

auslogics®

White Paper

The impact of proper PC maintenance
on computer performance

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Research Background

The Microsoft Windows operating system is a complex environment that acts as an intermediary between computer hardware and 3-rd party application programs. It controls crucial hardware functions such as Input/Output and provides an interface that allows users to interact with the computer. Particularly, Windows OS controls the order in which processes are executed, how memory is read and written and how information is received and sent by devices such as monitor, keyboard, mouse, etc.

In order for a PC to operate well, Windows settings must be properly configured, which requires some basic administration skills from users. Moreover, without regular maintenance, Windows tends to operate slower over time, degrading overall PC performance. The causes of declining computer performance appear to be wide-ranging:

- The Windows registry, a database of critical hardware and software instructions, accumulates obsolete shared DLLs, unused drivers and file extension associations as third-party software and devices are installed and uninstalled.
- NTFS file system is subject to file and free space fragmentation. Fragmentation forces hard drive's read/write heads to make several movements over different areas of the disk when accessing a fragmented file, thus reducing file read speed.
- Unexpected computer restarts and third-party software failures, as well as daily computer activity such as web browsing, increase the size of browser cache and lead to accumulating temporary files, log files, memory dumps and other files that are generally unnecessary for an average user. These files may waste gigabytes of disk space, bloating critical indexes that Windows maintains to organize its files.
- Numerous programs and services set themselves to start automatically on Windows boot, launching unneeded processes that are constantly running in the background and consuming PC's system resources.
- Hidden Windows settings make it hard for an average user to tune operating system for maximum performance.

Unfortunately, most users are either unaware of the problems mentioned above or don't maintain their Windows OS properly. This leads to a noticeable drop in computer performance after just 12-18 months of its moderate use. Auslogics BoostSpeed is a system utility that was designed to help users address Windows-related issues that affect computer performance. The program includes several modules for diagnosing and fixing errors, removing unnecessary files, optimizing file system and tuning Windows settings. Auslogics BoostSpeed simplifies and automates time-consuming tasks of Windows maintenance, so that users can keep their computers running fast and error-free.

Purpose of Study

This study was designed to:

- Quantify decline in computer performance that may occur over time in case the computer is not maintained properly.
- Define whether Auslogics BoostSpeed is able to reverse this degradation and restore computer performance to its initial state.

Testing Environment

The tests were performed on a **Windows Vista SP2 x32 Home Premium** system, using the following hardware configuration¹:

Motherboard:	Gigabyte GA-MA770T-UD3
CPU:	QuadCore AMD Phenom II X4 945
RAM:	2048 MB DDR3-1333 (666 MHz)
Video adapter:	NVIDIA GeForce 8600 GT (512 MB)
HDD:	SAMSUNG HD502HJ ATA Device (500 GB, 7200 RPM, SATA-II)

During the tests, **three computer conditions** were simulated:

Brand New PC	A computer with a freshly installed operating system and a minimum of third-party applications. Among third-party software only benchmarking tools were installed in order to measure the performance of the tested computer.
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3 Year Old PC	For the purpose of simulating a typical state of a computer that has been used for thirty-six months ² without any maintenance, the following techniques were implemented:
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- Over 50 widely used applications were installed on a Brand New PC, including popular office and multimedia software.
- Several applications were incorrectly uninstalled to generate invalid entries in the Windows registry.
Note: While most users are aware of the proper way of uninstalling applications, this technique was implemented to generate errors that may occur due to a poorly written program or install/uninstall failures.
- Five most popular web browsers were installed and one hour of moderate Internet use was simulated using each browser.
- Jkfragmenter was run to simulate a fragmented disk. File fragmentation on the disk made up 20.85%.

¹Detailed computer specifications in [Appendix 1](#)

²Based on observations of computers obtained from real users

Optimized PC

The 3 Year Old PC that was optimized using the latest version of Auslogics BoostSpeed.

In order to clean up and optimize the 3 Year Old PC, the following BoostSpeed's techniques were implemented:

- **Disk Cleanup**
Over 29,500 junk files were removed and approximately 30GB of disk space was freed up.
- **Disk Defragmentation**
File and free space fragmentation was totally eliminated.
- **Registry Cleanup**
Over 3,000 registry errors were fixed.
- **Registry Defragmentation**
The Windows registry was fully defragmented.
- **Startup Optimization**
30 third-party applications³ were configured to not start up automatically on Windows boot.
- **Services Optimization**
27 services³ were turned off. All the disabled services were not critical to proper Windows functioning and are rarely used by an average PC user.
- **System Settings Tweaking**
Over 60 Windows settings³ were automatically optimized to gain a performance increase.

