Diskeeper®9

"Set It and Forget It" Disk Defragmenter for Windows®

REVIEWER'S GUIDE

Executive® Software

Diskeeper 9 Reviewer's Guide

Part 1: Everything you ever wanted to know about eliminating fragmentation

Why defragment?

Disk fragmentation occurs when a file on the hard drive is broken up into pieces which are written to separate areas of the disk.

When the computer needs to access this file, all those pieces must be retrieved from several locations. (Imagine trying to make a sandwich with the bread in the kitchen, the roast beef in the basement, the cheese in the guest room and the condiments in the attic.)

Left unchecked, fragmentation grows like a weed. As more and more files are fragmented into more and more pieces, the speed at which the hard drive can read and write files slows to a crawl.

Information can only be processed as quickly as it is delivered. A computer may have the fastest processor (CPU) that money can buy, but if the hard drive can't deliver information quickly, that processor will sit there, twiddling its electronic thumbs. That's why fragmentation can bring even the fastest computers to their knees.

Defragmentation is the process of reassembling these broken pieces so that files can be read from a single location on the disk. Only by keeping fragmentation levels as low as possible can a hard drive deliver data as quickly as possible.

But the problems of fragmentation go well beyond slow performance. Severe fragmentation hammers system reliability. Furthermore, Microsoft has identified two critical system areas that must be defragmented to ensure stability: The paging file (a.k.a. virtual memory), a disk-based extension of the computer's physical memory (RAM), and the Master File Table (MFT), the virtual table of contents that tells Windows where to find files on the hard drive. When a Windows computer suffers from mysterious crashes, hangs and freeze-ups, fragmentation is often to blame.

Back in the DOS days, fragmentation was much less of a problem. Today's advanced operating systems demand more resources and are constantly reading, writing and deleting files. The simple act of opening a web page results in several files being written to the disk. The problem has gotten so bad that fragmentation can choke a computer within a matter of days—sometimes even hours.

When their computers slow down, crash, and boot slowly (or not at all), users often blame the operating system or the hardware. What they don't realize is that the *real* enemy of computer speed and stability is disk fragmentation.

What do computer users want in a defragmenter?

Diskeeper development is based around intensive market research: We ask computer users what they need and want, and our developers design the technology that will deliver it.

Our market research shows that home users and corporate users have similar concerns. It's not so much what they want, but what they *don't* want: They don't want slowdowns, they don't want freeze-ups, and they don't want crashes. They are concerned with the speed and reliability of their computer systems. They want a solution for these problems that is automatic and easy to use.

Disk fragmentation is a major cause of all these problems. The solution is a software system that simply makes the problem of fragmentation simply *go away forever*, with minimal fuss and minimal user intervention.

Home and corporate users agreed on the most desirable benefits of a dedicated automatic defragmenter: The ability to keep computers running at top speed, "Set It and Forget It" functionality, and achieving optimum performance on their computers.

When asked what features they consider to be most important in an automatic defragmenter, almost all agree: A very fast defragmentation engine. Home users like the concept of "Set It and Forget It" scheduling that runs when they want it to and an intuitive, easy-to-use interface. Corporate users value the ability to quickly defragment large disk volumes and the ability to defragment system files that are critical to system stability.

Diskeeper 9 builds on the strengths of earlier versions of Diskeeper and introduces new technology and new features to deliver what users want: A computing experience free of frustrating slowdowns, lock-ups and crashes.

Why is Diskeeper the only solution that meets users' needs?

Let's compare defragmentation to housecleaning. Everyone's house gets dirty, and there are basically three ways to handle it:

1. Do nothing. The house gets dirtier and dirtier, stuff starts to pile up, the smell gets worse and neighbors start calling the health department. Eventually the house gets so dirty that it's uninhabitable, so you move out and find another place to live. (This scenario is similar to never defragmenting.)

2. Clean it yourself. This usually requires carving a few hours a week out of your free time. (This scenario is like using a manual defragmenter.)

3. Hire a housecleaning service to come in and clean on a regular basis. (Automatic defragmentation.)

#2 seems like a reasonable solution. After all, plenty of people clean their own houses, right? In theory, yes. In reality, things come up—weekend plans, long work hours, etc. You might only have an hour to straighten up, or you might skip this week's cleaning altogether. The end result is that the house is rarely as clean as it could be, and when you do clean, it takes a huge chunk of your time.

The most effective way to keep your house clean is to have it done automatically, on a regular basis. And the most effective way to keep a computer running at top speed with maximum reliability is to have it defragmented automatically.

But wait—it's not quite that simple.

Let's say you hire a housecleaning service to come to your house once a week and scrub the daylights out of it. They vacuum carpets, clean windows, polish furniture, organize the attic, etc., etc. It takes them all day and well into the evening. And while you want a clean house, it's annoying to have to wait to eat dinner because someone is polishing the chrome on your oven door. Or to have to park on the street because someone was midway through straightening up the garage just as you got home from work.

Yet that's how a typical scheduled defragmenter works.

The perfect cleaning service is one that works around you. You can tell them when you want them to clean, or they can decide how often to clean based on how quickly your house gets dirty. They take care of the big stuff first—counters, floors, bathroom—so that you have a clean house as quickly as possible. Minor chores, like polishing the chrome in the kitchen or cleaning the garage, are done at times when they won't inconvenience you. And if they do happen to be cleaning a room you need to use, they get out of your way immediately.

That's how Diskeeper 9 works.

It's important to keep in mind that Diskeeper is not just a high-speed defragmenter that can be scheduled. *Diskeeper is a software system that completely eliminates the problems caused by fragmentation.* Once installed, it does this with no user intervention required. That's why we call it the "Set It and Forget It"® defragmenter!

Part 2: Introducing Diskeeper 9

Diskeeper started life as a defragmenter for VAX/VMS systems. Administrators were spending nights and weekends manually defragmenting their systems. Executive Software created the first online defragmenter for VAX/VMS systems and advertised it with the headline "Free weekends!" Diskeeper quickly became the best selling third-party VMS software title of all time.

When Microsoft developed Windows NT®, Executive Software developed Diskeeper for Windows, the first defragmenter for NT systems. When Microsoft developed Windows 2000, Executive Software supplied the technology for the built-in defragmenter.

With its superior defragmentation engine design and "Set It and Forget It" functionality, Diskeeper has remained at the forefront of defragmentation technology. It's no surprise that over 98% of corporations that use automatic defragmenters have chosen Diskeeper.

Diskeeper 9 Features

The following features are available in all versions of Diskeeper 9:

• **High-speed defragmentation engine**

- **"Set It and Forget It" operation** automatically defragments according to the schedule set by the user—or Diskeeper can schedule itself with SmartScheduling™

- **Multi-pass defragmentation** maintains maximum PC performance with no long waits or slowdowns

- **NEW! I/O Smart™** intelligently monitors drive access during defragmentation and allows other programs and processes to have priority access to the drive

- **Screen saver mode** defragments your drive while the system is idle

- **Power management for laptops** prolongs battery life by suspending background defragmentation while the computer is on battery power

- **30-day money-back satisfaction guarantee**

The following features are available in Diskeeper 9 Professional and Server Editions:

- **Boot-time mode** safely performs Microsoft-recommended defragmentation of the MFT and paging file (Note: Windows XP and Server 2003 allow partial defragmentation of the MFT while the computer is running. Complete defragmentation requires the Diskeeper boot-time mode)

- **NEW! FragShield™** dynamically reduces the fragmentation of critical system files to maximize system stability and reliability

- **NEW! Set up to two schedules per drive** for customized defragmentation based on when and how you use your computer

- **NEW! File performance defragmentation mode** gives an instant performance boost by defragmenting the files that are causing the biggest slowdowns

Isn't the built-in defragmenter enough for most users?

Executive Software provided the core technology used in the manual defragmenter that comes built into Windows XP, 2000 and Server 2003. The built-in defragmenter provides basic defragmenting functionality, in the same way that WordPad provides basic word processing functionality.

Most users quickly outgrow WordPad, so they buy a full-function word processor. Likewise, they quickly outgrow the built-in defragmenter; they just don't realize it. Once they start using their computer regularly, it's time to upgrade to Diskeeper 9.

Who can benefit from Diskeeper?

Anyone who uses a computer can benefit from Diskeeper!

Computer novices: By automating the defragmentation process, Diskeeper makes the computer "maintenance free" and eliminates frustrating fragmentation-related slowdowns and crashes.

Computer experts: For power users who regard their computers as finely-tuned machines, Diskeeper keeps their performance edge razor-sharp. Detailed reports and information screens keep the user informed of exactly what's going on "under the hood".

Gamers: There's nothing more frustrating than having to wait for a game to load or suffering choppy animation and low frame rates because the disk can't deliver data fast enough. Diskeeper ensures optimum load times, fast transitions between phases of the game, and no disk-related slowdowns while playing.

Internet surfers: Browsing the Web is a disk-intensive process. With files constantly being written to and read from the cache, surfing the web can lead to serious fragmentation. Diskeeper eliminates this problem, providing lightning-fast cache reads and writes and eliminating the buildup of fragmentation.

Business users: For those who rely on their PCs for a living, slow computer performance can kill productivity and an ill-timed crash can have disastrous results. Diskeeper eliminates fragmentation-related slowdowns and crashes.

