Total Defrag™ 2009

User Manual

CONTENTS

Introduction

If somebody asks you which part of your computer is the most important, you'll undoubtedly answer – a hard disk. You can change many things in your PC but a hard disk needs a special treatment because it keeps the most valuable – your information. As any important thing a hard disk requires your care. Giving some consideration to it you are able to increase efficiency of your work.

So, how can you optimize the disk system? A common problem that often decreases the disk efficiency is non-optimal allocation of files, the so-called file fragmentation. Under some inevitable circumstances the system keeps fragments of a file in different places of the disk, what significantly slows down reading operations. To defragment files, it is sometimes necessary to re-write them more compactly. It resembles threading beads – file fragments are gathering one by one, after that the system will spend less time on reading the file.

There are many solutions for the file fragmentation problem. Total Defrag™ is one of them. It is a reliable tool, which provides 27 defragmentation strategies and uses unique low-level optimization algorithms (see the complete list of key features). Despite the complicity of tasks Total Defrag has an easy-to-use interface. Moreover the present manual will help you to find the answers to many of the technical questions, which might arise while using the program.

Key Features

Let us list some of the key features:

- User-friendly interface. Easily understood icons accompany all functions of the program.
- 27 different defragmentation strategies for optimal speed increase. A properly chosen strategy allows setting the procedure in full accordance with the user needs. Your choice might depend on a size of used files, number of directories and frequency of files update.
- Two modes of execution (fast and safe) to suit the needs of any user.
- Unique low-level file system defragmentation and optimization algorithms enable to operate disks of different file systems.
- Defragmentation of the Master File Table (MFT) and system metadata, options, which are usually not available for standard system utilities (although their optimization increases the file system performance).
- Defragmentation of files that are located on USB 2.0 and IEEE 1394 (Fire Wire) drives (fixed drives only, not removable ones).
- Low free space defragmentation (less than 1% free space required) lets you defragment almost full disks.
- Detailed file fragmentation statistics on any partition. The user can analyze file allocation with a map where the file structure is represented in a bright graphical form.
- Exhaustive reports on every defragmentation procedure with the ability to save it on a disk for further analysis.

Installation

This chapter provides information, which is needed to perform the correct installation of the program, and in addition, checks if the current installation is working correctly.

Minimum System Requirements

To use the program on a computer satisfactorily, ensure that it meets the following minimum system requirements:

- ❑ Operating systems: Windows 2000/XP/Vista
- ❑ Internet Explorer 5.0 or higher
- ❑ Intel Pentium CPU or its equivalent, with 300 MHz processor clock speed
- ❑ 128 MB of RAM required (256 MB or more recommended)
- ❑ Hard disk drive with 20 MB of available space
- ❑ Supports USB 2.0 and IEEE 1394 (Fire Wire) drives

> ⚠ **To run the WinPE version of the program you need to have at least 384 MB of RAM.**

Installation Procedure

The installation process consists of the following steps:

1. Run Setup Application
From the folder, where the setup files are kept, run the *SETUP.EXE* file. This application will guide the user through the process of the program installation. The setup utility is compiled with the **InstallShield SDK**, hence it contains the standard user interface and set of installation steps.

2. Starting Setup
The Welcome page informs that the application is being installed. Click the *Next* button to continue.

3. Confirm License Agreement
The License Agreement page displays the Paragon License Agreement. Read the agreement and then click the *Yes* button to accept. If the user does not agree with any conditions stated there, the installation process will be interrupted.

4. Select an Installation Folder
The Destination Location page allows the user to choose the folder where the program will be installed. By default, the installation folder will be created as:

C:\Program Files\Paragon Software\Paragon Total Defrag 2009. To select another folder, click the *Browse* button.

After you have selected the required folder, click the *Next* button to continue.

5. Select a Program Group

The Program Folder page enables the user to select the application's program group for the Start Menu. By default, it will be the program group:

Start > Programs > Paragon Total Defrag 2009.

Click the *Next* button to continue.

6. Verify Setup Settings

The Start Copying page allows the user to verify settings, which have already been made and correct them if necessary. Press the *Back* button to return to the previous page and modify the installation settings. Click the *Next* button to complete the installation process.

7. **Copying Files**

The Setup Status page shows the overall progress of the installation. Click the *Cancel* button to abort the setup.

8. **Finishing the Installation**

The Final page reports the end of the setup process. Components included in the package are ready to use immediately after completing the installation process.

Basic Concepts

This chapter explains terms and ideas that show how the program works. To understand these helps to obtain a general notion of the operation performance and makes it easier for the user to operate the program.

A Hard Disk Layout

Before optimizing any system we need to understand it. Speaking about a file system of your computer we should picture how files are stored on a hard disk.
In appearance a hard disk resembles a set of mirror-smooth CD/DVDs or platters (they are even called the same). Every disk platter is divided to tracks and sectors. Tracks are concentric circles. Sectors are radial wedges. Mentioning a track and a sector we can easily find any place on the disk:
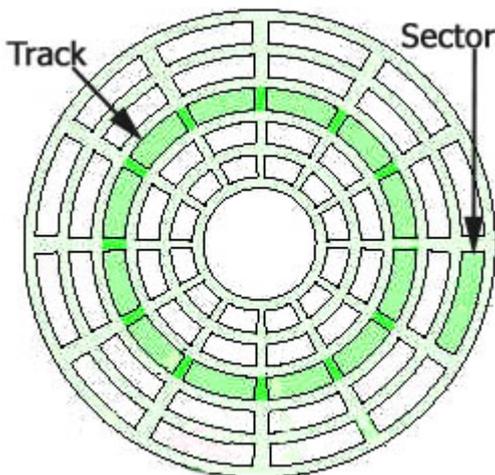
Sectors have a fixed size and contain a certain number of bytes (512, for example), which depends on an operating system.

