



The Effects of Disk Fragmentation on System Reliability Technical White Paper

OVERVIEW

This white paper addresses the impact of disk fragmentation on system reliability. In short, disk fragmentation decreases system reliability, in some cases rendering a system unstable or provoking errors in operation. Running *Diskeeper* to defragment system files, particularly the MFT and Page File, increases system reliability.

DATA

In determining how disk fragmentation affects system reliability, the following system reliability issues were considered:

- Slow response times or no response from applications or the operating system.
- Slow boot-up times or no boot-up response
- Slow shut-down times or no shut-down response
- System crashes

Research of various fragmentation-related factors that can cause the above reliability issues on a volume narrowed the target down to these four major factors:

1. MFT (Master File Table) Fragmentation¹

In-house testing showed that a system disk with an extremely fragmented MFT caused the boot-up time to almost double. Response time of some applications increased about 50%. Installation of a software product took 4-5x longer. On NT4, some system applications were missing their icons and reported missing dll errors.

¹ There are Microsoft Knowledge Base articles linking the first two factors to reliability issues. In our in-house testing, fragmentation of other system files did not affect system boot-up or response time as much as fragmentation of these two files.

Page File Fragmentation¹

In-house testing showed that an extremely fragmented Page File can degrade system response time so much it can almost seem like a hang. Responses of some operations, including mouse movement, were delayed by almost 30 seconds. A disk-intensive application ran twice as long.

2. File Fragmentation performance loss

In general, fragmentation worsens response time. Which applications are affected depends on what files are fragmented and by how much. In an extreme case where all the files except the Page File and MFT on a new windows installation were fragmented, Boot-up times increased by about 15% and response times worsened by about 15%.

3. Available Free Space

Low free space can affect system reliability as some applications can fail due to insufficient free space.

Each of these four factors has been found to cause one or more of the reliability issues noted above. Naturally, a combination of two or more of these factors markedly worsens the reliability of the disk.

Defragmentation with *Diskeeper* lessened or eliminated the problem in every case.

A future major release of *Diskeeper* will include monitoring and alerting features to warn the user when disk reliability is threatened or significantly degraded by fragmentation. In the meantime, frequent defragmentation of the MFT and Page File, in addition to data files, is strongly recommended to prevent reliability problems due to fragmentation.

SUMMARY

Disk fragmentation decreases system reliability, in some cases rendering a system unstable or provoking errors in operation. Running *Diskeeper* to defragment system files, particularly the MFT and Page File, increases system reliability.

©2006 Diskeeper Corporation. All Rights Reserved. Diskeeper and the Diskeeper Corporation logo are registered trademarks of Diskeeper Corporation in the United States and/or other countries. Microsoft is a registered trademark of the Microsoft Corporation in the United States and/or other countries.