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Allstate Ensures System and Database Reliability via Defragmentation

by Dan Osborne

Ensuring the reliability of systems and databases in a distributed enterprise can be quite a challenge. In addition to large-scale central databases, companies often have many smaller databases spread across numerous business units to support specific applications such as e-mail or security. This was the case at Allstate Insurance.

11,000 remote offices around the country access various central databases as well as office specific databases that run a variety of insurance and CRM systems. With 11,000 servers, 27,000 workstations and thousands of laptops in use remotely, the IT department ran into two serious problems - keeping those Windows NT and Windows 2000 machines updated, and maintaining system and database reliability. Both problems responded very well with the implementation of a strategy to defragment every remote machine on a daily basis.

"After we moved from NT 4.0 SP4 a couple of months ago, the Master File Table (MFT) became so corrupted because of fragmentation that PCs would die when booting," said Gene LoProto, Allstate Insurance Company's IT Manager for Agency Infrastructure. "We were getting half a dozen calls a day from agents who couldn't get into their databases to do their jobs so we scrambled to get Diskeeper out to everyone."

In this article, we take a look at the problems Allstate runs into in distributing software to so many remote points, how that affected system reliability and

how these issues were resolved using the latest defragmentation technology. We also investigated the link between fragmentation and reliability, finding that fragmentation plays a much greater role in system instability than most people realize.

Stable Deployments

Allstate, a $30 billion insurance firm headquartered in Northbrook, Illinois, has a custom developed Customer Relationship Management (CRM) system as the main application used by agents at thousands of remote offices in every state and large city in the nation. Among other duties, LoProto and his staff make sure that over 40,000 machines at those offices are working well so agents can access corporate and local databases, a web-based CRM system and a series of insurance specific and business applications.

Allstate's Enterprise IT Team decides which core components to load onto all the workstations - the operating system, Open DataBase Connectivity (ODBC), anti-virus software, browser, the Microsoft Data Engine (MSDE) database and an Office tools suite. Divisional desktop development teams select what additional components to install on particular desktops in their areas based on client needs.

Once the software build has been finalized, Allstate puts together desktop, server and laptop images to deploy around the country. As an integral part of the process, Allstate uses Executive Software International, Inc.'s (Burbank, CA) Diskeeper www.diskeeper.com to

defragment the files when building an image before converting it to a binary for deployment. By starting with an image composed of contiguous (in one piece) files, the company eliminates much of the reliability issues involved in remote deployment of software.

"Defragmentation is important not only for the excellent performance benefits once the image is deployed, but it also improves the transmission time of creating the image binary and the reduces the amount of time it takes to deploy the binary," said LoProto. "We've seen performance increases in the binary that were 30 to 40 percent faster after implementing defragmentation."

Defragmenting the image before shipping it out to users, however, is not enough. LoProto reports that those files and applications become fragmented during the process of loading them onto client machines. One single Windows update, for example, produced 20,000 to 30,000 excess file fragments on the workstations immediately after being loaded.

"Although we ran Diskeeper on the image snapshot to ensure it was in an unfragmented state at the time of loading, drives would end up 60 to 70 percent fragmented after loading the image," said LoProto.

Result: Allstate received a flood of calls from users unable to boot servers and workstations. Deployment of defragmentation software to consolidate the files, databases and MFT on these machines immediately took care of these problems.

But boot failures weren't the only sta-

bility issues that Allstate traced to fragmentation. On the company's 2000 laptops, for example, the HAL (hardware abstraction layer) DLL would corrupt after a month or two. In addition, blue screens, black screens and "Dr. Watson" errors cropped up several times a day on fragmented machines. LoProto notes that these situations vanished once the machines were defragmented.

Users also experienced performance gains on file access, database access and application speed once their disks were defragmented. According to LoProto, Web-based applications such as IE cache all their files, and the average user ends up with 15,000 to 20,000 cached files at any one time. These temporary files wreak fragmentation havoc on a daily basis. Further, email programs like Outlook and printing functions, he said, are constantly creating thousands of temporary files that are splintered into multiple pieces that are scattered throughout the disk. He recommends defragmentation at least once a day on all servers and workstations.

