



Disk DefragTM

Join file fragments together to
increase file access performance and recoverability

Part of the Intech's SpeedToolsTM Software
for MacOSTM X

User's Guide



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For One Computer

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Table of Contents

- 1. Guide Introduction 1**
 - About this Guide. 1
 - Conventions Used in this Guide. 1
 - User Registration 1
 - Technical Information 1

- 2. Using the Disk Defrag Utility 2**
 - About Disk Defrag 2
 - What is file Fragmentation? 2
 - What are File Forks? 3
 - Defragging vs. Optimizing Explained 3
 - Disk Defrag Instructions 4
 - Multiple, Simultaneous Defrag Runs. 5
 - Viewing the Defrag Log 5
 - Common Questions about Defragging a Volume 6
 - Disk Defrag System Requirements 6



Guide Introduction

About This Guide

The instructions and explanations in this guide assume that you understand how to operate your Macintosh computer. You should, for example, know how to choose, select, launch, and drag by using your mouse. In addition, you should also understand how the desktop, windows, dialog boxes, buttons and file/folders work within the Macintosh environment. For more information about these items, please refer to your Macintosh User's Guide.

Conventions Used In This Guide



Note: This symbol calls your attention to important information about the adjacent text. A note will always appear in standard print.



Warning: This symbol calls your attention to procedures in the adjacent text which can cause harm to you, your data or computer system. A warning will always appear in bold print.

User Registration

Please take a moment to register your copy of the SpeedTools™ software on-line via the Intech Software World Wide Web page at <http://www.SpeedTools.com>.

Technical Information

If you received this software with the purchase of a drive subsystem and you require technical support, Intech has made special arrangements with your drive manufacturer to support this software directly via their technical support department. For customers who have purchased this software product as stand-alone, Intech provides technical information and other late-breaking information via its web site at <http://www.SpeedTools.com>.



Using Disk Defrag

About Disk Defrag

Intech's Disk Defrag utility is designed to speed up your Macintosh's access to files stored on your hard disks. To do this, the Disk Defrag utility identifies files on HFS+ formatted drives which are stored in more than one place on your drive and rewrites those files so that they form one continuous data stream. This process can dramatically reduce the number of data reads and writes to access your files, thereby significantly speeding up file access related functions. An additional and often overlooked side-benefit is file recoverability in the event of a catastrophic directory corruption of a disk volume. In the event that a disk volume becomes inaccessible due to corruption, a file recovery tool will have a much higher probability of recovering the entire contents of a file if it is physically located in a single place on the disk instead of occupying multiple scattered locations (i.e. fragments).

What is File Fragmentation?

File fragmentation occurs, typically, as a result of the continuous process of creating, deleting and modifying files. When a file is deleted, for example, it leaves a "hole" (i.e. unused space) in the disk at the place it used to occupy. If a new file is created that is larger than the deleted file whose "hole" the new file is filling, the file may be split in to multiple pieces and placed within the available "holes". This file which now occupies more than one physical location on the disk is said to be "fragmented." Each part of the file located on separate areas of the disk is called a file fragment. The number of fragments that a file can be broken into is virtually unlimited. It is typical for large files on heavily fragmented drives to be made up of several hundred fragments!

So why should file systems allow files to become fragmented? Since the first days of the Macintosh, and many other file systems like MSDOS™, hard disk space has been at a premium. As a result, most file systems allow files to be broken up and stored in chunks on your disk when they are created and later grown to hold more information. If this weren't the case, disks would fill up much more quickly because there would always have to be enough free space on the disk to store the entire file from beginning to end. For large files on relatively full disks, this would be especially impractical.

What are File Forks?

There is one more concept which will fully explain how Intech's Disk Defrag works: file forks. Under the Macintosh HFS+ file system, the information in files is organized into smaller structures called "forks." Every file must have at least one fork. In MacOS versions prior to 9, there could only be two kinds of forks: resource and data. Resource forks are mapped and contain data typically defined by Apple, such as information about an application program's dialogs, controls, version information, etc. Data forks can contain any information, including executable PowerPC code. But from MacOS 9.1 through all versions of MacOS X, Apple has allowed for the addition of more than two forks. These forks are simply identified by name, not by type as in the case of data and resource forks.

