

WHITE PAPER

Defragmentation's Hidden Value for the Enterprise

Sponsored by: Diskeeper Corporation

Frederick W. Broussard

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IDC OPINION

Although CIOs may be aware of the problems caused by fragmented hard drives and files, this awareness tends not to receive the attention it may well deserve when it comes time to prioritize funds for purchasing future systems. However, business value is derived from having machines up and running to support business units, and fragmented files can be a factor in hardware upgrades as well as degraded server, desktop/laptop, and application performance. The problem of degraded system performance and the resulting business unit impacts can be addressed with file defragmentation software. CIOs in businesses that need increased server and desktop performance, overall system stability, savings resulting from system stability due to lower help desk calls, and longer hardware replacement cycles should consider investing in an automatic defragmentation software tool.

IN THIS WHITE PAPER

This IDC White Paper looks at the savings and benefits that system software and disk defragmentation can provide to customers. It also examines the savings that were achieved by three enterprise customers using a simple model over one year. These customers were selected by Diskeeper for analysis by IDC.

SITUATION OVERVIEW

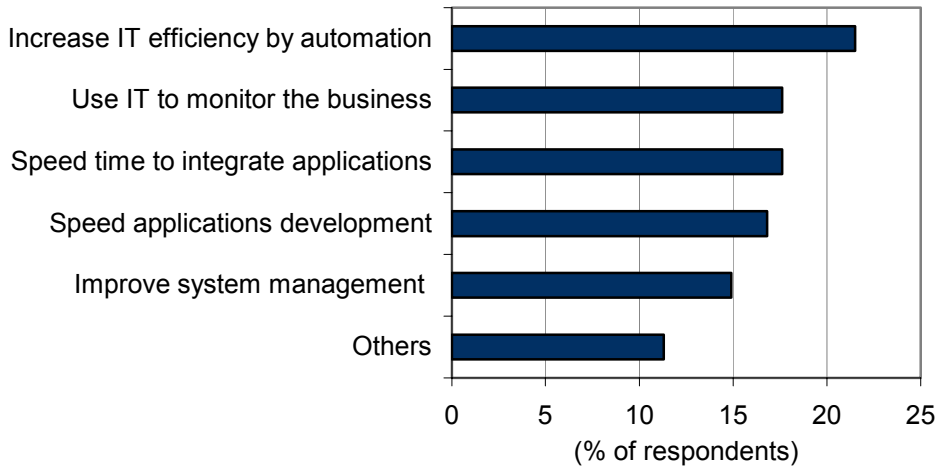
From its early beginnings in the 1980s, client/server technology has evolved to become one of the mainstays of the modern workplace. PCs, laptops, desktops, and servers are now commonplace among many organizations in North America and worldwide. Tools to network these systems and provide them with basic functions, such as a file system, larger hard drives, and RAM, have given way to focusing on the business value of installing and using these technologies. But significant issues have arisen that may be overlooked in the evolution of client/server computing, including:

- The need for reliable/robust systems that do not require high maintenance
- System hardware crashes, slowdowns, freezes
- Increase in basic expense of replacing hardware
- Manpower that is required to manage other complex systems such as backup and archiving of the desktop or laptop machine
- Overall software complexity, which requires IT managers to dedicate time to managing the software applications but not much time to maintaining the basic hardware

However, containing costs and increasing system efficiencies through automation remain the top IT goals. As Figure 1 shows, the top priority of IT departments is increasing operational efficiency through automation. Consistent with improving operational efficiency is using IT to monitor the business.

FIGURE 1

IT Goals



n = 204

Source: IDC, 2005

What has been overlooked is that many of these problems occur not only because of the basic hardware itself but also because of fragmented hard disks on servers, laptops, and desktops and because of a lack of automated defragmentation capability.

How Performance Suffers Because of Fragmentation

In simple terms, fragmentation occurs when users create, delete, and resize computer files on their hard disks. The continual creation and deletion of files causes file segments originally created in a continuous block to be scattered, or fragmented, into many pieces over time. The more fragmented the pieces become, the longer it takes for the computer to read the files, and overall system performance degrades.

A common analogy for fragmentation is to imagine a customer file that has been split among 20 filing cabinets. It would probably be easier to place the information into one cabinet. That's the job of the defragmenter.