As in the case of platters a computer starts reading (or writing) information from external tracks. The main reason for that is the next – a hard disk works faster on these tracks (having a permanent angular velocity we have the maximal linear velocity exactly on the external tracks). Please pay your attention on this important fact. If you keep data recorded in the beginning of the disk, it will be found and operated faster than data kept on the internal tracks.
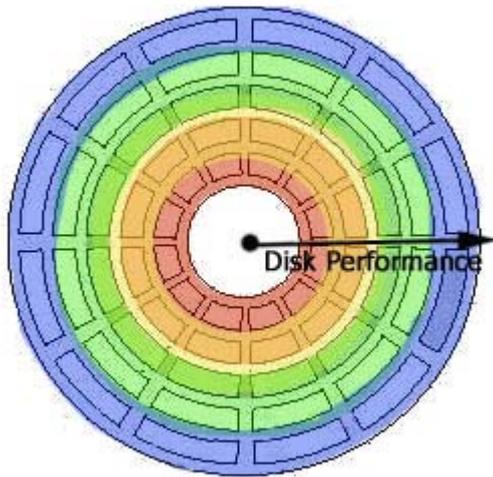
Dividing the disk to tracks and sectors are named low-level formatting. However before we are able to place our files on the disk we should create special high-level structures, which help to organize our records and to manage them. Similar structures form a file system. When we are performing high-level formatting, we are creating such structures as a file allocation table (FAT), data blocks (where our future files can be stored) and some others.

File Fragmentation

A wish to optimize the hard disk work might be caused by many reasons – from a simple habit to put a place in order to unpleasant occurrences of system failures. But any way a main obstacle you meet here will be the progressive fragmentation of files. Data is written irregularly on the disk. The same file might be stored in different sectors. While updating files, the system tends to save updates on the largest continuous space of the hard disk. This space is often on a sector different from sectors where the other parts (fragments) of the file are stored. In the case of fragmented files the system has to search the hard disk every time the file is opened to find all of its fragments what noticeably slows down the response time.
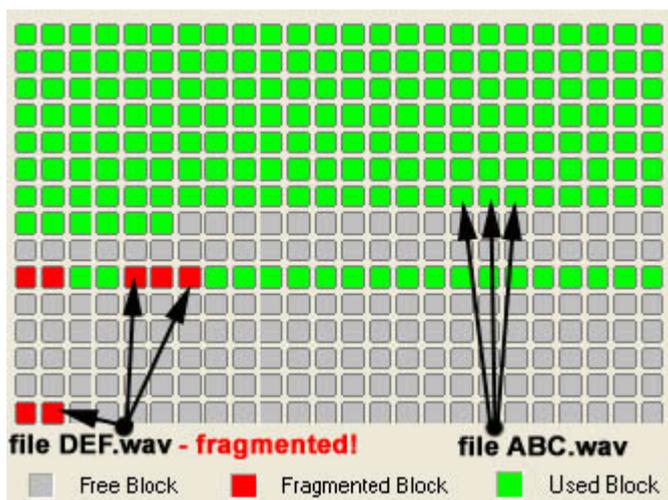
Service files of operating systems may be also fragmented. The NTFS file system has for example a special file, the *Master File Table* (MFT), which is a well-organized catalogue of all files on a partition. The table keeps records about every file allocation, about its attributes and even contents of small size files. MFT is a system file, which is stored on a protected part of the NTFS partition (the so-called MFT zone). Usually the $MFT file is inaccessible for standard defragmentation tools (not for Total Defrag!) although it is subject to fragmentation as any other file.

Defragmentation

The medicine against the fragmentation is evident. We should rewrite different parts of any file to contiguous sectors on the hard disk. This process is called defragmentation. It often helps to increase the speed of file access and data retrieval.
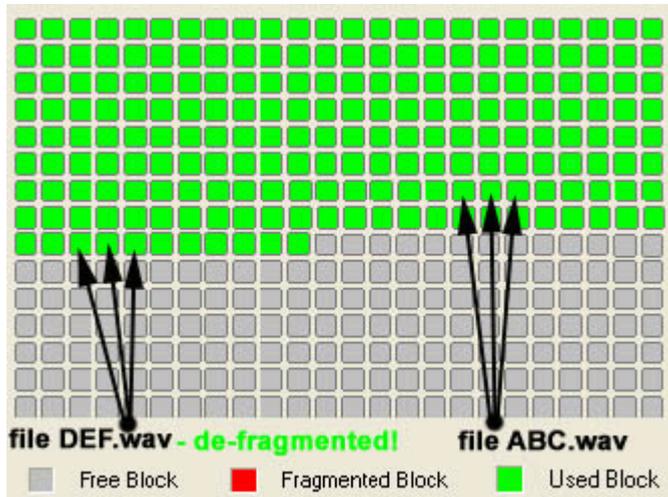
Total Defrag enables to re-write files in an optimal way depending on peculiarities of the file system and on your tasks. So it allows taking into account the following conditions:

❑ If you work with big size files (multimedia or CAD files are usually big), then it is reasonable to place them into those sectors of the disk where your computer could operate them faster, i.e. to the first sectors of the disk. It might be done during the defragmentation procedure (see the Defragmenting Partition chapter).
❑ If a hard disk has a great number of directories (for example it may be a data base or your favorite music collection), then you should also place directories on the sectors with the highest disk performance to make search files faster.
❑ And at least placing most frequently updating files to the first sectors of the disk will provide the performance increase too.

Before starting the defragmentation procedure we also recommend to draw your attention to PAGEFILE.SYS and HIBERFIL.SYS system files that are used in the NTFS system as the temporary ones. They are re-initialized at the beginning of every Windows session and they are absolutely unimportant between the sessions. Excluding them from the processing files you save time.

Interface Overview

This chapter introduces the graphical interface of the program. The design of the interface precludes any mistake being made on the part of the user. Buttons and menus are accompanied by easy understandable icons. Nevertheless, any problems that might occur while managing the program can be tackled by reading this very chapter.

General Layout

When the user starts the program, the first component that is displayed is called the *Launcher*. It enables the user to run wizards and utilities, to specify program settings, to visualize the operating environment and the hard disk configuration.

