

auslogics®

White Paper

Enhancing computer speed and
stability with Auslogics BoostSpeed® 5

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Introduction

Microsoft Windows is a complicated system that allows users to interact with their computers. Unfortunately, Windows is not perfect. As time goes by, computers become slower, system stability starts suffering and Windows starts experiencing unexpected errors and freeze-ups, which can lead to data loss.

The most common reasons for Windows speed degradation are registry errors, junk files, hard drive fragmentation, and unnecessary services and startup items:

- Registry errors are references to outdated libraries, non-existent files, corrupted or deleted drivers, incorrectly registered file extensions, and registry keys that belong to uninstalled programs. If the registry goes unattended for one or two years, it can accumulate several thousands of incorrect registry keys. Not only do these keys make registry navigation more complicated, but they can also cause application and system errors.
- Junk files are created every day and they accumulate during the whole lifetime of your PC. This happens because every single computer constantly runs background programs. Each of them creates its own set of temporary files and leaves a lot of them behind. As a result, unless they are deleted manually, junk files can take up gigabytes of disk space without adding any value. Over time, a typical computer can accumulate thousands of junk files, which are temporary application files, logs, browser cache files, system update leftovers, memory dumps, and more. These useless files take up disk space and can also slow down Windows systems because they grow in size and lead to MFT (Master File Table) fragmentation.
- File fragmentation occurs because the NTFS file system attempts to use disk space in the most effective way. To do that, NTFS splits large files and fills every available bit of free space with file fragments. If a file is split into a large number of fragments, the hard drive read head needs to move more than necessary to read the file. This significantly reduces read speed. As more and more files become fragmented, overall disk speed decreases. On top of that, Windows page file can also get fragmented, which reduces PC speed when the page file is used. This happens because the page file is usually located on the same disk as user-created files and all installed applications. The more fragmented the disk is, the slower the page file will work.
- A lot of applications configure themselves to run automatically on system startup. Some of them are installed as services and are running all the time despite being used very infrequently. Such programs increase system boot time and consume system resources without providing any benefit to the user.

We've conducted a research to determine how much an average PC speed and performance suffers without any computer maintenance during a 3-year period. We've also tested whether it was possible to revert the degradation with the help of Auslogics BoostSpeed and make a 3-year-old computer run as fast as new.

Testing Environment

The tests have been performed on a system with the following specifications:

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)
Operating System:	Windows Vista Home Premium SP2 x32

For the research purposes, three operating system states were simulated:

- **New system** - this system state simulated the state of a freshly installed and configured operating system. The only third-party applications installed were benchmarking tools.
- **Three-year-old system** - this system state was simulated according to a typical state of a 3-year-old system used by home users. To achieve this state the system was aged by installing a number of popular programs (from download.com top software list), creating junk files and registry errors. The system disk was fragmented with the help of JKFragmenter (ca. 85% file fragmentation) before any programs were installed.
- **Optimized system** - this system state simulated a 3-year-old system after it's been fully tuned up and optimized with Auslogics BoostSpeed. More details in the next chapter.

Computer Optimization

Removing junk files and incorrect registry keys

The first step of system cleanup and optimization is deleting junk files and obsolete registry keys. If these objects are not deleted, they can decrease the effectiveness of any further optimization.

A scan of the system disk with **Disk Cleaner** detected almost 30,000 junk files (temporary Internet files, applications temporary files, Windows update leftover files, outdated system restore points, etc). Deleting these files allowed to free up more than 30 GB of disk space.

When the junk files were removed, a full system registry scan with **Registry Cleaner** was performed. The scan detected nearly 3,500 thousand incorrect and obsolete registry errors (invalid file associations, invalid file types registrations, references to missing software and files, invalid shortcuts and autorun entries, COM and ActiveX errors). Deleting these keys improved the performance of the registry and registry access speed by 7%. After the cleanup the registry was defragmented with **Registry Defrag**, which allowed to compact the registry and provide an additional 2,5% speed boost.