Excessive disk fragmentation can create substantial performance degradation on both servers and workstations across a site. Some companies, unaware of the impact, may resolve such a performance impact with more expensive acquisitions of higher-performance hardware. However, it is just a matter of time before fragmentation impacts

the new machines because this process only temporarily masks the performance problem. Therefore, an enterprise can address performance slowdowns without hardware purchases by instituting automatic defragmentation software rather than relying exclusively on more costly hardware upgrades to increase system performance.

Defragmentation Approaches

Typical approaches to defragmentation include:

- ☒ **Ignoring the problem altogether.** This approach leads to degraded system performance and possibly unnecessary hardware replacement.

- ☒ **Using built-in defragmenters.** This approach provides a better-than-nothing capability for ensuring that hard drives stay relatively unfragmented. However, the increased overhead and lost production caused by manual operation are worth noting.

These approaches need a more effective solution behind them that addresses the need for automatic scheduling and moves beyond what is available from the operating environment.

Diskeeper Software

Diskeeper Corporation, headquartered in Burbank, California, was founded as Executive Software in 1981 and focused on automatic defragmentation software for the VMS and Windows operating environments. The company has received a number of awards for its products and has hundreds of thousands of active customers. The company's product line includes not just the defragmentation software for which it is probably best known but also other system utilities software for fragmentation analysis, file recovery system software, automatic data caching software, and automated patch and systems management software.

Case Study Solutions

Overall, customers interviewed for this white paper were evaluated based on quantifiable key metrics identified within their organizations. Because much of the performance data varied between the organizations, separate metrics were used for each company.

An estimate of the savings associated with customers that used Diskeeper was based on a one-year installation, assuming an average hourly wage of \$25.50 per employee. Each customer was asked about individual installations of hardware and software.

Renasant Bank performed an evaluation of defragmentation software solutions and found that servers with Diskeeper were able to handle, on average, five people more than servers without Diskeeper. Further, during the reliability test, the servers that were defragmenting files automatically had up to 10% higher uptime than the servers that didn't have defragmentation software automatically running. IDC estimates that the total savings to Renasant Bank is \$19,520 per year per 100 servers, with a return on investment (ROI) of 165%.

Another customer, the sales pricing group for a large telecom vendor, has noted improved response time of 20% for applications and estimates a 20% longer refresh cycle because the hardware is more reliable. IDC estimates the total savings to the telecom vendor to be \$17,650 per year per 100 machines. The ROI for Diskeeper licenses is 120%.

A third customer, Kaestle Boos Associates, noted the average number of monthly help desk calls from headquarters and the two satellite offices decreased from six to five. End-user downtime also decreased. IDC estimates the overall annual savings to be \$21,886, with an ROI of 141%.

FUTURE OUTLOOK

Diskeeper's core products continue to center on the disk defragmentation product from which the company takes its name. Overall, the product direction continues to be one of its strengths because the name itself has brand recognition. In addition to the company's rebranding efforts, Diskeeper is hiring additional technical R&D staff.

On the research and development front, the company has also begun further development of technologies to make file placement (and therefore fragmentation), disk manufacturer and storage array indifferent. Called Disk Performance Calibration (DPC), this technology employs the arrangement of data in coordination with physical disk architectures to enhance file read/write performance at a volume level. I-FAAST is the first application of DPC to the Diskeeper line. The company expects such an enhancement to increase performance of file defragmentation software by an additional 10–80%.

CHALLENGES/OPPORTUNITIES

Diskeeper has a solution available for hard disk defragmentation, and with the hundreds of millions of desktops, laptops, and servers available and requiring automatic scheduling for defragmentation, it has a significant opportunity to address file fragmentation with the Diskeeper product. Moving forward, Diskeeper needs to address the following challenges:

- ☒ **Overall problem and product awareness.** Although defragmentation is important, it does not receive the press attention or visibility of other problems plaguing IT departments. Further, the company has tried to address the product and market awareness issues by changing the company name to Diskeeper Corporation.
- ☒ **IT consolidation to fewer vendors.** Larger customers have expressed the need to deal with fewer vendors as they address hardware and software complexity in their organizations. Thus, penetrating very large enterprises will be a challenge.
- ☒ **Trend toward solution sales.** Many vendors across the infrastructure software universe have been moving toward bundling software solutions together to address software compatibility and complexity issues associated with integrating solutions from multiple vendors. Further, the resulting acquisitions and mergers have led to the acquiring company being able integrate its existing products with the new products it has acquired. This has led to its ability to cross-sell and upsell the integrated products to existing customers and acquired customers.