The following **performance indicators** were measured for each of the computer conditions:

Windows Startup Time

Windows startup time is the time needed by a computer to completely load the operating system and all third-party applications that are configured to run automatically on Windows boot up. Startup time was measured as a length of time from when the power switch was turned on to the point when the CPU usage reached a stable average level.

³ Full list in [Appendix 2](#)

Memory Usage

Memory usage was measured using the [AIDA64 Extreme Edition](#) system diagnostics tool. This indicator shows the average amount of random access memory (RAM) loaded when a computer is in idle state.

Memory usage is considered to be one of the most important factors that influence computer performance. If a computer becomes low on RAM during intensive application cycles, Windows uses a paging file (an area on the hard drive) to store temporary data that doesn't fit into physical memory. This can significantly lower overall computer performance, because hard drives are by far slower than RAM.

HDD Space Usage

Poorly written programs, improper shutdowns, application freeze-ups, as well as daily computer activity such as web browsing, leave temporary files behind. This creates gigabytes of system clutter. These files degrade computer performance in three main ways:

- System clutter reserves hard drive space, leading to lack of free space, occasional shutdown and download problems.
- Critical Windows indexes become bloated with useless files, which results in dramatic file and application access slow-downs.
- Defragmentation and other scheduled tasks require more time and processing power due to the inclusion of useless files.

The software used for defining disk space usage was [AIDA64 Extreme Edition](#).

PCMark Vantage Performance

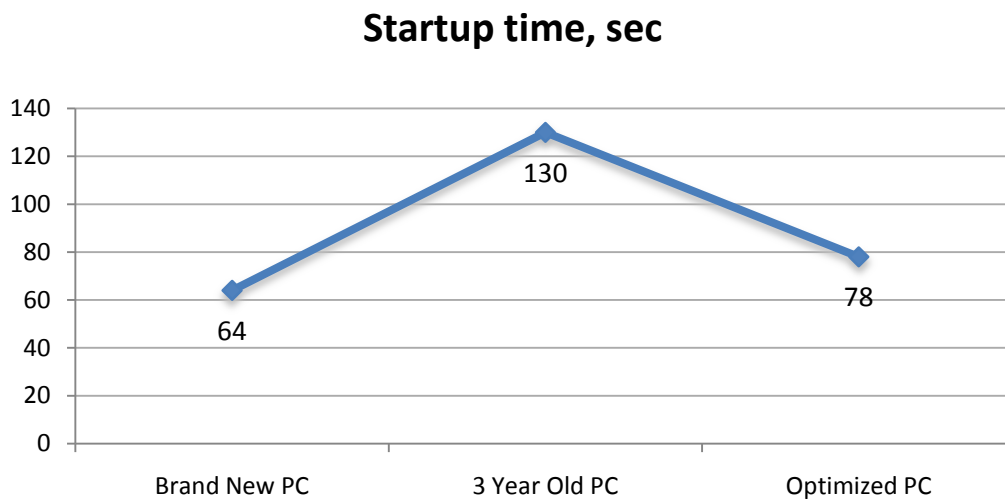
[PCMark Vantage](#) is a benchmarking suite that measures the performance of a tested PC using a variety of common scenarios, such as viewing and editing photos, video, music and other media, gaming, communications, productivity and security. Upon finishing the test, PCMark Vantage calculates a score that determines how well the tested PC performs. The higher the PCMark score is, the better the tested computer performs.

