A System Manager's Guide to
Evaluating Disk Defragmentation Solutions

What to look for when evaluating defragmentation software and how to make the right choice

The first thing to realize if you are considering a disk defragmentation solution for your organization is that all defragmentation software is not the same. The available products differ in their approach to the defragmentation process, handling of free space and metadata, scheduling, and other criteria. You should perform a thorough evaluation and make sure there are no hidden surprises. This guide is intended to make you aware of the many issues surrounding defragmentation and how they can affect your overall operations.

Apples to Apples

If you are evaluating defragmentation products side-by-side, you are going to need identical disks. You can replicate a fragmented disk using third-party software like Norton's *Ghost* or Symantec's *Drive Image*. The goal here is to have the same baseline disk for the evaluation.

How Bad Is The Problem?

Before you can assess the benefits of defragmentation, you need to know how bad the problem is before you begin. Most defragmentation software has an analysis mode that provides statistics on the partition. You will want to know the total number of files and how many are fragmented. You will want to know the same for directories. If you are evaluating on Windows® systems, you will want to know the condition of the Master File Table and the associated metadata. You will want to know how fragmented your free space is. These are your baseline statistics. Be sure to record them for use later.

Measuring Results

Common sense tells you the file system should be able to read a file in one piece faster than it reads a file in 300 pieces. But how do you measure that? Along with PerfectDisk®, Raxco Software provides a Timed Read program that lets you measure the time it takes to read a file *before* and *after* defragmentation. The difference between the two times is the performance improvement.

This tool is independent and can be used with any other defragmentation software. The performance improvement is necessary to perform any cost-justification or return on investment (ROI) analysis. Raxco Software also provides a free utility that creates fragmentation for the purposes of testing. To download these utilities, visit www.raxco.com/support/utilities-tools.

You can also use both commercial and open source disk benchmarking utilities. The following utilities provide real world simulations that can be used to verify the benefits of defragmentation on everything from desktop productivity to database, web and file servers.

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- Iometer from iometer.org*

- Performance Test from passmark.com**

- PCMARK from pcmark.com

* To test with Iometer, ensure that the test file created by iometer is first fragmented. Once data is collected, defragment the test file and test again.

** Passmark also provides a utility for fragmenting files for free. To download this utility, visit passmark.com/products/fragger.htm

Defragmentation

First we will deal with just the defragmentation results. Some defragmentation products defragment the entire drive in a single pass, while others require multiple passes to get the same result. Once a product completes its pass on the partition, be sure to check the statistics again to be sure you are getting the desired result.

Most sites schedule their defragmentation software to run during "off hours" so it does not conflict with normal operations. A single-pass defragmentation product will completely defragment the disk during this scheduled interval. A multi-pass defragmentation product may defragment from 10% to 80% of the fragmented files depending on disk size and severity of defragmentation. You need to decide how much time is available for defragmentation, how good a job you want done in the time available, and how often you want to run defragmentation as a part of your disk maintenance.

Free Space

While most system managers look at how well a defragmentation product defrags files, there are other related issues that can have an impact on performance and disk behavior as much as fragmentation. Fragmentation happens when the file system cannot find sufficient contiguous free space to create or extend a file in one piece. In the process of defragmentation, the remaining free space on the disk has to go somewhere. Some defragmentation products consolidate the free space into one large piece while others leave small pieces of free space all over the disk.

If the file system can find contiguous free space, it will create new files and extents of existing files contiguously. This means the disk will take longer to re-fragment. If the free space is scattered about the disk, the likelihood of creating new files or extents contiguously is diminished. This will

accelerate future re-fragmentation. The treatment of free space is a by-product of defragmentation that can help or harm future disk performance.

File Placement

A defragmentation product may employ a file placement strategy that not only defragments a file but puts it on the disk in an area deemed advantageous to the workings of the defragmentation engine. Some have no such strategy.

What difference does this make to you?

If you have limited time to run a defragmentation product, a file placement strategy can help you. On subsequent defragmentation passes, the files that are already contiguous and "placed" do not have to be moved again. This means future defragmentation will take less time and uses fewer resources. Products without a placement strategy start at the beginning of the disk on every run and move almost every file every time they run.

Metadata

On systems using the NTFS file system, each partition has a Master File Table (MFT), 10 metadata files, and a page file that constitute system files. All defragmentation products can move the MFT with varying degrees of success, but not all defragment the metadata files. If the metadata files are not defragmented, small pieces can be scattered about the disk, causing other data files to be split around them. This makes complete disk defragmentation difficult. Examples of metadata files are: $MFTmirr, $Logfile, $Upcase, etc.

Enterprise Management and Reporting

Having a thorough and efficient defragmentation solution is critical to maximizing the performance of enterprise servers and workstations. But if it is not easy to deploy, schedule, configure, manage and report on, its value is diminished. You should carefully consider the expertise you have in-house as well as the tools currently in place for enterprise management. For example, consider whether you use Active Directory®, SMS, or other third-party tools for installing and managing software. Also consider reporting requirements.

You should select a defragmentation solution that meets your enterprise management requirements. Make sure it is easy to deploy on its own or with the tools you know and use. Similarly, ensure that managing the software can be done easily, with little time and effort. And finally, you should confirm that the tool you select provides robust reporting of the enterprise's fragmentation issues, as well as alert you to potential problems before they occur.

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Safety Considerations

Windows has exposed Application Programming Interfaces (APIs) that can be used to safely defragment most files online, while Windows is running. These APIs safely move (defragment) files on both the NTFS and FAT file systems. These APIs are a part of the native Windows file systems and have been coded, tested and certified by Microsoft® to ensure that no data loss or corruption occurs when a file is moved. These APIs are fully synchronized with all file I/O and memory management functions of Windows. You can even safely defragment files that are open and currently being modified.

Summary

Other criteria, including scheduling, reporting, logging, command-line use, and deployment are issues of personal preference versus performance. In this document, we have provided information on issues that are not always intuitive in the evaluation of defragmentation software. We hope you have found it useful and we hope you enjoy your experience with PerfectDisk.

Corporate Headquarters

6 Montgomery Village Avenue

Suite 500

Gaithersburg, MD 20879

United States

Phone: 301.527.0803

Toll Free: 1.800.546.9728

PerfectDisk Sales
Direct: 301.527.0803
Toll Free: 1.800.546.9728
sales@raxco.com

About Raxco Software

Raxco Software has been helping large enterprises, small businesses, and consumers with their computer resource management needs for over 30 years. Its PerfectDisk is Windows® Certified by Microsoft®, and optimized for Windows 7. The PerfectDisk line has a long award-winning history, most notably its perfect 5-star review from CNET Download, winner of the *Windows IT Pro* Readers' Choice Awards for Defragmentation Utility and Storage Management Tool, and Redmond Magazine's Best of the Best Award, and having won PC Magazine's Editors Choice award multiple times. In addition to its PerfectDisk line, Raxco also produces PC optimization software for Windows operating systems and HP's OpenVMS operating system. Raxco Software can be found on the Web at www.raxco.com.

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