Corporate system administrators: Routine manual defragmentation of every machine on a corporate network is impractical due to the labor and time that would be required. That's why most corporations that rely on manual defragmentation wind up never defragmenting at all. Diskeeper keeps every machine defragmented all the time with no intervention required. Likewise, servers that need to run 24/7 can't be taken down for manual defragmentation. The Diskeeper product line includes Server editions specially designed to keep large servers defragmented with no performance loss during defragmentation.

Diskeeper 9 Editions

Introduced in October of 2004, Diskeeper 9 is available in six editions:

Diskeeper 9 Home Edition is designed for home users who want maximum computer speed with easy "Set It and Forget It" functionality. Diskeeper 9 Home Edition runs on Windows XP, 2000 Professional, Me and 95/98.

Diskeeper 9 Professional Edition provides advanced functionality to boost reliability on NTFS volumes and a wide variety of configuration options. Diskeeper 9 Professional Edition runs on all Windows editions (95 and above), *except* for Windows Server editions.

Diskeeper 9 Server Standard Edition keeps servers running at maximum levels of speed and reliability. Diskeeper 9 Server Standard Edition runs on all versions of Windows 2000, Server 2003, NT and XP.

Diskeeper 9 Server Enterprise Edition is specially designed for high-capacity and mission-critical servers, and includes the Terabyte Volume Engine™ for thorough defragmentation of large disk volumes with millions of files. Diskeeper 9 Server Enterprise Edition runs on all versions of Windows 2000, Server 2003 and XP.

Diskeeper 9 Administrator Edition is a centralized management utility that allows remote management of Diskeeper on a network, including installation, scheduling, reports, e-mail alerts, and remote control. Diskeeper 9 Administrator Edition runs on all versions of Windows 2000, Server 2003, XP and NT.

Note: This reviewer's guide covers Home, Professional, Server Standard and Server Enterprise edition. If you would like more information on evaluating Administrator Edition, please contact Colleen Toumayan; contact information will be found at the end of this guide.

Part 3: Evaluating Diskeeper 9

Installing Diskeeper 9

Install Diskeeper by following the instructions on the CD and accepting the default settings. The first time you run Diskeeper, it will check for updates. If an update is required, download and install it before proceeding.

The Diskeeper 9 Interface

When you first start Diskeeper, the interface will look like this:
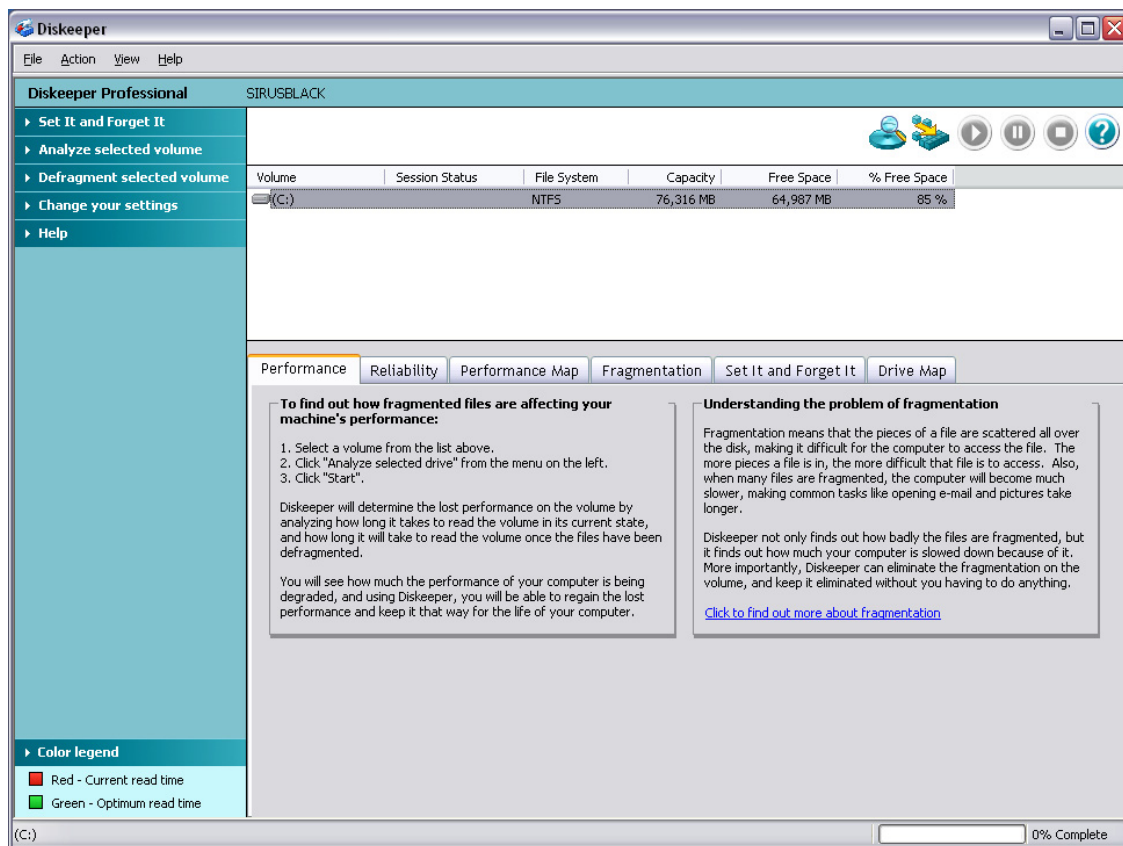
Disk analysis

The Disk Analysis will show you the extent and effects of fragmentation on your PC.

Highlight one of the drives. On the left side of the Diskeeper screen, click **Analyze selected drive**, then **Start**.

When the analysis is finished, a summary screen will appear:

```
┌─────────────────────────────────────────────────────────────┐
│ Analysis Completed                                        ✕   │
├─────────────────────────────────────────────────────────────┤
│ Findings on C:                                                │
│                                                               │
│ Diskeeper has completed analysis of this volume and found     │
│ 1967 fragmented files and/or directories and 13369 excess     │
│ fragments.                                                    │
│                                                               │
│ The average number of fragments per file is 1.33.            │
│                                                               │
│ This volume is heavily fragmented, with 75% of the total      │
│ volume space available for defragmentation. If you haven't    │
│ run Diskeeper on this volume yet, it is time to do so. If you │
│ have run Diskeeper on this volume, you should schedule         │
│ Diskeeper to run more often than it has been running to       │
│ reduce the current fragmentation and maintain a lower level   │
│ of fragmentation. Also, scheduling Diskeeper to run at times  │
│ when system activity is low improves the overall performance  │
│ of your computer.                                             │
│                                                               │
│                                                               │
│ ☑ Show this screen after analysis.              [   OK   ]    │
└─────────────────────────────────────────────────────────────┘
```

Click **OK**.

Diskeeper has several screens to show you the effects of fragmentation. The first is the performance analysis, which compares the time currently required to read fragmented files with the optimum read time (i.e. read time with the drive defragmented). The same comparison is shown for all files on the drive.
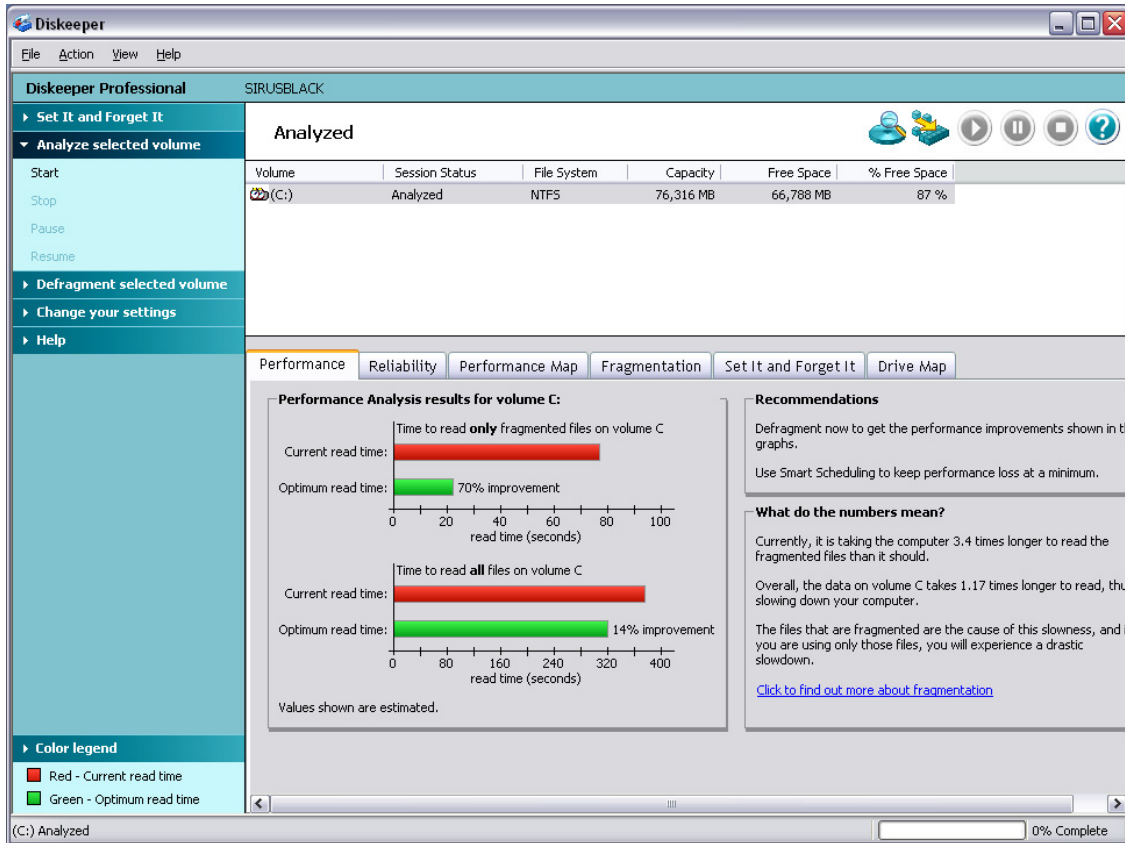
The right side of the screen includes a recommend course of action as well as an explanation of what the numbers mean.