"The performance gain from fragmentation is obvious to see," said LoProto. "It takes three to five seconds to open a fragmented 12k Word file versus instantaneous access after you run ran Diskeeper. For Internet Explorer, the gain is 30 to 40 percent."

What about using the built in defragmenter than comes with Windows 2000? LoProto is distinctly unimpressed.

"The crippled defragmenter versions inside Windows are too slow, must be run manually and never do what we want to do," he said. "Since the Windows 2000 built in defragmenter doesn't defrag the MFT, it is pretty much useless."

Fragmentation and System Failure

The heavy levels of fragmentation experienced at Allstate are far from unique. Anyone purchasing a brand new computer, in fact, takes home a badly fragmented machine. Take an actual example of a recent desktop purchase. The unused drive already had 4322 fragmented files with 23,891 excess fragments. One file was found to be in 1931 pieces and nineteen others ranged from 102 to 891 fragments. In addition, there were 290 fragmented directories and the MFT had split into 18 pieces.

Downloading OS and antivirus updates, and installing a few pieces of software and some data files from an old computer added another 8816 fragments. Worse, the MFT had now splintered into 51 pieces. Yet, there remained sixty percent free space on the 32GB volume.

The problem becomes far worse once the computer is actually used. When American Business Research conducted a study on 100 companies, one quarter had Windows NT/2000 workstations with files ranging from 10,000 to 51,222 fragments. But the servers were even worse off. One third of the companies reporting having servers with files fragmented into 10,333 to 95,000 fragments.

While defragmentation has long held the reputation of being a simple and cost-effective method of improving server, workstation and database performance, the impact of fragmentation on system stability and reliability is only now becoming known. A visit to Microsoft's Knowledge Base turns up a number of articles on the subject of fragmentation and reliability, and National Software Testing Laboratories (Conshohocken, PA) and IDC (Framingham, MA) have also written about the problem.

Some of the issues traceable to fragmentation include:

- Slow boot times - machines which formerly took only a minute or two to boot end up taking as long as thirty minutes
- Boot time failures - even worse than slow boots, the computer can fail to boot at all due to MFT fragmentation. This manifests in several ways including the computer hanging after the power-on self-test (POST) or displaying an error message that a kernel file is missing
- Slow backups - fragmentation greatly increases the amount of time it takes to perform a routine backup as the file system has to retrieve each of the file fragments scattered throughout the disk
- Aborted backups - as backup times increase, they may exceed the time allocated for the process, resulting in aborted backups. Defragmentation often cuts hours off the time it takes to perform nightly backups, thereby eliminating the problem of aborted backups
- File corruption and data loss - excessive file fragments reduce operating system efficiency and, when a file is added or a database is updated, can result in large-scale data corruption
- Program and process failure due to slow I/O - databases and applications can become fragmented to the point where the process times out or freezes
- Intermittent CD recording failures - CD recording requires that the data be fed to it in a continuous stream. Given the added time it takes to retrieve all the file pieces on a fragmented hard drive, the data stream can be interrupted causing failure of the write
- Stability problems and data loss due to fragmented paging files - a fragmented paging file destabilizes the system, resulting in "Out of virtual memory" error messages and data loss
- Premature hard drive failures caused by excessive I/O wear and tear - it is usual for drives to contain files split into hundreds or thousands of fragments, even when the equipment is brand new. This accelerates the wear on the drive's mechanics when it needs to perform hundreds or thousands of seek operations, rather than a single one

LoProto's advice: Instead of waiting for some of these problems to be reported and then fixing them when they arise, daily defragmentation of all server, workstations and laptop drives - site wide eliminates these issues and reduces help desk calls significantly.

"In our world, a one percent failure rate equates to 360 angry clients," said LoProto. "It's much easier to schedule Diskeeper to run automatically each day due to the performance and reliability benefits."

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