskeeper Boot-Time feature is called upon to restore the MFT and paging file to a defragmented condition.

Note that in order for Frag Guard to provide any benefit on most volumes, it is necessary for you to run a full Boot-Time defragmentation of the volume. This includes defragmenting the MFT and paging file, as well as defragmenting and consolidating the directories. This manual Boot-Time defragmentation run "clears the way" to allow Frag Guard to fully function.

The dialog box that controls the Frag Guard settings is displayed during setup, but can also be accessed later from the **Action** menu.



The following controls are available in the **Frag Guard** dialog box:

## Paging File Frag Guard

When Paging File Frag Guard is enabled, Diskeeper will monitor the paging file and attempt to keep it defragmented while the computer is online.

### Enable

When this option is selected, Diskeeper reserves a portion of contiguous disk space for the paging file to expand into, provided there is enough free space to do so. The amount of free space reserved is based on the minimum and maximum sizes you have set for the paging file, as well as the amount of the paging file in use. When Frag Guard detects the need for additional space for the paging file, this reserved space is made available for the paging file to expand into. This minimizes paging file fragmentation.

## **Disable**

When this option is selected, Diskeeper will not attempt to keep the paging file defragmented online. However, you can still defragment the paging file at boot-time.

## **MFT Frag Guard**

When MFT Frag Guard is enabled, Diskeeper will monitor the MFT(s) on the selected disk volumes and attempt to keep them defragmented while the computer is online.

### **Disable on ALL volumes**

When this option is selected, Diskeeper will not attempt to keep the MFT defragmented online. However, you still have the option to defragment the MFT at boot-time.

### **Enable on ALL volumes**

When this option is selected, Diskeeper minimizes MFT fragmentation online, on all local NTFS volumes. It does this by ensuring the MFT is contiguous, and by extending it as needed when new files are written to the disk volume.

### **Enable individually on each volume**

This option allows you to select certain NTFS disk volumes for online Frag Guard processing of the MFT, while excluding others. To select one or more disk volumes for online Frag Guard processing, highlight the appropriate drive letter(s) in the list box and click **Set**.

### **List of NTFS Volumes**

This box contains a list of all NTFS volumes that are visible to Diskeeper. This box is activated by selecting the **Enable individually on each volume** option above it. To enable MFT Frag Guard on a volume, select it and click **Set**. To disable a previously enabled volume, select it and then click **Clear**.

### **Set Button**

Click **Set** to activate MFT Frag Guard on the selected disk volume(s).

### **Clear Button**

Click **Clear** to disable MFT Frag Guard on the selected disk volume(s).

## Automatic Boot-Time

When enabled, this feature will cause your computer to restart and defragment the MFT or paging file when the number of fragments reaches the threshold level you have set. However, it will not log you off the computer, except when you give it permission to do so at the time.

### Never

Select this option if you want to disable the Automatic Boot-Time defragmentation feature. Boot-time defragmentation of the MFT and/or paging file defragmentation can still be done manually, using the Boot-Time Defragmentation option in the Diskeeper **Action** menu.

### Only

Select this option if you want Diskeeper to restart automatically, during the designated time period, if the MFT or paging file fragmentation reaches or exceeds the specified level.

### Allow Restart

Select the day(s) of the week when automatic restarting of the computer is allowed.

### Between

Select the starting time when automatic restarting of your computer is allowed.

### And

Select the ending time of the time period when automatic restarting of your computer is allowed.

### Notification

When this option is selected, you are notified when the computer is scheduled for an automatic restart. The notification screen is displayed and asks you to log off.

All users must log off the computer. If at the scheduled restart time any user is still logged on, another message box is displayed, informing the user that the automatic restart could not be done and will be rescheduled for the next available time period.

### Confirmation

When this option is selected, a dialog box is displayed (regardless of whether anyone is logged in) one hour before an automatic restart is scheduled to occur. You will be notified that an automatic restart has been scheduled. Click **OK** to restart your

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computer immediately or click **Cancel** to skip the scheduled restart. If at the end of the one hour confirmation period neither button has been clicked, the automatic restart of the computer will be rescheduled for the next available time period.

### **OK Button**

Click **OK** to accept the current settings in the Diskeeper **Frag Guard** dialog box.

### **Cancel Button**

Click **Cancel** to exit the Diskeeper **Frag Guard** dialog box and ignore any changes to existing settings.

### **Help Button**

Click **Help** to see Help topics about Frag Guard.

### **Automatic Boot-Time Options**

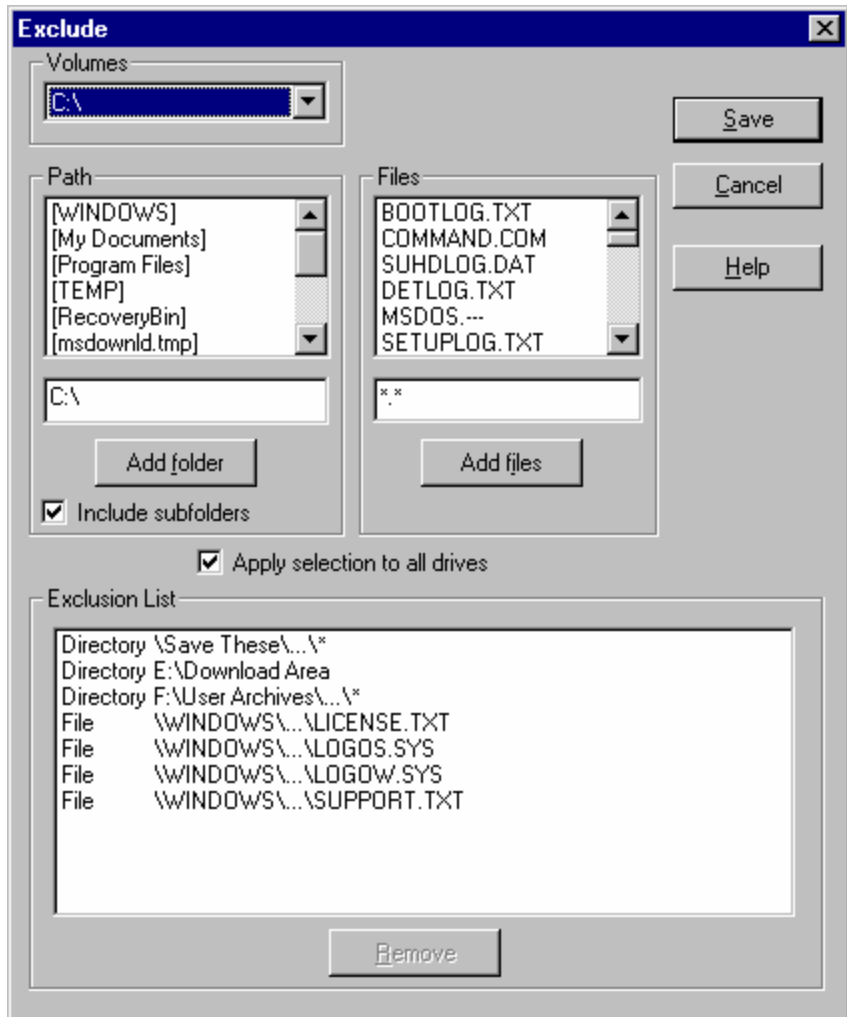
If Paging File Frag Guard is enabled and the paging needs to be defragmented, the paging file will be defragmented at boot-time and placed at the end of the volume.

If MFT Frag Guard is enabled, files and directories on the volume may be defragmented or moved to facilitate MFT defragmentation.

## **Setting an Exclusion List**

Diskeeper exclusion lists allow you to specify files and directories that will not be allowed to be processed by Diskeeper. For example, you might not want to defragment temporary files that will soon be deleted. When you choose the **Exclusion List** button or menu option, the window shown below appears.

**Note:** Wildcard file specifications such as \* or ? are allowed.



The following controls are available in the **Exclude** dialog box:

### Files

Use this section of the Exclusion List window to choose specific files (by name) to be excluded from defragmentation. Highlight the file(s) to be excluded, and then click **Add Files** to add the file to the exclusion list.

### Path

Use this section of the Exclusion List window to choose specific directories to be excluded from defragmentation.

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Select a directory by highlighting it, and then click **Add Folder** to add the directory to the exclusion list.

When a directory folder is added to the exclusion list, any subdirectories below the directory in the tree are also excluded.

### Volumes

Use this section of the Exclusion List window to choose the disk volume from which you want to exclude files or directories from defragmentation.

### Add Files Button

Click **Add Files** to add the selected file(s) to the Diskeeper exclusion list.

### Add Folder Button

Click **Add Folder** to add the selected directory path to the Diskeeper exclusion list.

### Exclusion List Box

This box shows the files, directories, and volumes that will be excluded from defragmentation.

### Remove Button

Click **Remove** to remove specific files, directories, or volumes from the Diskeeper exclusion list. To remove one or more items from the list, highlight the items in the Exclusion List Box and click Remove.

### Save Button

Click **Save** to save the exclusion list and return to Diskeeper.

### Cancel Button

Click **Cancel** to cancel any changes you have made to the Diskeeper exclusion list and return to the main Diskeeper display.

### Help Button

Click **Help** for context-sensitive help about the Diskeeper file exclusion list option.

## Diskeeper Internal Exclusion List

There are certain files that should not be moved under any circumstances. These files may be system files or files related to specific applications. Moving these specific files can cause system or application failure. As a result, Diskeeper uses an “internal” exclusion list to ensure these files are always excluded from Diskeeper processing. This list is fixed in memory and cannot be modified. These are the files that are currently in the Diskeeper internal exclusion list:

- bootsect.dos
- hiberfil.sys
- memory.dmp
- boot.ini
- NTDETECT.COM
- NTLDR
- NTOSKRNL.EXE
- safeboot.fs
- safeboot.csv
- safeboot.rsv
- pad.esi

Note that these files are not displayed in the Diskeeper user-defined exclusion list. See “Diskeeper won't move some files no matter what I do. Is there a problem with Diskeeper?” on page 76 for more information about the Diskeeper internal exclusion list.