Next, click the **Reliability** tab.
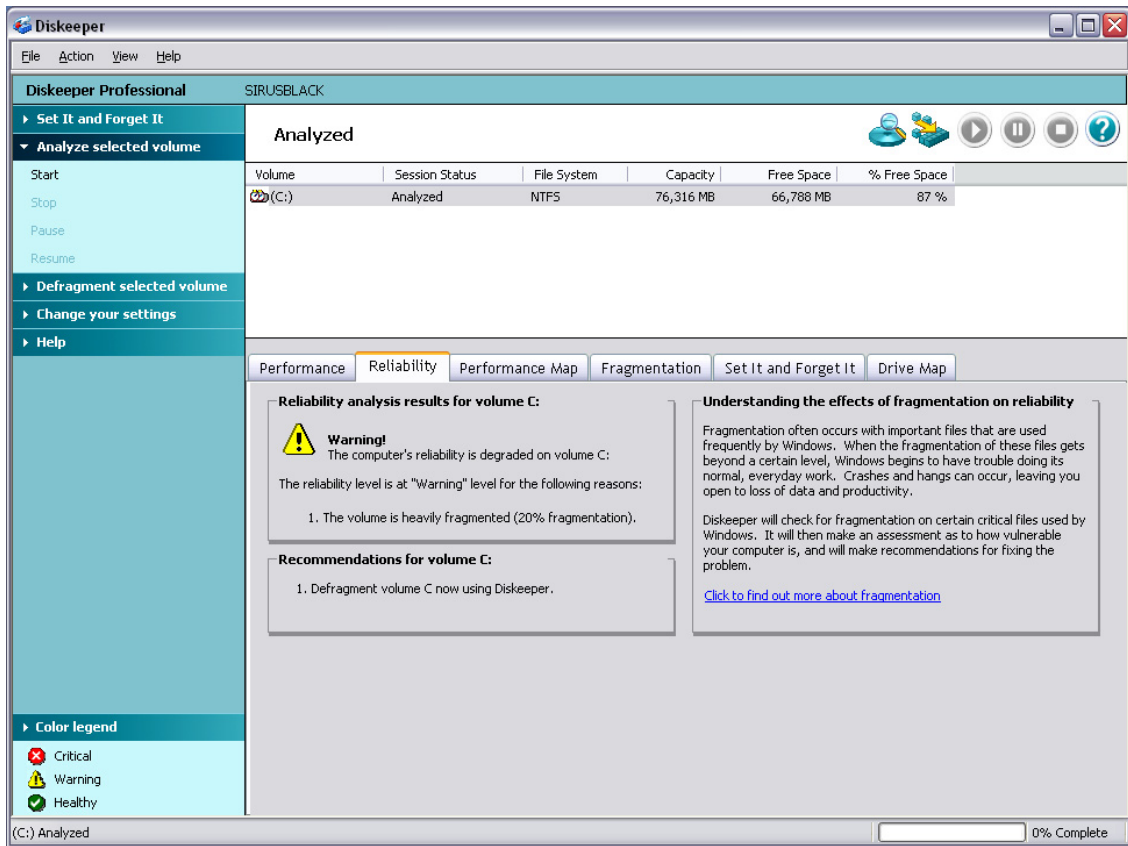
The reliability tab assigns a condition to the disk (healthy, warning or critical) and explains the problems that are causing this condition, including heavy fragmentation or low disk free space. This screen includes an explanation of how fragmentation affects reliability and a recommended course of action.

Now click the **Fragmentation** tab.
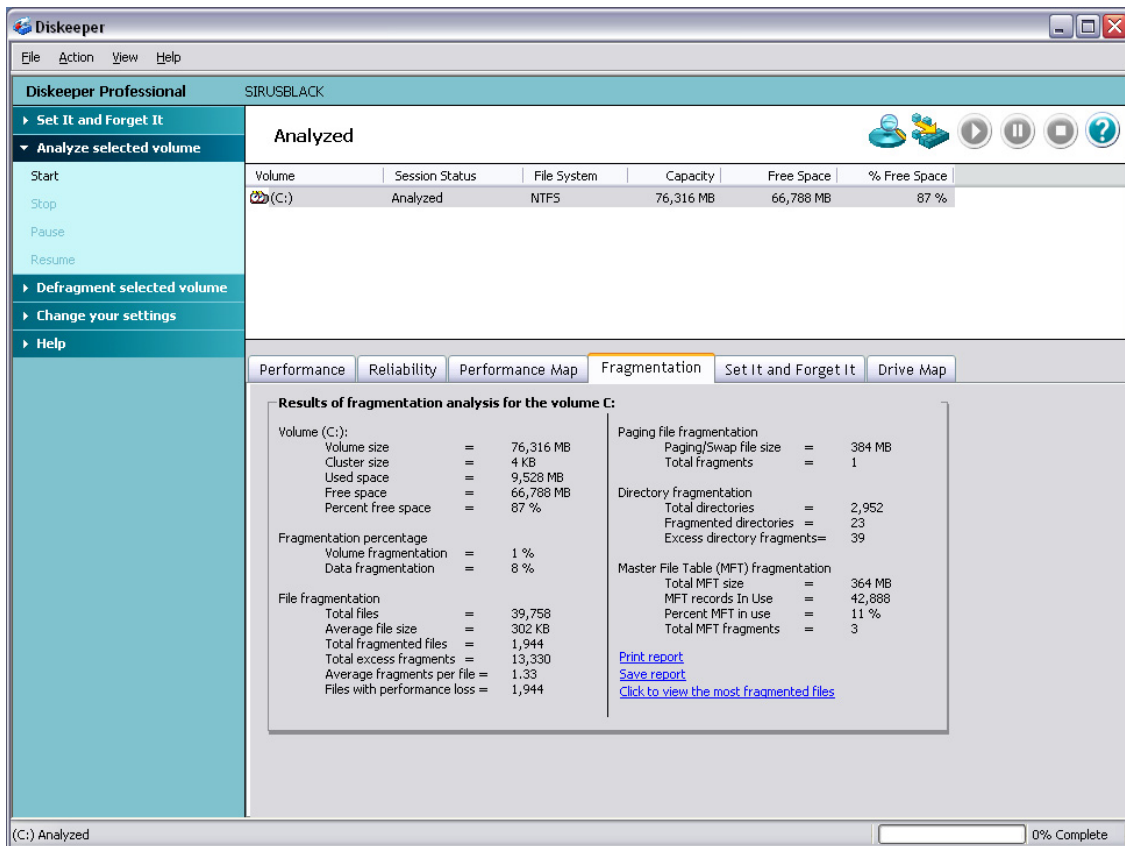
For those who really want to know what's going on "under the hood", this screen contains numeric data relating to fragmentation including detailed information on the fragmentation of files, directories, the paging file and the master file table. You can see a list of the most fragmented files by clicking the link at the bottom-right.

