Diskeeper® I/O Smart™ Performance Tests

OVERVIEW

Keeping a drive automatically defragmented is critical to keeping your systems running at top speed. But the actual process of defragmentation has the potential to cause major slowdowns. Defragmentation involves moving pieces of data from one location on the hard drive to another. When another application needs data to be read or written (an input/output or I/O request), the drive has to split its time between the demands of both programs. Computer performance slows down and defragmentation takes longer. The result is a data traffic jam in which defragmentation can actually create the same condition it is intended to cure.

In the 1990's Diskeeper pioneered CPU and memory sensitivity through technology leadership and the leveraging of Windows® native process thread scheduler. While this has addressed resource conflicts in those areas, it does not handle the traffic jam (disk I/O queue) created on the disk subsystem. The proliferation of electronic multimedia, large data files and seemingly near daily increases in data storage capacity requirements has exacerbated the need for advanced technology.

Diskeeper 9 handles this growing problem with innovative new I/O Smart technology. During background defragmentation passes, Diskeeper 9 actively "listens" for I/O requests. When another application or process needs access to the hard drive, Diskeeper intelligently pauses defragmentation until other program I/O requests are fulfilled. Once that happens, Diskeeper gets the go-ahead to resume defragmentation until another request comes along. Thanks to its high-speed engine, Diskeeper can easily defragment using the "spaces" between I/O requests, even on busy servers.

A rigorous set of laboratory tests was conducted here at Executive Software to determine just how invisible I/O Smart technology is. The improvement is significant across the entire range of common production operating systems.

TEST METHODOLOGY

Tests were conducted to determine the benefits of having IO Smart Enabled with Diskeeper 9.0 on I/O Activity. I/O Activity can be any user input-output activity such as copying files from one volume to another, streaming video / audio etc. Two tests were performed, the first of which included mimicking the I/O effect of moving many small files; the second test involved the copying of one large file.

Setup

Hardware:

− 2.4 GHz Intel® Pentium® 4 CPU on an Asus® P4PE ACPI motherboard, BIOS revision 1002.

- 512 Mb RAM
- Seagate® 7200 RPM IDE hard drives
    2 * ST 380021A 80GB and 1 * ST 380011A 80GB
- Intel® PRO /100S 100 Mb/s network interface card; Desktop Adaptor
- Matrox® MillenniumG550; Driver Version 5.86.32.0

Software:

Operating Systems (default configurations)
- Microsoft® Windows NT® 4 Workstation
- Microsoft Windows 2000 Professional Edition
- Microsoft Windows XP Professional Edition
- Microsoft Windows Server 2003 Standard Edition

Defragmentation (default configuration)
- Diskeeper Professional 9.0.515

TEST PROCEDURE

I. Test 1: Time the copying of numerous small files, totaling approximately 300MB, during defragmentation.

1. Create an image of the operating system partition on the tested hardware platform.
2. Create two 1 GB volumes "A" and "B" on a common physical disk separate from the physical disk containing the operating system.
3. Create fragmentation on volume A (2000 fragmented files, with 70% available free space).
4. Create a folder (\IOTest_smallfiles) with numerous small files fragmented files totaling 300MB, and a folder called (\IOTest_largefile) with one large 300MB file, on volume B
5. Create an image of volumes A and B.

Test Stages:
   Stage 1 – No Defragmentation
   Stage 2 – Defragment with Diskeeper 8.0
   Stage 3 – Defragment with Diskeeper 9.0 (I/O Smart enabled)

6. Restore all appropriate drive images
   o System images, either:
      o Windows NT 4 (not used in Test 1)
      o Windows 2000
      o Windows XP
      o Windows 2003 Server
   o Test volume images (both volumes A and B)

7. Install and set up one of the Diskeeper versions for testing purposes (Diskeeper 8.0 or 9.0) on system partition.
8. Launch defragmentation on fragmented volume A

o During Test Stage 1 defragmentation is not run
o Prior to Test Stage 3 I/O Smart is enabled or disabled (as required for testing)

9. Execute a custom batch file to copy the files from IOTest_smallfiles folder of Volume "B" to Volume "A" and time the process.

