CASE STUDY

Faster File Access Using Diskeeper on SAN

Hobbs+Black Associates, Inc. is a nationally recognized firm serving a diverse group of clients since 1965. Over 90 professionals provide architectural, engineering, design services and related consulting services from its offices in Ann Arbor, Lansing, and Phoenix.

As one of the top 100 largest architectural firms in the country (*Engineering News Record* 2009), this diversified practice meets design challenges that often require extensive research and innovation. The firm's professional flexibility makes it uniquely qualified to solve complex problems with minimal resources and within stringent time lines. As a full-service architecture firm, Hobbs+Black provides its clients with complete service, from study to construction administration.

The Challenge

In 2005, the Hobbs+Black IT staff began a complete migration to Windows Server from a legacy Novel server platform to meet the expanding needs of the business. Turning a business that was decentralized into a single support model with the primary focus on reducing costs, eliminating repetition and streamlining the company data was a daunting task.

Patrick Blanche, Directory of Technology, reported: "We started with a focus on the need to manage users and resources by switching to a Microsoft domain-based system of management, pulling together various departmentalized file servers into a central SAN. Within the first six months we ran into serious complaints that files were taking longer and longer to open and manage."

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The firm used the Windows Performance Manager to visualize a day in the life of the file server and saw that disk I/O was over 90%; seek times were excessive on the file server and the CPU was being thrashed throughout the day. Blanche told us, "It was clear from the Perfmon reports that the underlying file system (NTFS) was the culprit, with over 80% fragmentation on a file server that was only one year old. The central file server needed a hand with keeping its file system fragmentation in check, and the built-in Windows defrag tool was not going to work for us, as it lacked a mechanism for balancing disk I/O against user requests. Diskeeper® performance software includes the ability to be scheduled, and IntelliWrite® technology for monitoring the live file system allows for prevention of fragmentation in real-time."

Due to the way the Autodesk hierarchal files were managed using external references, as well as the effect of opportunistic locking and NTFS SID checking, we saw a dramatic increase in access times when files were spread over large areas of the file server's SAN storage system. The SAN is a data storage solution designed with slots for up to eight SATA hard disks. It has a powerful and flexible platform using the industry-standard iSCSI protocol that allows consolidation of storage across multiple servers.

When AutoCAD opens a file, a temporary (.BAK) file is created. More files are opened and more temporary files are created, so fragmentation is inevitable on a server (or local workstation) using AutoCAD. The .BAK file is left behind even after exiting the application, essentially doubling the data on the disk/SAN, since, for each file opened, a .BAK is created. Normally this is not so serious a problem when working with a single file – as only a single temporary file is created – but AutoCAD works differently, managing small interrelated files (xrefs). A single building is broken up into floors, sections, elevations and details; all these files are linked together so a single design can be managed, yet continue to be flexible enough so many people can work on the design collectively.

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Hobbs+Black projects range from a few thousand to over a million square feet in size for healthcare and retail designs, so the use of AutoCAD's unique referenced file system, where one file can be linked up to 100 others, is critical. For a design firm, linked files in applications such as Adobe Illustrator, InDesign, Photoshop, Google Sketchup, Autodesk AutoCAD, Revit and 3DS Max are all key for the complex workflows.

Using these tools effectively means literally tens of thousands of files are fragmented at an alarming rate. Couple this with other designers working on single large files, sometimes 1-4GB to perform photorealistic renderings of these same buildings for both exterior and interior – and you begin to see a hard disk array in turmoil after a very short period of time.

The IT staff tried using the built-in defragmenter to cope with fragmentation on terabyte-size volumes – in most cases never finishing, and creating issues with the Volume Shadow Copies. This process took days on a 2TB volume, thus slowing down the server.

The Solution

They considered adding SCSI RAID cache controllers, multiple gigabit network cards, and even trying to partition the disks; but all were dropped, as what was really needed was a better performing file system. The solution was simple: they needed to have the hard disk data streamlined with the temporary file space organized and in real time.

In 2008, Diskeeper trialware was used to attempt to solve this issue. Within a few days the IT staff was amazed to find that opening and loading times were down, I/O latency was under control, and emails from happy staff were coming in from all departments.

"It's pointless to try to tell people the equipment was never the issue unless you prove this," related Blanche. "They want a quick and easy solution, so the test began. We disabled the Diskeeper service, and waited for the phone to ring. After a few days, the file fragmentation was at 35-40% when the first person asked, 'What's happening on the server? My files are taking minutes to process again.' We told them we were working on it, and simply turned the Diskeeper service back on."

Condusiv staff helped to identify server issues and, in connection with certified Microsoft Support, their evaluation was all the proof of concept required to know the firm could have been sinking tens of thousands of dollars into more equipment if it had not had the right people and resources to find a better solution.

The purchase decision was made, the licenses were installed, and the invisible background magic of Diskeeper began to work. Within a few hours fragmentation was down to 20% and making a noted difference. The CPU was ratcheting back, and the staff was much happier once the slowness issues vanished.

The Benefits/Results

The IT team observed that Diskeeper continued to keep the server running like new. The same HP DL380-G4 server is still in service with five years of added data, plus three more hard drives and an upgrade to Windows 2008. "Windows 2008 does nothing to handle its own file fragmentation dynamically. Diskeeper is a must for maintaining system performance," Blanche commented.

These questions can be considered when weighing the cost of Diskeeper:
- Does the IT department have a limited budget?
- Do servers need upgrades frequently to keep up with user demands on speed?
- Are multiple small files accessed frequently, or are large databases updating slowly?
- Do you know the cost of users' lost production due to wait times?

Another direct benefit is that the users are far more focused when they don't have to wait for the spinning blue circles in Windows 7, caused by applications waiting for files to open, save, print, etc. – all of which are affected by local- and server-based fragmentation. There is less stress and the people get to be truly productive. In the architectural industry, frustrated and stressed people could make mistakes, missing key details that could lead to a poor-quality or even a dangerous design.

For the past five years Diskeeper has been working full-time to control the endless sprawl of fragmented data, on dynamic disks across SAN arrays on all Hobbs+Black file servers in Michigan, Arizona and Utah. The result has been significant improvement in the user experience and productivity. "Diskeeper makes it perfect," said Blanche. "I am a huge advocate for adding Diskeeper to all systems: desktops, laptops and virtual machines. Diskeeper is now installed on any production file server, virtual server or database type server used. When we hear about firms that use the same kinds of linked file systems, with millions of small files on thousands of projects day in, day out, we are proud to recommend Diskeeper, which is truly a silent partner."

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