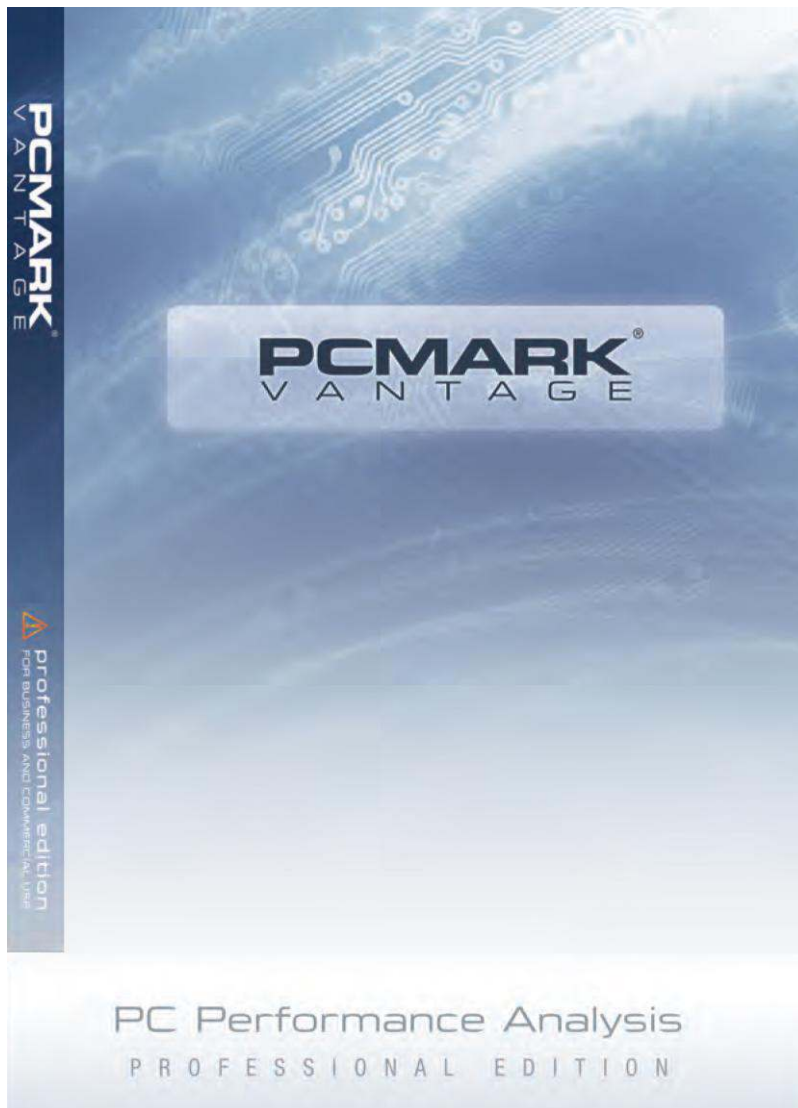




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Reviewer's Guide: PCMark™ Vantage

Product Name: PCMark™ Vantage

Product Tagline: The New System Performance Measurement Standard for PCs

About this Guide: This Reviewer's Guide is intended to provide background, test information, procedures and reference data for media interested in benchmarking Windows Vista PC hardware performance, as well as supplying product specific details for those that are interested in reviewing the PCMark Vantage Benchmark tool.

Version 0.2



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System Requirements to run PCMark Vantage

Minimum System Recommendations:

- PCMark Vantage package requires approx. 800 MB of hard disk space and running the tests requires additional 800 MB space.
- Modern CPU with SSE2 support.
- SM2.0 compliant graphics card for the GPU gaming test.
- SM3.0 compliant graphics card for the GPU image manipulation test.
- Microsoft *Windows Vista*™

Testing guidelines

In order to get accurate and repeatable benchmark results, you should follow the requirements and recommendations below. These guidelines may be updated from time to time.