CONCLUSION

Disk defragmentation is an understood but unappreciated problem occurring in offices using client/server hardware and software worldwide. Although departments typically address defragmentation on an individual basis, the problem more likely is ignored or, even worse, may lead to increased hardware purchases because of poor system performance.

Diskeeper Corporation's Diskeeper solution is one way for IT departments to improve system performance without costly hardware purchases. This software is readily available to address defragmentation issues that will continue even with new and ongoing hardware purchases. Further, because the existing defragmentation capabilities in operating environments do not include automatic scheduling, one of the best ways for companies to address the continued defragmentation of files on system hard drives is to take advantage of Diskeeper's automatic scheduling feature. This capability enables system maintenance without significant workload increases on the IT administrator, who can then return to other high-priority tasks.

Three customers discussed significant savings associated with the use of Diskeeper software. Renasant Bank, a large telecom company, and Kaestle Boos have used Diskeeper software effectively. These savings were the result of fewer help desk calls, decreased troubleshooting time, and decreased amount of time that users were unproductive due to slower file response and troubleshooting problems. In some cases, significant savings were achieved as a result of fewer visits to remote sites for service.

Diskeeper should be considered by any organization that is looking for savings and benefits from increased performance without costly system hardware purchases. That money could be spent on other critical business issues.

CASE STUDIES

Renasant Bank

In Tupelo, Mississippi, the birthplace of Elvis Presley, Renasant Bank has grown from its small-town roots to provide banking services in three southern states. It helps that Renasant Bank's parent is Renasant Corporation, a publicly traded company with more than \$2 billion in assets. Renasant Bank and its sister company, Renasant Insurance, are teamed within Renasant Corporation to provide banking, mortgage, insurance, and other financial services. Renasant Bank began life as People's Bank and Trust in Tupelo, but over the past few years, it has enjoyed a burst of growth through acquisitions. The company now has a network of 61 branches spread through Alabama, Mississippi, and Tennessee, and it is looking to expand further. However, like many banks, Renasant Bank has augmented its physical presence in these states with its online presence in mortgage banking services. These services provide significant income to the company and allow the company's presence to be marketed across the nation.

The bank's 850 employees work to provide this presence across the three states. Tellers provide the typical personal banking services that customers expect, so the tellers' systems must be responsive, available, and reliable.

IT Infrastructure

One of the biggest requirements for the bank's IT department is the security of individual customer data, account information, and financial records. For most banks, protecting this data means preventing outsiders from accessing the network or porting to a device on the network; therefore, computers with floppy drives, USB ports, and other network outlets were not allowed. Being a small staff, and the bank expecting to expand branches as well as regions, the bank restructured its IT infrastructure to move from networked PCs to a thin client environment to facilitate security and to make system software management easier from a centralized point. The new thin clients are supported through a network of Citrix MetaFrame servers running on Windows Server 2003. The company has 100 servers: 40 support the company's banking operations, and the remaining 60 support the company's mortgage banking and other applications. Each of the 61 bank branches supports 3 to 6 thin client-based machines, which are used by the tellers, and another 5 to 10 computers running Windows 2000 and Windows XP, which are used by the administrative and clerical staff.

Challenges

James Hayes, Renasant's manager of IT, observed that many of the bank's users tended to exit applications by turning off their machines, rather than exiting the application first and then turning off the machines, and that the overall use of applications by hundreds of users tended to slow down the system's response time. Customers were always impatient when they had to wait more than a few seconds, and the tellers would note this impatience. Based on his observations, Hayes thought that defragmentation was the biggest issue with performance, as the network had recently been upgraded to a WAN, and network traffic analysis showed that bandwidth didn't seem to be a problem.

Search for a Solution

In consulting with other colleagues and other sources, Hayes found that one of the best practices was regularly defragmenting the hard drives of the servers because file fragmentation tended to quickly slow down and affect application performance. Hayes and the Renasant team reviewed three products in an evaluation within their organization.