Diskeeper 9 has two ways of displaying a graphical representation of the disk. Click the **Performance Map** tab.
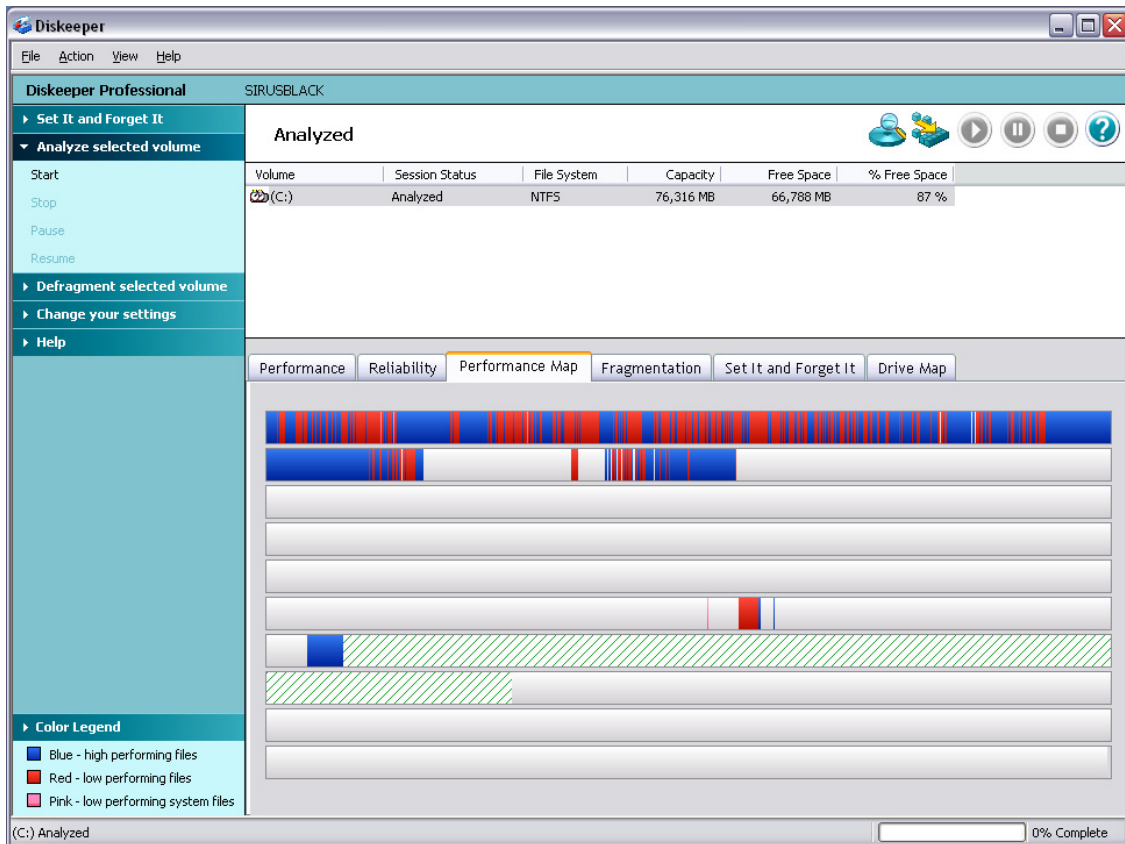
The Performance Map shows a simple representation of fragmented and defragmented files. (This is an actual screenshot from the author's system after running for about a week and a half with Diskeeper disabled. Notice that this volume is heavily fragmented despite the presence of large areas of free space.)

Click on **Drive Map**.
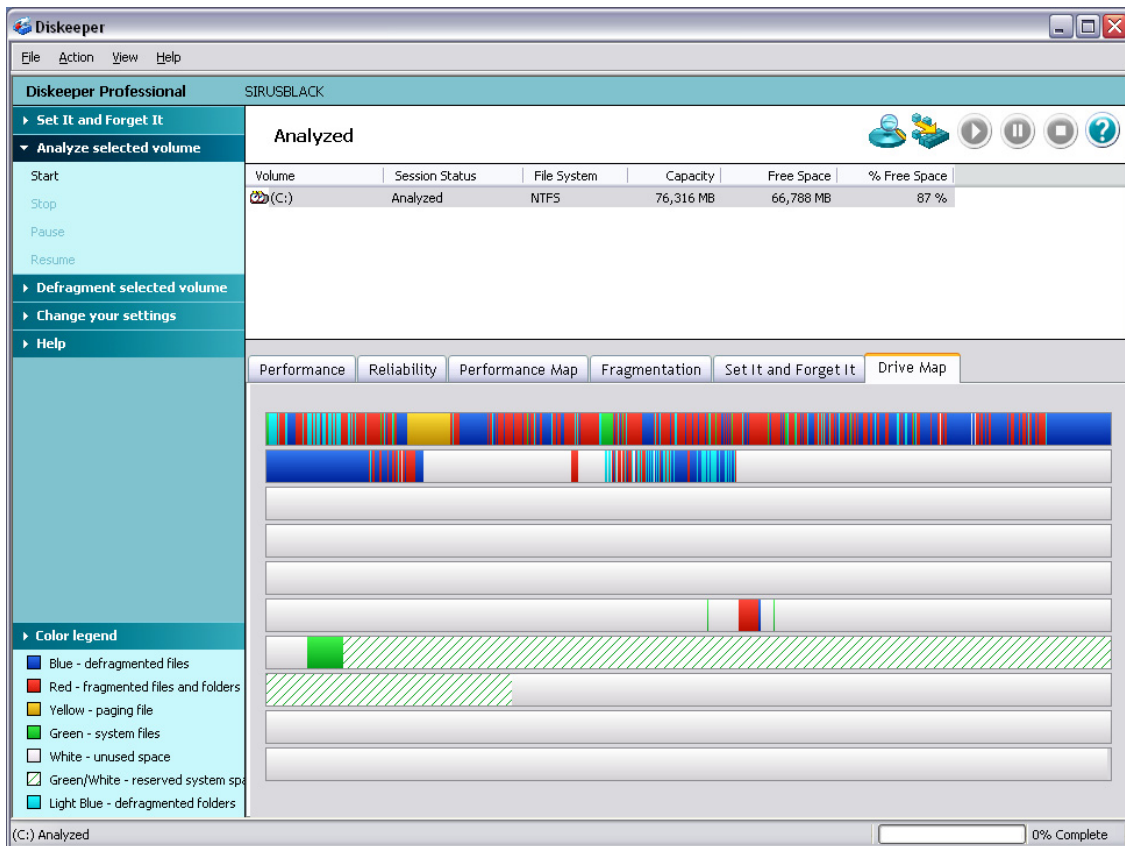
The Drive Map is similar to the Performance Map, with different colors to differentiate folders, system files, paging file, and reserved system space.
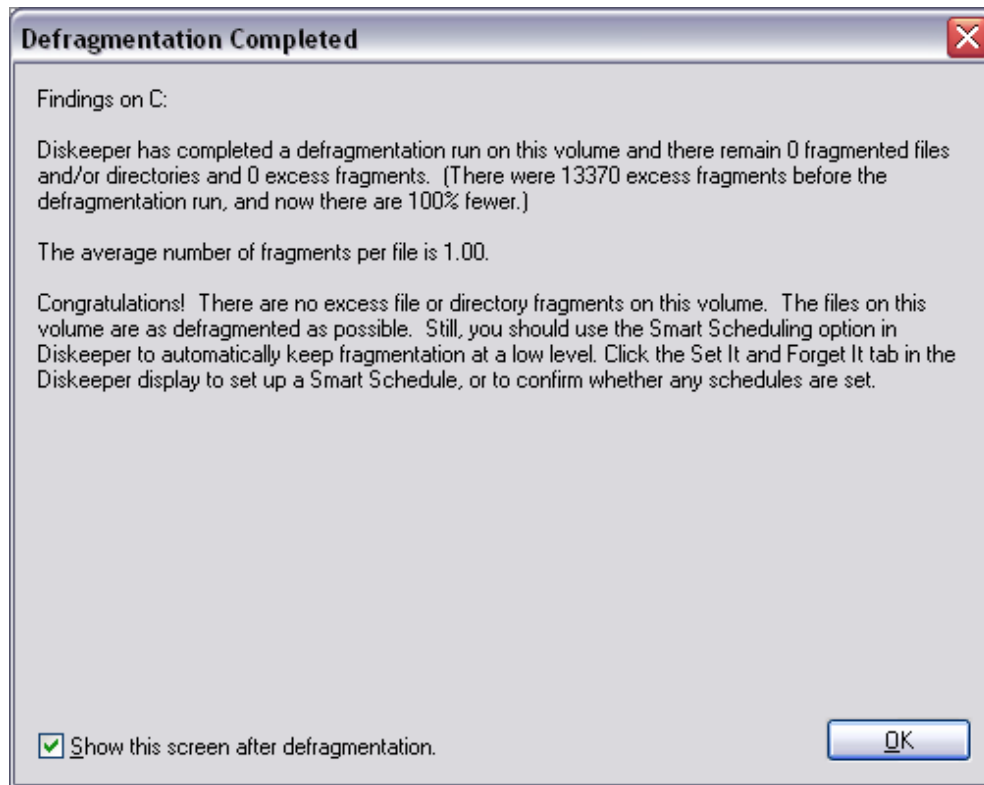
Manual defragmentation

Though Diskeeper 9 is designed to be an automatic background defragmenter, it can be used to defragment manually. If the computer hasn't been defragmented in a while, it's a good idea to manually defragment the drives.

Highlight the drive you wish to defragment, select the **Defragment selected drive** tab, then click **Start**. The status bar at the bottom of the screen will show you which files are currently being moved as well as the total progress. If you like, you can click the Performance Map or Drive Map tabs during defragmentation to watch the movement of the files.

Here you'll start to see the differences between Diskeeper 9 and the built-in defragmenter. Diskeeper is up to five times faster; drives that take the built-in defragmenter hours to clean up can be defragmented by Diskeeper in minutes. (The author's system took about six and a half minutes to defragment using the Diskeeper default settings.)

While the built-in defragmenter has a heavy system resource load, Diskeeper allows you to keep using your computer during defragmentation, thanks to the engine's low resource usage. I/O Smart (described in detail later in this document) is disabled by default for manual defragmentation, so you may see some lag in disk-intensive operations. I/O Smart is enabled by default for background defragmentation, so such lags will not occur.

Once the drive has been defragmented, a summary screen will appear:

In some cases, the summary screen will indicate that some files are still fragmented. This is intentional. Diskeeper reports the status of *all* files, not just files that are available for defragmentation. If an unavailable file is fragmented, the summary screen will reflect that.