Test Results

Windows Startup Time

	Brand New PC	3 Year Old PC	Optimized PC
Startup time, sec	64	130	78

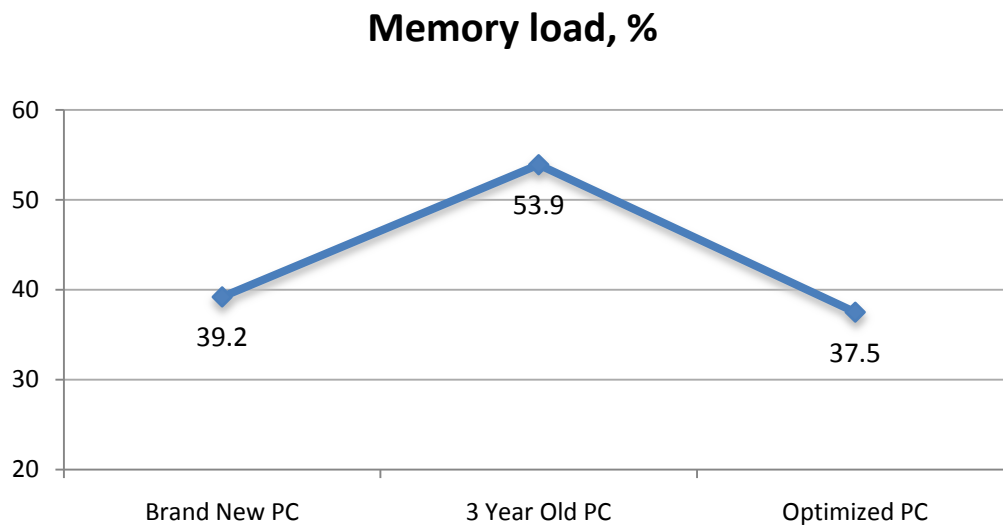
As seen from the table above, time required to boot up the 3 Year Old PC increased more than twice compared to the Brand New PC - from 64 seconds to 2 minute, 10 seconds. After optimizing the 3 Year Old PC with Auslogics BoostSpeed, startup time reduced to 78 seconds. This means that the 3 Year Old PC optimization resulted in a 40% faster startup.



Memory Usage

	Brand New PC	3 Year Old PC	Optimized PC
Memory load, MB	804	1105	770
Memory load, %	39.2	53.9	37.5

According to the test results, the 3 Year Old PC consumed 37% (301 MB) more RAM than the Brand New PC in idle state. When the 3 Year Old PC was optimized, memory usage reduced to 770 MB. Overall, the Optimized PC consumed 30.3% less RAM than the 3 Year Old PC and even 4.2% less than the Brand New PC.



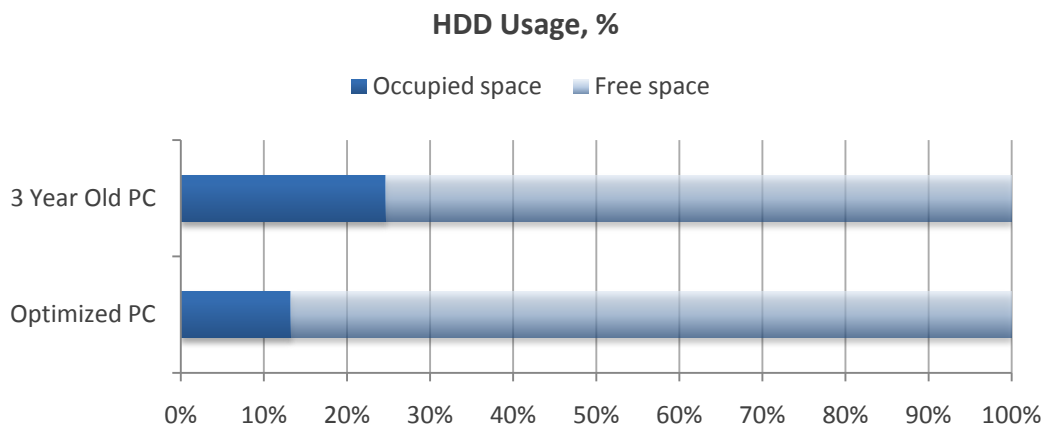
Taking into account that the total amount of RAM installed on the tested PC was 2,048 MB, free memory available for use by third-party applications comprised:

- 1,244 MB (60.7%) on the Brand New PC
- 943 MB (46.1%) on the 3 Year Old PC
- 1,278 MB (62.5%) on the Optimized PC