10. Repeat steps 6-9 with the remaining operating system images.

Operating System	Test Case #	Diskeeper version used to defragment	Time Taken by File Copy I/O Activity (Seconds)
Windows 2000 Professional	1	File copy only (no defrag)	193.65
	2	Diskeeper v8.0	241.60
	3	Diskeeper v9.0 (I/O Smart)	**199.54**
Windows XP Professional	1	File copy only (no defrag)	167.76
	2	Diskeeper v8.0	229.17
	3	Diskeeper v9.0 (I/O Smart)	**174.15**
Windows 2003 Server	1	File copy only (no defrag)	191.7
	2	Diskeeper v8.0	206.89
	3	Diskeeper v9.0 (I/O Smart)	**198.29**

Results for Test 1: Time the copying of numerous small files, totaling approximately 300MB, during defragmentation.

II. Test 2: Time the copying of a single large image file, approximately 300MB in size, during defragmentation.

Test Stages:
Stage 1 – No Defragmentation
Stage 2 – Defragment with Diskeeper 8.0
Stage 3 – Defragment with Diskeeper 9.0 (I/O Smart enabled)

1. Restore all appropriate drive images (images created in Test 1)
   o System images, either:
      o Windows NT 4
      o Windows 2000
      o Windows XP
      o Windows 2003 Server
   o Test volume images (both volumes A and B)

2. Install and set up one of the Diskeeper versions for testing purposes (Diskeeper 8.0 or 9.0) on system partition.

3. Launch defragmentation on fragmented volume A
   o During Test Stage 1 defragmentation is not run
   o Prior to Test Stage 3/4 I/O Smart is enabled or disabled (as required for testing)

4. Execute a custom batch file to copy the 300 MB file from the IOTest_largefile folder on Volume "B" to Volume "A" and time the process.

5. Repeat steps 1-4 with the remaining operating system images.

Operating System	Test Case #	Diskeeper version used to defragment	Time Taken by File Copy I/O Activity (Seconds)
Windows NT 4	1	File copy only (no defrag)	29.88
	2	Diskeeper v8.0	84.15
	3	Diskeeper v9.0 (I/O Smart)	**33.61**
Windows 2000 Professional	1	File copy only (no defrag)	30.57
	2	Diskeeper v8.0	94.54
	3	Diskeeper v9.0 (I/O Smart)	**35.60**
Windows XP Professional	1	File copy only (no defrag)	30.27
	2	Diskeeper v8.0	57.67
	3	Diskeeper v9.0 (I/O Smart)	**32.18**
Windows 2003 Server	1	File copy only (no defrag)	15.60
	2	Diskeeper v8.0	46.96
	3	Diskeeper v9.0 (I/O Smart)	**15.35**

Results for Test 2: Time the copying of a single large image file, approximately 300MB in size, during defragmentation.

SUMMARY

Benefits:

- I/O Smart provided improved I/O throughput during defragmentation up to 250% on NT4, 266% on Windows 2000, 179% on Windows XP, and 306% on Windows Server 2003 over previous editions.

- Implementation of I/O Smart provides I/O throughput improvements in every case tested.

Scheduling is only one of many necessary requirements in an automatic defragmentation solution. These tests conclusively show that Diskeeper 9.0's revolutionary I/O Smart technology introduces dramatic enhancements to Diskeeper's transparency of operation. These advancements are vital in an automated solution for critical 24/7 environments, multimedia workstations and even common production desktops and laptops.

With I/O Smart, Diskeeper 9.0 customers benefit with lower system overhead greatly improving the flexibility and possibility of defragmentation on demand; systemically lessening total cost of system ownership (TCO). The use of Diskeeper 9.0s technology is clearly an essential minimum requirement to maintain expected performance of any and all computer systems running Microsoft Windows.

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