The Launcher's window can be conditionally subdivided into several sections that differ in their purpose and functionality:
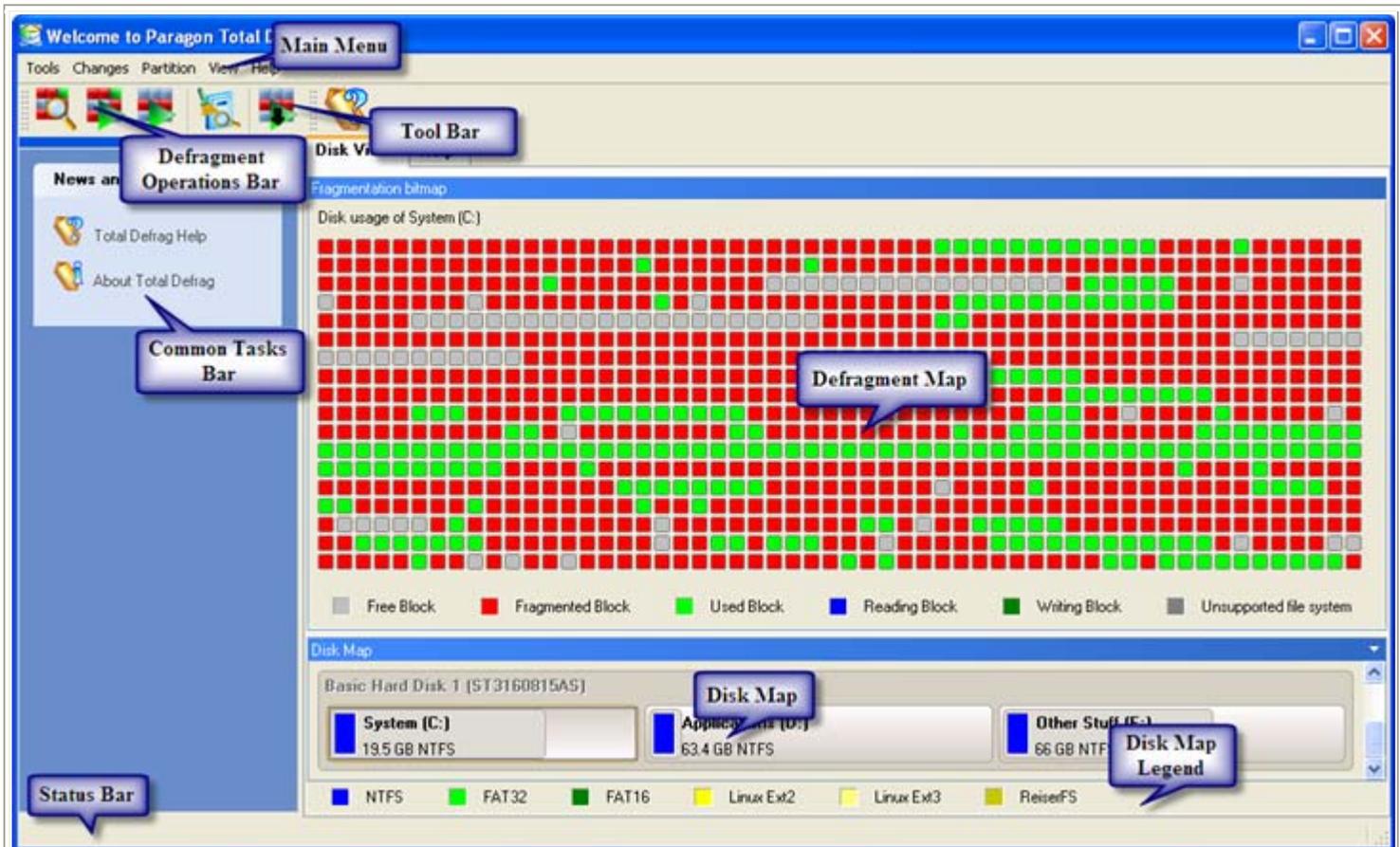
1. Main Menu
2. Tool Bar
3. Defragment Operations Bar
4. Common Tasks Bar
5. Defragment Map
6. Disk Map
7. Disk Map Legend
8. Status Bar

Some of the panels have similar functionality with a synchronized layout. The program enables the user to conceal some of the panels to simplify the interface management.

All panels are separated by vertical and horizontal expandable sliders, allowing the user to customize the screen layout.

Main Menu

The Main Menu provides access to the entire functionality of the program. The available functions are as listed below:

MENU ITEM	FUNCTIONALITY
File	
Settings	Edit the general settings of the program
Exit	Exit the program

Changes	
Reload Disk Info	Refresh the current information about disks
Defrag	
Compact MFT	Perform the MFT compacting procedure for a chosen NTFS partition
Analyze Fragmentation	Display the structure of partition blocks in the form of the Defragmentation map
Defragment Partition…	Perform the defragmentation process for a chosen partition
Defragment MFT…	Perform the defragmentation of the MFT file (for a NTFS partition)
Cancel	Cancel the running defragmentation procedure
Test surface…	Perform the surface test for a chosen partition
Check File System Integrity	Perform the integrity test for a chosen partition
Properties	Display properties of the selected partition
View	
Toolbar	Manage the Tool bar representation: show / hide standard buttons, text labels and large icons.
Status Bar	Display the Status bar
Common Tasks Bar	Display the Common tasks bar
Disk Map Legend	Display the Disk map legend
Defragmentation Map	Display the Defragmentation Map
Disk Map Location	Select whether the Disk map will be located on the top of the main window or at the bottom
Help	
Help	Open the Help system
About	Open the dialog with information about the program

Tool Bar

The Toolbar provides fast access to the most frequently used operations:

BUTTON	FUNCTIONALITY
	Perform the integrity test for a file system
	Perform the MFT compacting for an NTFS partition
	Open the Help system

Defragment Operations Bar

The Defragment Operation Bar enables to manage the defragmentation procedure.

BUTTON	FUNCTIONALITY
	Analyze the fragmentation. The program displays the current structure of partition blocks in form of the Defragmentation map.
	Start the defragmentation procedure for a partition.
	Start the MFT defragmentation procedure for an NTFS partition.
	Cancel the running defragmentation procedure

Common Tasks Bar

The Common Tasks Bar is located on the left side of the main window. It is intended for easy access to News, Help System, Web References and other documentation.

The bar contains a tab called *News and Documentation*, which can be folded by clicking it.

News and Documentation	
Total Defrag Help	Launching the Help system.
About Total Defrag	Opening the page, which contains information about the program.

Disk Map

The Disk Map is displayed when the *Disk View* tab is selected. It is located either at the top or at the bottom of the window, depending on the state of the *Disk Map Location* option (Main menu: *View > Disk Map Location*). The user can change the current location of the map with this option.