HDD Space Usage

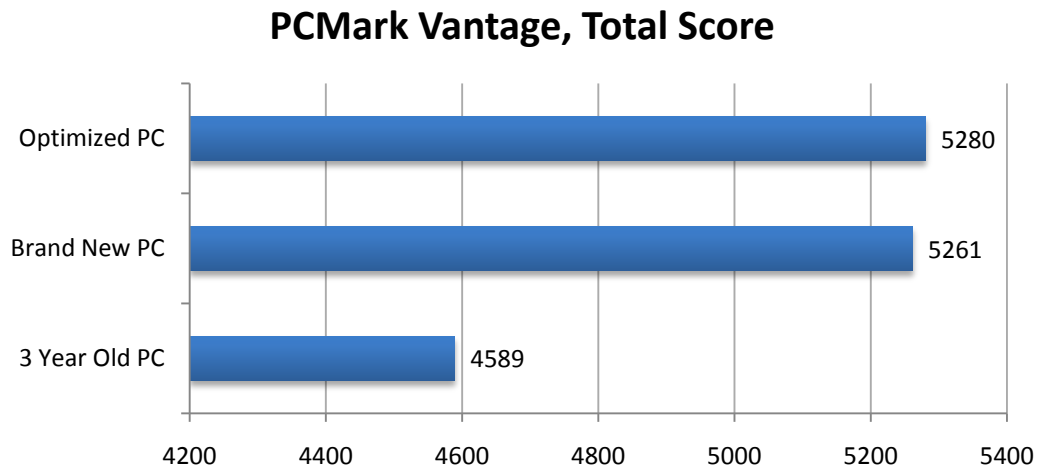
	Brand New PC	3 Year Old PC	Optimized PC
Used space, MB	16,321	73,817	39,516

HDD space usage on the Brand New PC totaled 16,321 MB. This comprised of the cleanly installed Windows Vista SP2 x32 Home Premium and benchmarking tools required to conduct the tests. The space usage increased to 73,817 MB on the 3 Year Old PC. However, only 39,516 MB of that data were useful files: after cleaning up the 3 Year Old PC with Auslogics BoostSpeed, over 29,500 junk files were removed and approximately 34,301 MB of disk space were freed up³.



³ During the cleanup process none of the applications were uninstalled. All the removed data comprised only from unnecessary temporary files and system clutter.

PCMark Vantage Performance



As seen from the chart, PCMark Vantage test showed a 12.7% decrease in total performance of the 3 Year Old PC compared to the Brand New PC - from 5,261 to 4,589. Cleaning up and optimizing the 3 Year Old PC with Auslogics BoostSpeed resulted in a 15% improvement of the total PC Mark Vantage score.

Summary

The study confirms that the performance of a computer is subject to degradation over time if the computer is not properly maintained. All the examined performance indicators experienced a significant drop in the typical state of a computer that has been used for a long time without any maintenance. In particular:

- The time required to boot the Windows Operating System increased by 103%
- Average RAM usage in idle state increased by 37%
- Overall computer performance, according to PCMark Vantage benchmark, decreased by 12.7%

The study also showed that Auslogics BoostSpeed is able to not only restore all the performance indicators, but in some cases to slightly improve them. After optimizing the "cluttered up" PC with Auslogics BoostSpeed:

- Average Windows startup time became 40% faster
- Average RAM consumption in idle state reduced by 30.3%
- 34,301 MB of disk space was freed up
- Overall computer performance, according to PCMark Vantage benchmark, increased by 15%

Appendix 1

Tested Computer Specs:

OS Name: Microsoft Windows Vista Home Premium
Service Pack: 2
Architecture: 32-bit
DirectX: DirectX 10.1

CPU Name: AMD Phenom(tm) II X4 945 Processor
Physical Processors: 1
Logical Processors: 4
Frequency: 3000 MHz
External Clock Frequency: 200 MHz
L1 Instruction Cache: 64 KB
L1 Data Cache: 64 KB
L2 Cache: 512 KB
L3 Cache: 6 MB

Motherboard: Gigabyte GA-MA770T-UD3
Motherboard Chipset: AMD 770, AMD K10

Memory Modules: 1
Capacity: 2,048 MB
Form Factor: DIMM
Type: DDR3 SDRAM
Speed: 667 MHz

Video Adapter: NVIDIA GeForce 8600 GT
Video Memory: 512 MB

HDD Name: SAMSUNG HD502HJ
Capacity: 500 GB
Interface: Serial ATA 3.0 Gbps
Buffer DRAM Size: 16 MB
Byte per Sector: 512 bytes
Rotational Speed: 7.200 RPM

Appendix 2

The list of changes made by Advisor, Startup Manager, Service Manager and Tweak Manager:

Tool	Changes	
Advisor	<p>Applied advice: Speed up Windows shutdown.</p> <p>Applied advice: Indexing Service can be disabled.</p> <p>Applied advice: Disable wireless zero Configuration Service.</p> <p>Applied advice: Disable Tablet PC Input service.</p> <p>Applied advice: Disable Smart Card service.</p> <p>Applied advice: Disable Smart Card Removal Policy service.</p> <p>Applied advice: Disable Secondary Logon service.</p> <p>Applied advice: Disable the Remote Registry service.</p> <p>Applied advice: Disable ReadyBoost Service.</p> <p>Applied advice: Disable Administrative share.</p>	<p>Applied advice: Disable automatic search for network folders.</p> <p>Applied advice: Disable Distributed Link Tracking Client service.</p> <p>Applied advice: Disable certificate Propagation service.</p> <p>Applied advice: Do not save Internet Explorer encrypted data on disk.</p> <p>Applied advice: Disable Autorun.</p> <p>Applied advice: Aero Effects can be disabled.</p>
Startup Manager	<p>Disabled System settings protector</p> <p>Disabled RoboForm Taskbar Icon</p> <p>Disabled QuickTime Task</p> <p>Disabled OkozoDesktop</p> <p>Disabled ManyCam virtual webcam</p> <p>Disabled Malwarebytes Anti-Malware</p> <p>Disabled Java(TM) Platform SE binary</p> <p>Disabled Internet Downloader</p> <p>Disabled InstallShield Update Service Updater</p> <p>Disabled InstallShield Update Service Scheduler</p> <p>Disabled ICQ</p> <p>Disabled GrooveMonitor Utility</p> <p>Disabled Google Installer</p> <p>Disabled Device Detector</p> <p>Disabled Cyclone wallpaper changer</p>	<p>Disabled Camfrog Launcher</p> <p>Disabled uTorrent</p> <p>Disabled Ask Updater</p> <p>Disabled Adobe Reader and Acrobat Manager</p> <p>Disabled Acronis True Image Monitor</p> <p>Disabled Acronis Scheduler Helper</p> <p>Disabled WinZip Executable</p> <p>Disabled Trillian</p> <p>Disabled Timeleft</p> <p>Disabled GetRight! Download Manager</p> <p>Disabled Yahoo! Messenger</p> <p>Disabled Wordweb Thesaurus/Dictionary</p> <p>Disabled Windows Live Messenger</p> <p>Disabled Windows Defender User Interface</p> <p>Disabled WebcamMaxAutoRun</p>
Service Manager	<p>Changed Yahoo! Updater</p> <p>Changed Visual Importer Enterprise – Execution Agent</p> <p>Changed TuneUp Utilities Service</p> <p>Changed Soda PDF Service</p> <p>Changed Soda PDF Helper Service</p> <p>Changed SeaPort</p> <p>Changed NitroPDFReaderDriverCreatorReadSpool</p> <p>Changed Magic Desktop Server</p>	<p>Changed ICQ Service</p> <p>Changed Google Update Service (gupdate)</p> <p>Changed Adobe Acrobat Update Service</p> <p>Changed Apple Mobile Device</p> <p>Changed Acronis Scheduler2 Service</p> <p>Changed Acronis Nonstop Backup Service</p> <p>Applie profile “Game box with networking”</p>
Tweak Manager	<p>User Interface \ Aero Effects, 3 tweak(s)</p> <p>User Interface \ Visual Effects, 3 tweak(s)</p> <p>User Interface \ Animation, 4 tweak(s)</p> <p>User Interface \ Menu, 5 tweak(s)</p> <p>Windows Explorer\ View, 5 tweak(s)</p> <p>System Security\ Privacy Policy, 1 tweak(s)</p> <p>Startup and Shutdown \ Event Logging, 1 tweak(s)</p> <p>Microsoft Office \ General, 5 tweak(s)</p> <p>Microsoft Office \ MS Word, 5 tweak(s)</p> <p>Microsoft Office \ MS Excel, 1 tweak(s)</p> <p>Software Tweaks \ Windows Live Messenger, 1 tweak(s)</p> <p>Software Tweaks \ Windows Media Player, 3 tweak(s)</p>	<p>Software Tweaks \ Acrobat Reader, 3 tweak(s)</p> <p>Internet Explorer \ Interface, 9 tweak(s)</p> <p>Windows Explorer \ Thumbnails, 3 tweak(s)</p> <p>System Security\ UAC, 1 tweak(s)</p> <p>System Security \ UAC, 2 tweak(s)</p> <p>Startup and Shutdown \ Startup, 3 tweak(s)</p> <p>Startup and Shutdown \ Shutdown, 1 tweak(s)</p> <p>System \ System Restore, 2 tweak(s)</p> <p>System \ Application Start. 1 tweak(s)</p> <p>System \ Prefetch, 2 tweak(s)</p> <p>Internet Explorer \ Connections, 1 tweak(s)</p>