## Setting Diskeeper Priority

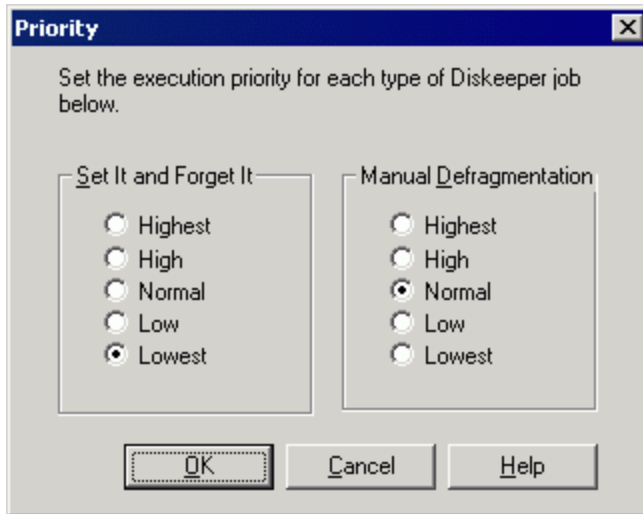
Select the **Priority** option on the **Action** menu to select the Windows priority at which Diskeeper defragmentation jobs run. You can set the priority independently for both “Set It and Forget It” and “Manual Defragmentation” defragmentation jobs.

By default, scheduled, “Set It and Forget It” defragmentation jobs run at the lowest possible Windows priority. Also by default, “Manual Defragmentation” jobs run at the normal Windows priority. The priority for either type of defragmentation job can be changed with the Priority option.

Running at the lowest priority minimizes the system performance impact when Diskeeper is defragmenting a disk volume. However, defragmentation jobs running at the lowest priority can take substantially longer to complete than those running at higher priorities, since Diskeeper “backs off” for any process running at a higher priority (even screen savers).

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For this reason, you may have occasions where you want to run Diskeeper at a higher priority. Keep in mind, though, that your system performance may be impaired when Diskeeper is run at higher priorities.



To change the priority setting for either Set It and Forget It or Manual Defragmentation, click the appropriate option button and then click **OK**.

## Logging Diskeeper Activity

Use the **Event Logging** option in the **Action** menu to enable and disable the logging of various Diskeeper events to the Windows Application Event Log.

## Windows NT/2000/XP Event Log

In the Windows NT/2000/XP version of Diskeeper, a log of Diskeeper activity is stored in the Application Event Log file.

When Diskeeper logs an event, the event and its message are appended to the Windows Application Event Log file, along with the date, time, user, and other identifying information.

These events can then be viewed with the Windows Event Viewer by choosing the **Application** option in the **Log** menu of the Event Viewer. This can be done on either local computers or remote computers on your network. The Event Viewer is found in the Windows Administrative Tools group on Windows NT 4.0 and in the Computer Management Console on Windows 2000/XP.

By default, the Application Event Log is 512 kilobytes in size and is set to overwrite events older than 7 days. Diskeeper may quickly fill the log file if these default settings are used. To make this log a more useful size, perform the steps described in “The Windows NT/2000/XP Application Event Log,” page 6.

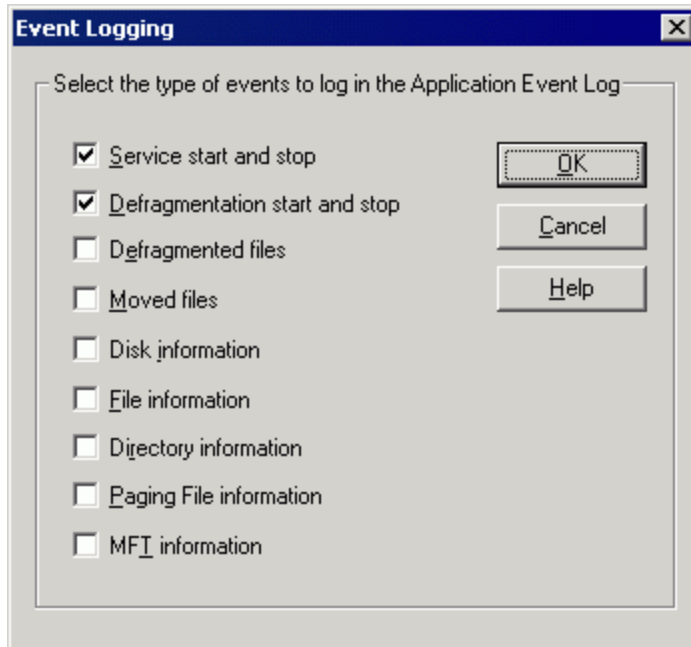
## Windows 95/98/Me Event Log

Diskeeper for Windows 95/98/Me provides the option of logging Diskeeper events into a text file. When Diskeeper logs an event, the event and its message are appended to the Diskeeper log file. These events are written as a text file, which can then be viewed with Notepad, or your choice of text editor programs.

The Diskeeper log file is named **DkEventLog.txt** and it is stored by default in the directory folder where Diskeeper is installed. The file is limited to 1 MB in size. When it reaches this size, the log is purged completely and the event log is started from scratch.

## Specifying What Gets Logged

The **Event Logging** dialog box displays a list of events for which logging can be enabled or disabled. Click the check boxes for the following options to alternately enable or disable each option.



### **Service start and stop**

When this option is enabled, an entry is made to the Event Log each time the Diskeeper service starts or stops. This option is enabled by default.

### **Defragmentation start and stop**

When this option is enabled, an entry is made to the Event Log whenever a defragmentation run starts or stops. The Event Log entry for this option also includes information about files that cannot be moved, either because the files are on a Diskeeper exclusion list, or the files cannot be opened. Common causes preventing a file from being opened include access controls or permissions on the file being set to prevent Diskeeper from accessing it. File permissions must allow SYSTEM to have full control of a file in order for Diskeeper to defragment it.

This option is enabled by default.

### **Defragmented files**

When this option is enabled, an entry is made to the Event Log listing each file that is defragmented by Diskeeper. Note that enabling this option can cause the Event Log to fill rather quickly, especially if Diskeeper defragments a high number of fragmented files. (This will be particularly likely when Diskeeper is first run on a volume, since Diskeeper will probably be defragmenting a large number of files.)

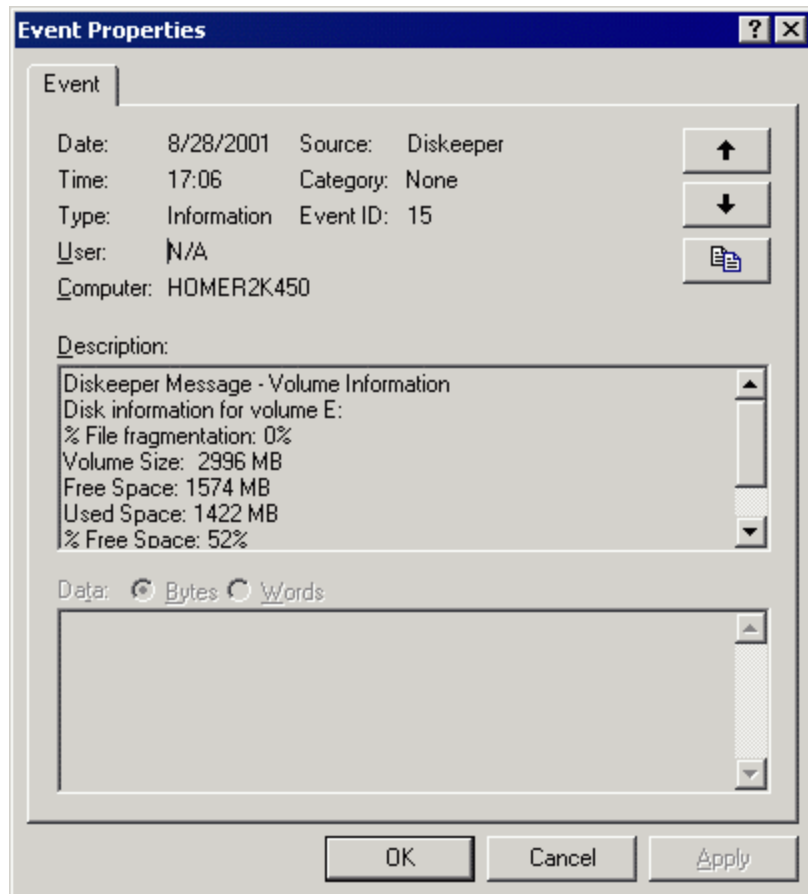
This option is not enabled by default.

### **Moved files**

When this option is enabled, an entry is made to the Event Log each time a file is moved for reasons other than to defragment the file. This would include cases where files are moved in order to create more contiguous free space. This option also notes when files could not be moved, such as files that are on a Diskeeper exclusion list or files that cannot be opened. Common causes preventing a file from being opened include access controls or permissions on the file being set to prevent Diskeeper from accessing it. As mentioned previously, file permissions must allow SYSTEM to have full control of a file in order for Diskeeper to defragment it.

Here again, enabling this option can cause the Event Log to fill quickly. This option is not enabled by default.

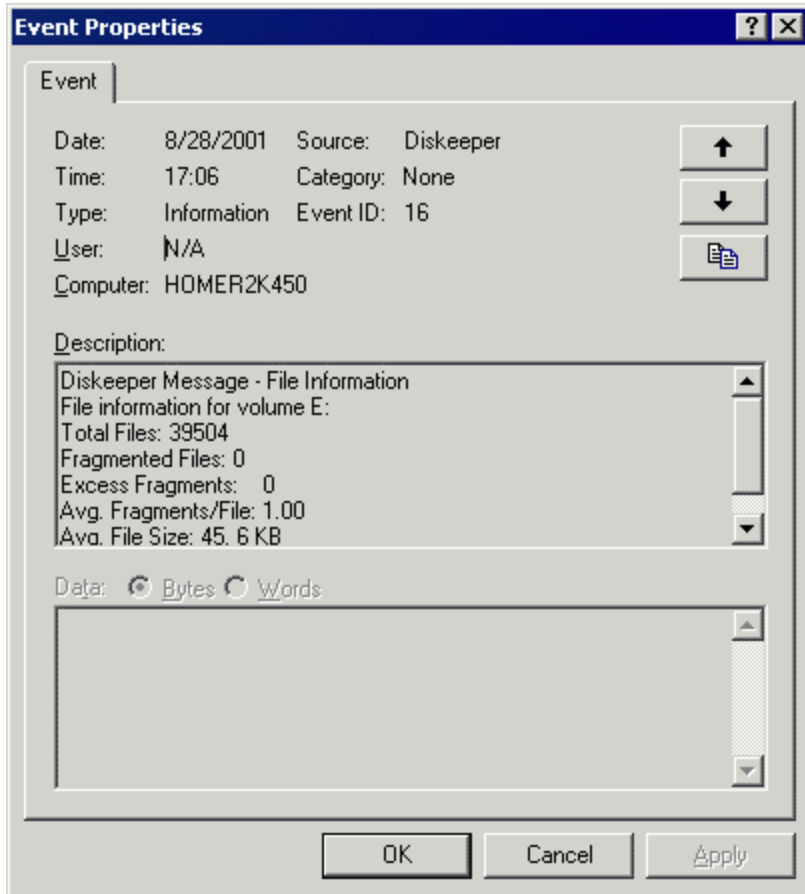
## Disk information



**On Windows NT/2000/XP:** When this option is enabled, an entry is made to the Application Event Log at the end of each defragmentation run showing general information about the disk volume that was defragmented. This appears in the Windows Event Viewer as Diskeeper Event 15. When you double-click Diskeeper Event 15 in the Event Viewer, information similar to this example is displayed. This option is not enabled by default.