So how does the concept of forks affect Intech's Disk Defrag utility? Intech believes it is much more important to keep each fork within a file contiguous (in one piece) than it is to keep an entire file with multiple forks contiguous. The reason for this is simple: the Mac can only access one fork at a time. For this reason it takes very little extra time to access different forks which are not sequential with respect to one another. In the Disk Defrag utility we call the situation where a file has contiguous forks, but the forks themselves are not contiguous with the respect to one another a "file with non-sequential forks."

Therefore, while Disk Defrag will attempt to make the forks of a file sequential to each other, the main priority is to remove the fragments of each fork of a file. Defragging forks is where nearly all the speed improvement is gained.

Defragging vs. Optimizing Explained

An optimizing program makes the forks and files contiguous like Disk Defrag does, but optimizing programs additionally group all the files together, back to back, in some sort of pre-determined arrangement. For example, all files could be moved to the beginning or end of a disk, and potentially even grouped into categories, etc. While this type of functionality can serve a purpose, Disk Defrag does not perform this function.

Why doesn't Disk Defrag perform an optimizing function? There are several reasons. First and foremost, it is not supported by Apple. The reason is simple: file optimizing requires direct manipulation of low-level file system data structures. When Apple decides to change these structures (which it has on multiple occasions), a file optimizer could wreak havoc in these structures. Furthermore, if there are any errors in these structures, direct manipulation of them could make the situation far worse. Secondly, file optimization can actually encourage file fragmentation to return sooner and more severely than performing defragmentation exclusively since the files are placed end to end. As a result of the end to end file placement produced by optimizing, there is no room to grow a file without immediately creating a new file fragment elsewhere on the disk.

