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The Essentials Series: Why You Need  
to Defragment

# Doesn't Windows Have This?

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by Greg Shields

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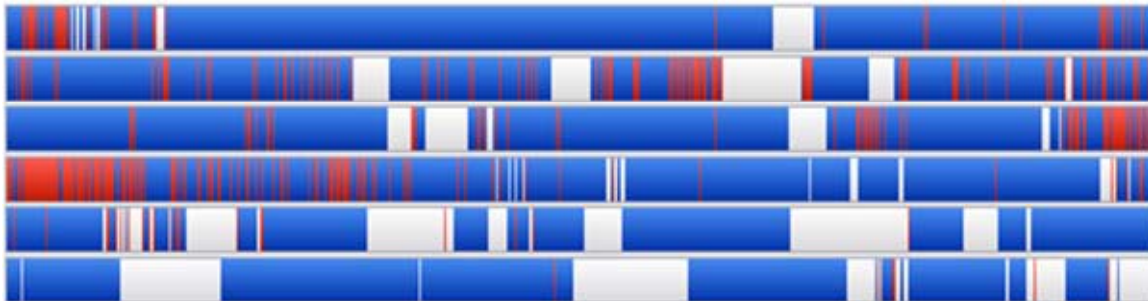
# Doesn't Windows Have This?

Of course it does. But as with many other things in life, with Windows' onboard defragmentation engine, *you get what you pay for*. Microsoft's built-in disk defragmentation tool is a solution that was originally obtained from its third-party ecosystem. Starting in the early 1990s, Microsoft ported this third-party code into its operating system (OS) as a built-in solution for accomplishing basic defragmentation operations.

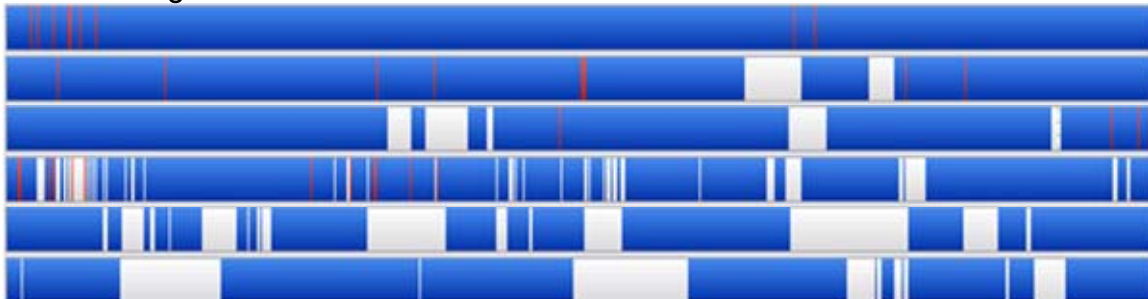
However, the codebase incorporated with this port remains dramatically different than those available through today's third-party software vendors. Although the core performance of this solution is visibly improved in newer OSs such as Windows Vista and Windows 7, its implementation on Windows XP systems simply does not provide the level of defragmentation required by most enterprises.

Even with Windows Vista, Windows 7, and Windows Server 2008 R2, Microsoft's defragmentation implementation today remains only a stopgap measure to prevent the grossest levels of fragmentation. As an example of this, reference Figure 1, where two representations of a Windows file system are presented.

## Before Defragmentation



## After Defragmentation



**Figure 1: File performance with the standard Vista defragger (top) and after using a third-party defragmentation solution.**

In this figure, the image on the top represents the level of fragmentation on a Windows Vista computer that has used only the native defragmentation solution. This computer has been in operation for nearly 2 years, using only the native weekly defragmentation available in Windows Vista.

You'll notice here that a number of areas are marked in red. These correspond to files and folders that have not been fully defragmented and are not operating at full efficiency. Even though the native defragmentation solution was scheduled to occur on a weekly basis, that defragmentation pass was unable to fully complete its mission. Compare this graphic with the alternative on the bottom, which was taken immediately after completing a defragmentation pass on this same computer using a third-party defragmentation solution. Here, you'll see that the number of non-optimized files is dramatically reduced through just a single pass of the third-party solution.

## Limitations of the Native Defragger

Article two of this series discussed how today's conventional wisdom associated with defragmentation has dictated a proactive approach. Using the proactive approach, the level of resources required by the defragmentation engine is dramatically reduced. Defragmentation simply isn't allowed to exist on the system, which means that proactive management also ensures a fully-optimized file system.

In contrast, the native Windows defragmentation solution leverages a less-effective scheduled approach to its processing. By default, it invokes a defragmentation pass every Wednesday at 1:00am on desktops, which can directly impact system performance while it goes through its machinations. Due to the architecture of the Windows scheduling engine, if this scheduled pass is missed due to the machine being powered off, the pass will instead occur at the next power on.

Further, the native Windows defragging solution is limited to online operations only. There are some files in the Windows file system that cannot be optimized while the system is powered on. These files, such as the system paging file and hibernation file can accumulate their own levels of fragmentation over time, especially when configured for growth. One result of this limitation is an inability to consolidate free space across the computer's hard disk, leaving the aforementioned "holes" of free space on a defragmented disk. Alternative solutions that enable proactive and continuous defragmentation are necessary for these files to be fully optimized.

## Impacts on Servers

It is not a well-known fact that Windows' native defragmentation solution is disabled by default on Windows Server 2008. But before you go about enabling it on all your systems, consider the impact: Enabling that schedule can have a dramatic impact on performance during its initial and even future passes. This fact means that many business networks are likely operating their servers with exceptionally high levels of fragmentation, potentially causing a major impact on their server operations.