In conducting the evaluation, the team split the server farm into two groups: one set of 20 servers with a defragmentation product and one set of 20 servers without a defragmentation product. Further, to get a sense of system reliability with and without the defragmenter, Hayes and his colleagues further broke out the group of 20 servers running the defragmentation product into 10 machines with the defragmentation product started manually and 10 machines with the defragmentation product set up to automatically run on a schedule. The results are as follows:

- ☒ **Better performance.** Renasant's evaluation found that servers with Diskeeper were able to handle, on average, five people more than servers without Diskeeper. Further, during the reliability test, the servers that were defragmenting files automatically had a higher uptime (5–10%) than the servers that didn't have defragmentation software automatically running.

- ☒ **Fewer unproductive hours.** Tellers and bank customers didn't have to be kept waiting because the tellers, loan officers, and people opening new accounts were finding that the Citrix servers were responsive to their needs and that the customers were actually getting served on time and quickly.

Of the three solutions, Diskeeper was found to be more effective than other solutions within their organization.

Solution Found

After purchasing Diskeeper licenses for its 100 servers, Hayes incorporated the new product into the company's infrastructure in late 2003. Hayes also noted that with the increase in server capacity through regular defragmenting of the hard drive, Renasant didn't have to purchase new server equipment. IDC estimates that the total savings to Renasant Bank is \$19,520 per year per 100 servers, with an ROI of 165%.

"We try to get 30 users per server," said Hayes. "Once we start losing 4 servers, people start saying 'The system is really slow,' and they let you know that real quick." Fortunately, he doesn't hear that anymore, or at least less often.

Pricing Group for Telecom Firm

Clearly, large telecommunications companies need dependable IT systems to keep their telecom services up and running and serving customers. With billions in annual revenue, this telecom company depends on multiple technologies to meet this goal. Of course, providing technologies such as cell phones to both consumers and enterprises presents many challenges, such as how to competitively price phones so that the company makes money. Fortunately, the sales staff can rely on a business unit specifically dedicated to creating bundles for promotion, such as a "buy three phones, get one free" promotion or other type of promotion pricing. However, this group does more than just price phones; it uses a set of in-house-designed applications to provide the sales staff with pricing for the frame relay, optical, voice, and IP/VPN services that form the bulk of the company's business. These applications run on 100 workstations and a set of 25 servers that run Windows Server operating environments. The IT department staff is responsible for maintaining and supporting these 125 machines.

Business Challenges

While the IT administrator has responsibility for the overall care and maintenance of the systems within the group, he cited the hard drive failures as one particular area where he had problems with machines. "These systems don't have the priority that the production systems have because we're just development," he said. "So time is money for us." Further, as a cost center, he really has limited budget to spend on buying new machines.

As the only person working on supporting these machines, he spent time analyzing their poor performance and noticed it was due to heavily fragmented disks.

Savings

The IT administrator noted the following benefits in his evaluation and use of Diskeeper:

- ☒ **Improved response time.** When applications in their environment start slowing down, the IT administrator reviews the system performance and notes whether or not the system has defragmented. Usually, in those cases, the machine hasn't. He noted that running the defragmenter has led to a 10–30% increase in performance on machines with computing-intensive requirements.

- ☒ **Longer refresh cycle.** Because the overall system performs as required, the administrator doesn't have to replace hardware as often. He said, "I have no doubt that a fragmented drive is harder on the hard drive than a nonfragmented drive. I suspect that mean time between failures is increased because the hard disk is being defragmented."

- ☒ **Decreasing failures.** In terms of random failures, the administrator noted that hard drive failures occurred every two to three months prior to the Diskeeper implementation, but now the systems can run for 18 months without requiring a hard drive replacement. He said that the automatic scheduling capability in the Diskeeper product allows him to defragment hard drives without visiting each individual desktop and is the main reason for the improvement in hard drive performance.

IDC estimates the overall total savings for the 100 machines to be \$17,650 per year based on these benefits. The ROI for Diskeeper licenses is 120%. Overall, the IT administrator is pleased with Diskeeper: "Of all tools, certain tools get a reputation. I really believe — as far as tools go — that Diskeeper has put a powerful one at our disposal that is invaluable for what it does. It works well and is unintrusive. You can see the results and get an immediate benefit. How many things are like that?"