Official Testing Requirements:

- Restart the computer before running the benchmark.
- Exit all other programs.
- Under the Windows operating systems, other tasks can preemptively run during the tests, thus affecting the results. You will want to eliminate as many of these types of tasks as possible, such as automatic updates in operating systems, e-mail clients or other tasks from your Startup folder. This action also maximizes your available memory.
- Disable all file sharing and possibly also all network connections. Background network activity may affect results. You can submit your results even if you run the benchmark without network connection. Save your results in the default format (.pcr) and restart your system with network connection after the benchmark run. Run PCMark Vantage and submit your saved results by clicking the 'Submit Saved Result' item in the right click menu (open the right click menu by right clicking the PCMark Vantage main window).
- Follow a standard testing procedure each time you run the tests. Run the tests at least three times to verify that the results are reproducible.
- Before running the HDD tests, the target drive should be first defragmented in order to receive accurate results.

Additional Recommendations for Testing:

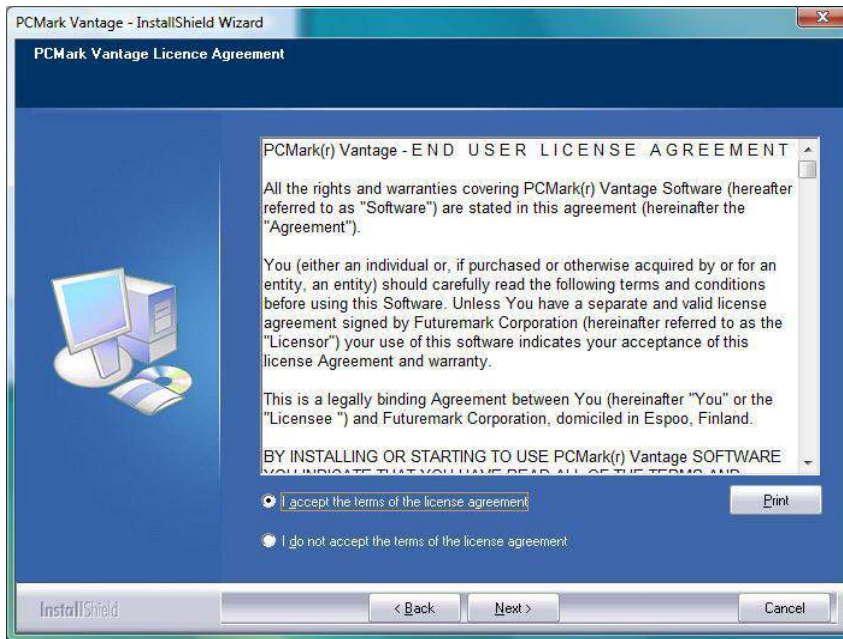
- We recommend that you test on a "clean" system only. You should use a program like "Norton Ghost" (<http://www.ghost.com>) to restore a clean system for every test case.
- We recommend that you disable the System Restore feature in Windows Vista. For more information, please see Microsoft Knowledge Base article Q267951.

NOTE: These steps help to ensure that your results are consistent!