You cannot simply enable this schedule without expecting some ramifications. Although the native Windows solution incorporates limited process throttling to prevent resource overuse, that throttling is reactive in nature. As such, to protect yourself against a measure of pain, consider the use of third-party solutions that leverage proactive solutions for resource overuse prevention before ever turning on Microsoft's native solution on your servers.

Nowhere is this more dramatic than on servers with very large volumes. These volumes, which may measure in the hundreds of gigabytes or even terabytes, have special needs due to the sheer size of their data storage. As the defragmentation process requires involvement from processing and memory resources in order to accomplish its optimization, servers with very large volumes should also consider the use of external solutions that are designed to scale.

### Impacts on Management

Finally, there are two useful management elements that are missing from the native defragmentation solution in the Windows OS. The first of these is a user interface (UI) that provides the right level of detail to users. As you can see in Figure 2, the Disk Defragmenter wizard in Windows 7 is very limited in the information it presents to its users.

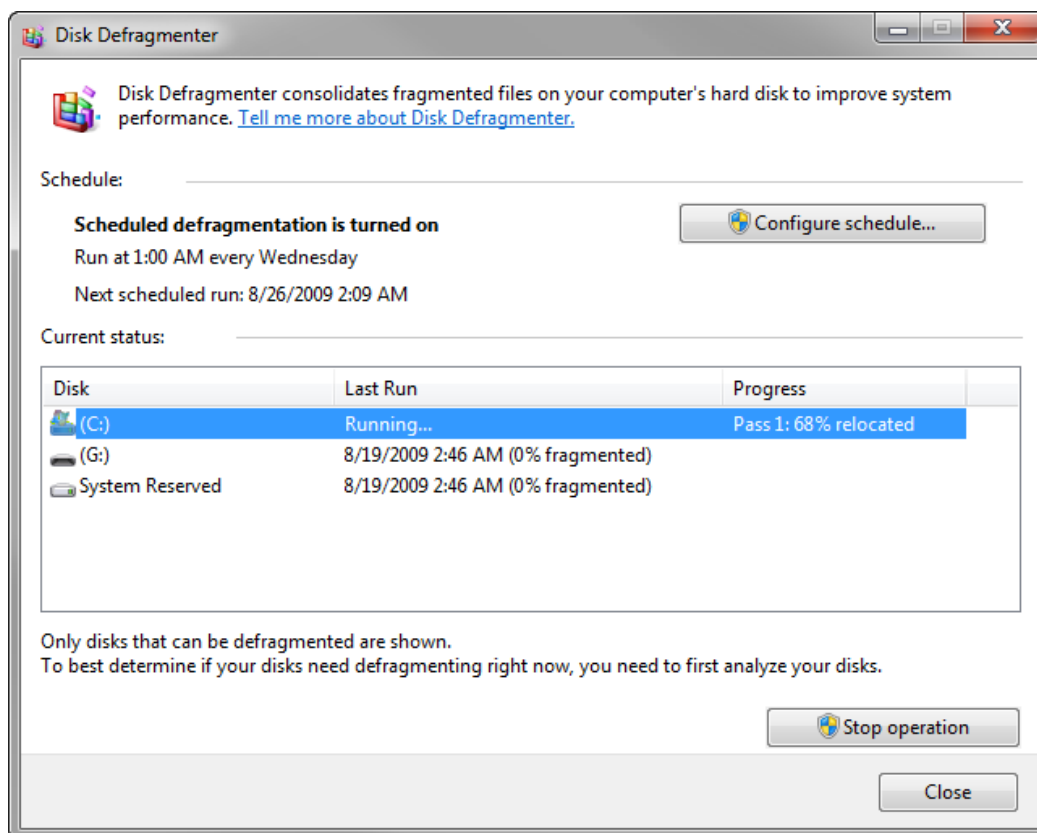


Figure 2: The UI in Windows 7's native defragmentation solution.

In this image, the user is informed that the defragmentation process is occurring, that it is running one of a series of passes, and that the process is 68% complete. Considering the performance impacts of this process that have already been discussed, you might want to provide more information to keep your users informed about the status of their defragmentation process.

The second, and more important, omission relates to the level of centralized control available to administrators. In short, Windows' native disk defragmenter has no exposure for policy-based configuration. Thus, administrators cannot create or modify an enterprise defragmentation configuration using tools such as Group Policy. Nor can administrators gain an understanding of system health across their managed computers through centralized reporting. As such, using the Windows native defragmentation solution in many ways transfers the responsibility for defragmentation away from administrators and to the user. The result is that administrators lose the ability to take action based on information gathered through any centralized information-gathering solution.

### **Windows Does Have This, But...**

Native tools by nature enable only limited capabilities. To that end, this article series has attempted to show three things: First, that defragmentation is indeed a problem that is a naturally-occurring part of file systems operations. Second, that defragmentation is a necessary requirement of any Windows-based network. Third, the rudimentary capabilities to accomplish this process are a part of the Windows OS. However, as has been noted in this third article, they are limited in their functionality while at the same time can add a performance impact on servers and workstations.

In all of this, never forget that ultimately the sole purpose of defragmentation is to increase system performance. Save yourself the headache of freezes, crashes, and the potential for expensive purchases down the line, and consider incorporating the right kinds of defragmentation solutions into your environment.