

Whitepaper: SSDs and Defragmentation

Defragmentation does not lead to a gain in performance of SSDs - on the contrary, it may even shorten the life of a SSD drastically. Nevertheless, in order to address the question of how and why defragmentation software can still significantly increase the performance and extend their lifespan, O&O Software has written a White Paper entitled "O&O Defrag and Solid State Drives".

Berlin, September 28, 2010 – Solid State Drives (SSD for short, or "flash drives") are very fast storage media which are competing more and more with traditional hard drives.

By the sole use of a memory chip, all moving parts associated with a mechanical hard drive are eliminated, which is reflected in much lower power consumption and less heat. In addition, SSDs operate silently and are insensitive to shock or vibration. The main disadvantages of SSDs when compared to conventional hard drives are a very high price, still, and unfortunately a limited life, since the memory chips used allow only a finite number of write cycles.

Functionality of SSDs

For those SSD devices relevant to end-users, flash memory is used to store the data, which is written in flash cells. Several flash cells then form a flash block. Individual cells can be read but cannot be written individually. If a single Bit is changed, the entire Flash block must be completely erased and rewritten.

Thanks to increased voltage in each of these erase-write cycles, charge carriers are moved between the semiconductor layers, but this leads over time to substantial damage to the chip. Depending on the design, a flash block can carry out a maximum of 5000-10000 (MLC) or 100,000 (SLC) erase cycles. After that, there can be no guarantees as to the safety of the data, and a catastrophic loss becomes a real threat.

To counter such effects, the SSD controller distributes write accesses intelligently: new incoming data is written into the previously least-loaded flash blocks. The physical wear and tear is not prevented but effectively mitigated (also known as "wear leveling").

Defragmentation shortens lifespan

This internal data management of SSDs can lead to a large file that is not fragmented in the file system, being divided into thousands of blocks by the SSD controller - without it having produced negative performance effects. Defragmenting on the other hand would not lead to acceleration but, because of the numerous short write accesses, would rather shorten the life of a SSD unnecessarily.

Another problem in the interaction between Windows and SSDs is caused by defragmentation programs, including Windows own defragmenter. Should a SSD not be recognized as a SSD, a defragmentation is automatically carried out: this brings no improvement in performance and reduces the lifespan of the flash drive. It is therefore essential that a defragmentation on SSDs is prevented.

Extending an SSDs lifespan through TRIM

SSDs also save those areas that are marked by the operating system as free and contain no data from the user's perspective. Using regularly exported ATA TRIM commands an SSD drive is informed of the hard disk areas that become available for new data. Instead of storing the no longer required contents of deleted files, the SSD can use the newly-vacated areas for drive-internal optimization of data management and thus speed up write access to the SSD drive and also prevent premature wear and tear.

O&O Defrag 14 and SSDs

Automatic optimization through regular TRIM Commands has been developed specifically in O&O Defrag 14 for SSDs. O&O Defrag 14 recognizes SSDs and prevents defragmentation attempts. Furthermore, it turns off the Windows own Disk Defragmenter to prevent automatic (and damaging) defragmentation of the SSD. The default configuration of O&O Defrag is optimized to suit the overriding nature of the system it is working on and takes into account the possible combination of conventional hard drives and SSDs in a computer.

The automatic optimization is enabled by default after installation and optimizes the disk in the background without the computer's performance being negatively affected.

Whitepaper "O&O Defrag and Solid State Drives"

The 7-page white paper, "O&O Defrag and Solid State Drives" is now available on the Internet at http://www.oo-software.com/en/docs/whitepaper/ood_ssd.pdf for free download in PDF format.

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O&O develops solutions for corporate customers that not only support them in their daily activities, but also help substantially reduce their costs. Our products for system optimization, data imaging, data recovery, secure data deletion and company-wide administration are pioneers in the Windows technology sector. Together with our worldwide network of partners, we support corporations, companies, public authorities and private customers in over 140 countries, all from our headquarters in Berlin, Germany.

Press Contact

Andrea Streh sow
O&O Software GmbH, Am Borsigturm 48, 13507 Berlin, Germany
Tel.: +49 (0)30 4303 4303, Fax: +49 (0)30 4303 4399
E-mail: andrea.streh sow@oo-software.com

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