As the name infers, the Disk Map displays the layout of physical and logical disks. Physical disks are represented with rectangle bars that contain small-sized bars. These small-sized bars represent logical disks. Their color depends on the file system of the appropriate partition.

Large-sized bars display the following information about physical disks:
- ❑ Manufacturer,
- ❑ Model.

Small-sized bars display the following information about logical disks:
- ❑ Serial number,
- ❑ Drive letter,
- ❑ Total size,

❑ File system.

Furthermore, it is possible to estimate the used disk space by looking at the size of the bar's shaded area. The program offers to choose from several types of the disk layout scaling. It's done especially to increase the program usability. For instance, if you've got a high capacity hard drive containing both very large (more than 100 GB) and rather small (less than 10 GB) partitions, you can select the logarithmic type to make all partitions readable, otherwise (selecting the linear type) you won't be able to see small partitions at all, but thing strips. On the other hand, if the proportional disk layout is critical for you, the linear type is exactly what you need.

Nevertheless there's a compromise solution – linear scaling with the minimal limit to small partitions. So if a partition is too small it will remain readable.

Just click on the arrow icon on the top right side of the Disk Map to select the desired scaling type.
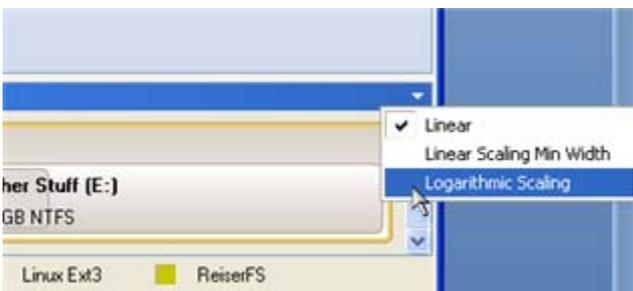
Disk Map is synchronized with the Defragment Map. When the user selects a disk on the Disk Map the Defragment Map display detailed information of the selected disk.

Legend Bar

The Legend Bar explains the color scheme used for disk and partition presentation. The user can hide (or show) the bar with the appropriate Main menu item: *View > Disk Map Legend*. When it is activated it can be found at the bottom of the window.

The program distinguishes between the following types of known file systems:

- FAT16/32,
- NTFS,
- Linux Ext2/3,
- Linux ReiserFS.

Defragment Map

Defragment Map is another helpful tool that enables the user to get a clear-cut picture of the current state of the file system. The map represents the structure of blocks for a partition, which has been selected in the Disk Map. The disk name will be displayed at the top part of the bar. Below the disk name the user sees the Defragment Map itself. Block colors depend on their types. The correspondence between a color and a block type is in the map legend.
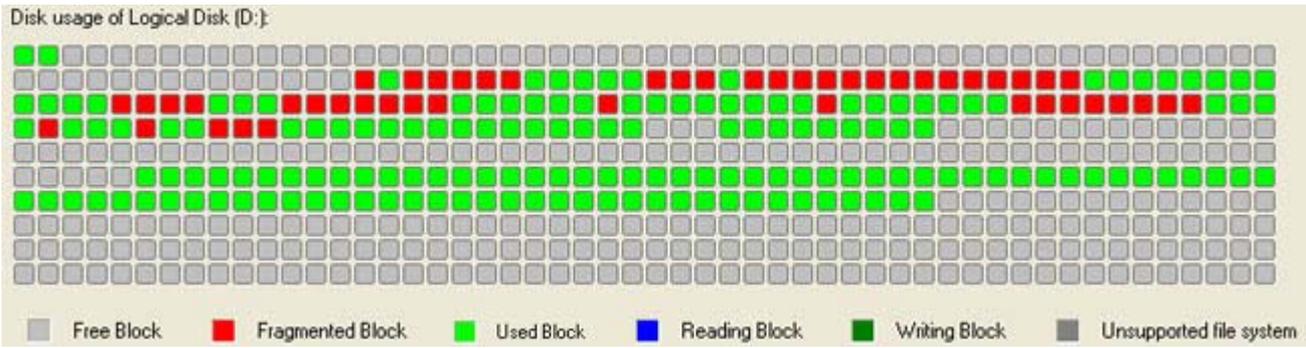
When the user starts the defragmentation procedure, there is the ability to see how the program re-writes file fragments more compactly and disk blocks change their colors from red to green.

Furthermore, the Defragment Map is synchronized with the *Disk Map*.

Status Bar

This is the bottom part of the main window. The status bar displays menu hints, for each item the cursor points to.

The user can hide (or show) the bar with the appropriate Main menu item: *View > Status bar*.

Settings Overview

The Settings dialog is available from the Main menu: *File > Settings*. All the settings are grouped into several sections of which the functions are described in the following paragraphs. The list of sections is placed on the left side of the dialog. By selecting a section from the list, the user opens a set of options.

Defragmentation Options
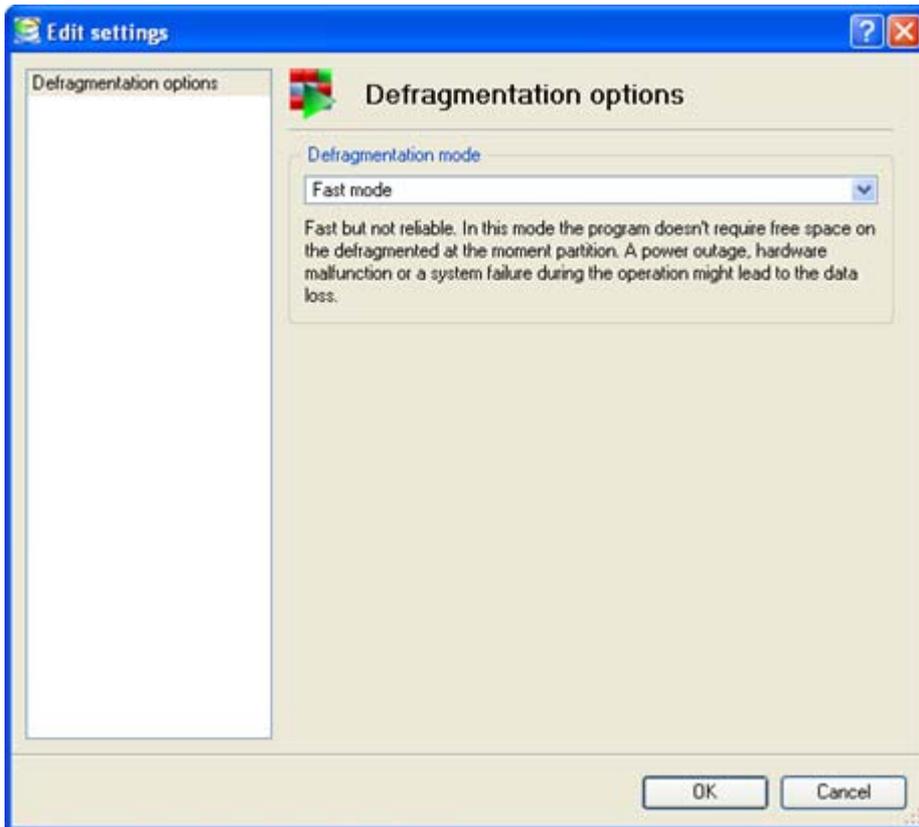
In this section you can set the preferable mode of the program execution. Actually you've got two options:

- ❑ **Fast mode**. Partitions will be defragmented rather fast (10-30% gain depending on the data fragmentation), but a power outage, hardware malfunction or a system failure during the operation might lead to the data loss.
- ❑ **Safe mode**. To guarantee protection of your data during the operation, the program will allocate some free space (not less than the on-disk largest file) on the defragmented at the moment partition to make a duplicate of every processed file. Thus we strongly recommend you to use this very mode.

How to Optimize a File System

This chapter lists various scenarios of disk system optimization, which might be accomplished by the program. This has already been reviewed in the Basic concepts chapter. Here the user will find more useful recommendations and descriptions of operations.

Analyzing Disks

To begin with, let us examine the current situation of the available disk space. The program provides some helpful tools for this purpose.

Analyzing File Fragmentation

The program allows analyzing the fragmentation of any partition that has been selected in the Disk Map. For a preliminary estimate the Defragment Map can be used. It represents the current structure of partition blocks in the graphic form.
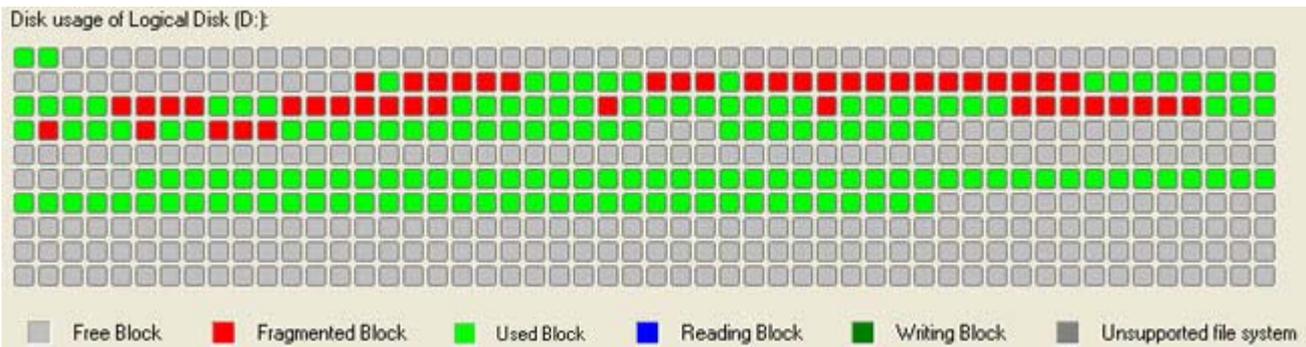
Blocks are colored in accordance with their types – free, fragmented, writing, reading, used and blocks of unsupported file systems. Fragmented blocks are well noticeable – they're red. The more red-marked blocks the greater extent of the fragmentation. If fragmented blocks content more than 50 per cent, it is reasonable to accomplish the defragmentation procedure.

To get more exact information, the user should take the following steps:

1. Select a partition on the Disk Map.

2. Start the special analyzing procedure. There are several ways to do it:

- ❑ Select in the Main menu: *Defrag > Defragment > Analyze Fragmentation*
- ❑ Click the *Analyze fragmentation* button in the Defragment Operation Bar.

Results of the analysis will be displayed in a new dialog.
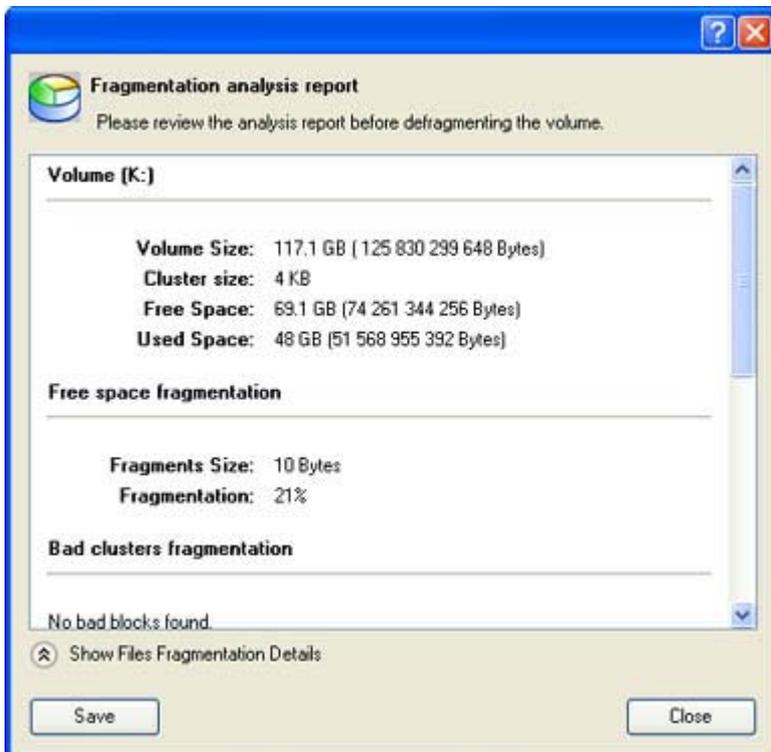
They include the exact value of the fragmentation (in percents) and the detailed information about fragmented files. To get the last, just click the button *Show Files Fragmentation Details*.