Disk defragmentation

Daily computer activity, such as creating and moving files, installing and uninstalling programs, and so on, leads to disk fragmentation. In turn, this causes the hard drive's read head to move more than necessary, which significantly reduces disk access speed. High levels of fragmentation can even cause problems with reading files if several applications are trying to read files from the disk at the same time. For example, if you are watching a video and copying files at the same time, the video can start freezing up.

It's necessary to perform the following maintenance tasks before running defragmentation (**Disk Defrag**): check the disk surface for errors by running **Disk Doctor** and delete temporary files with **Disk Cleaner**. Running Disk Doctor will fix any existing disk errors and prevent new disk errors from occurring (defragmentation always involves moving a large number of files, so it's best to have an error-free file system). Running Disk Cleaner will significantly decrease the time needed for defragmentation because it will reduce the number of files on the disk.

After performing the necessary pre-defragmentation tasks, we've run defragmentation and optimization¹ of the system disk. The fragmentation level was reduced from 22% to 0% and more than 50,000 files were optimized.

¹ Consolidating files in the beginning of the volume allows to defragment free disk space and prevent future fragmentation by defragmenting the free space and removing bits of free space between files.

Disabling unnecessary startup items and Windows services

The **Startup Manager** was used to disable more than 30 startup items² (IM programs, various Web clients, launchers, dictionaries, etc). This allowed to noticeably speed up system boot.

Some applications are installed as services. Sometimes this installation method makes sense (that's the case with anti-virus programs), but in most cases these applications simply include themselves into the list of processes and take up valuable system resources that could be used elsewhere. We've used the **Service Manager** to inspect installed services and disabled more than 15 services², which allowed to reduce the amount of consumed RAM in idle system state.

Service Manager can also be used for one-click services optimization without having to go through the whole list of Windows services. The program includes a feature that allows to quickly select one of the predefined computer usage profiles and thus disable all the unnecessary services automatically.

Fine-tuning and optimizing the system

Tweak Manager allows to fine-tune a lot of Windows settings that are either hidden or very difficult to change manually. For example, Tweak Manager allows to change Windows Aero settings, fine-tune ClearType, change Start menu settings, configure dozens of Windows Explorer settings and performance settings, and reduce resource consumption by some applications. During the test more than 60 parameters² that affect system performance³ were configured.

System Advisor was used to disable all services that didn't serve any purpose under our system configuration. In total, 16 suggestions were applied².

Internet Optimizer is a powerful tool that allows to fine-tune and optimize Internet connection. It allows to configure a large number of hidden Internet connection settings, and improve Internet performance and usability. Internet Optimizer has two modes - manual and automatic:

- The manual mode presents all Internet connection settings and parameters as a list. Each entry comes with a detailed description and the list of possible values. This mode is best suited for advanced computer users who want to fine-tuning Internet connection settings.
- The automatic mode offers the users to select one of three configurations depending on their connection speed and type. When the necessary configuration is selected, the program applies the optimal Internet connection settings values. This mode is best suited to novice users.

² Full list in [Appendix](#)

³ Tweak Manager allows to sort the list of settings by their effect on system performance. During the test only tweaks from the "moderate" and "high" groups were applied.

System monitoring tools

Auslogics BoostSpeed includes a full range of system monitoring tools that allow to access the most accurate and recent system information.

Disk Explorer allows to establish which files and folders take up the most of hard drive space and view free space usage stats for the selected disk. This information comes useful when a user is about to perform disk cleanup and needs to know which files and folders occupy disk space and the size of which files and directories is larger than expected.

Service Manager displays detailed information about all system services and allows to perform all standard services management tasks. Each service has a detailed description, security rating and system performance rating.

Task Manager allows to access all the necessary information about running processes. The information for each process includes its current CPU and RAM consumption, disk usage and network activity. The program also displays a short description and security rating for each running process. If a process is considered dangerous, the program will warn the user. In addition to providing process management options, Task Manager allows to manage running services and unlock locked files.