**On Windows 95/98/Me:** When this option is enabled, an entry is made in the Diskeeper EventLog.txt file containing the information shown in the Windows NT/2000/XP example above. This option is not enabled by default.

For a description of information contained in the Description box, see “Analysis Report Display,” page 26.

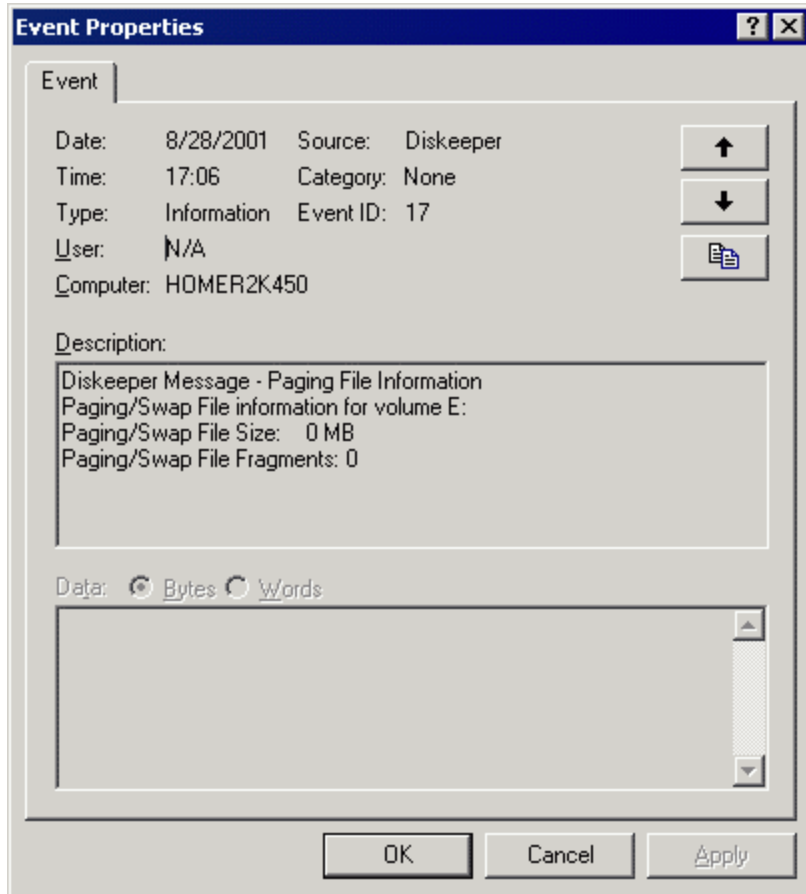
**File information**

**On Windows NT/2000/XP:** When this option is enabled, an entry is made to the Event Log at the end of each defragmentation run showing information about the files on the disk volume that was defragmented. This appears in the Windows Event Viewer as Diskeeper Event 16. When you double-click Diskeeper Event 16 in the Event Viewer, information similar to this example is displayed. This option is not enabled by default.

**On Windows 95/98/Me:** When this option is enabled, an entry is made in the Diskeeper EventLog.txt file containing the information shown in the Windows NT/2000/XP example above. This option is not enabled by default.

For a description of information contained in the Description box, see “Analysis Report Display,” page 26.

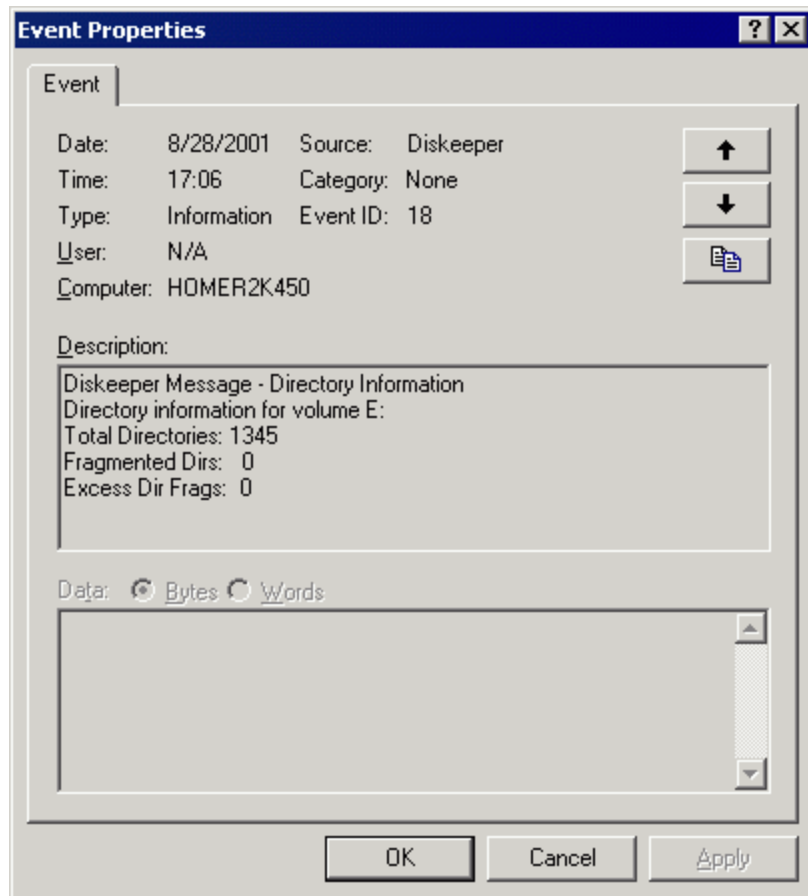
## Paging File information



**On Windows NT/2000/XP:** When this option is enabled, an entry is made to the Event Log at the end of each defragmentation run showing information about the paging file on the volume that was defragmented (if it exists on the volume). This appears in the Windows Event Viewer as Diskeeper Event 17. When you double-click Diskeeper Event 17 in the Event Viewer, information similar to this example is displayed. This option is not enabled by default.

**On Windows 95/98/Me:** When this option is enabled, an entry is made in the Diskeeper EventLog.txt file containing the information shown in the Windows NT/2000/XP example above. This option is not enabled by default.

For a description of information contained in the Description box, see “Analysis Report Display,” page 26.

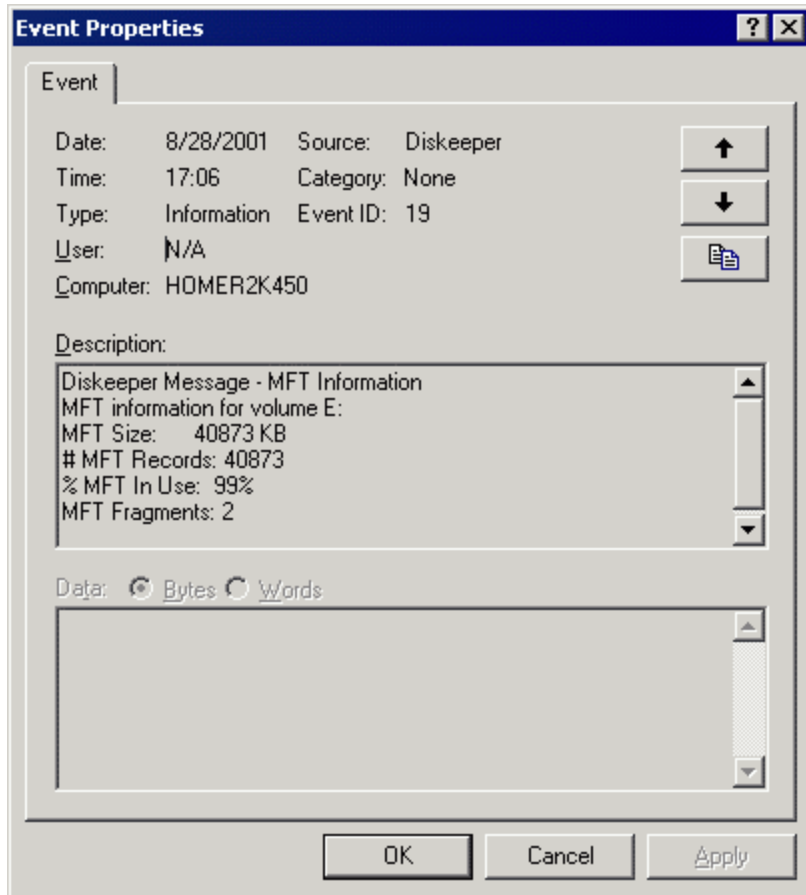
**Directory information**

**On Windows NT/2000/XP:** When this option is enabled, an entry is made to the Event Log at the end of each defragmentation run showing information about the directories on the volume that was defragmented. This appears in the Windows Event Viewer as Diskeeper Event 18. When you double-click Diskeeper Event 18 in the Event Viewer, information similar to this example is displayed. This option is not enabled by default.

**On Windows 95/98/Me:** When this option is enabled, an entry is made in the Diskeeper EventLog.txt file containing the information shown in the Windows NT/2000/XP example above. This option is not enabled by default.

For a description of information contained in the Description box, see “Analysis Report Display,” page 26.

## MFT information



**On Windows NT/2000/XP:** When this option is enabled, an entry is made to the Event Log at the end of each defragmentation run showing information about the Master File Table (MFT) on the volume that was defragmented. (Keep in mind, since only NTFS volumes have an MFT, this information will only apply to NTFS volumes.) The entry appears in the Windows Event Viewer as Diskeeper Event 19. When you double-click Diskeeper Event 19 in the Event Viewer, information similar to this example is displayed. This option is not enabled by default.

This option does not exist on Windows 95/98/Me machines, as MFT files are unique to Windows NT/2000/XP.

For a description of information contained in the Description box, see “Analysis Report Display,” page 26.