Kaestle Boos Associates

Kaestle Boos Associates Inc. has established an enviable reputation for excellence in the design of public facilities. Since the firm's founding in 1963, it has won numerous awards for its designs of city and town halls; correctional facilities; and library, recreational, and commercial buildings. The firm's 107 employees provide architecture, landscape architecture, structural engineering, and related services to clients throughout New England. Employees in the firm's headquarters in New Britain, Connecticut, as well as in satellite offices in Portsmouth, New Hampshire, and Foxboro, Massachusetts, keep the IT staff busy. With only three people performing the IT functions, the company needs dependable, reliable systems to support its architects and design staff. Further, because the small IT staff is based in the corporate headquarters, hundreds of miles away from the remote offices, any onsite system repairs will have significant impact on individual and corporate downtime.

In the past, design services may have been conducted with slide rules and blueprints, but nowadays, those tools are augmented by a strong set of computers on which the company relies to design buildings. Like any modern firm, Kaestle Boos requires stable, reliable computing systems to create these designs. The head of the IT department, James Bednarz, faces significant challenges with these computing systems.

IT Challenges

The company's 120 workstations and 12 servers are spread across its three operating locations. While the headquarters has the bulk of the computing resources, the Portsmouth office has one server and a couple of desktops supporting an architect and sales staff, and the Foxboro office has 18 machines and 3 servers supporting 5 architects and 4 sales staff members. Because both offices are more than an hour's drive from the main office, the software on these machines, as well as the machines themselves, must be as reliable as possible. The company's three full-time IT staff members have to maintain the locations, architects, and sales and support staff members as well as handle the resulting help desk calls. Onsite visits to the remote locations clearly have a significant impact on the cost of ownership of IT.

Software Solutions

Bednarz reported that Kaestle Boos started having significant problems with numerous help desk calls, machines in need of repair, and significant user downtime. He associated the three issues with the heavy use of the company's CAD/CAM software and the regular use of applications that taxed processing capability and hard drives. The solution he found was Diskeeper. The Diskeeper product has been instrumental in reducing help desk calls, visits to the remote sites, and downtime for users of the machines in the following ways:

- ☒ **Help desk.** The average number of monthly calls from headquarters and the two satellite offices decreased from six to five. With the existing Diskeeper software, the company found that it still had to invest in the full production software package from Diskeeper not only because users weren't as sophisticated as they are now but, more important, because users weren't in the habit of using defragmentation software and therefore didn't defragment their computers. This automatic scheduling capability was critical.
- ☒ **Visits to remote sites.** Staff members had to be dispatched to address the help desk solution. In addition, because the hardware was repeatedly causing problems for the users, the IT staff regularly had to make the three-hour one-way trip to Portsmouth and the two-hour one-way trip to Foxboro approximately twice a week to repair and address hardware issues and help desk trouble tickets. With the installation of the Diskeeper software, the help desk staff has to make only one visit per week to the remote locations. They attribute the improved performance to the defragmentation software. Certainly, when one looks at the cost of having one person on the road for a day to repair only one set of computers, then one clearly sees that the impact of a solution that can prevent two visits to one of the remote sites will be significant.
- ☒ **Downtime for end users.** Frequently, hard drives with heavily fragmented files will be a challenge to use because they increase the time that users take to boot up the application as well as the time to call up, use, and save application files. The greater the fragmentation, the longer the time to perform one set of tasks in using files. With users having to create custom solutions in response to RFPs for new company work, it was clear that time was money. With the defragmentation solution from Diskeeper, Kaestle Boos was able to provide more timely support for more customers.

☒ **Increasing the hardware upgrade cycle.** Before Kaestle Boos went to automatic scheduling, it purchased new hardware about every three years. With the move to the automatic scheduling capability in Diskeeper, the company now purchases hardware every four years. This is helpful because the company's employee count grew from 25 to 75 over that time. The company is now able to spend money in other areas, increasing in an intangible way the ROI of the solution. Further, Bednarz noted that his shop was experiencing hard drive failures every two or three months before Diskeeper, but it has gone 18 months without replacing a hard drive since implementing the solution. Bednarz feels that Diskeeper has much to do with that improvement. In fact, he said that 25% of the increase is due to the full version of Diskeeper being in the organization since early 2002.

Overall savings is \$21,886 for the year, with an ROI of 141%. The scheduling capability that Diskeeper calls "set it and forget it" is clearly instrumental in ensuring a stronger ROI because it allows the software to take care of itself and its scheduling needs and leaves end users to focus on their own work and productivity. Therefore, the IT staff can focus on other high-value tasks.

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