System Information displays detailed hardware and software computer configuration. All data is grouped in an easy to navigate way, which simplifies finding particular bits of system information. In addition to that, the tool has an option to save system reports in separate files that can be easily emailed or printed out. System Information also includes a separate screen that displays running processes, services and drivers, as well as CPU, RAM and virtual memory consumption graphs.

Disk Doctor allows the user to check disk surface and file system of any disk drive for errors and repair errors in case any are found. If the disk is used by other processes, the user can schedule error repair.

There are two things that make BoostSpeed's system monitoring utilities special. For a start, all tools have a very intuitive and user-friendly interface, as well as descriptions written in plain English. This makes the tools very easy to use. Secondly, all utilities are grouped together depending on their purpose, which lets users find and launch them in a quick and easy way (similar third-party system information tools are not that user-friendly).

Maintaining the system

When system cleanup and optimization is done, the user continues to use the system in the same way as before the cleanup. This restarts performance-degrading processes, such as junk files and registry errors accumulation, disk fragmentation, and accumulation of new unnecessary startup entries. Thus, it won't be long until the system returns to the degraded state similar to the one before system optimization⁴.

To keep an optimized system running fast, the user needs to run **Integrator** on a regular basis. Integrator is a tool that combines disk cleanup, registry cleanup, disk error checking and disk defragmentation functionalities. In addition to that, Integrator provides easy access to the full list of BoostSpeed utilities.

Rolling back changes

All changes made by any of the BoostSpeed tools⁵ can be easily rolled back. To do this, the user needs to open **Rescue Center**, select the necessary backup (all backups have short descriptions, which allow users to view backup contents before restoring), and click on **Restore**. This will return the system to its state prior to applying any changes. The changes made by BoostSpeed will be rolled back.

⁴ "Three-year-old system"

⁵ By default, the option to restore is disabled for Disk Cleaner and Track Eraser. It can be enabled from the program settings.

Test Parameters and Results

Test parameters

The following test parameters checklist was used to benchmark system performance before and after optimization:

- **System boot time⁶** - time needed to fully load all operating system components and third-party applications that are configured to load on system startup. Measured from the moment of pressing the power button to full system boot.
- **RAM usage in idle system state⁷** - the amount of RAM used by the system in idle state (when the user is not running any applications). This is one of the most important system speed factors because it shows the amount of RAM available for user-launched applications. If there isn't enough available memory, the page file will be used, which needs more time to operate and reduces system speed.
- **Disk space usage⁷** - the amount of disk space occupied by system and user files. The amount of occupied disk space is measured before and after optimization. The difference is the space that was occupied by junk files.
- **System test results using [PCMark Vantage](#) benchmarking software.** This software measures system performance using various everyday computer usage scenarios (viewing and editing images, watching videos, listening to music, playing games, using the Internet, computer security levels, etc). The separate testing results are then combined and the overall benchmarking score is calculated. Higher score indicates higher system performance.

⁶ Using Solutio and Bootracer benchmarking utilities

⁷ Using tools from the AIDA64 suite

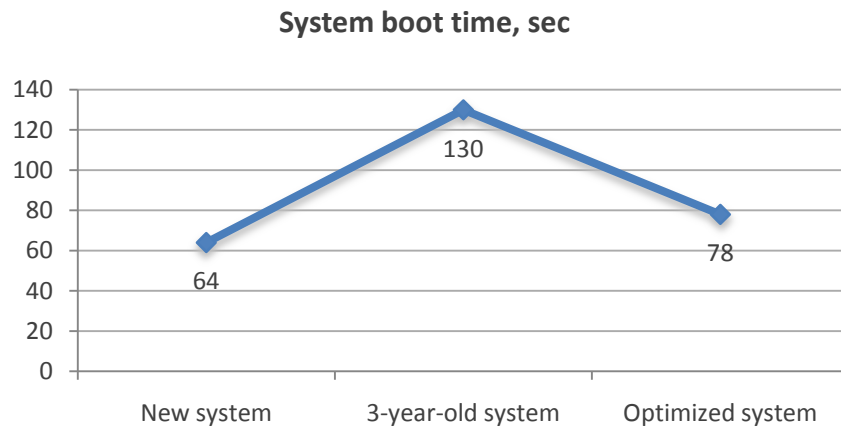
Benchmarking results

Below are the benchmarking results for the three compared system states.