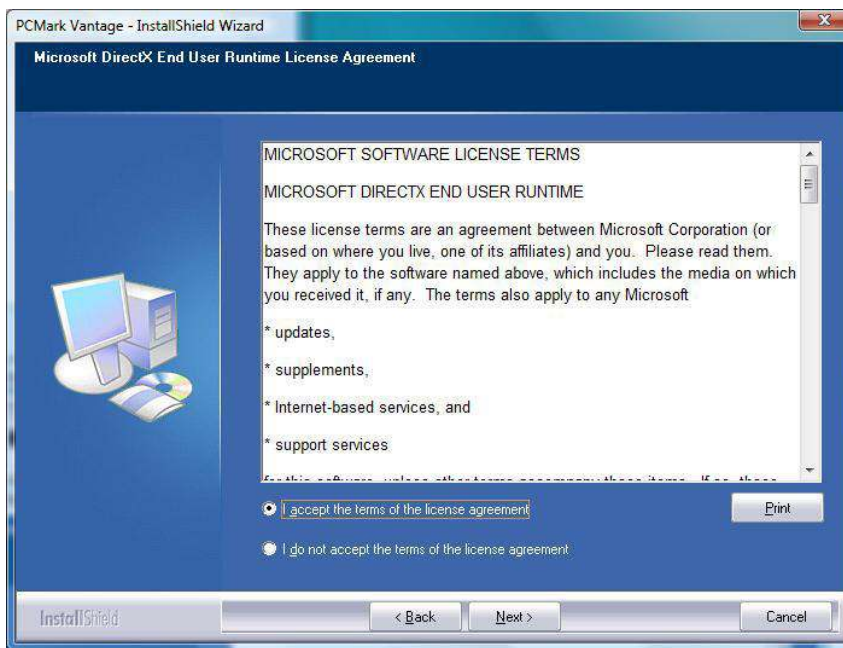


Installing PCMark Vantage

1. Start the PCMark Vantage .exe installer by double clicking.
2. You'll need to select "I Accept terms of the license agreement" to continue with the PCMark Vantage installation.

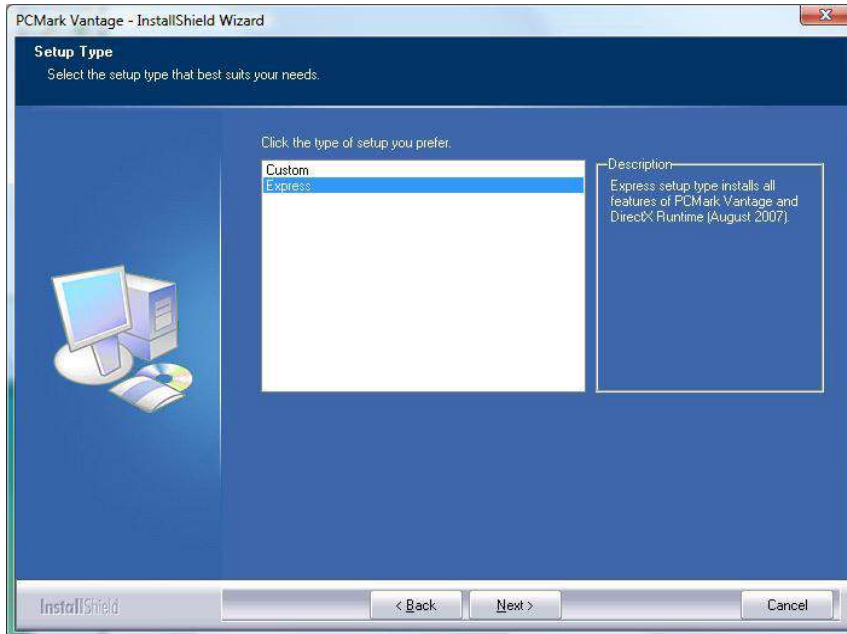


3. PCMark Vantage requires DirectX to run, select "I Accept terms of the license agreement" to continue with the DirectX installation.

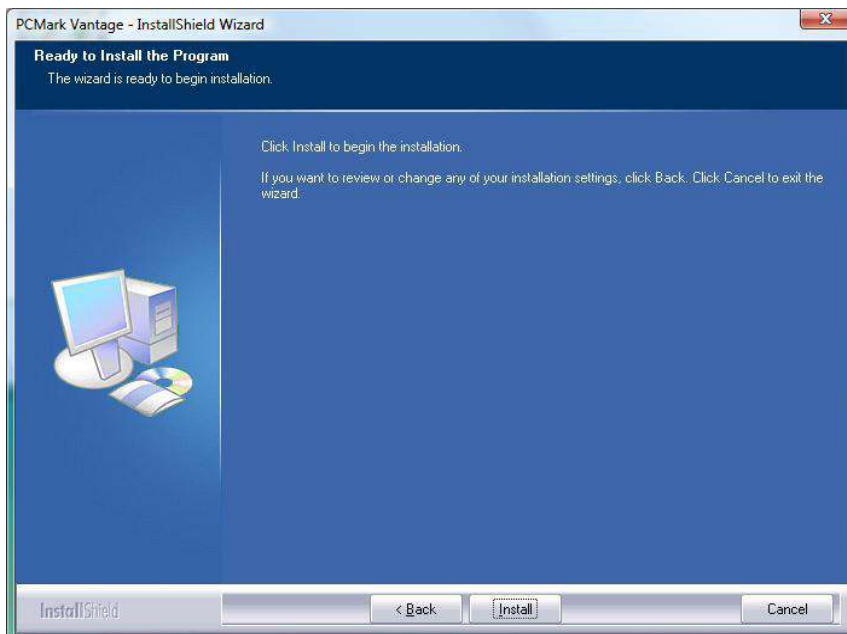




4. By selecting “Express” set-up, the PCMark Vantage and DirectX installer will automatically install all required components to run the benchmark, to your C drive. “Express” install is highly recommended for consistent results.