# Diskeeper on a Network

## Select Computer Option

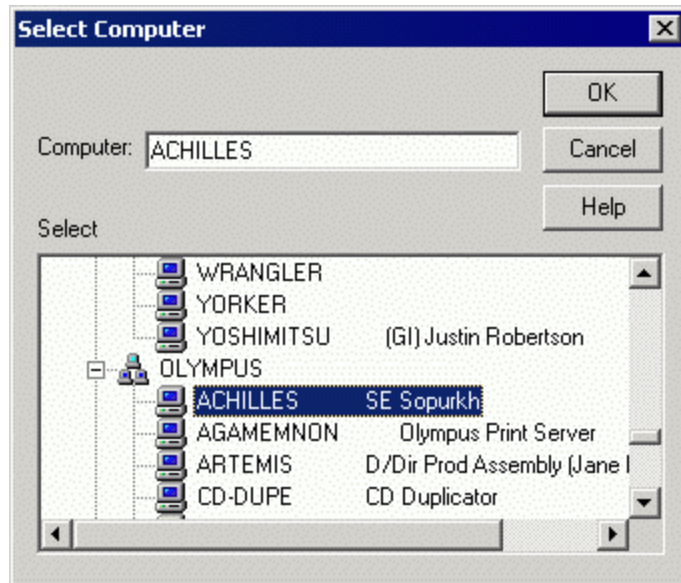
**Please note:** This option is only available in the Server version of Diskeeper.

The Server version of Diskeeper can analyze fragmentation and control the defragmentation of disk volumes on computers connected to your network or volumes on your local computer. You must specifically connect to a computer before using Diskeeper.

Click **Select Computer**  in the Diskeeper toolbar, or select **Select Computer** from the **Action** menu, to connect to a remote computer.

A Workstation or Server version of Diskeeper must also be installed on the remote computer.

When the **Select Computer** button is clicked or **Select Computer** option is invoked, the **Select Computer** dialog box is displayed.



Choose the computer on which you want to run Diskeeper, and then click **OK**. After the computer is connected, the name of the computer being controlled is displayed at the top of the Diskeeper snap-in

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After selecting the computer on which to run Diskeeper, start analyzing or defragmenting any of the volumes on that computer in the same manner as running Diskeeper on a local computer.

Note that after restarting your Windows NT/2000/XP system, you may need to wait several minutes for the Windows Browser to detect the available network computers before the listing of available computers on your network appears in the **Select Computer** dialog box.

Error messages will be displayed if Diskeeper fails to connect to a network computer.

## Troubleshooting Network Connections

This section describes several situations that can occur when running Diskeeper on remote network computers.

### Network Error Messages

Error messages are displayed if Diskeeper fails to connect to a network computer. The following circumstances can prevent Diskeeper from connecting to a network computer, thus causing an error message to be displayed:

- Diskeeper is not installed on the remote computer.
- The Diskeeper service has not been started on the remote computer.
- The Diskeeper main menu is open on the remote computer.
- There is a problem within the Windows network.
- You are not logged onto an account that has Administrator privileges on the remote computer

Also, if your computer does not have a network card installed or the network is not started, a message box is displayed stating that the network is not present or not started.

### Editing Exclusion Lists on a Network

To edit exclusion lists on remote computers on your network, you must have sufficient permissions to edit a file in the Diskeeper directory on the remote computer. If you do not have sufficient permissions, an error message is displayed stating that access is denied to the exclusion list. If you cannot edit an exclusion list that you think you have permission to use, there are two likely possibilities:

- You logged on with a username that the target computer recognizes and a password that it does not recognize. A common example is to log on to your computer as Administrator and then try to edit an exclusion list on a computer that has its own Administrator account established with a different password.

- Your computer and the remote computer do not share the same network protocol.

### **Run Schedules Across a Network**

To create or alter “Set It and Forget It” run schedules on remote computers on your network, you must have sufficient permissions to edit a file in the Diskeeper directory on the remote computer. If you do not have sufficient permissions, an error message is displayed stating that access is denied to the run schedule. If you cannot create or alter a run schedule that you think you have permission to use, there are two likely possibilities:

- You logged on with a username that the target computer recognizes and a password that it does not recognize. A common example is to log on to your computer as Administrator and then try to edit an exclusion list on a computer that has its own Administrator account established with a different password.
- Your computer is not running a protocol that is running on the target computer.
- Remember that Smart Scheduling does not affect Diskeeper versions earlier than 6.0. If you send a network schedule to remote computers running earlier versions of Diskeeper, no schedule will be sent to these computers.



## Chapter 5

# Theory of Operation

This chapter describes the Diskkeeper design goals and how those goals were met.

## Introduction

As described in the introduction of this manual, the term *disk fragmentation* means two things:

- a condition in which pieces of individual files on a disk are not contiguous, but rather are broken up and scattered around the disk volume; and
- a condition in which the free space on a disk volume consists of little pieces of space here and there rather than a few large free spaces.

The effects of excessive fragmentation are twofold as well:

- file access takes longer because a file must be collected in pieces here and there, requiring several disk accesses instead of just one; and
- file creation takes longer because space for the file must be allocated in little pieces here and there instead of just one contiguous allocation.

Before the introduction of Diskkeeper, there was no method for completely correcting the problems of file and free space fragmentation on Windows NT computers or in a mixed Windows network.

## Design Goals

In designing Diskkeeper for Windows, the following goals were established:

- The product must be completely safe to use.

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- It must improve Windows system performance. It is not designed to make the disk look “pretty”—it is designed to improve disk performance and, as a result, overall system performance.
- It should process live disks without interfering with user access to files.
- It should run without operator intervention.
- It must defragment all possible files and consolidate free space into the smallest possible number of large spaces.

Diskeeper defragments files and free space on a disk, allowing access to the files on the disk at any time while Diskeeper is running.

### Safety

Diskeeper is designed with *safety* as the highest priority.

To ensure the safe movement of files on Windows NT/2000/XP systems, Diskeeper uses mechanisms built into Windows NT/2000/XP that were developed and implemented by Executive Software, and fully incorporated into Windows NT/2000/XP by Microsoft. On Windows 95, Windows 98, and Windows Me systems, Diskeeper uses similar mechanisms used by Microsoft and others.

By using these built-in mechanisms, Diskeeper maintains cache coherency, file security and permissions information, and file content integrity no matter how fragmented the files on the disk are.

The foremost design goal for Diskeeper is to make sure that no data is ever lost. To accomplish this goal Diskeeper uses the following criteria for accessing files:

- the contents of data files are never modified under any circumstances
- only one file is processed at a time, not the whole disk
- each processing pass is independent of the other passes
- no information is stored on any other device or in a “scratch space”
- Diskeeper accesses a file in such a way that no user access can conflict with Diskeeper during the critical portion of the relocation process
- file relocation is aborted if any error is encountered, leaving the file in its original state

Diskeeper was designed to err on the side of caution. In other words, it only moves a file on the volume when it is absolutely certain that no data will be lost, including file attributes. The only change to file attribute-type information is the physical location

of the file on the volume. None of the file dates are changed and no other fields in the file record header are used to store Diskkeeper information.

Diskkeeper never defragments or moves files that are specifically stored at a specific physical location on the volume.

If anything causes your computer to crash while Diskkeeper is running, or if you abort the Diskkeeper defragmentation run in the middle of the file relocation process, no data is ever at risk.

**Windows 95/98/Me Note:** Stopping or pausing a Diskkeeper job through its menus or toolbars is completely safe. Note, however, that in the event of a system crash or other non-standard termination of the Diskkeeper process while it is running, it is possible for free space and file information to be stored incorrectly. Executive Software strongly recommends running the Windows Scandisk error checking utility immediately when Diskkeeper is stopped abnormally. Scandisk will correct any potential file errors.

## Performance

When running in the “Set It and Forget It” mode, Diskkeeper is designed to run in the background, without adversely affecting performance of your Windows computer. Steps have been taken to assure that, by default, Diskkeeper overhead has the lowest possible impact on system performance. Diskkeeper can be run at the lowest possible Windows priority, using only otherwise unused CPU cycles. Diskkeeper was designed in such a way to ensure it will not interfere with other processes on your Windows computer.

However, for cases where you want to defragment disks more quickly, Diskkeeper allows you to increase the defragmentation priority. For more information, see “Setting Diskkeeper Priority,” page 57.

## Process Live Disks

It is not acceptable to force users off the disk while performing routine defragmentation. To do so would be a case of the cure being worse than the disease. Access to fragmented files is better than no access at all.

The best solution is to defragment online with users active on the same disk volume. Diskkeeper was designed with this in mind. During most of the time Diskkeeper is processing a file, it shares the file with any other users that may access the same file. The last step of processing the file, however, involves locking the file for a very brief period, a matter of milliseconds. If another user requests a file that Diskkeeper has locked, that request is suspended for the brief period until Diskkeeper releases the file. Then the request is serviced. There is never an interruption of either process as a result of this delay.

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This solution allows Diskkeeper to defragment open files safely, regardless of whether they are open for read operations or for write operations.

**Note:** Due to the Windows NT 4.0 design, directories, MFT and paging files cannot be moved safely on live disks (NTFS directories *can* be moved on Windows 2000/XP). Therefore, Diskkeeper performs these operations at the only safe time, while the computer is starting up.

### No Operator Intervention

In keeping with the design goals, after Diskkeeper has been started in the “Set It and Forget It” mode, it runs automatically in the background, without the need for operator intervention. It runs indefinitely, unless told otherwise by you.

## Appendix A

# Answers to Frequently Asked Questions

### How do I set access permissions to allow Diskeeper to defragment my files?

In order for Diskeeper to have access to move files, both SYSTEM and ADMINISTRATOR must have full control over a file (or the directory folder it is in). This version of Diskeeper includes a batch file that sets the access permissions on a disk volume to allow Diskeeper to run properly. This batch file is called **setdkacls.bat**, and it is located in the directory folder where Diskeeper is installed.

If you find you have made files inaccessible to Diskeeper, or that you have some files inaccessible to Diskeeper, open a command-prompt window, change directory to the Diskeeper installation directory, and type:

```
setdkacls x:
```

where *x*: is the letter name of the disk volume on which you want to change access permissions.

The **setdkacls.bat** procedure automates the following sequence of commands:

```
cd /d x:  
  
cd \  
  
cacls * /e /t /c /g Administrators:F System:F
```

For more information about the **cacls** command, type **cacls /?** at a command prompt.

This batch procedure will only work if the account you are logged onto has been granted access to the file(s) you are wanting to defragment.

### Why won't my volume defragment completely?

This can be the result of several situations. If your volume is extremely full, there may not be sufficient free space to defragment the files completely. In that case, we recommend temporarily moving some of the files off the volume, particularly large files. This temporary measure often allows Diskeeper the “working room” it needs to

complete the defragmentation process. It also allows Diskkeeper to defragment the free space on the volume, increasing the possibility that the temporarily-moved files can be moved back to the volume in a contiguous or less fragmented condition.

Another cause of incomplete defragmentation is a fragmented paging file. For more information, see “Can Diskkeeper defragment paging files?” on page 77.