System boot time

	New system	3-year-old system	Optimized system
Boot time, sec.	64	130	78

The table above shows that a 3-year-old Windows Vista's boot time increased more than twice (from 64 seconds to 130 seconds) and the boot time of an optimized system decreased to 78 seconds, which is a 40% improvement.



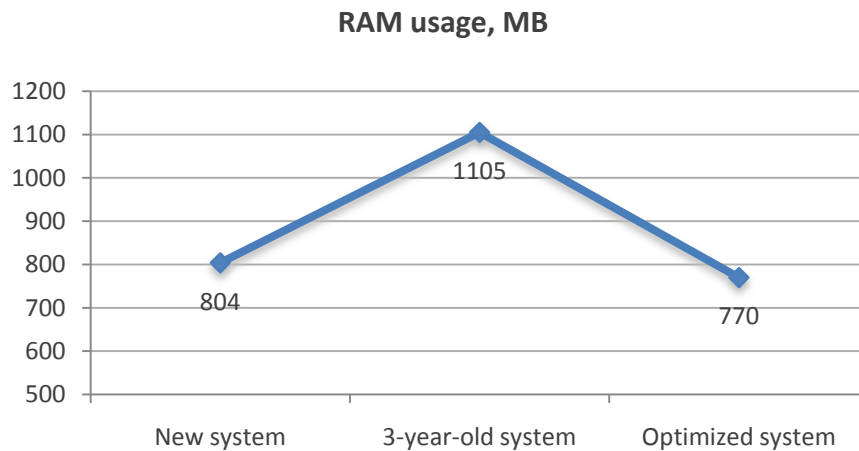
RAM usage in idle system state

	New system	3-year-old system	Optimized system
RAM usage, MB	804	1105	770
RAM usage, %	39.2	53.9	37.5

The benchmarking results showed that a 3-year-old system in an idle state used 301 MB (37%) more RAM than a new system. After optimization the total amount of used RAM decreased to 770 MB, which is a 43% improvement compared to a 3-year-old system and a 4,2% improvement compared to a new system.

With the total amount of 2028 MB RAM installed, the amount of RAM available for custom user applications is:

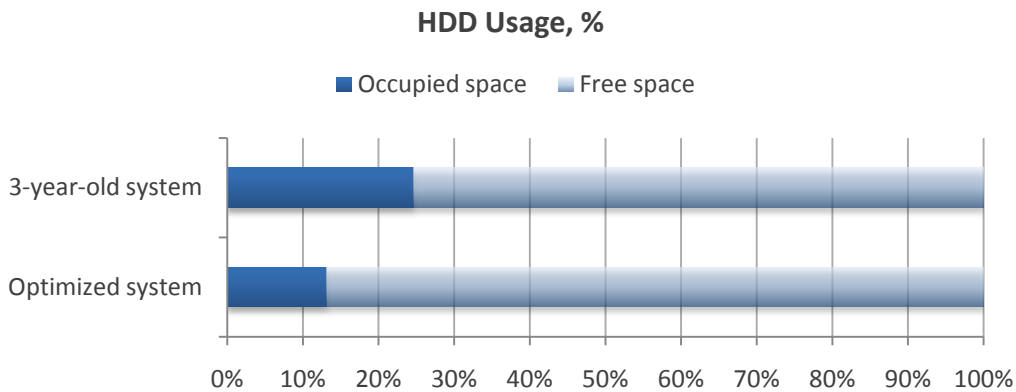
- 1244 MB (60.7%) on a new system
- 943 MB (46.1%) on a 3-year-old system
- 1278 MB (62.5%) on an optimized system