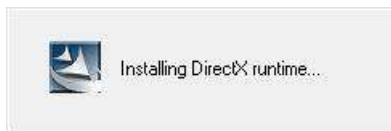


5. Clicking “Install” will automatically start the full, one-step installation process.

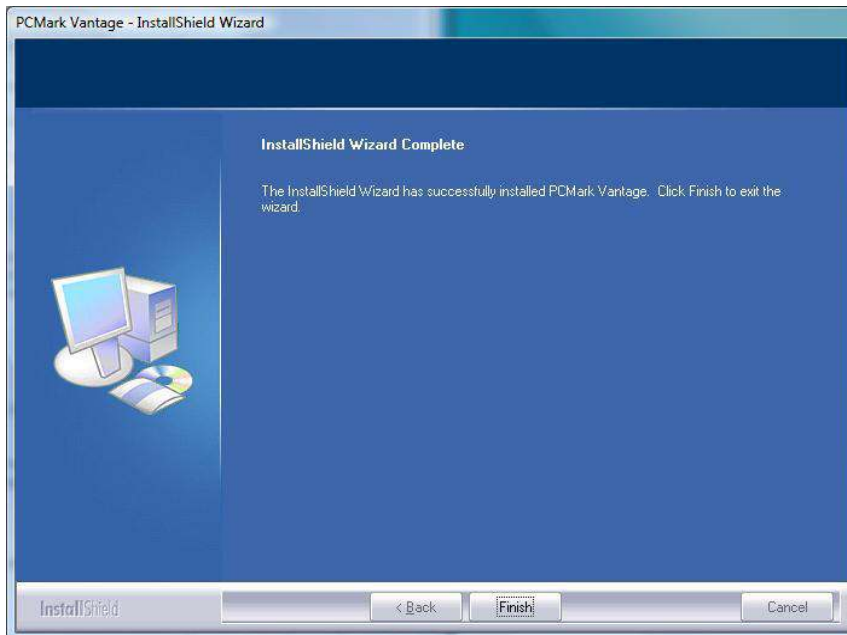




6. Microsoft DirectX installer will request that you select I accept the end user runtime agreement to finish installing the required components. Click “Next” to complete the DirectX installation.



7. Once your installation of PCMark Vantage is complete, click the “Finish” button to close the installation wizard.





Registering and unlocking PCMark Vantage

1. Close all other applications for consistent results before starting up PCMark Vantage.
2. Double click the PCMark Vantage icon on your desktop to start-up the application. The installer will automatically create a desktop icon if "Express" set-up was selected.



3. When entering your PCMark Vantage registration code to unlock full Professional or Advanced Edition functionality, cut and paste the registration code as supplied in the Futuremark email. Zeros and "O's" may look the same and unless you enter the registration code exactly, your copy of PCMark Vantage will have disabled functionality.





4. Once you've correctly entered the registration code you'll be shown which version of PCMark Vantage is unlocked. Click the "OK" button to continue.





Starting up PCMark Vantage for the first time

1. Close all other applications for consistent results before starting up PCMark Vantage
2. Once the application has started, PCMark Vantage will display the benchmark options for the version you've unlocked. This control panel allows you to select test suites, change test settings, view previous test results if the benchmark has previously run on the system, and view detailed system information following a system scan. Clicking the "Run Benchmark" button will start the benchmark, but before starting the test, explore the suite descriptions shown below to select the best suite to meet your test needs.