The information contains:

- ❑ A number of file fragments
- ❑ Size of fragments
- ❑ Names of fragmented files.

To close this part of the dialog, click the *Hide Files Fragmentation Details*. There is also the possibility to save analysis reports into a file on the disk by clicking the *Save* button.

Viewing Partition Properties

The program enables to obtain in-depth information on the properties of hard disks/partitions. Besides the general information, such as capacity, used space or file system type it provides the possibility to get info on a hard disk geometry, cluster size, exact partition location, etc.

In order to view properties of a partition/hard disk the user should take the following steps:

1. Select a partition/hard disk on the Disk Map.

2. Call the *Properties* dialog. There are several ways to do it:

- ❑ Select in the Main menu: *Defrag > Properties…*
- ❑ Call the popup menu for the selected partition (right click of the mouse button) on the Disk Map, then select the menu item: *Properties…*
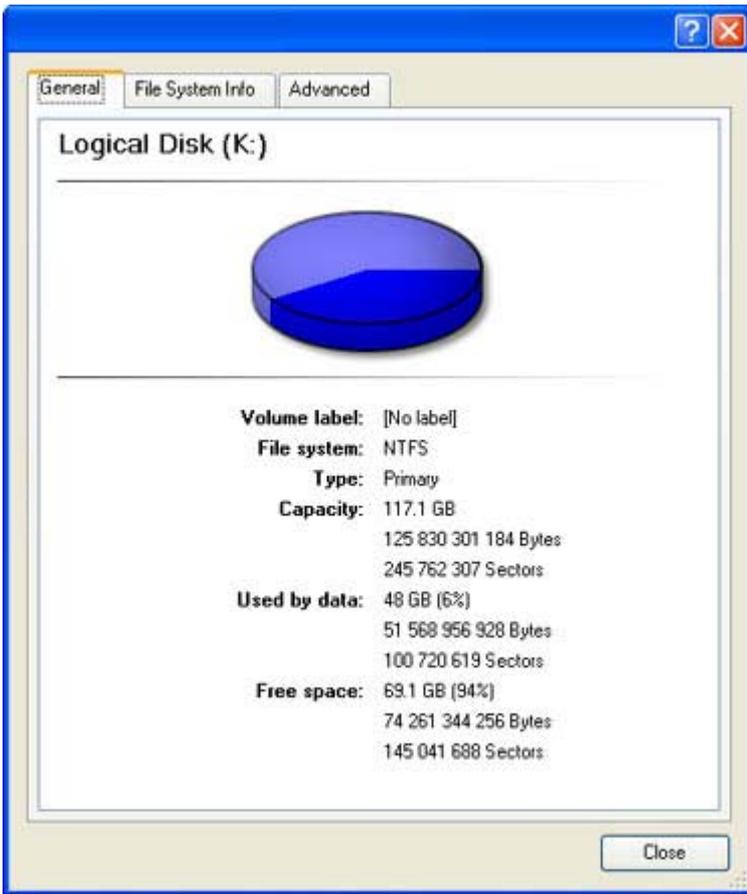
3. The provided information is grouped according to its properties, thus select the required tab and get the information you need.

Testing Disk Surface

The disk analysis may also include surface tests. The program allows performing these tests on existing partitions.

In order to start the surface test the user should take the following steps:

1. Select a partition on the Disk Map.

2. Call the *Test Surface* dialog to define appropriate settings. There are several ways to do it:

- ❑ Select in the Main menu: *Defrag > Test Surface…*
- ❑ Call the popup menu for the selected partition (right click of the mouse button) on the Disk Map, then select the menu item: *Test Surface…*

Surface test level. Choose the level of the test procedure.

3. The operation will be performed immediately after confirmation.

Checking File System Integrity

The program enables to check the file system integrity on existing partitions. This function can be used for detecting file system errors before performing operations on a partition. Some operations (such as the defragmentation) require the targeted partition to have a valid file system to be processed.

In order to start the system integrity check the user should take the following steps:

1. Select a partition on the Disk Map.

2. Call the *Check File System Integrity* dialog to define appropriate settings. There are several ways to do it:

❑ Select in the Main menu: *Defrag > Check File System Integrity*.
❑ Click the *Check File System Integrity* button in the Toolbar.
❑ Call the popup menu for the selected partition (right click of the mouse button) on the Disk Map, then select the menu item: *Check File System Integrity*.

3. The operation will be performed immediately after confirmation.

Defragmenting Partition

Defragmentation is the process of rewriting different parts of a file (its fragments) to contiguous sectors of a hard disk to increase the speed of file access and retrieval (see the Basic concepts chapter for more details).

The program provides a necessary tool for the defragmentation of NTFS and FAT partitions of a hard disk.

> **The user must have administrator's privileges to accomplish the defragmentation of the system partition.**

In order to start the operation the user should take the following steps:

1. Select a partition on the Disk Map.

2. Call the *Defragment Partition* dialog to define appropriate settings. There are several ways to do it:

❑ Select in the Main menu: *Defrag > Defragment > Defragment Partition…*
❑ Click the *Defragment Partition* button in the Defragment Operation Bar.
❑ Call the popup menu for the selected partition (right click of the mouse button) on the Disk Map, then select the menu item: *Defragment Partition…*