Disk Defrag Instructions

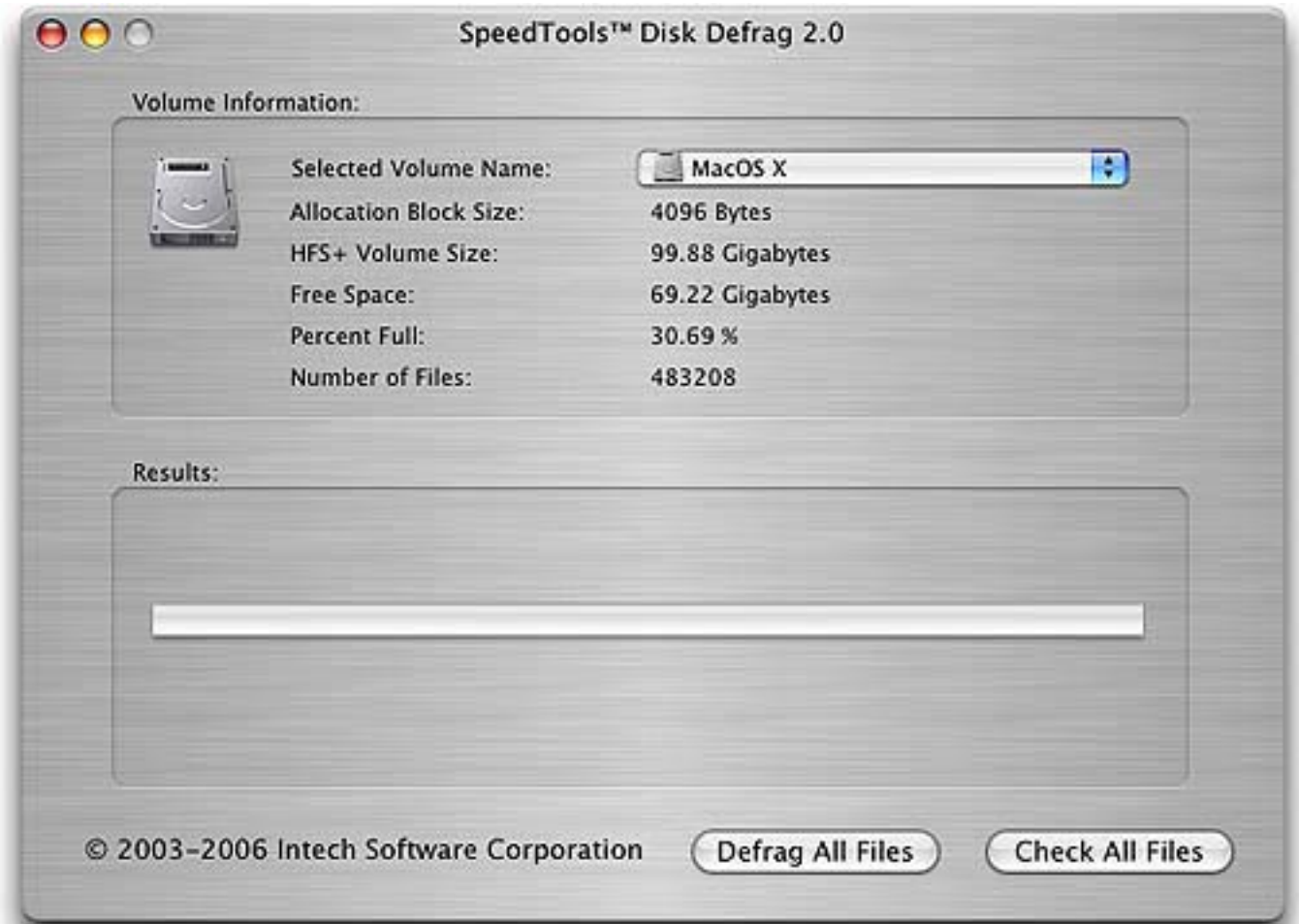


Figure 1. The Disk Defrag Utility Window

To select a disk volume for checking or defragging, select a compatible volume in the presented volume popup menu, or alternatively, drag and drop a volume's desktop icon onto Disk Defrag's main window. After the volume has been determined to use the HFS+ format and allow writing, the information about the volume's size and files will be displayed. Now you're ready to begin a volume check or defrag run.

Click the "Check All Files" button to get information about the amount of fragmentation on the selected drive. This option will NOT modify your volume in any way. While a check is in progress, you may click the "Stop" button to stop the run at any time.

Click the "Defrag All Files" button to start a defragmentation run. Click the "Stop" button at any time, but you cannot stop while a file is being defragmented.

Multitple, Simultaneous Defrag Runs

As of Version 2.0 of the SpeedTools Disk Defrag release, Apple Computer no longer manufactures any Macintosh computer which does not have at least two central processor cores. Disk Defrag takes advantage of multiple CPU architectures by allowing the checking & defragmenting processes to be assigned by MacOS X to any available processor. Additionally, Disk Defrag allows multiple copies to be run and multiple disk volumes to be defragmented simultaneously. The only restriction is that the same disk volume cannot be defragmented at the same time by two copies of Disk Defrag. (This would be quite pointless anyway).

To run multiple copies of Disk Defrag, go to the File menu and select "Launch new Instance of Disk Defrag." You can run as many copies of Disk Defrag as you like (even while a defrag run is currently taking place). Bear in mind, however, that defragmenting files on two volumes on a single physical hard disk drive will not be nearly as efficient as defragmenting files on volumes belonging to two or more different hard disk drives. This is because Disk Defrag creates a lot of disk access relative to the amount of CPU cycles consumed, and a single disk can only process one read or write request at a time.

Viewing the Defrag Log

Each time a volume is checked for fragmentation or actually defragmented, information about that operation is stored in a log file. The contents of this file can be viewed by going to the File menu and selecting "Open Defrag Log".

The log file is a simple text file which will open with your default text editor software. The file is fully editable.

Since not all files can be defragmented, Defrag will explain the reason for any file which is not able to be fully or partially defragmented. Some errors are correctable, like those instances when the fragmented file is currently in use by another program. To fix this problem, quit the application which has the file open. Some errors are not correctable, like those instances when there is not enough free space left on the volume to defragment the file.

The log file is fully editable if you wish to add notes of your own. Also, the log window supports drag-and-drop so text can be selected and dropped into or out of the log window.

Common Questions about Defragging a Volume




Q. Can I Defrag a MacOS 9 volume in MacOS X?

A. Yes, provided the volume has been setup with a Mac Extended HFS (plus) format.

Q. Can I Defrag My Boot Volume?

A. Yes, but any fragmented files which are in use by the operating system will be skipped.

Disk Defrag System Requirements

-  MacOS X 10.2 or later
-  5 MB of available RAM
-  Mac Extended HFS (plus) formatted disk or volume