

## **Fragmentation: A \$50 Billion A Year Problem**

**Citibank and Wells Fargo achieve performance gains and cost savings through defragmentation.**

*By: Jim Middlemiss*

Financial institutions could save billions of dollars in unnecessary computer upgrades by simply ensuring that their computer systems undergo a regular defragmentation check, according to recent research from International Data Corp. (IDC).

Corporations of all stripes are losing as much as \$50 billion a year globally because of disk fragmentation problems, said Steve Widen, an analyst at IDC who was involved in the study. Financial institutions, he said, are "highly impacted" because they rely heavily on word processing, e-mail and spreadsheet programs that are most susceptible to fragmentation.

Although the fragmentation problem isn't new, it lacks the "sex appeal" of computer viruses and other problems, Widen said. However, it can be equally deadly to the bottom-line and IT professionals' attempts to maintain efficient information systems.

While popular viruses like the Love Bug or Melissa have captured the attention of IT managers, fragmentation remains a silent killer, quietly stalking systems, causing them to freeze up and slowing down applications by as much as 15 minutes.

"Unless a red flag gets raised people don't get concerned about it or look at the problem," Widen said.

Fragmentation occurs when documents are created and then later saved or erased. When a document is first created and saved onto a hard drive or disk, it is stored in contiguous clusters. Widen explained that when the file is later called up the "head," which reads the information, moves from one cluster to another on a single track. As files are added, they are also set out in contiguous clusters. When files are erased, the cluster space they occupied becomes available and is filled as new files are created. However, when the new files are larger than the available contiguous space, the information in those files gets broken up and is randomly placed on the disk, and the files start to become fragmented.

As documents continue to be created, edited and deleted, fragmentation becomes more pronounced, with more information dispersed in blocks throughout the disk. Because the head must jump from track to track to compile all the information it slows down the performance of the system. Files that once took one or two seconds to open can take as long as 10 or 15 minutes to compile, IDC found. As well, the time it takes to boot a computer can triple and disk backups can take hours instead of minutes.

The problem of fragmentation is underestimated in most organizations, said Gary Lorenzen, a LAN administrator with Wells Fargo, San Francisco. "I see it all the time, not just in user applications but on the server as well."

Lorenzen now runs a disk defragmentation program in off-peak hours to clean up files and keep his system humming. On a day-to-day basis, he said, the problem is not acute. "It's usually an accumulation-over several days it builds." Once a month, he chooses a night when the system's not in use and runs a defragmentation program that essentially pulls together the different clusters of each file and structures them to make it easier to read. By carrying out a regular cleansing program it takes only a few minutes to defragment a system compared to the hours it can take if you let the problem build up, he says.

Vadim Eijvertine, assistant vice president at Citibank, noted that fragmentation can "dramatically decrease the performance of your system. Computers start hanging and some applications won't load fast enough. The performance decreases over time." Like Lorenzen, he relies on a defragmentation program, Diskeeper by Executive Software, which Citibank recently licensed. "In my neighborhood, almost everybody uses it." Now he runs it everyday after hours to sweep his station and keep his files orderly.

According to Theobert Ahlbert, CIO of Citicorp, regularly scheduled defragmentation is a vital necessity in maintaining Windows NT at peak performance. The IDC study is a wake-up signal to top management to ensure that a defragmenter is installed across the entire network, he said.

However, fragmentation isn't just limited to Windows environments. It affects Unix and everything else, Wells' Lorenzen noted. Often, he said, the problems brought on by fragmentation are misdiagnosed as hardware issues, with the result that "people tend to throw hardware at the solution instead of software" and needlessly upgrade systems.

Corporations globally are wasting an estimated \$6 billion annually on hardware improvements to battle what is a software problem, according to IDC's Widen. At best, throwing hardware at the problem might temporarily mask it, but the fragmentation issue still remains.

The National Software Testing Lab (NSTL), an independent organization, tested the impact of defragmentation on the systems performance of standard applications such as Microsoft Excel, SQL Server 7.0, Microsoft Outlook and Microsoft Exchange-programs commonly used in financial institutions. The tests were conducted using a defragmentation system and different hardware configurations.

Defragmentation resulted in a performance increase of 80.6% in Excel and Outlook applications running on an NT workstation and 219.6% when running on Windows 2000. Defragmentation resulted in an average 56.1% performance increase in Exchange and SQL Server running on NT Server 4.0.

Lucent Technologies reported a 15% to 20% performance gain on both servers and workstations when it defragmented its systems on a daily basis. Citibank's Eijvertine estimated improved performance in the range of 10% to 20%.

The benefits of defragmentation extend beyond performance improvements to lowering the total cost of ownership for an enterprise, according to the IDC report. "By using a defragmentation facility it is possible to achieve performance gains that meet or exceed many hardware upgrades."

Individual employees may manually run their own defragmentation programs using applications available in Windows, or through independent software programs like Diskeeper or Norton. However, "it is both impractical and cost-ineffective for IT support groups to manually run defragmentation box by box across an enterprise," the report said. Such a procedure would be

labor intensive and create such problems that much of the benefits available from defragmentation would be lost.

It's also a haphazard approach, Widen noted, with no guarantee that defragmentation would be carried out. The better bet is to deploy network-wide defragmentation software that runs on a schedule, he said.

Network defragmentation clearly provides cost savings of several magnitudes when compared to manual defragmentation, Widen said. According to a cost comparison study by IDC, defragmenting 1,000 workstations and 10 servers manually would take 52,520 hours and cost \$2.1 million, based on \$40 per hour for IT staff time. Using a network-deployed defragmentation system, the job would require only 24 hours of staff time at a cost of \$960.

IDC also compared the costs of hardware upgrades versus the cost of licensing and installing defragmentation software. It estimated the cost of purchasing 1,000 workstations, including staff set up time, at \$3.2 million. In comparison, licensing Diskeeper NT for 10 servers and 1,000 workstations would cost only \$24,000.

Defragmentation software can extend the life of a typical workstation by as much as two years over the normal three-year cycle, which can significantly affect a company's bottom line, Widen added. For example, IDC estimated the savings per computer at \$270 per year, or \$1,350 per computer on a five-year cycle.

Financial institutions need to implement policies and a maintenance program around defragmentation, said Widen, noting that fragmentation will in time be perceived as more of an applications problem.

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