PCMark Vantage test suite selections

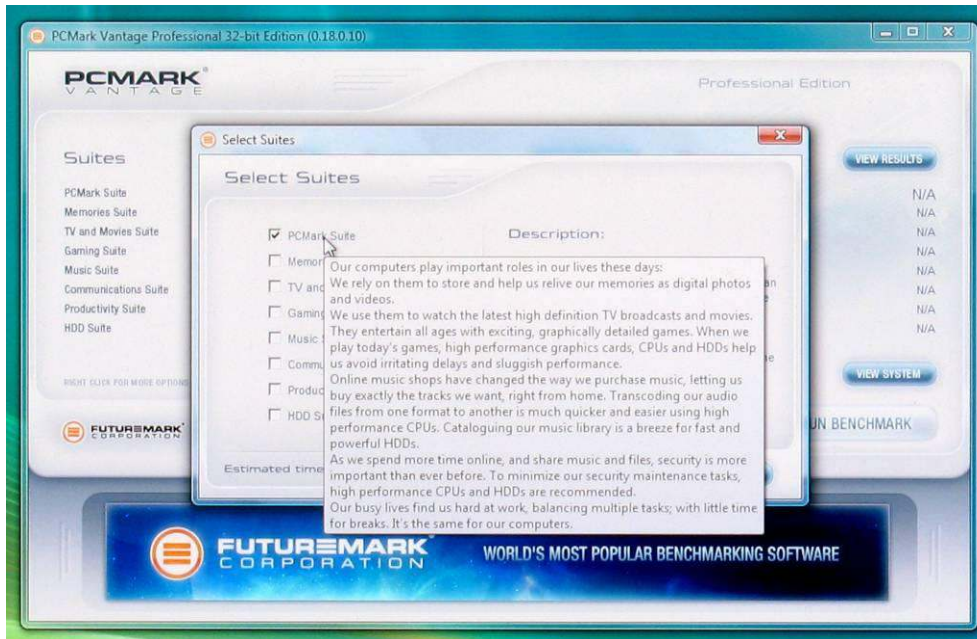
Click on the "Select Suites" button to choose which PCMark Vantage "Consumer Scenario" test suite you'd like to run. The six Consumer Scenario suites are based on a collection of actual real-world end user applications, and reflect the system performance a typical user would expect running those applications. Each test suite contains a subset of the following tests as applicable: data encryption, decryption, compression and decompression, GPU and CPU image manipulation, image import, video playback, editing and transcoding, audio playback and transcoding, GPU and CPU game tests, game data loading, web page rendering, mail operations, media player operations, contacts search, text editing and applicable HDD tests.

Each Consumer Scenario test suite generates a unique, fully comparable performance score for that series of tests. A comprehensive, overall PCMark score is generated by running the PCMark Suite. And the HDD Suite produces its own fully comparable performance score. All results can be uploaded, stored and compared in Futuremark's exclusive OnlineResult browser dependant on which version of PCMark Vantage that the user is running.



PCMark Suite

The PCMark Suite is a collection of various single- and multi-threaded CPU, Graphics and HDD test sets with the focus on Windows Vista application tests. Tests have been selected to represent a subset of the individual Windows Vista Consumer Scenarios. PCMark Suite includes CPU, Graphics, Hard Disk Drive (HDD) and a subset of Consumer Suite tests. **Note: Only the PCMark Suite will provide a PCMark Score.**



Our computers play an important role in our lives these days. We rely on them to store and help us relive our memories as digital photos. We use them to watch the latest high definition TV broadcasts and movies. They entertain all ages with exciting, graphically detailed games. When we play today's games, high performance graphics cards, CPUs and HDDs help us avoid irritating delays and sluggish performance. Online music shops have changed the way we purchase music, letting us buy exactly the tracks we want, right from home. Transcoding our audio files from one format to another is much quicker and easier using high performance CPUs. Cataloguing our music library is a breeze for fast and powerful HDDs. As we spend more time online, and share music and files, security is more important than ever before. To minimize our security maintenance tasks, high performance CPUs and HDDs are recommended. Our busy lives find us hard at work, balancing multiple tasks; with little time for breaks. It's the same for our computers.