3. Define parameters of the operation with the *Defragment Partition* dialog. Initially the program suggests some consistent values for all parameters. In most cases, the user may just press the *Yes* button to confirm the operation. At the same time there is the possibility to set the procedure in full accordance to peculiarities of the current file structure. So you can consider the following details:
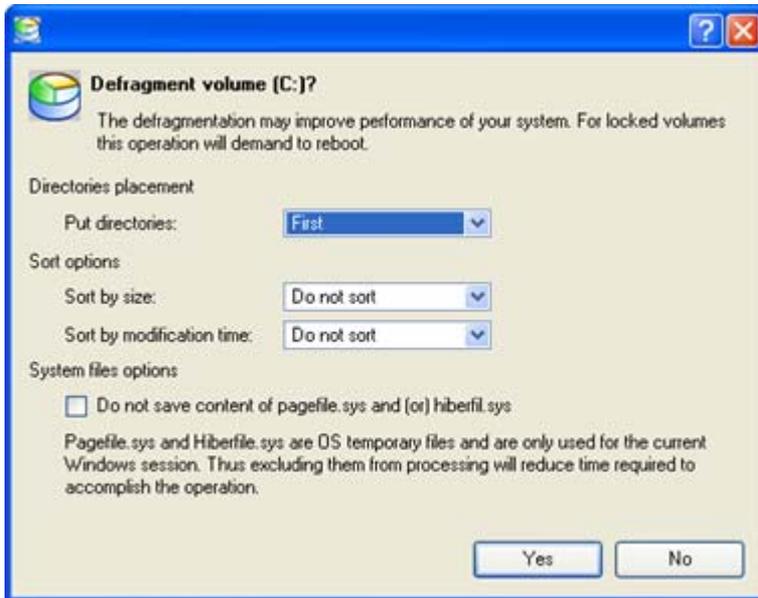
- ❑ **Directories Placement**. From the pull-down list select where to place directories during the defragmentation procedure. They should be putted *first*, if you have a great number of them on the partition. In this case directories will be placed in sectors with the highest speed of access what decreases file search time.
- ❑ **Sort by size**. Sort files according to their size. This option enables to place large files first, i.e. in sectors where the disk performance is maximal. If you work with large files (such as multimedia or CAD ones), it will speed up read/write operations for these files.
- ❑ **Sort by time**. Sort files according to the last time of update. It helps you to put most frequently updating files to the starting sectors of the disk what will lead to increasing response time for them.
- ❑ **Skip auxiliary files**. Mark the option to ignore contents of the PAGEFILE.SYS and HIBERFIL.SYS system files. These files are used temporarily in the operating system.
  You are able to get more information about available strategies of the defragmentation in the Basic concepts chapter.

⚠️	**For the best operation performance we recommend you to use the default parameters.**

4. The operation will be performed immediately after your confirmation. During all the procedure you are able to control the current state of the partition with the Defragment map. This map reflects a level of the fragmentation. Disk blocks are colored in accordance with their types – free, fragmented, used and blocks of unsupported file systems. Fragmented blocks are well noticeable – they're red. The more red-marked blocks the greater extent of the fragmentation.
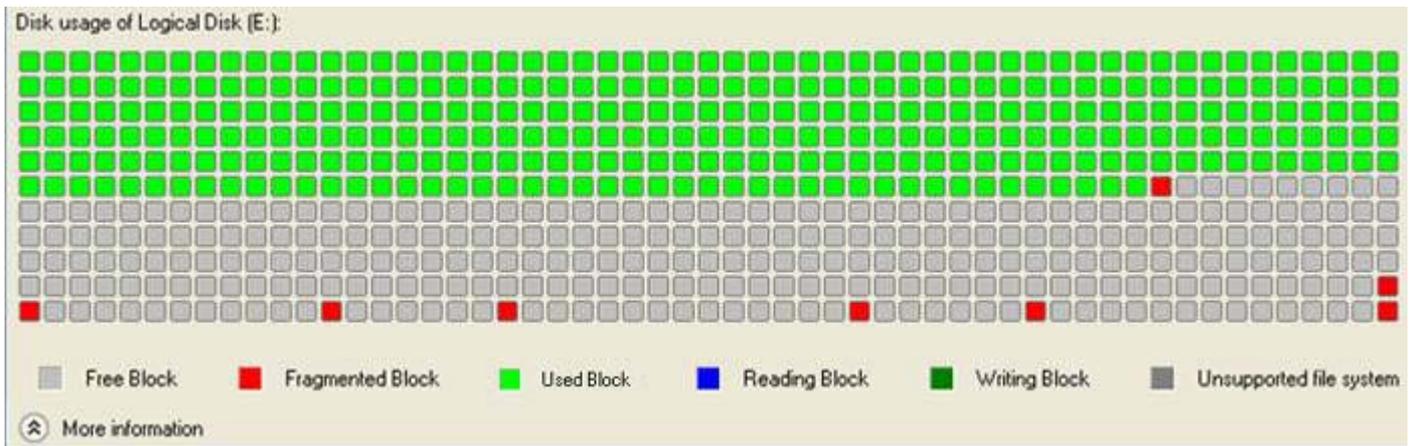
The *More information* button gives the ability to watch the defragmentation progress, to estimate the time left till the operation is completed. In this mode the option "*Shutdown system on complete*" is available. To close this additional panel, the user should click the *Fewer information* button.
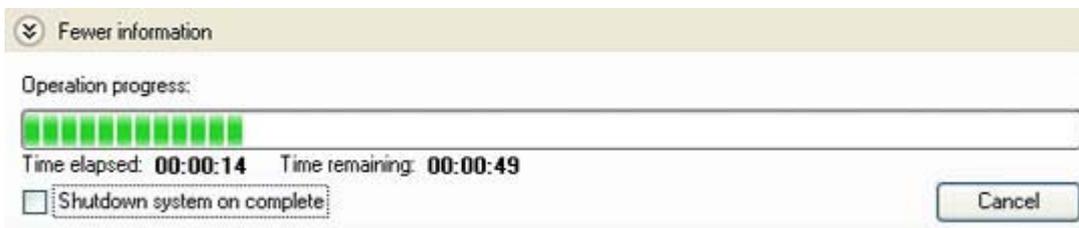
The running operation can be stopped by clicking the *Cancel* button in the Defragment Operations Bar.

5. After completing the operation, the user will get the exhaustive report about the defragmentation. There is the possibility to save it on a disk.