Why would a file be unavailable for defragmentation?
During the fragmentation run, there may be files or portions of files that the operating system flags as unavailable for defragmentation, usually for safety or security reasons. The only way to defragment these files while the system is up and running would be to bypass the operating system's built-in protective mechanisms. Diskeeper prioritizes data integrity above all other concerns, so it does not attempt to bypass these mechanisms and instead leaves the file alone.

Because Diskeeper is a multi-pass background defragmenter, unavailable files are not a major concern. Once a file or file section become available, it will be defragmented during the next background pass.

Now click the **Performance** tab.
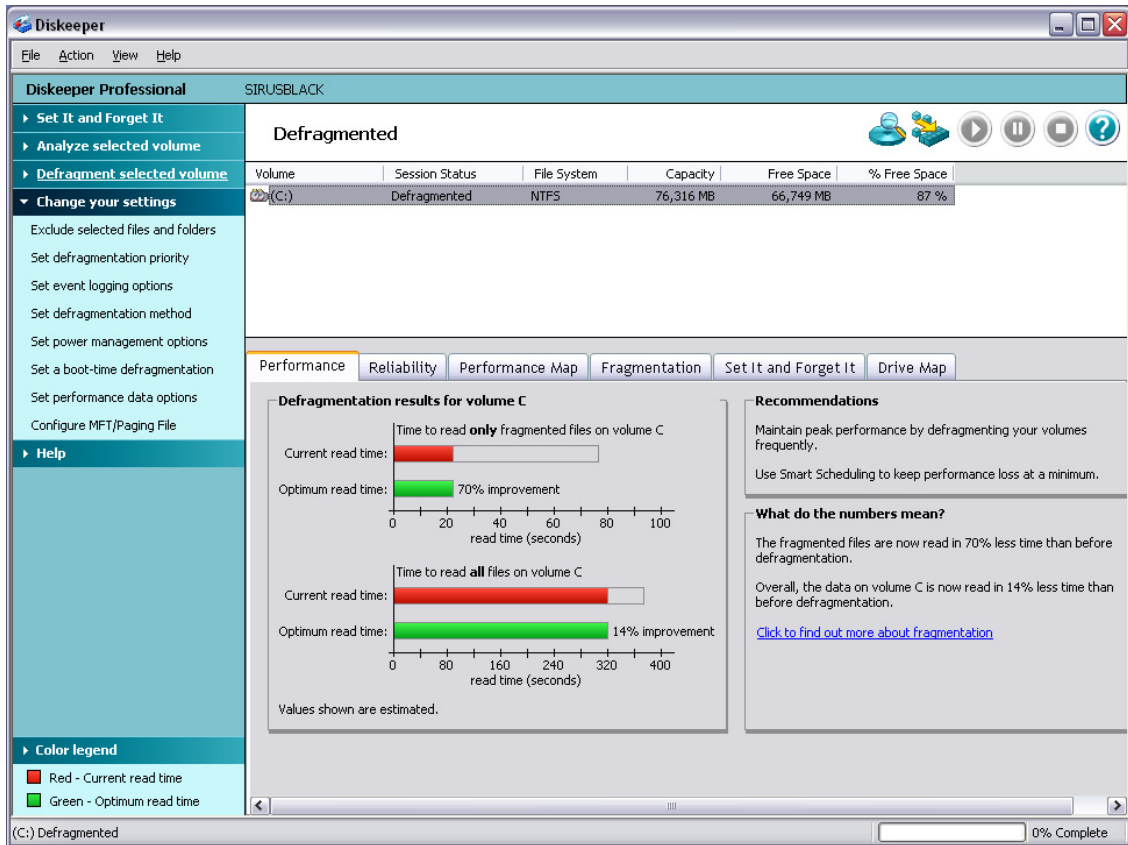
The graphs will be updated to show the performance improvements. You will find similar updates on the Reliability, Fragmentation, Performance Map and Drive Map tabs.

If you check the performance or drive maps, you may still see unused disk space spread throughout the volume, rather than being totally consolidated. In order to restore performance as quickly as possible, Diskeeper does not concentrate heavily on free space consolidation during manual defragmentation runs. (Remember, files will often fragment regardless of the amount of free space available.) Free space consolidation can be achieved by setting the defragmentation method (described in detail later in this document).
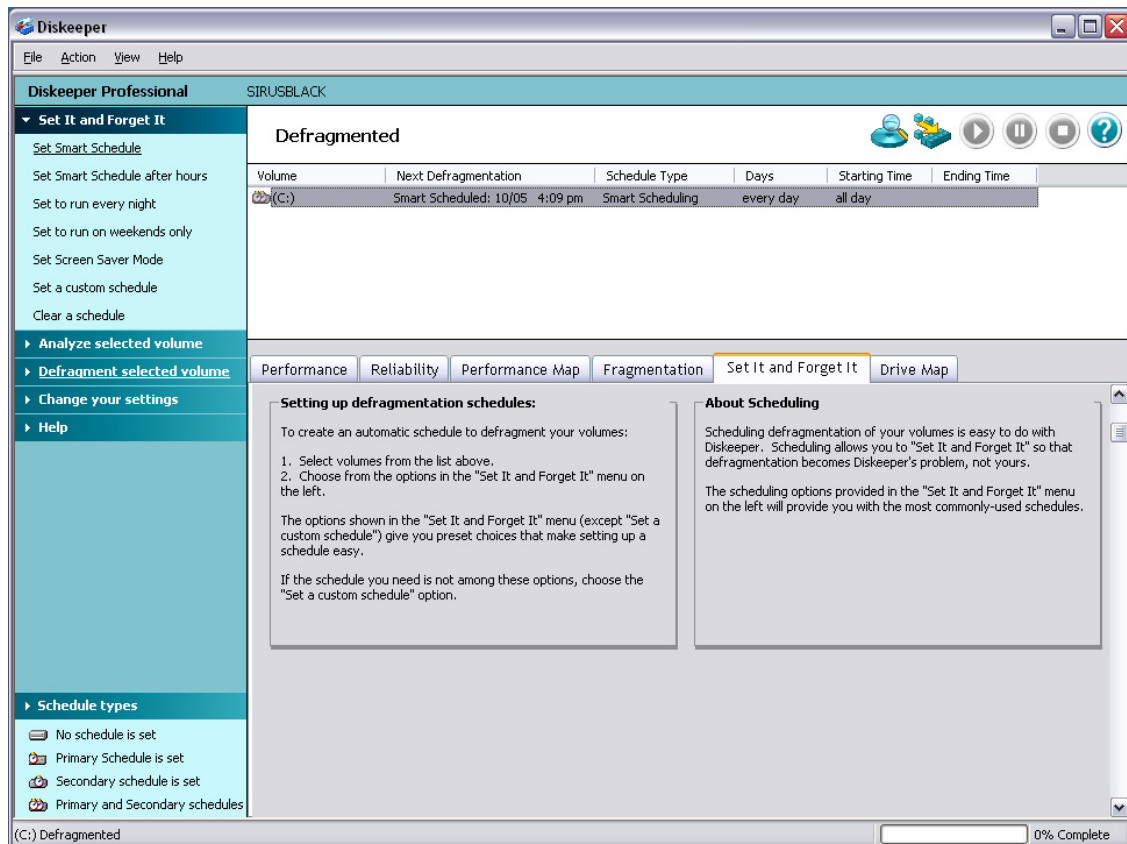
"Set It and Forget It"®

To access the automatic features of Diskeeper 9, click **Set It and Forget It** on the left side of the screen.

(NOTE: Diskeeper 9 Home Edition automatically defaults to Set It and Forget It/SmartScheduling™ mode. Diskeeper 9 Professional and Server editions are not scheduled by default.)

Diskeeper has several automatic modes:

Smart Schedule: Intelligently monitors fragmentation levels and schedules background defragmentation as needed.

Smart Schedule after hours: Same as above, but only defragments between 10:00pm and 4:00am.

Run every night: Defragments every two hours between 10:00pm and 4:00am.

Run on weekends only: Defragments every four hours on Saturday and Sunday.

Screen Saver mode: Defragments any time the screen saver is active.

Custom schedule: Allows user-defined scheduling, including the ability to set a secondary schedule. Diskeeper scheduling is designed for maximum flexibility; users can select one-time defragmentation, continuous defragmentation, or intervals from 2 to 72 hours; they can set

Diskeeper to run on certain days, or not to run on certain days; and they can select times to start and stop defragmentation.

For most users, SmartScheduling™ is the mode that best takes advantage of the advanced technology incorporated into Diskeeper. Server operators and power users will most likely want to select Custom scheduling so they can set a second schedule for each volume. Diskeeper supports different defragmentation methods and priorities (covered below) for each schedule.

To set one of the modes, simply select a drive and then click the desired mode. Custom schedule mode will bring up a screen that lets you set scheduling options.

I/O Smart and defragmentation priority

The I/O Smart function monitors disk I/O requests during background defragmentation. If another program or process needs access to the drive, Diskeeper 9 pauses background defragmentation until that request has been fulfilled. I/O Smart eliminates lags in other applications during background defragmentation passes.