A volume that, at some time, has been filled to capacity may have a severely fragmented Master File Table (MFT). Volumes that have been converted from FAT to NTFS often also have a fragmented MFT. A White Paper describing the causes and effects of MFT fragmentation is available from the Executive Software Web site at <http://www.execsoft.com/whats-new/whitepaper.asp>. Use the Boot-Time Defragmentation option to defragment a fragmented MFT. For more information, see “Boot-Time Defragmentation,” page 44.

Another situation that can prevent complete defragmentation of a volume is the existence of a large number of directories on the volume. For more information, see “Can Diskkeeper move directories?” on page 77.

Yet another cause for incomplete defragmentation on Windows NT/2000/XP systems can be a security access situation. Both SYSTEM and ADMINISTRATOR must have full control over a file (or the directory folder it is in) in order for Diskkeeper to have access to move the file. This is because the Diskkeeper service runs under the Administrator account, and System access is necessary to defragment files safely. This security feature is governed by the Windows NT/2000/XP C2 security requirements. Included with Diskkeeper is a batch file that sets the access permissions on a disk volume to allow Diskkeeper to run properly. See “How do I set access permissions to allow Diskkeeper to defragment my files?” on page 75 for information about using this batch procedure.

### **Diskeeper won't move some files no matter what I do. Is there a problem with Diskeeper?**

Diskeeper has a built-in list of files that it will not move under any circumstances. This list is referred to as the Diskeeper internal exclusion list.

The most common reason for a file existing on the Diskeeper internal exclusion list is safety. The file cannot or should not be moved in order to maintain the integrity of your system.

For example, the file **memory.dmp** is on the Diskeeper internal exclusion list. This file is on the exclusion list because the disk locations where this file is stored are loaded by the kernel when the system boots and stored in memory. These disk locations are then used to write the dump file should it need writing. If Diskeeper were to move this file, then the system failed, the dump file would be written over other files or in space considered to be free space. This could result in a very corrupted disk.

The same situation applies to **hiberfil.sys**. When your system goes into hibernation mode, the pre-fetched disk locations are overwritten with the hibernation data. If

Diskeeper moved hiberfil.sys out and moved other files into those disk locations, then disk corruption would occur.

The files **boot.ini**, **NTDETECT.COM**, **NTLDR**, and **NTOSKRNL.EXE** are not moved or defragmented to ensure that your system remains bootable. (Moving these files to higher locations on a disk can render a system unbootable.) There is information in the Microsoft Knowledge Base about why the location of these files is critical.

### **Can Diskeeper move directories?**

Windows NT 4.0 does not allow directories to be moved, because of data integrity issues related to how Windows NT maintains directory information. Since Diskeeper runs while other processes are active on the system, it does not attempt to move directories online.

However, directories on Windows NT 4.0 volumes *can* be moved safely while your computer is being started—a time when Windows has not yet taken complete control of the files and directories on your disk. For more information on how to consolidate Windows NT 4.0 directories, see “Boot-Time Defragmentation,” page 44.

On Windows 95/98/Me computers, and NTFS volumes on Windows 2000/XP systems, Diskeeper *can* safely move and defragment directories, which makes consolidation unnecessary.

### **Can Diskeeper defragment paging files?**

Diskeeper does not defragment active paging files, since paging files must be open for exclusive use by Windows at all times. However, Diskeeper *can* defragment paging files safely when your computer is being started—a time when Windows NT/2000/XP has not yet taken full control of the files and directories on your disk. For more information, see “Boot-Time Defragmentation,” page 44.

### **Can Diskeeper defragment the Master File Table?**

The Master File Table (MFT) is the area on an NTFS disk volume where Windows NT/2000/XP keeps the necessary information for retrieving files from the disk volume. The MFT also contains information such as file creation, modification, and backup dates and times. Because the MFT is held open for exclusive use by Windows NT/2000/XP, Diskeeper does not move any pieces of this critical system file while Windows NT/2000/XP is running, but can do so safely at boot-time. For more information, see “Boot-Time Defragmentation,” page 44 and “Frag Guard,” page 50.

### **Why doesn't Diskeeper completely consolidate the free space on my volume?**

Several factors can prevent the free space on a volume from being defragmented:

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- A fragmented paging file. For more information, see “Boot-Time Defragmentation,” page 44.
- A large number of directories on the volume. For more information, see “Can Diskeeper move directories?” on page 77.

On NTFS volumes, a portion of the free space on the volume is reserved by Windows NT/2000/XP for the Master File Table (MFT). For more information, see “Why don’t my files get moved to the beginning of the volume?” on page 78.

Having all of the free space in a single, contiguous piece provides very little (if any) performance benefit. Free space fragmented into hundreds of pieces will affect disk performance, but free space that’s in a few pieces should not have any effect on the performance of your volume.

### **Why don’t my files get moved to the beginning of the volume?**

On NTFS volumes, Windows NT/2000/XP reserves a portion of the free space on a disk volume for the Master File Table (MFT). This free space is usually most noticeable at the physical “beginning” of the volume (easily seen using the graphic fragmentation analysis display), but space is also reserved for use by the MFT in other areas of the volume.

Since Windows NT/2000/XP reserves this space for exclusive use, Diskeeper will not move files *into* these areas of the volume, but will move them *out* of these areas.

### **Why don't all of my NTFS volumes appear in the Diskeeper Volume List?**

Both SYSTEM and ADMINISTRATOR must have full control over a file (or the directory folder it is in) in order for Diskeeper to have access to move the file. This is because the Diskeeper service runs under the Administrator account, and System access is necessary to defragment files safely. This is a security feature governed by the Windows NT/2000/XP C2 security requirements.

If the root-level directory folder does not have SYSTEM and ADMINISTRATOR set for full control (as seen in the **Permissions** section under the **Security** tab in the **Properties** dialog box) Diskeeper will not display the disk volume in the Volume list under some circumstances.

### **How do I determine how often to run Diskeeper on my volume?**

This depends on many factors, including the level of file activity, the sizes and types of files used, and the amount of free space available on the volume. While there are no set rules on how often to defragment your disk volumes, here are some guidelines.

- Of course, the first suggestion is to let the Diskeeper Smart Scheduling feature automatically and dynamically determine the optimum run frequency for your particular disk volumes. Smart Scheduling monitors the fragmentation levels of

your volumes and adjusts the defragmentation schedule to best fit your needs. See “Smart Scheduling”, page 43.

- Disk volumes on busy file servers should be defragmented more often than those on single-user workstations. You may need to run Diskkeeper on a server volume as often as every two to four hours to maintain optimum system performance, while on a workstation, you may only need to run Diskkeeper once a day.
- To determine how often to run Diskkeeper on *your* disk volumes, you can use the logging function of Diskkeeper to monitor the number of files moved during each Diskkeeper run. For information about how files that are moved by Diskkeeper are logged, see “Logging Diskkeeper Activity,” page 58. In general, if Diskkeeper moves fewer than 50 files per run, you are running Diskkeeper frequently enough to maintain the performance of your Windows system at an optimum level. If the number of files moved during each run is greater, or is increasing, schedule Diskkeeper to run more frequently.

### **Why don't my defragmentation jobs all start at the same time?**

Diskkeeper is designed to defragment more than one disk volume at a time. However, when the defragmentation of two or more disks is scheduled to begin at the same time, Diskkeeper will start each job separately, in one-minute intervals. For this reason, you will notice the start times for each Diskkeeper job run in the Application Event Log can vary by several minutes. This is no cause for alarm.

### **Why doesn't the free space reported by the post-analysis (or post-defragmentation) summary pop-up screen match what the Diskkeeper report view shows?**

Several post-analysis and post-defragmentation summary screens include information about the amount of free space available on the volume for defragmentation. This figure is based on the space available to Diskkeeper, which may be less than the total free space on an NTFS volume. NTFS volumes reserve a percentage of the total volume for the Master File Table (MFT), which Diskkeeper cannot use for defragmenting files. Because of this, the figure shown in the Diskkeeper post-analysis and post-defragmentation summaries on NTFS volumes will not match the total free space figure displayed in the Diskkeeper report view (or other utilities like Disk Properties in Windows Explorer).

### **Why didn't Boot-Time Defragmentation move my directories?**

The Windows NT/2000/XP Boot-Time Defragmentation feature requires enough contiguous free space to contain the directories on the volume. For this reason, you should run Diskkeeper in one of its online modes before running the Boot-Time Directory Consolidation.

Also, keep in mind that there are two directories that cannot be moved safely, even at boot-time. The directories are \Recycler and \Recycled. Because these two directories cannot be moved, the Boot-Time Directory Consolidation operation may still leave one or two directories that are not consolidated with the rest of your directories

### **Should I use Diskeeper on RAID arrays?**

Yes—Diskeeper supports all levels of software- and hardware-based RAID arrays. RAID arrays are often used to increase system performance. In a RAID array of four disk drives, for example, a file can be accessed up to four times as fast as on a single drive. This is because the file is spread between the four drives, and all four drives can be accessed at the same time, so the file can be retrieved much faster. However, like the files on a single disk drive, these file parts can become fragmented on the individual drives, which reduces the speed advantage of RAID. In fact, the effects of fragmentation can be more obvious in a RAID array than in a single disk drive.

Diskeeper defragments RAID arrays just as it would single disk drives. Diskeeper improves the speed and performance of a RAID environment by eliminating wasteful and unnecessary I/Os from being issued by the file system. In our four-drive array example, it would defragment the pieces of the file on each separate drive as though they were separate files, and as directed by the RAID controller.

### **Why do I get an incorrect excess fragment count after defragmenting an NTFS drive under Windows 2000?**

Under Windows 2000, NTFS files that have been compressed, then decompressed, accumulate excess space allocations that Diskeeper cannot move. (The defragmentation APIs can only move actual data, not unused allocated space in the file.)

Microsoft states in knowledge base article Q228198 "Disk Defragmenter Analysis Shows More File Fragments Than File Size Suggests" that the "excess allocation" is released when the file is closed. Experiments performed in our labs show that this is not the case. The disk must be dismounted and remounted (or the system rebooted) followed by an open and a close of the file for the excess allocation to be released.

Therefore, when this condition exists on an NTFS volume, Diskeeper moves the data portion of a file, and if the file has an excess allocation, it can actually fragment the file one piece being the data just moved, the other piece being the excess allocation "left behind". Diskeeper notes this properly in its statistics. However, sometime after the file movement is completed and the file is closed, the excess allocation is released by Windows 2000. Thus, a subsequent analysis shows the fragmentation figures reported at the end of the defragmentation run to be wildly wrong.

