

Disk Defragmentation in a Lotus Notes Environment

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What is Fragmentation?

File fragmentation is a normal byproduct of the file systems (FAT And NTFS) used with the Windows operating systems. Fragmentation occurs when the file system is unable to create a file in a single piece. As files grow, the file system may not be able to extend the existing file in one piece so a fragment is created. File deletion also leads to fragmentation by creating "holes" of free space which the file system will subsequently reuse. The more file fragments there are, the longer it takes to read the file. Testing has shown it can take 30-80% longer to read a fragmented file than it does to read one that is contiguous. This translates into lost productivity, poor system performance, higher help desk expense, and unnecessary hardware expense.

User behavior has a lot to do with how quickly fragmentation occurs. The frequency of creating new files, modifying existing files, and deleting files will have an effect on the rate of fragmentation. However, certain applications are more prone to fragmentation than others. Digital video editing, CAD applications, graphics packages, and Lotus Notes are examples of applications that can rapidly fragment disks.

Fragmentation and Lotus Notes

Fragmentation uniquely affects Lotus Notes performance.

The remainder of this white paper examines why fragmentation is a problem with Lotus Notes and what type of solution works best.

Lotus Notes is an enterprise collaboration package designed to provide email, calendar, and contact information for desktop and laptop users. Lotus Notes is particularly well-suited to environments where groups of users share information and documents. The Notes database server hosts a document and authorized users can access that document automatically, keeping their local files up to date.

The Lotus Notes replication function is what enables remote users to keep their local Notes database current with the server database. When a remote user clicks on "replicate" the local database synchronizes with the server database. This results in new information being written to the local disk drive, increasing the size of the Notes database. The Windows file system views the Notes database as a single file. As more data is downloaded due to replication, the file system needs to find more free space to accommodate the growth of the Notes database. If the file system can't find contiguous free space, it will place the new data wherever it can, with the result being a badly fragmented Notes database. Severe Notes fragmentation manifests itself in unacceptable Notes application launch times and slow overall system performance as the fragmentation worsens.

Almost everyone understands why you would want to have a file in one piece as opposed to hundreds of pieces. But it is equally important to have the remaining free space on the disk consolidated. If the free space on the disk is fragmented into hundreds of pieces, the file system has no choice but to create hundreds of fragments as it extends the Notes database. If the free space is consolidated, the file system can allocate large pieces of contiguous space to extend the Notes databases, thereby reducing the total number of fragments and minimizing the adverse impact on performance.

The Windows Disk Defragmenter (WDD)

The operating system includes the Windows Disk Defragmenter (WDD). If you have a Notes environment, can't you just run the WDD and fix everything? The answer is no. There are several drawbacks to the built-in defragmenter that will not help the Notes user.

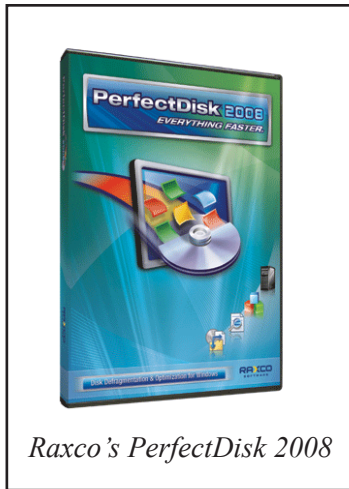
First, Notes is generally used in a multi-user environment. Since the built-in defragmenter has no network scheduling capability, it is time-consuming and labor-intensive to automate enterprise defragmentation with the Microsoft tool. End users can only run the WDD if they have administrator privileges. This is something most companies are not willing to grant their users due to security concerns.

Second, the built-in defragmenter uses a multi-pass defragmentation engine. This means it must be run over and over to defragment the disk. While it does make gradual progress on file fragmentation, this multi-pass approach has the nasty side effect of increasing the fragmentation of the remaining free space. The more fragmented the free space, the faster new file fragmentation (i.e. the Notes database) will occur. Here is what industry expert Gartner Research had to say about the built-in defragmenter. It is the same version that is in Windows 2003 Server and XP.