Diskeeper 9 also allows the user to set the priority at which Diskeeper runs. The priority level determines the amount of CPU time allocated to Diskeeper as compared to other programs that may be running. The speed of the Diskeeper 9 defragmentation engine allows fast, effective defragmentation even at lower priority levels.
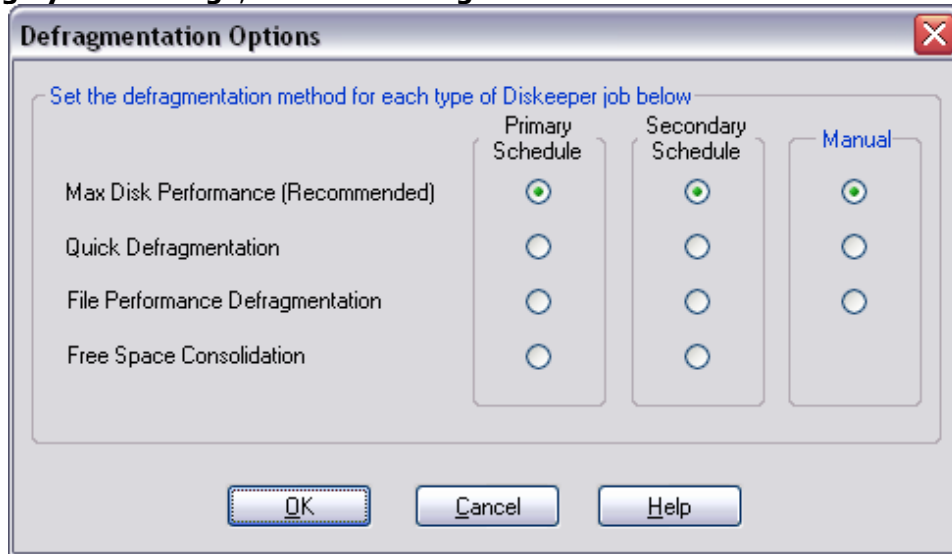
Click **Change your Settings**, then **Set defragmentation priority**.
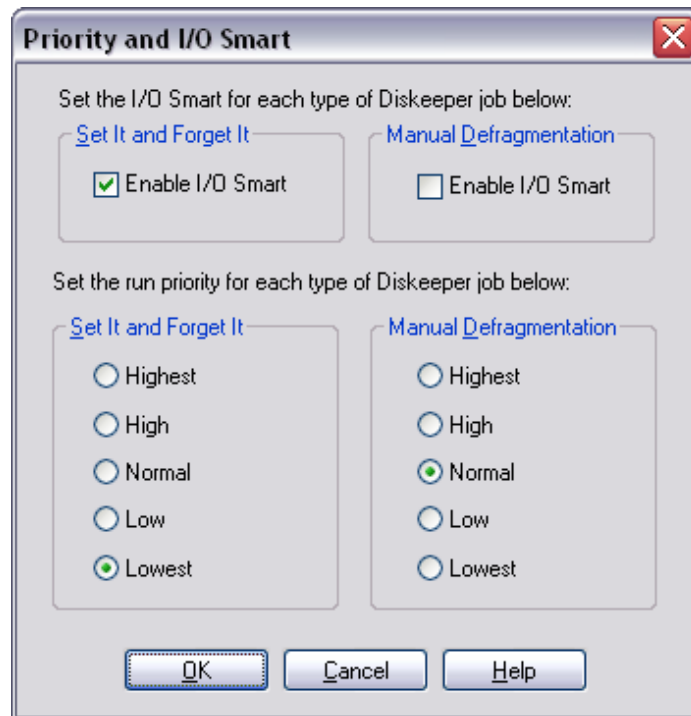
You can set separate I/O Smart and Priority options for background (Set It and Forget It) and manual defragmentation.

Defragmentation methods

Click **Change your Settings**, then **Set defragmentation method**.

Diskeeper 9 has four defragmentation modes:

Max Disk Performance performs full file defragmentation and partial consolidation of free space. This mode is recommended because it maintains top system speed while reducing the amount of time spent defragmenting.

Quick Defragmentation defragments files only, and does not perform any free space consolidation. This mode is recommended for volumes where large numbers of small files are regularly created and deleted.

File Performance Defragmentation quickly defragments files or portions of files to achieve a boost in performance with short defragmentation passes.

Free Space Consolidation provides full file defragmentation and consolidates all free space into contiguous blocks. Free space consolidation requires more defragmentation time.

You may select separate methods for both the primary and secondary "Set It and Forget It" modes. (For example, you may want to run Max Disk Performance in SmartScheduling mode, and run Free Space Consolidation on the weekends.) Because of the time required for defragmentation vs. the speed benefit, Diskeeper 9 does not perform free space consolidation when running in manual mode.

FragShield

Note: FragShield is not available in Diskeeper 9 Home Edition.

Fragmentation of the Master File Table (MFT) and paging file can cause system crashes and instability. FragShield helps you to configure the space allocated for these files as recommended by published Microsoft guidelines, so that fragmentation is unlikely to occur in the future. Chances are that once FragShield has been run, it will not be needed again.

To run FragShield, click **Change Your Settings**, then select **Configure MFT/Paging File**. The FragShield Configuration window will appear.

Frag Shield Configuration

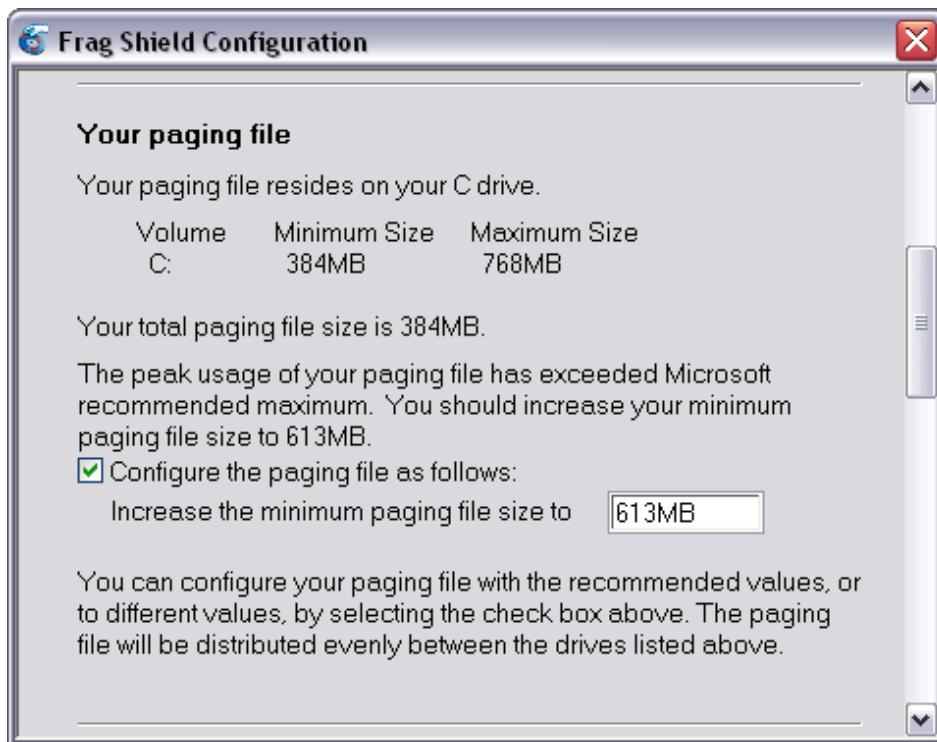**Frag Shield Configuration**

This page provides information about two of your important system files and helps you configure them to prevent them from becoming fragmented. These two files are:

The Master File Table (MFT) - the basic 'table of contents' on your disk

The Paging File - provides additional memory support on your computer

When these files become fragmented, the effect is often much greater than if a normal file gets fragmented. Special measures must be taken to defragment these files, so it is better to prevent their fragmentation in the first place.

Help

Your paging file

Your paging file resides on your C drive.

Volume	Minimum Size	Maximum Size
C:	384MB	768MB

Your total paging file size is 384MB.

The peak usage of your paging file is at a level that is well within good performance guidelines, and no changes to your paging file configuration are recommended at this time.

The FragShield window explains in detail why FragShield is needed and what it does. Click the **Help** button for more information.

The first section of the window deals with the paging file. FragShield analyzes actual virtual memory use to determine the optimal paging file settings. It only displays configuration options if there is a need to reconfigure the paging file:

Leave the box checked to implement FragShield recommendations. When you submit your changes, FragShield will set the size and configuration of the paging file to avoid fragmentation in the future.