PCMark Suite includes the following tests:

- **Suite Tests**
 - Memories 1 & 2
 - TV and Movies 1 & 2
 - Gaming 1 & 2
 - Music 1 & 2
 - Communications 1 & 2
 - Productivity 1 & 2
- **CPU Test**
 - Data encryption, Data decryption, Data compression, Data decompression
 - CPU image manipulation (compression/decompression/resize)
 - Audio transcoding
 - Video transcoding
 - Text editing
 - Web page rendering
 - Windows Mail
 - Windows Contacts
 - CPU game test



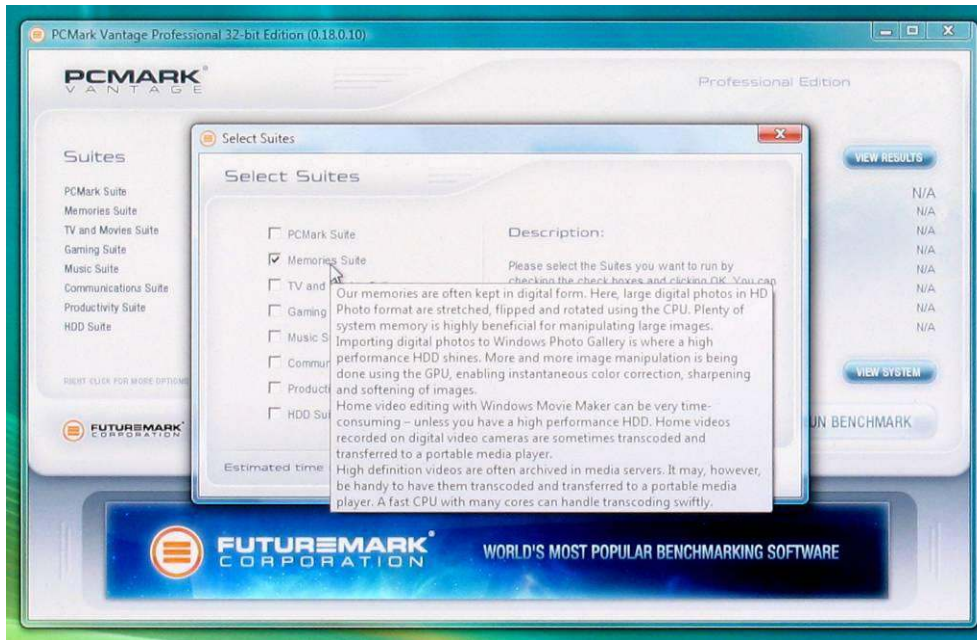
- **Graphics Test**
 - Video playback
 - GPU game test
- **HDD Test**
 - 6 HDD Tests total
 - HDD Tests use new 4K block size*
 - All HDD Tests use RankDisk using Intel's IPEAK Storage Performance Toolkit
 - WinTrace is used to record the HDD traces
 - AnalyzeTrace is used to analyze precisely what the traces are doing
 - RankDisk: a Futuremark modified version that it is non-destructive and runs in a temporary sandbox file.

* **NOTE:** Clean installation of Microsoft Windows Vista has proper 4K LBA alignment. Upgrading from Microsoft Windows XP causes possible alignment issues. Also using some 3rd party partition tools may cause alignment issues.



Memories Suite

The tests in the Memories Suite have been selected to represent the Windows Vista Memories Consumer Scenario. The combination of test sets covers the common Memories scenario usage. Memories Suite gives a separate PCMark Memories Score which does not affect the overall PCMark Score.



Our memories are often kept in digital form. Here, large digital photos in HD Photo format are stretched, flipped and rotated using the CPU. Plenty of system memory is highly beneficial for manipulating large images. Importing digital photos to Windows Photo Gallery is where a high performance HDD shines. More and more image manipulation is being done using the GPU, enabling instantaneous color correction, sharpening and softening of images. Home video editing with Windows Movie Maker can be very time-consuming – unless you have a high performance HDD. Home videos recorded on digital video cameras are sometimes transcoded and transferred to a portable media player. High definition videos are often archived in media servers. It may, however, be handy to have them transcoded and transferred to a portable media player. A fast CPU with many cores can handle transcoding swiftly.