Diskeeper engineers are working on a solution for this inconsistency. Until it is found, you can (1) avoid using NTFS disk compression or (2) perform a subsequent disk analysis to get the correct information.

Note that this excess allocation phenomena was newly introduced with Windows 2000.



## Appendix B

# Support Services

### U.S. Support Services

Registered users are entitled to 90 days of free telephone support, as well as special upgrade pricing, from Executive Software. Our free U.S. technical support is available Monday through Friday during the first 90 days from 7:00 A.M. to 5:30 P.M. Pacific time. If you have not yet registered your Diskeeper for Windows purchase, use the registration card in your Diskeeper box and do so now. Or, register your purchase online via our Web site at:

**<http://www.executive.com>**

Most technical support questions can be answered from the Technical Support section of our Web site at the address shown above.

You may also contact our technical support team via the Internet at:

**[tech\\_support@executive.com](mailto:tech_support@executive.com)**

Or via FAX at:

**818-252-5514**

If you are within your 90-day free support period, or have purchased telephone support, you can call:

**818-771-1600**

When your 90-day free support period has expired, you may purchase the support plan which best suits your needs. Executive Software offers 24-hour, 7-day support plans. Contact Executive Software to find out which support options suit you best.

Executive Software's address is:

**Executive Software  
7590 North Glenoaks Boulevard  
Burbank, California 91504, USA**

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### **European Support Services**

Registered users are entitled to 90 days of free telephone support, as well as special upgrade pricing, from Executive Software. Our free European technical support is available Monday through Friday during the first 90 days from 8:30 to 17:30 GMT. If you have not yet registered your Diskeeper for Windows purchase, use the registration card in your Diskeeper box and do so now. Or, register your purchase online via our Web site at:

**<http://www.execsoft.co.uk>**

Most technical support questions can be answered from the Technical Support section of our Web site at the address shown above.

You may also contact our technical support team via the Internet at:

**[tech.support@execsoft.co.uk](mailto:tech.support@execsoft.co.uk)**

Or via FAX at:

**+44 (0) 1342-327390**

If you are within your 90-day free support period, or have purchased telephone support, you can call:

**+44 (0) 1342-327477**

When your 90-day free support period has expired, you may purchase the support plan which best suits your needs. Executive Software offers 24-hour, 7-day support plans. Contact Executive Software to find out which support options suit you best.

Executive Software's address is:

**Executive Software UK Inc.  
Kings House, Cantelupe Road  
East Grinstead, West Sussex RH19 3BE  
England**

## Appendix C

# Remote Installation

Here are some methods to facilitate installing Diskeeper on multiple computers in a network.

## Diskeeper Remote Install

Using the Remote Install feature, Diskeeper (Workstation version) can be installed simultaneously to multiple computers on a network from a single machine acting as a server. Diskeeper Remote Install can save system administrators a tremendous amount of time and effort, especially on large networks, where the same software needs to be installed on hundreds, or even thousands of computers.

To make use of the Remote Install feature, you previously must have installed Diskeeper Server version and the Remote Install program on a Windows NT/2000/XP computer that will act as the server on the network. You must also be logged into a domain administrator account. The receiving computers must be running Windows NT Workstation, or Windows 2000/XP Professional and may not contain an existing installation of Diskeeper Server.

1. Select **Start | Programs | Diskeeper Remote Install**.
2. Click **Next** in the information window that appears.
3. Diskeeper Remote Install will display a message to indicate it is collecting information about the other machines on the network.
4. After a while, a tree display will appear that shows each computer on your network, along with a check box, and a visual indicator for each computer that already has Diskeeper installed. Icons are as follows:



Domain Server



Computer available for installation



Computer has Diskeeper Workstation version installed



Computer has Diskeeper Server version installed



Computer is running a server operating system



Computer contents unknown—registry inaccessible.

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5. Click in a box next to an icon to enable the remote installation on that computer, workgroup, or domain. If you want to exclude a particular computer, click again on a check box to disable it.
6. Alternatively, if you wish to uninstall Diskeeper from one or more network computers, select the appropriate computers and then, in the **Action** box, select **Remove**.
7. Click **Next** to proceed.
8. After some processing, the Diskeeper remote installation log appears. Click **Next** to continue.
9. A final information window appears. Click **Finish** to exit.

## Installing Diskeeper with SMS

Diskeeper can be installed as a distributed installation from a Windows NT/2000 server using Microsoft's System Management Server (SMS).

Note: By default, when using SMS, Diskeeper will install to \Program Files \Executive Software \DiskeeperWorkstation. To install on a different volume or in a different directory, share the directory where the Diskeeper installable files reside, then log into the target machine and run **DiskeeperWorkstation.msi** from the target machine as described in the Diskeeper documentation, or create the following command line to install Diskeeper to the desired folder:

```
msiexec /m MIF /qn /I DKMSI INSTALLDIR="C:\MyDir"
```

(Where MIF represents the Management Information File—8 characters maximum; DKMSI is either **DiskeeperServer.msi** or **DiskeeperWorkstation.msi**, depending on the Diskeeper version; C:\MyDir represents the directory path where you want to install Diskeeper.)

You can use any of the following methods to create an SMS package:

### **Repackage Installation Wizard**

The Repackage Installation Wizard is the simplest method for creating software packages. It operates by taking a "snapshot" of a reference computer's file system, registry, and desktop. After the first snapshot is taken, you can install a product and modify the computer as desired. Then the Repackage Installation Wizard takes another snapshot of the computer and compiles the difference into a script. The script is then compiled into a setup executable package. Packages created using the Repackage Installation Wizard can be installed on any target computer that is functionally equivalent to the reference computer.

### ***The Installation Expert***

The Installation Expert provides a graphical interface for building or editing an installation script. You can drag and drop files, registry keys, and shortcuts into a package definition and select other options for the package from a simple user interface. When you are finished describing the package content and characteristics, you compile the script into a setup executable package.

### ***The Script Editor***

Using the Script Editor you can create an ad hoc setup program using the SMS Installer scripting language.

You can choose to use a combination of SMS Installer mechanisms to create a setup package. For example, you can start your installation script by using the Repackage Installation Wizard and then customize the script by using the Script Editor.

Regardless of the mechanism you use, the result is compiled into a setup executable package—the actual software package. This package includes the setup logic, all the files, registry keys and other data, as well as the engine for performing the setup operation on a computer. You can distribute the migrated .msi file using the normal SMS 2.0 software distribution process.

### ***Package Definition File***

The .PDF file included in the Diskkeeper installation folder can be used to create an SMS 1.2 or SMS 2.0 package.



## Appendix D

# Diskeeper as a Cluster-Aware Application on a Cluster Server

Diskeeper can be run as a cluster-aware application on a cluster server. To do this, you must set up the DkCluster.exe executable image as a cluster resource and bring it online. DkCluster.exe is supplied with Diskeeper, and is located in the directory where Diskeeper is installed.

### Requirements

**Note:** This feature only appears on Windows 2000 systems. Diskeeper must be installed on all the nodes of the cluster upon which you want to run Diskeeper, under the same drive names and directories.

### Setting Up the Cluster Resource and Bringing it Online

Follow these steps to set up the cluster resource and bring it online:

1. Start the Cluster Administrator from the Start | Administrative Tools menu.
2. Create a new group by selecting **New**, then **Group** from the File menu.
3. Specify **ESI** for the group name, optionally add a description for the new group and click **Next**.
4. Select the nodes that Diskeeper is going to run on from **Available nodes:** list and **Add** them to the **Preferred owners:** list.
5. Click **Finish** to create the new cluster group.
6. Select the newly created group from the **Groups** tree.
7. Create a new resource by selecting **New**, then **Resource** from the File menu.
8. Specify **DkCluster** for the name and optionally add a description for the new resource.
9. Choose **Generic Application** for the **Resource type:** and click **Next**.

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10. The **Possible Owners** dialog box will display the nodes chosen in step 4 shown in the **Possible owners:** list box. Click **Next**.
11. Click **Next** on the **Dependencies** dialog box.
12. Under **Command line**, specify the path for the **DkCluster.exe** executable image which resides in the Diskeeper install directory.
13. Enter the Diskeeper install directory path under **Current directory**.
14. Check the **Allow application to interact with desktop** box and click **Next**.
15. Click **Finish** in the Registry Replication dialog box.
16. You can move the ESI group to the node on which you want to bring the **DkCluster** cluster resource online by right clicking on the ESI group in the Move Group option box.
17. To bring **Dkcluster.exe** online, select the **DkCluster** resource and select **Bring online** from the File menu.
18. Right-click **DkCluster** and select **Properties**.
19. Click the Advanced tab.
20. Select **Restart**.
21. Set **Threshold** to 0 (fails over immediately), or decide what value is wanted here. (The threshold value is the number of times the application will return to the same computer before it fails over to the next computer.)
22. Set **Period** to 1000. (Period is the time interval in seconds, during which the threshold count is tracked. After that time has elapsed, the threshold count starts over.)
23. Click **OK**.

# Glossary

**access:** To store *data* on, or retrieve data from, a *disk drive* or other *peripheral device*. See also *file*.

**administrator:** See *system administrator*.

**applet:** A small *application* program that is usually built into an *operating system* or a larger application program. For example, the built-in writing and drawing programs that come with *Windows* are sometimes called “applets.”

**application:** A computer *program*, which causes a computer *system* to perform some useful work for the user.

**AutoPlay:** A feature of some *Windows* applications on *CD-ROM* that causes the program to start automatically when the CD-ROM is placed in the drive.

**auto-restart:** A Diskkeeper feature that, given certain conditions are met, will automatically restart a computer and perform a boot-time defragmentation of the MFT and/or paging file.

**background processing:** The execution of certain operations during momentary lulls in the primary (foreground) process. An example of a background process is printing while a word processor is waiting for keystrokes.

**binary:** From Latin “bini,” meaning two by two and “ary,” meaning of, or pertaining to. Computers use the binary number system, which is a way of counting in which only two *digits* (0 and 1) are used. Contrast with the familiar decimal number system, in which we count with 10 digits (0 through 9).

**bit:** Short for *binary digit*. The smallest unit of information handled by a computer. Like a light switch, a bit is either on or off, which corresponds to a numerical value of one or zero. Larger numbers are expressed by groups of bits. See also *byte*.

**boot:** Refers to the initial start-up of a computer, such as when you turn on the computer’s power. From the word “bootstrap,” indicating the computer “lifts itself by the bootstraps;” that is, it gets itself going.

**boot-time:** The time during which a computer *boots*; that is, the computer is starting up and the *operating system* has not yet taken over control of the computer.

**browser:** A software program, such as Microsoft’s *Internet Explorer*, designed to locate and view Web pages on the *Internet*. In addition to displaying text, modern browsers also can display pictures and play sounds.