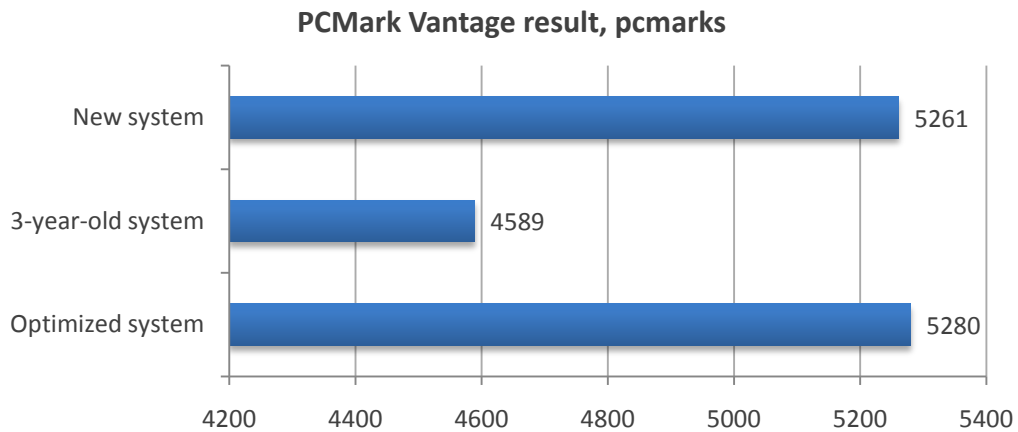
Disk space usage

	New system	3-year-old system	Optimized system
Disk space usage, MB	16,321	73,817	39,516

For a new system, the only things that occupy disk space are Microsoft Windows Vista SP2 Home Premium x32 and benchmarking utilities. When the system was artificially aged, 73,917 MB of disk space were occupied, but only 39,516 MB were necessary files. The rest were junk files and outdated system restore points. During system cleanup and optimization 29,500 junk files were deleted, which allowed to free up 34,301 MB of disk space (only junk files were deleted and none of the installed applications were uninstalled).



PCMark Vantage result



The diagram above shows that the benchmarking result for an artificially aged system decreased by 12,7% or 672 pcmarks. After optimization the result increased by 15% or 691 pcmarks - from 4589 to 5280, which is a bit higher than the result for a new system.

The benchmarking results show that optimizing the computer with Auslogics BoostSpeed increased system performance and allowed to reach the level of performance of a new computer (the insignificant difference appeared because of newly installed user startup applications and third-party services). This optimization result was achieved by deleting only junk files, unnecessary startup entries, unnecessary services, registry errors, etc. None of the installed applications were removed.

Conclusion

These tests confirmed that Windows performance significantly decreases without the necessary maintenance. When three years of computer usage were simulated, all test parameters showed a dramatic performance degradation:

- System boot time increased more than twice, from 64 to 130 seconds
- RAM usage in idle system state increased from 804 to 1105 MB (from 39% to 54%)
- More than 30 GB of junk files accumulated on the disk
- PCMark Vantage benchmarking score decreased from 5261 to 4589 (by 12,7%)

After cleaning up and optimizing the system with Auslogics BoostSpeed 5 all test parameters were back to the ones of a new system or even a bit better:

- System boot time decreased by 40%, from 130 seconds to 78 seconds
- The amount of RAM used in idle system state decreased by 43% compared to the amount of RAM used by a 3-year-old system (from 1105 MB to 770 MB) and by 4,2% compared to a new system
- Nearly 30 GB of junk files and old system restore points were deleted
- PCMark Vantage benchmarking result improved by 15%, from 4589 pcmarks to 5280 pcmarks.

Appendix

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>