Scroll down to the Master File Table configuration.
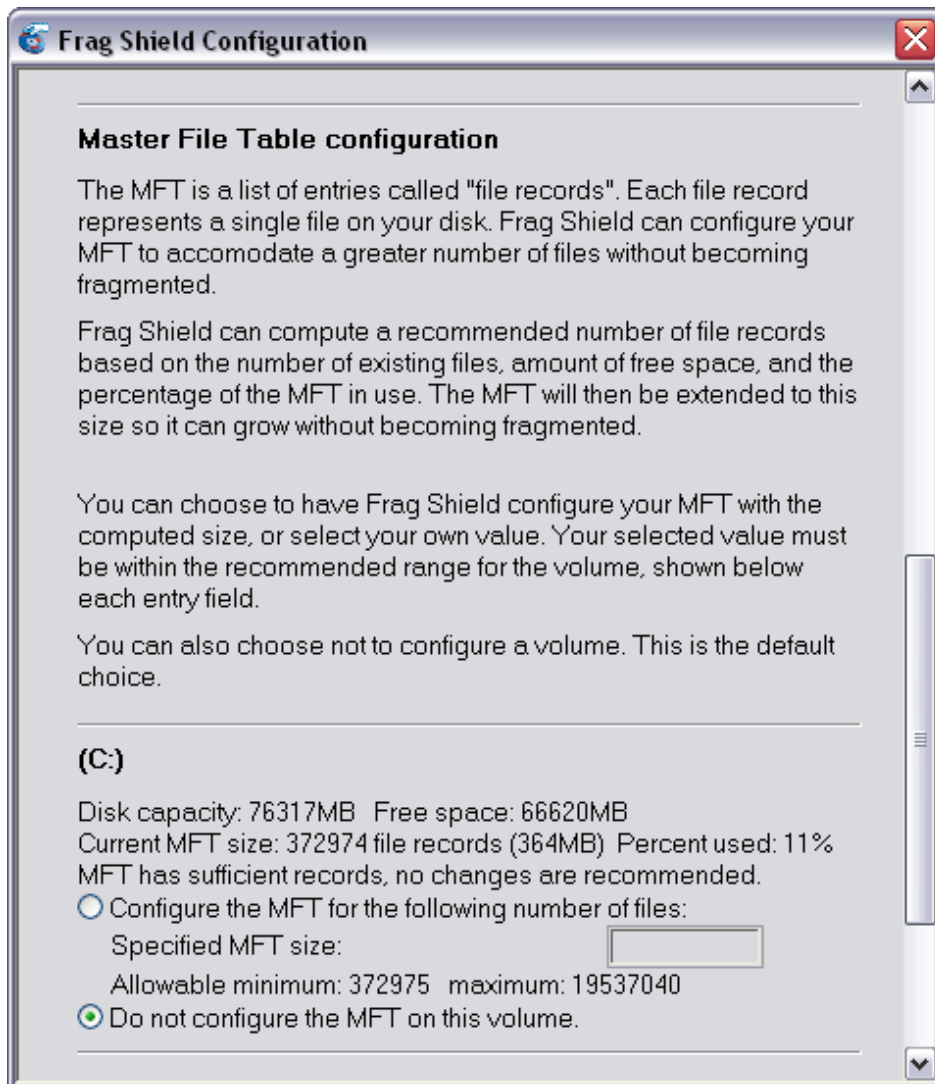
FragShield will display information on the status of the MFT and will recommend changes if needed. The MFT report is based on the number of files currently on the volume. If you plan on a large increase in the number of files (for example, if you install Diskeeper immediately after installing Windows and before you load your applications), click the "Configure the MFT…" radio button and input an estimate of the number of files. You can also re-run FragShield after other applications and data files have been loaded.

Once you have made your changes, scroll down to the bottom of the window and click Submit. FragShield will display a confirmation window. Click **Proceed** to apply the changes or **Finish** to cancel.
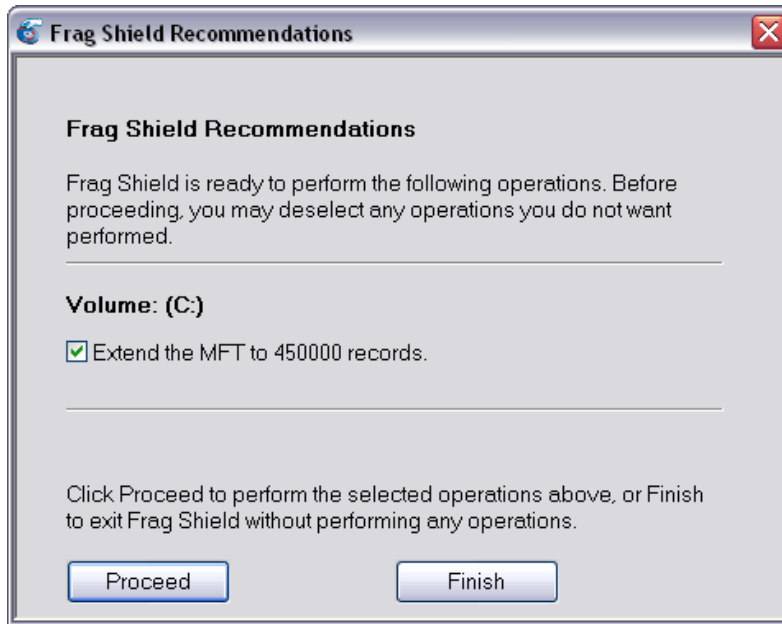
If you click **Proceed**, FragShield will display a progress window:
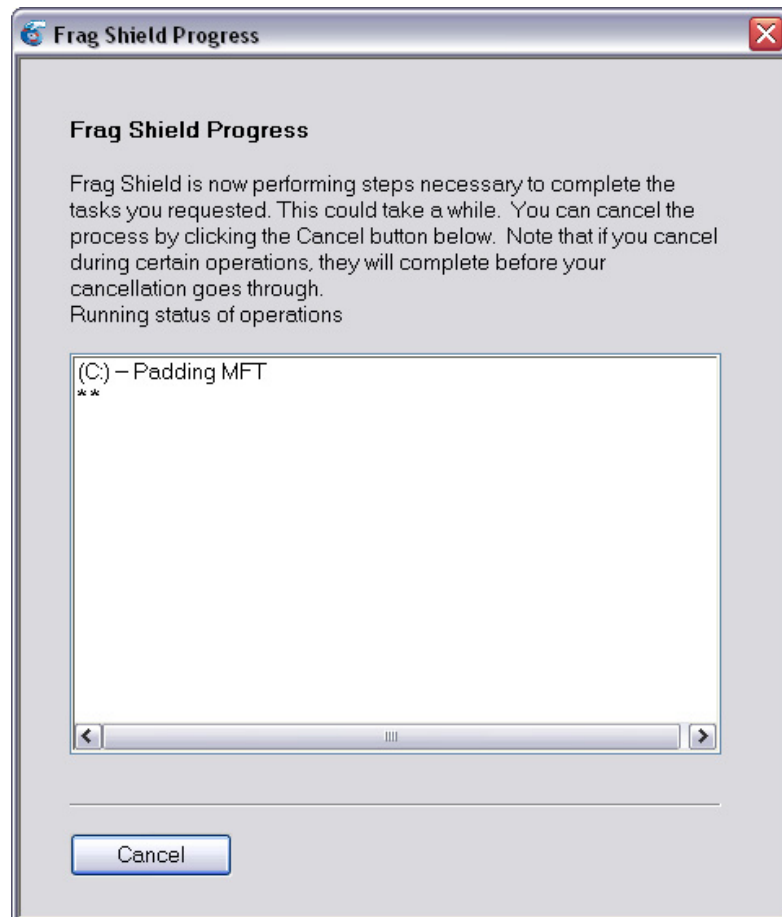
Diskeeper 9 will implement FragShield-recommended changes in such a way as to make future fragmentation of these files highly unlikely. This process may take some time.

Once the operations are done, Diskeeper 9 will return you to the main user interface or will recommend further actions, including a boot-time defragmentation.