**byte:** A group of eight *bits*, which can represent a number from zero through 255, a letter of the alphabet, or a variety of other things.

**cache:** From the French word *cache*, meaning “to hide.” A temporary storage facility designed to speed things up by providing information to software that would otherwise have to be obtained from a slower *medium*. Caches exist for Web browsers, *disk drives* and *CPUs*. See also *cache memory*.

**cache coherency:** A condition where the *data* contained in the *cache memories* in a computer with multiple processors is kept consistent at all times.

**cache memory:** In computers, a cache is a small amount of very fast *memory* that is placed close to (or inside) the *CPU chip*, in order to improve performance. The cache memory holds copies of recently accessed *data*. Because computer programs often run the same instructions repeatedly, many times the CPU will find the data it needs in the cache and therefore will run faster because it does not need to access the computer’s main memory.

**CD-ROM:** Compact Disk Read-Only Memory. A stiff plastic disk commonly used by *software* manufacturers to distribute software to customers. As the name implies, the original contents of a CD-ROM cannot be changed.

**central processing unit (CPU):** The part of the computer hardware that controls the computer’s overall operation and performs computations. Most modern CPUs are built into a single *integrated circuit* or *chip*. See also *Pentium*, *x86*.

**chip:** See *integrated circuit*.

**CHKDSK:** A program that checks the integrity of a disk and corrects disk errors such as lost *clusters*.

**client:** In a computer *network*, a computer that uses the services of another computer, called a *server*. For example, a client can “ask” a server to provide it with needed data, or to print a file for the client. See also *server*, *workstation*.

**cluster:** Smallest addressable unit of space on a disk. A one-byte file will actually use a cluster of disk space. The minimum size of a cluster depends on the size of the disk *volume*. The *FAT file system* allows a maximum of 65,536 clusters per volume, which means that the cluster size on a 64-megabyte disk volume is one kilobyte, while a 128-megabyte volume uses two-kilobyte clusters. Thus, the FAT file system can be very wasteful of disk space on large volumes. The *NTFS* file system does not suffer from this limitation.

**COM:** Acronym for Component Object Model, a specification developed by Microsoft for building software *components* that can be made into programs or add functionality to existing programs running on Microsoft Windows platforms.

**component:** A small modular *program* that performs a specific function and is designed to work interactively with other components and *applications*. See also *applet*, *COM*, *DCOM*.

**contiguous:** Adjacent; placed one after the other. A contiguous file is not fragmented; that is, it takes up a single “chunk” of disk space. See also *fragmentation, defragmentation*.

**control file:** A file (**Diskeep.ctl**) used by *Diskeeper* to keep track of and control scheduled defragmentation of disk volumes. See also *Set It and Forget It*.

**controller:** A specialized electronic circuit, which serves as an *interface* between a *device*, such as a *disk drive*, and a computer. See also *IDE, SCSI*.

**CPU:** see *central processing unit*.

**data:** Information, as processed by a computer. Plural of the Latin word *datum*, meaning an item of information.

**database:** A collection of related information about a subject, organized in a useful manner that provides a base or foundation for procedures such as retrieving information, drawing conclusions, and making decisions.

**datum:** Singular of *data*.

**DCOM:** Acronym for Distributed Component Object Model, a version of the Component Object Model (*COM*) software developed by Microsoft to support *objects* distributed across a network. For example, the *Set It and Forget It* feature of *Diskeeper* uses DCOM to start a scheduled *defragmentation*.

**defragmentation:** The reduction or elimination of *fragmentation*, by making files and/or free disk space more *contiguous*.

**device:** A machine, such as a printer or a *disk drive*.

**digit:** From Latin “digitus,” meaning finger. Any of the numbers 0 through 9 in the decimal number system, called a digit because people originally used their fingers for counting. Computers use a *binary* number system with only two digits (0 and 1).

**directory:** A file that contains a catalog of files and other directories stored on a disk, which allows you to organize your files into groups, making them easier to find.

**directory consolidation:** A *Diskeeper* (*Windows NT/2000/XP* version) feature which, at *boot-time*, gathers (almost) all *directory* entries on a *disk volume* into a single area on the disk, instead of scattered in many places. The only exceptions are the `\Recycler` and `\Recycled` directories, which *Windows NT/2000/XP* expects to find at a fixed location on the volume. Directory consolidation makes *defragmentation* more effective than it would otherwise be. Directory consolidation requires sufficient contiguous free disk space into which the directories can be moved.

**disk drive:** A *device* containing one or more disks, treated as a unit by a computer.

**Diskeeper:** A *software* product that increases *system* performance through disk *defragmentation*. It eliminates *resource-wasting file fragmentation* safely, by consolidating fragmented files and free space.

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**diskette:** See *floppy disk*.

**domain:** In *Windows*, a group of *workstations* and *servers*, defined by an *administrator*, that share a common directory database and allow a user to log onto any *resource* in the domain with a single user ID and password. Each domain in a network has a unique name.

**drive:** See *disk drive*.

**drive letter:** In *Windows* and *MS-DOS operating systems*, the naming convention for *disk drives*, consisting of a letter, followed by a colon. Drives A: and B: are normally reserved for *floppy disk* drives and C: typically indicates the first *hard drive*. See also *volume*.

**encrypted file:** A file that has been scrambled and made unrecognizable by anyone who does not have the proper “key” to decode it. The Windows 2000/XP Encrypting File System (EFS) allows users to encrypt files and folders on an NTFS volume to prevent access by unauthorized individuals.

**event logging:** The *Windows NT/2000/XP* process of recording audit information when certain events occur, such as *services* starting and stopping, users logging on and off and accessing *resources*. Logged events can be viewed with the *Event Viewer* utility (in Administrative Tools). The Windows NT/2000/XP version of *Diskeeper* uses the Windows NT/2000/XP event log to record events, while on *Windows 95/98/Me* this information is written to a text file for the same purpose.

**Event Viewer:** A *Windows NT/2000/XP* utility, which permits the viewing of logged events. See also *event logging*.

**extended partition:** A type of *partition* that permits the limitation of four partitions per disk drive to be overcome. A disk drive may be partitioned into a maximum of four *primary partitions*, or three primary partitions plus an extended partition. One or more *logical drives* may be created within an extended partition.

**FAT:** See *file allocation table*.

**FAT file system:** The *file system* used by *MS-DOS* and adapted for *Windows* to store information on disks, which makes use of a *file allocation table*. There are three types of FAT file system. The FAT12 (12-bit) file system is used on FAT volumes smaller than 16 megabytes in size, such as floppy disks—it is not supported by *Diskeeper*. FAT16 can be found on *Windows 95/98/Me/NT/2000/XP*. *Windows 2000/XP*, *Windows 98* and the later *OSR 2* version of *Windows 95* also support FAT32; *Windows NT* does not.

**field:** A subdivision of a *record* in a *file*. For example, a record in a customer file may contain a name field, an address field and a phone number field.

**file:** A complete, named collection of *data*, such as a *program*, a set of data used by a program, or a user-created document. See also *record*, *field*.

**file allocation table (FAT):** A table or list maintained by some *operating systems*, to keep track of how *files* are stored on a disk.

**file system:** The method used by an *operating system*, of naming, *accessing* and organizing *files* and *directories* on a disk. See also *NTFS*, *FAT file system*.

**floppy disk:** A removable storage *medium*, consisting of a small magnetic disk made of flexible plastic, housed in a square protective envelope or cartridge. Originally, floppy disks really were “floppy,” because they were enclosed in a paper envelope. Also called a *diskette*, which is a better name for the more recent design that uses a stiff plastic cartridge. Contrast with *hard disk*.

**formatting:** A method of preparing a disk surface for use by placing certain magnetic patterns on it, which are used by the *file system* in storing and retrieving *data*.

**Frag Guard:** A Diskkeeper feature that, given certain conditions are met, will move unwanted data out of the MFT and/or paging file and thus reduce the likelihood of these files becoming more fragmented.

**fragmentation:** The word *fragmentation* means “the state of being fragmented.” The word *fragment* means “a detached, isolated or incomplete part.” It is derived from the Latin “fragmentum,” which in turn is derived from “frangere,” meaning “break.” So, *fragmentation* means that something is broken into parts that are detached, isolated or incomplete.

**graphical user interface (GUI):** Pronounced “gooey.” A user *interface*, as used in the *Windows operating systems*, which uses a mouse and graphic displays to interact with the user, with the purpose to make the computer system easier to use than other operating systems, such as *MS-DOS*.

**GUI:** See *graphical user interface*.

**hard disk:** One or more rigid metal platters, coated with magnetic material. Contrast with *floppy disk*, or *diskette*, which is made of plastic. Also used to refer to the physical unit that makes up a *disk drive*.

**hardware:** The physical parts of a computer *system*, including *devices* such as printers and *disk drives*. Contrast with *software*.

**IDE:** Integrated Device Electronics. One of two common types of *interfaces* between a *disk drive* and a computer, where the *controller* is built into the disk drive, which eliminates the need for a separate controller card in the computer. See also *SCSI*.

**integrated circuit:** Also called a *chip*. A collection of electronic parts with a specific purpose, built into a single physical package. See also *central processing unit*.

**Intel:** Manufacturer of *processor chips*, known especially for the *Pentium* and *x86* processors.

**interface:** The connection and interaction between *hardware*, *software* and/or the user. For example, a disk *controller* provides a physical interface between a computer

and a *disk drive*. The keyboard, mouse and display are an interface between a computer and the user.

**Internet:** A global *network* that links millions of computers. One popular section of the Internet is the World Wide Web, which allows computer users to view text and pictures with the aid of a browser, such as *Internet Explorer*. E-mail (electronic mail) is another popular part of the Internet, which allows computer users to send and receive written messages.

**Internet Explorer:** A software package developed by Microsoft for browsing the *Internet*, but increasingly used with other applications.

**job:** A request to have the computer or its *peripherals* perform some activity. In relation to *Diskeeper*, it is a request to have a disk *defragmented*.

**log file:** A *file* that keeps track of certain events as they occur. The *Windows NT/2000/XP operating system* maintains several log files that can be viewed with the *Event Viewer*. On *Windows 95/98/Me* systems, *Diskeeper* uses a specially created text file for the same purpose. See also *Event Logging*.

**logical drive:** That portion of the space on a *disk drive* that is considered by the *software* to be a single unit. In this context, *logical* means “conceptual.” because there is no direct relationship between the name and a physical object. See also *partition, volume*.