...multi-pass defragmenter that must be run over and over to defragment the disk, especially when defragmenting very large disks with heavy fragmentation and limited free space.

"The Windows 2000 Server built-in defragmentation tool is a multi-pass defragmenter that must be run over and over to defragment the disk, especially when defragmenting very large disks with heavy fragmentation and limited free space. As such, multi-pass defragmenters characteristically fragment the remaining free space on the disk, which accelerates fragmentation later. It is recommended that a third-party single-pass server defragmentation tool be implemented instead."¹

The Windows 2008 Server and Vista use a rewritten tool that is somewhat better in its total file defragmentation, but it still leaves very fragmented free space, which is the crux of the problem in a Notes environment.



Without contiguous free space the Notes database will continue to fragment quickly with replication.

Case Study

A major pharmaceutical firm was experiencing severe performance issues at one of their R&D facilities. The research staff was complaining about slow system boots, slow response times, and slow launching of their Notes application. Much of the performance problem stemmed from the user behavior with Lotus Notes. Users would connect to the network for a work session and at the end of the session they would use the replication feature in Notes to synchronize their laptop database with the server database. The IT personnel noticed that replication was accelerating file fragmentation.

To address the fragmentation issue, the IT group purchased a third-party defrag tool. After some time they noticed an unexpected result. Their new defragmenter employed the same multi-pass defragmentation engine that is used by the built-in defragmenter. The more they ran it, the more fragmented the remaining free space became; and the fragmentation of the Notes databases actually got worse. Many users had Notes databases in 12,000 to 15,000 fragments. Their defragmenter would run every day for a few minutes and report that it had completed its task, but there was no reduction in the free space fragmentation.

What had happened was the free space had become so fragmented the third party defragmenter could no longer function. The third party defragmentation tool was trying to defragment the Notes database file, but there wasn't enough contiguous free space to effectively reduce the fragmentation. Each successive pass actually chopped the remaining free space into smaller pieces.

The IT staff then tried Raxco Software's PerfectDisk. PerfectDisk differs from the Windows defragmenter and the other defragmenter used here in two major areas: (1) PerfectDisk defragments 99-100% of all data files in a single pass. After PerfectDisk runs once the disk is about as good as it is going to get; and (2) PerfectDisk also consolidates the free space on a disk into the largest possible piece in that same defragmentation pass. PerfectDisk eliminated the severe fragmentation on the Notes workstation databases and consolidated the remaining free space in one pass. The systems then booted faster, launched Notes faster, and experienced better overall performance.

Summary

This example clearly demonstrates that all defragmentation software is not the same. There are clear technical differences in the algorithms and strategies employed and their impact on resource consumption, application performance, and results can vary greatly. The multi-pass strategy employed by the Windows defragmenter and other third-party tools are not effective in a Lotus

Notes environment when users are frequently using the replication feature in Notes. Similarly, defragmenters that recommend running continuously in the background do a poor job of creating a large contiguous piece of free space. Without the contiguous free space the Notes database will rapidly fragment with replication.

Notes users will realize the most benefit from a single pass defragmenter that consolidates the free space. Raxco Software's PerfectDisk 2008 addresses both of these points. If PerfectDisk is used in a regularly scheduled program of proactive defragmentation, the Notes user will experience the best possible system performance, the best storage utilization, and a lower total cost of ownership.

PerfectDisk 2008 Command Center enables enterprise management.

PerfectDisk 2008 can be configured, deployed, scheduled and managed through the PerfectDisk 2008 Command Center, which is part of the PerfectDisk 2008 family. The Command Center also provides graphic alert/warning information to the Command Center console for all machines on which PerfectDisk is installed. Enterprise reporting is also available through the Command Center. Alternatively, Active Directory can be used for enterprise management.

(Footnotes)

¹ Gartner Research Note "Windows 2000 Operating System" February 20, 2003
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