Boot-time defragmentation

Note: Boot-time defragmentation is not available in Diskeeper 9 Home Edition.
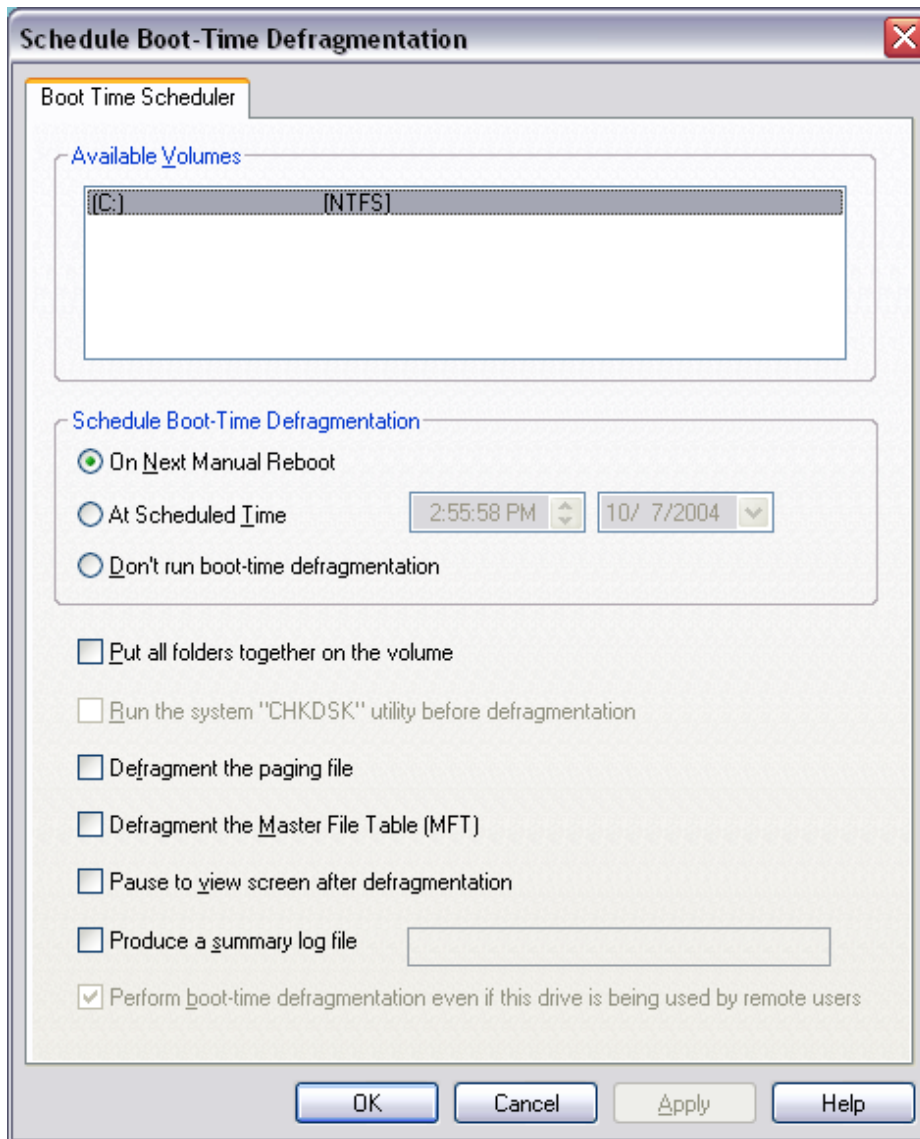
The paging file, MFT and directories (NTFS only) cannot always be safely defragmented while the computer is running Windows. (Specifically, Windows XP and Server 2003 support online MFT defragmentation; 2000 and NT do not; NT does not allow online directory or MFT defragmentation; and none of these versions allow online defragmentation of the paging file.) If these files need to be defragmented, Diskeeper 9 will indicate the need for a boot-time defragmentation.

(NOTE: Diskeeper 9 displays MFT, directory and paging file fragmentation on the Fragmentation tab. The MFT will always show as having at least two fragments. The MFT has a partial mirror [a backup version] which is intentionally stored in a different location on the disk; hence Diskeeper shows the MFT in two parts.)

To initiate a boot-time defragmentation, click **Change Your Settings**, then **Set a Boot–Time Defragmentation**. The boot-time scheduler will appear.

Schedule Boot-Time Defragmentation

Boot Time Scheduler

Available Volumes

[C:]   [NTFS]

Schedule Boot-Time Defragmentation
- ◉ On Next Manual Reboot
- ○ At Scheduled Time   2:55:58 PM ⬍   10/ 7/2004 ⬇
- ○ Don't run boot-time defragmentation

- ☐ Put all folders together on the volume
- ☐ Run the system "CHKDSK" utility before defragmentation
- ☐ Defragment the paging file
- ☐ Defragment the Master File Table (MFT)
- ☐ Pause to view screen after defragmentation
- ☐ Produce a summary log file
- ☑ Perform boot-time defragmentation even if this drive is being used by remote users

OK   Cancel   Apply   Help

Boot-time defragmentation can be run immediately or can be scheduled for a later time. You can also cancel a boot-time defragmentation that has already been scheduled.

Use the checkboxes to tell Diskeeper 9 which actions to perform during the boot time. (On Windows XP and Server 2003 systems, the MFT is defragmented online. If the MFT is severely fragmented, complete online defragmentation may not be possible. If Diskeeper 9 has been running background defragmentation and the MFT still shows significant fragmentation, use the boot-time mode to defragment it.)

The option to run CHKDSK will become available if you select any defragmentation task. It is highly recommended that you select this option. CHKDSK verifies the condition of the disk and avoids any possibility of the MFT or paging file being written to a corrupt area.)

For evaluation purposes, select **On Next Manual Reboot**. Use the check boxes to select which components you want defragmented. Select the **pause** option if you'd like to see the results of the boot-time defragmentation before Windows restarts. Select the **log file** option

and fill in a directory if you would like to see details of the boot-time defragmentation after Windows has restarted. Click **OK** to schedule the boot-time defragmentation.

Reboot the computer to run the boot-time defragmentation.

Other features

Under **Change your settings**, you'll find additional options:

Exclude selected files or folders: You can exclude files or directories from being defragmented—for example temporary files or Internet cache files that will soon be deleted anyway.

Set event logging options: Allows you to specify how much detail Diskeeper supplies to Windows' application event log.

Set power management options: For laptops and tablet PCs. When enabled, Diskeeper will not defragment while on battery power.

Set performance data options: Allows Diskeeper to perform a longer, more thorough analysis for improved performance.

Part 4: Frequently asked questions

Is the built-in defragmenter a "lite" version of Diskeeper?

The defragmenter built into Windows was originally designed by Executive Software and given to Microsoft as a promotional action for Diskeeper. However, the built-in defragmenter is not a "lite" version of Diskeeper. It's an entirely different product.

Why does Diskeeper use a multi-pass defragmentation method?

Diskeeper is designed to work unnoticed in the background, keeping computers running at maximum speed with no negative performance impact. Doing so requires taking into account the system resources needed for defragmentation. Since fragmentation is an ongoing phenomenon, it requires an ongoing solution—hence the patented Diskeeper multi-pass engine. The only efficient way to accomplish thorough defragmentation without slowdowns is with a multi-pass defragmentation engine.

The multi-pass approach combined with the Diskeeper engine's unique technology makes for an extremely small resource "footprint", allowing Diskeeper to run in the background as often as needed without disturbing normal computer operations. The end result is that fragmentation levels are *constantly* kept at the lowest possible level with no adverse effects.

Why does Diskeeper recommend a minimum of 20% free space for defragmentation?

Rapid defragmentation of large files requires enough free space to assemble those files. Attempting to defragment with a small amount of free space causes unacceptably long defragmentation times.

More importantly, Windows requires free disk space to operate. Low free space can cause slow performance, reliability problems and crashes. If your drive has less than 20% free space, fragmentation is not your biggest problem. It's important to have adequate free space to keep the computer running smoothly and to reap the benefits of defragmentation.

Does defragmentation cause excessive wear and tear on the hard drive?

Defragmentation with Diskeeper 9 will actually *increase* the life span of a drive. When a disk is fragmented, the drive head must go to thousands of locations to retrieve one file, every single time that file is requested. Not only does the drive have to work more when the disk is fragmented, it also slows the system down. Every time you access the file, thousands of head movements are required. Running Diskeeper involves running through those thousands of movements *once* to consolidate the file, after which that file can be retrieved with a single input/output cycle, plus a few movements here and there to keep the file in one piece. The end result is that the disk has to do less work, so its life is extended.

Do multi-disk (RAID) arrays benefit from Diskeeper?

Yes. RAID (Redundant Array of Inexpensive Disks) arrays consist of several hard drives linked together to form a single large drive. RAID provides fast disk access with optional redundancy for data protection. The actual *physical* hard drives that make up the RAID array are not read from or written to directly by the operating system. The Windows file system sees the RAID array as a single "virtual" drive. This virtual drive has logical cluster numbering just like any other partition supported under Windows NT.

As an application reads and writes to this virtual environment (creating new files, extending existing ones, as well as deleting others), the free space becomes fragmented, thus causing new and existing files to be fragmented as they are written. Because of this fact, fragmentation on this virtual drive will have a substantial negative effect on performance. When an I/O request is processed by the file system, there are a number of attributes that must be checked, requiring CPU activity to be diverted from other tasks. If an application has to issue multiple I/O requests, as in the case of a fragmented file, the RAID controller must process each request individually as it decides which physical drive to read the data from or write it to. Furthermore, RAID arrays allocate storage space in "chunks" of a pre-set size. Each fragment is likely to include at least one chunk that is partially filled, requiring more chunks and therefore more work on the part of the RAID controller. The end result: Fragmentation can actually *negate* much of the speed benefits of a RAID array.

Diskeeper sees the RAID environment as a single virtual drive, just as the operating system does. By defragmenting the virtual drive, Diskeeper eliminates those wasteful and unnecessary I/Os from being issued by the file system to the RAID controller. Because the operating system sees the files and free space as being more contiguous, it spends less time checking file attributes and creating individual I/O requests. That frees up processor time that can be dedicated to the application(s) the user is running. Storage of the files is more efficient as there is not nearly as much need for partially-filled chunks. Diskeeper enables the computer to take maximum advantage of the speed and efficiency that RAID provides.

Part 5: Customer Service and Support

Executive Software is dedicated to the highest levels of customer service and support. As with every Executive Software product, Diskeeper 9.0 is backed by a 30-day money back guarantee. Technical support is provided by knowledgeable technicians located at our Burbank, California headquarters.

Diskeeper 9 is available from most major software retailers and can be ordered direct from our web site at www.executive.com. Buyers can also purchase and download Diskeeper directly from our site.

Part 6: Contact information

If you have any additional questions or need more technical information, please contact Colleen Toumayan at ctoumayan@executive.com or (818) 771-1600. If you'd like to experience Executive Software's award-winning technical support, they may be contacted at the same number, or via email at support@executive.com.

Thank you for evaluating Diskeeper 9!

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