Boot-Time Mode Defragmentation

Sometimes the defragmentation procedure needs rebooting the computer into a special mode, as the program requires exclusive access to the processing partition. Especially this is right for system partitions where background read/write operations are being performed all the time. If this is the case, the program displays the following message:
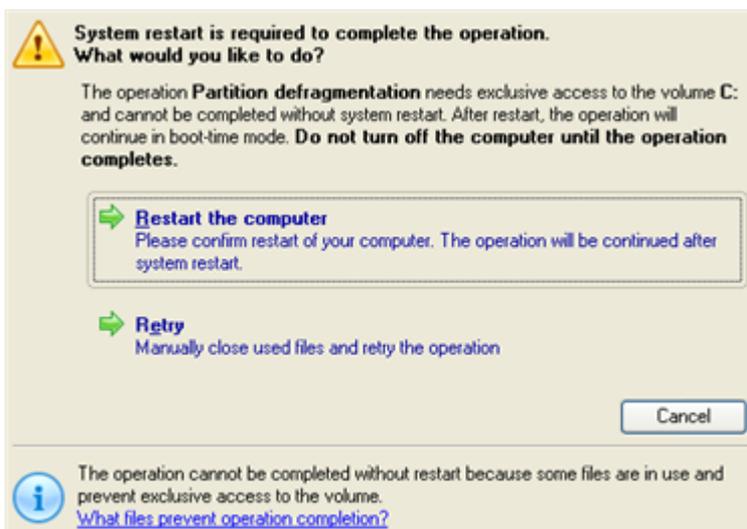
The user may try not to reboot the computer by manually closing all running applications and retrying the operation, but generally restart into the boot-time mode is the only way out to carry out defragmentation.
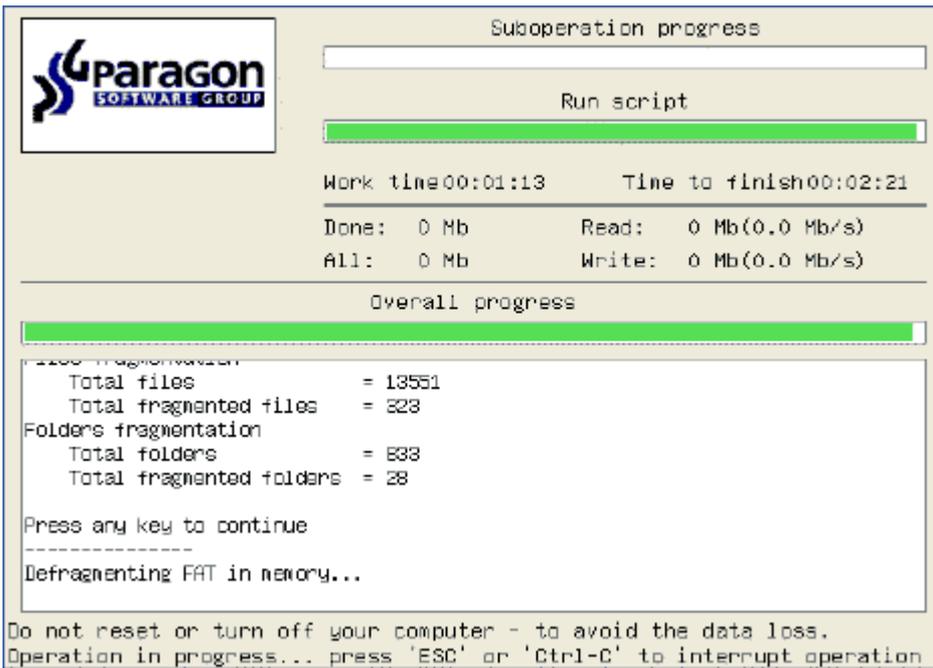
	To avoid data loss, please do not interrupt defragmentation except by pressing *Esc* or *Ctrl+C*:
	Please use the *Tab* button to choose the required action.
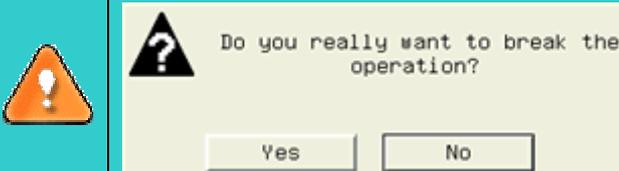
Defragmenting the MFT

The MFT (Master File Table) is an NTFS system file that contains in-depth information on files, including size, time and date stamps, permissions, and data contents. In the course of time the MFT file can also be fragmented, thus slowing down the speed at which data is accessed (see the Basic concepts chapter for more details).

The program offers its users a special tool to defragment the MFT file.

	The user must have administrator's privileges to accomplish the defragmentation of the MFT file.

In order to start the operation the user should take the following steps:

1. Select an NTFS partition on the Disk Map.

2. Call the *Defragment MFT* dialog to define appropriate settings. There are several ways to do it:

- ❑ Select in the Main menu: *Defrag > Defragment > Defragment MFT…*
- ❑ Call the popup menu for the selected partition (right click of the mouse button) on the Disk Map, then select the menu item: *Defragment MFT…*
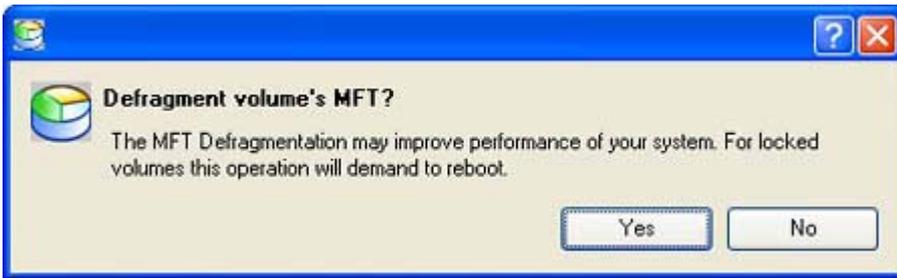
3. The operation will be performed immediately after confirmation.

> During the operation, to avoid possible data corruption, the program makes no impact on the original MFT file and does not move any files on disk, but creates a copy of the MFT file on non-fragmented free space. In case there is no non-fragmented free space of the required size, the program enables to use available disk space of less than 10 fragments. Otherwise the operation will be interrupted with the following error:

Compacting the MFT

There is the ability to re-write MFT (Master File Table) in a more compact way that will also increase access speed to files of NTFS partitions.

> The user must have administrator's privileges to accomplish this operation with the MFT file.

In order to start the operation the user should take the following steps:

1. Select an NTFS partition on the Disk Map.

2. Call the *Compacting MFT* dialog to define appropriate settings. There are several ways to do it:

   ❑ Select in the Main menu: *Defrag > Modify > Compact MFT…*
   ❑ Call the popup menu for the selected partition (right click of the mouse button) on the Disk Map, then select the menu item: *Compact MFT…*

3. Define parameters of the operation with the *Compact MFT* dialog. Initially the program suggests some consistent values for all parameters

❑ **Compact records**. In this case the program will re-write MFT records moving them to the table head.

❑ **Truncate MFT after compacting**. Emptied during the procedure the table rows will be removed

4. The operation will be performed immediately after confirmation.