Defragmentation Return on Investment
More than Meets the Eye
Learn some of defragmentation's unexpected benefits that contribute to a positive ROI

Let's face it - the current business environment is not for the faint of heart. Worldwide stock markets are on a roller coaster, credit is tightening, inflation is a threat, unemployment is ticking upwards and uncertainty seems to be the norm. In times like these, business tends to turn inward and look for ways to preserve capital and reduce expenses. If any money is to be spent, management wants to be sure the investment yields a positive Return on Investment (ROI).

IT departments can be particularly hard hit in times of economic turmoil, since the cost of maintaining a corporate IT environment is high. In addition to the price of hardware and software, there is the cost of the IT professionals who keep it all working. If staffing levels are to remain at the recommended levels, IT management should look for technologies that can help the organization run more efficiently while providing that positive ROI. Disk defragmentation software can provide some unexpected benefits that contribute to a positive ROI, while helping leverage the most from the existing hardware investment.

First, let's look at the issue of fragmentation. There are two kinds of fragmentation that can have a detrimental effect on your servers and desktop/laptops. The first is file fragmentation, which occurs when the file system can't create a file in a single I/O. The net effect of file fragmentation is that it takes longer to read a file than it would if it were in one piece. In other words, it takes longer to do your work than it should.

The second kind of fragmentation is free space fragmentation. If the free space on the disk is fragmented, the file system has no choice but to create more fragmented files; it actually exacerbates the problem you are trying to fix. File defragmentation without free space consolidation is like doing half the job. While file defragmentation improves the time it takes to read a file, free space consolidation improves the time it takes to write a file, slows down re-fragmentation and reduces the number of unnecessary seeks to the disk.

Typically, organizations view disk defragmentation simply as a remedy for a slow system. While defragmentation will improve the file read time and increase user productivity, there are other benefits to be had from disk defragmentation that are not as intuitive and also contribute to a positive ROI. For example:

• **Backups**. File backup is an activity that effectively reads the entire disk. With larger drives, the window to complete disk backups is getting smaller all the time. Disk defragmentation can improve backup times by 20-70%, depending on the severity of fragmentation, the number of files and the size of the files. Shorter backup means increased server availability. It may also mean less overtime

for system administration personnel. Both of these benefits can contribute to an improved ROI for disk defragmentation. It might also make life easier for the administrator.

• **SQL and Exchange Servers.** Defragmenting SQL and Exchange databases improves their performance. Defragmentation also improves the efficiency of the native database utilities provided by the database vendor. For example, re-indexing and compression both work better when performed on a database that has previously been defragmented. [Note: The Microsoft® API for moving open files makes it safe to defragment SQL databases.] More efficient database access and improved internal database performance also contribute to a positive ROI.

When you add free space consolidation to simple disk defragmentation you receive a host of additional benefits you can't count on with just defragmentation alone. While file defragmentation improves the time it takes to read a file, it does nothing for disk writes. Free space consolidation speeds up disk writes since a new file can be written in a single write I/O. When a file is created in a single contiguous write, there is a secondary benefit that accrues to the user - new file fragmentation is slowed down. As a result, it takes much longer for system performance to degrade.

These are great benefits in and of themselves; but how do they manifest themselves in a working environment in a way that improves an organization's ROI? Here are just a few examples:

• **Print Servers.** Fragmented print files take longer to print than contiguous files. Free space consolidation improves the likelihood that print files will be spooled as a single contiguous file, improving the performance of print jobs and increasing the efficiency of print servers. A 20-30% improvement in print time for a large print job adds up to savings.

• **File Servers.** While contiguous files can be read faster, consolidated free space ensures new files are written faster and they are created in one piece. For a single file, this may not seem like a big deal, but when you consider thousands of new files being created on a disk in the fastest accessible way, the benefits are obvious.

• **Virtual Machines.** Individuals, small businesses and the largest enterprises are all using virtual machines now. Virtualization provides a flexibility to work between operating systems or to maximize resource utilization on a single physical system. Virtualization also uses a lot of disk space. With consolidated free space, you can ensure your virtual machine is created in a contiguous chunk of disk space for the best possible performance. Multiple virtual machines can stress system resources. Defragmenting the host and the virtual guest machines will deliver the best throughput in

a Windows® environment. With VMware® or other non-Windows hosts, there is a performance and resource benefit to defragmenting the Windows guest systems.

• **Reduced Help Desk Costs.** Fragmentation-related problems manifest themselves in the form of slow boot times, slow application launches, poor response time and in severe cases, applications hanging or crashing is a possibility. A regular proactive defragmentation effort on all servers and workstations eliminates these problems and frees help desk or system administrators from having to diagnose the problem and take the appropriate remedial action. Usually, during the trouble shooting and solution, the costs are compounded by an idled user.

Other things to look for in an enterprise defragmentation solution include features that can get you more of an edge from your computing environment. These are the extras some vendors provide as part of the defragmentation process that can squeeze some additional performance from your hardware and add to that cumulative ROI. Things to look for include:

• **Centralized Management.** Enterprise defragmentation can save a lot of time provided it can be managed from a single point of control. Look for a management console that facilitates configuration, deployment, scheduling, alerts and warnings, management and reporting. Centralized management is at the heart of enterprise defragmentation. System administrators use the management console to monitor the status of disks at the partition level, and react to developing problems. The console alone contributes to a positive ROI in that it notifies the administrator of situations needing attention before they become problems.

• **Optimized Boot Files.** When the files related to the boot process are defragmented and located adjacent to the Master Boot Record (MBR), there can be a 10-30 second improvement in system boot time on workstations. When you want to get working, you don't want to wait for a slow system boot.

• **Optimized MFT.** Microsoft Research published a white paper prior to the launch of Windows XP stating that relocation of the MFT, about 3GB into the drive, delivers a 5-10% performance increase. Since the MFT is accessed with every data file access, anything that can improve its I/O throughput is a plus.

• **Intelligent File Placement.** File defragmentation definitely improves file access, but if the files are scattered randomly all over the disk there are still inefficiencies in the process. A defragmenter

that employs an intelligent file placement strategy will maintain better file access over time and reduce the time and resources needed for subsequent defrags.

Combine the benefits of file defragmentation and free space consolidation with intelligent file placement, boot file optimization, MFT optimization and a centralized management console, and the benefits of regular, proactive networked defragmentation/optimization pays for itself in very short order. The savings come in the form of:

• Better end user productivity

• Shorter backup times

• Improved server availability

• Centralized management

• Maximizing the most from the hardware investment

• Improved performance from virtual environments

• Faster print and file server performance

• Reduced help desk cost as fragmentation-related problems are eliminated

• Reduced system administration time in defragmentation management

• Possible life cycle extension due to a well-managed storage environment.

Now is the time to get control of storage performance. Eliminate a well-recognized problem in Windows and save time and money in the process. Disk defragmentation with free space consolidation pays for itself in better performing hardware, more productive employees, less downtime, and fewer problems.

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