**long filenames:** In the DOS operating system, filenames were limited to a maximum of eight characters, followed by a period and up to three characters to indicate the type of file. This is also referred to as the 8.3 file naming convention. The *Windows NT/2000/XP* and *Windows 95/98/Me* operating systems allow filenames that are over 200 characters long. In addition, these filenames may contain a mixture of upper- and lowercase characters and embedded spaces.

**master file table (MFT):** On an *NTFS volume*, the master file table is a *file*, which contains information about all other files in that volume. This includes the name of each file, its physical location on the disk, and other information.

**media:** A collective word for the physical material on which computer-based information is stored, such as a *CD-ROM* or *floppy disk*. Media is the plural of *medium*, but like *data* is often used in the singular form.

**medium:** See *media*.

**memory:** The computer’s temporary working storage, where *program* instructions and *data* are kept, permitting the *CPU* to process the instructions.

**MFT:** See *master file table*.

**Microsoft:** A computer *software* company, with its head office in the state of Washington; creators of the *MS-DOS* and *Windows operating systems*.

**MMC:** Microsoft Management Console. MMC can be used to create, save and open administrative tools (called *snap-ins*), such as Diskkeeper. MMC provides a common user interface for system tools, as well as a system for managing hardware, software and network components.

**MS-DOS:** Microsoft Disk Operating System. An *operating system* designed for a small computer with a single user running one *application program* at a time.

**multitasking:** A feature of an *operating system*, where the computer can work on more than one *task* at a time. See also *background processing*.

**network:** A group of computers that are connected together and capable of exchanging data with each other. See also *server*, *client*.

**Network Scheduling Engine:** A *process*, generated by *Diskkeeper*, which performs the work of updating the *Diskkeeper control files* on one or more remote computers, without the need for you to individually connect to each computer.

**NTFS:** New Technology File System. A *file system* designed specifically for use with *Windows NT/2000/XP*.

**OEM:** Acronym for original equipment manufacturer. The term is misleading, because an OEM typically buys computers from another manufacturer, customizes them for a particular application, and then sells them under the OEM's own brand name.

**operating system:** A collection of *programs*, which perform *system* functions and control the running of *application* programs and the allocation of *resources*.

**OSR 2:** Acronym for *OEM Service Release 2*, a version of *Windows 95* released in late 1996, which features an improved file system, called *FAT32*, while the original version of *Windows 95* used *FAT16*.

**page file** or **paging file:** An area of a disk that is set aside to hold *data* intended to reside in the computer's *memory*. Portions of the paging file are copied to memory as needed. This mechanism requires a much smaller amount of physical memory than would be required if the entire *program* were to be loaded into memory all at once.

**partition:** A subdivision of the space on a *disk drive* that is treated as though it were a separate physical unit. A computer with only one hard disk drive can have a single partition, often called drive C:, or it can have several partitions, such as drive C:, drive D:, and drive E:. See also *volume*, *drive letter*, *primary partition*, *extended partition*, *logical drive*.

**Pentium:** The name of a type of *processor*, introduced by *Intel* in 1993. It is the successor to the 80486 and equivalent to the 80586 chip in the *x86* series.

**peripheral device:** (Related to *periphery*, roughly meaning "on the outside.") A *device*, such as a *disk drive*, printer, keyboard or mouse, connected to and used by a computer.

**permission:** The ability of a user on a computer *system* to *access* or modify *files*, especially those that he or she did not create. Permissions exist for security reasons, to prevent unauthorized access to sensitive information. The *system administrator* assigns permissions, or “who has access to what.”

**platform:** The environment, in which a computer *system* operates, either based on the computer’s *CPU* or its *operating system*. For example: the *x86* platform, or the *Windows NT/2000* platform.

**platter:** A *disk drive* consists of one or more platters, each of which can receive magnetic recordings on both sides. The platter spins like a phonograph record on a turntable.

**primary partition:** In *Windows* and *MS-DOS operating systems*, the disk space on a *disk drive* may be divided into a maximum of four primary partitions; or three primary partitions plus an *extended partition*, which in turn can contain one or more *logical drives*.

**priority:** On a *Windows system*, several *programs* can appear to be running at once, even though the *CPU* can only process one instruction at a time. With the help of the *operating system*, the CPU processes a few instructions from one program, then a few instructions of the next program, and so on, over and over. Without priority assignments, each program would be given about the same amount of time in each “time slot.” but by assigning priorities, the more important programs can be given longer time intervals than the less important ones, allowing them to complete faster.

**process:** A *program*, along with the system *resources* the program requires to run. A process represents a unit of resource ownership and work to be done. The *operating system* creates processes to keep track of resources and to ensure the proper scheduling of *tasks*.

**processor:** See *central processing unit*.

**program:** A set of instructions that tell a computer what to do. Synonym: *software*.

**RAID:** Redundant Array of Independent Disks. A method of combining several *disk drives* to make one large volume. Typically used on a *network file server* to achieve faster *access*, greater protection against disk failure, or both.

**record:** A collection of related *data* items, treated as a unit. For example, in a *file* containing information about a company’s customers, one record would consist of the particulars (name, address, phone number, etc.) of one customer. See also *field*.

**registry:** A *database* that contains information about current *hardware* settings, installed *software*, user preferences and associations between *file* types, and *applications* that *access* those files.

**resource:** Any part of a computer system, such as a *disk drive*, printer, or *memory*, which can be used by a *program*.

**SCSI:** Small Computer System Interface. One of two common methods of *interfacing disk drives* and other *devices* to computers. See also *IDE*.

**server:** On a computer network, a computer that makes *resources* available to other computers (*clients* or *workstations*.) For example, all the computers on a network can be set up to share a single high-speed printer, which is connected to the server. Usually, the server is faster and more powerful than the client computers connected to it.

**service:** A process that performs a specific system function and often provides an application programming interface (API) for other processes to call. *Diskeeper* uses a *Windows* service, which allows *Diskeeper* to run in the *background* while other applications are running.

**Service Pack:** A collection of *software* used to issue corrections and updates to software between major releases.

**Set It and Forget It:** A term that was created by Executive Software, which is a registered trademark and hallmark of the company. A “Set It and Forget It” product can operate transparently (unseen by the user) and in the *background* (concurrent with other *applications*). After a schedule is set up for its operation, it thereafter performs its functions at predetermined times, without further intervention or attention from the user or *administrator*.

**Smart Scheduling:** A feature, introduced with *Diskeeper* 6.0, which has a built-in mechanism to determine how frequently a disk *volume* needs to be *defragmented*. With Smart Scheduling, *Diskeeper* automatically schedules defragmentation runs to occur more often when a disk volume becomes more fragmented, or less often when it becomes less fragmented.

**SMS:** System Management Server. A *software* product from *Microsoft*, which permits the *system administrator* on a *Windows NT/2000/XP network* to do such things as install and run new software on different computers on the network, all from a single location.

**snap-in:** A program, such as *Diskeeper*, that can be used with the Microsoft Management Console (*MMC*). For more information, see the *MMC Help* facility.

**software:** A generic term for computer *programs*, taken collectively. Contrast with *hardware*. Software can be categorized into *application* software and *system* software.

**sparse files:** A method of storing large files—that contain mostly empty space and not much data—in a way that uses much less disk space than would otherwise be used. Sparse file support allows an application to create very large files without committing disk space for every byte.

**system:** The collection of one or more computers and *peripheral devices*. Sometimes used as a synonym for *operating system*, or the combination of *hardware* and *software*, as a logical unit.

## 100 Glossary

**system administrator:** The person in charge of maintaining a multi-user computer system.

**system file:** In general, a *file* that is part of, or *accessed* by, the *operating system*. The Diskeeper graphic analysis display shows certain system files in green, particularly the *master file table* (MFT) and several other files that cannot be moved safely by Diskeeper (or any other defragmenter). These are not the files that make up the *Windows NT/2000/XP operating system*, but the files that make up the *NTFS file system*.

**task:** A *program* or portion thereof that is run as an independent entity.

**trialware:** A free software package from Executive Software, such as Diskeeper, that has the same functionality as the official version of the software, but which works for a limited time period, after which it expires. Trialware allows the user to try the software before making a buying decision.

**utility:** A *program* that provides basic services or functions.

**volume:** A subdivision of the space on a *disk drive* that is treated as though it were a separate physical unit, or a combination of physical disks treated as a single unit. A computer with only one hard disk drive can have a single volume, often called drive C:, or it can have several volumes, such as drive C:, drive D:, and drive E:. See also *drive letter, logical drive, partition*.

**volume set:** In *Windows*, a single *logical drive*, which is composed of up to 32 areas of free space on one or more *disk drives*. Volume sets can be used to combine small areas of free space on one or more disk drives into a larger logical drive, or to create a single large logical drive out of two or more small disks.

**Windows:** A family of *operating systems*, first introduced by *Microsoft* in 1983, with a *graphical user interface* and which ran on *MS-DOS* based computers. See also *Windows 95, Windows 98, Windows NT, Windows 2000, Windows XP*.

**Windows 95:** A version of *Windows* released in 1995. New features in Windows 95 with regard to its predecessor, Windows 3.1, include a new user interface and support for 32-bit applications. See also *OSR 2*.

**Windows 98:** Successor to the *Windows 95* operating system, Windows 98 features support for the *FAT32 file system*, greater Internet integration, and supports recent hardware developments.

**Windows Me:** Short for Windows Millennium Edition, an *operating system* released by *Microsoft* in September 2000. Successor to *Windows 98* and designed for home use, Windows Me offers enhancements in the areas of *digital media, user interface, home networking*, and the *Internet*.

**Windows NT:** An *operating system* released by *Microsoft* in 1993 (NT stands for New Technology.) It has a similar *graphical user interface* to *Windows*, but it does not run

over *MS-DOS* and has been designed specifically for computer *network* environments.

**Windows 2000:** Originally named *Windows NT 5.0*, Windows 2000 is a family of operating systems for desktop computers and network servers, announced by *Microsoft* in 1998. Windows 2000 resembles *Windows NT 4.0* and *Windows 98*, but has many enhancements and new features.

**Windows XP:** An *operating system* that is based on and expands upon the *Windows NT* and *Windows 2000* technologies. Its Professional version is scheduled for release to the public in October 2001.

**workgroup:** In *Windows*, a workgroup consists of one or more computers that do not participate in a *domain* and are therefore responsible for their own security and administration.

**workstation:** A computer that has been set up for use by an individual typically connected to a *network*. The term is also used to indicate a *client* computer, in contrast with a *server*.

**x86:** Symbol to represent a series of *CPUs*, manufactured by *Intel* and others, including model numbers 8086, 80286, 80386, 80486 and 80586 (*Pentium*). All of the CPUs in this series have certain characteristics in common, which permits *software* to be written that will run on any of them.

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