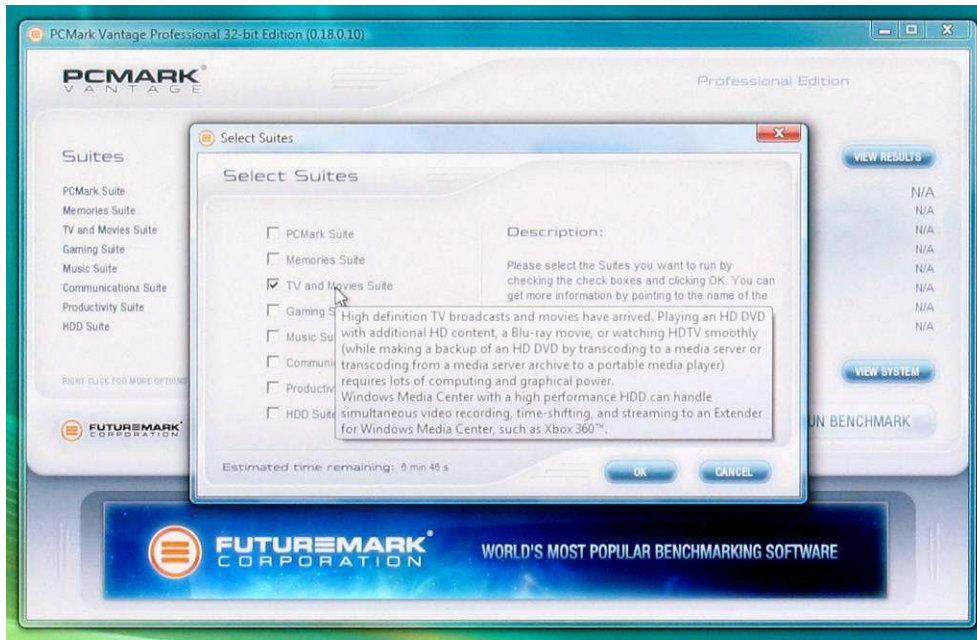
Memories Suite includes the following tests:

- **Memories 1**
 - Two simultaneous threads
 - CPU image manipulation
 - HDD picture import
- **Memories 2**
 - Two simultaneous threads
 - GPU image manipulation
 - HDD video editing
- **Memories 3**
 - Video Transcoding: DV to portable device
- **Memories 4**
 - Video Transcoding: media server archive to portable device



TV and Movies Suite

The tests in the TV and Movies Suite have been selected to represent the Windows Vista TV and Movies Consumer Scenario. The combination of test sets covers the common TV and Movies usage. TV and Movies Suite give a separate PCMark TV and Movies Score which does not affect the overall PCMark Score.



High definition TV broadcasts and movies have arrived. Playing an HD DVD with additional HD content, a Blu-ray movie, or watching HDTV smoothly (while making a backup of an HD DVD by transcoding to a media server or transcoding from a media server archive to a portable media player) requires lots of computing and graphical power. Windows Media Center with a high performance HDD can handle simultaneous video recording, time-shifting, and streaming to an Extender for Windows Media Center, such as Xbox 360™.

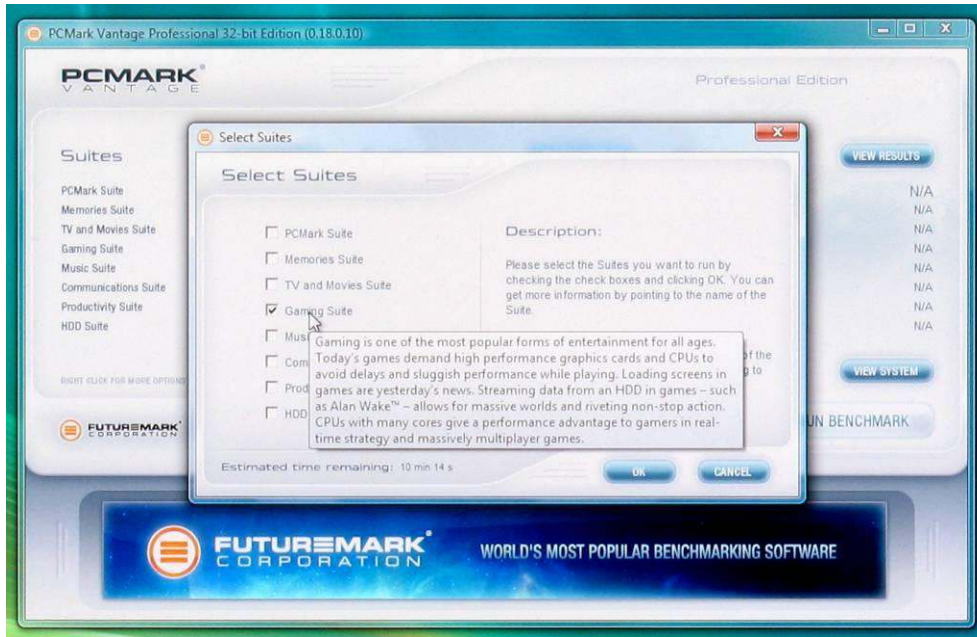
TV and Movies Suite includes the following tests:

- **TV and Movies 1**
 - Two simultaneous threads
 - Video transcoding: HD DVD to media server archive
 - Video playback: HD DVD w/ additional lower bitrate HD content from HDD, as downloaded from net
- **TV and Movies 2**
 - Two simultaneous threads
 - Video transcoding: HD DVD to media server archive
 - Video playback, HD MPEG-2: 19.39 Mbps terrestrial HDTV playback
- **TV and Movies 3**
 - HDD Media Center
- **TV and Movies 4**
 - Video transcoding: media server archive to portable device
 - Video playback, HD MPEG-2: 48 Mbps Blu-ray playback



Gaming Suite

The tests in the Gaming Suite have been selected to represent the Windows Vista Gaming Consumer Scenario. The combination of test sets covers the common Gaming usage. Gaming Suite gives a separate PCMark Gaming Score which does not affect the overall PCMark Score.



Gaming is one of the most popular forms of entertainment for all ages. Today's games demand high performance graphics cards and CPUs to avoid delays and sluggish performance while playing. Loading screens in games are yesterday's news. Streaming data from an HDD in games – such as Alan Wake™ – allows for massive worlds and riveting non-stop action. CPUs with many cores give a performance advantage to gamers in real-time strategy and massively multiplayer games.

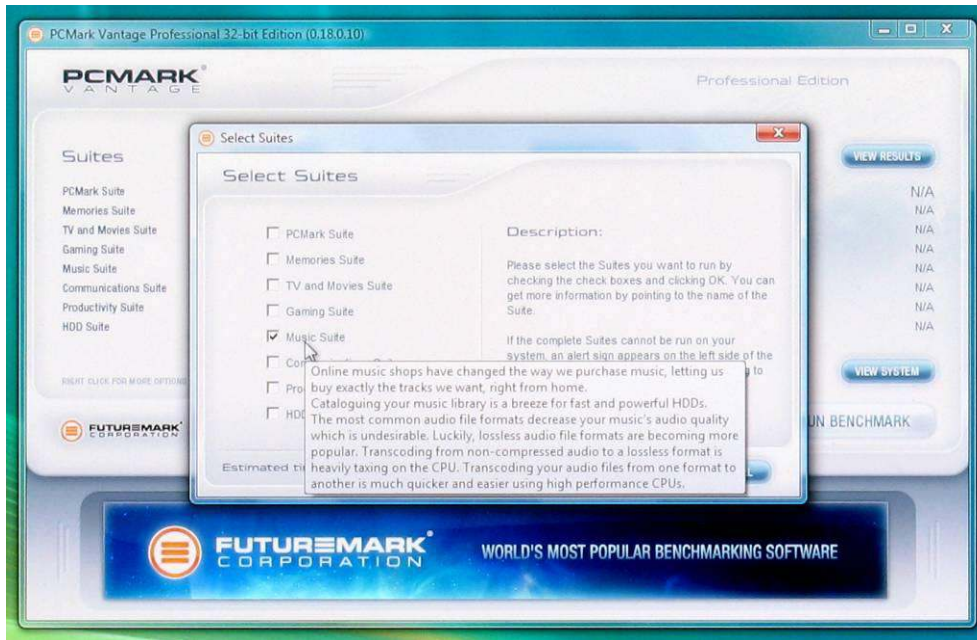
Gaming Suite includes the following tests:

- **Gaming 1**
 - GPU game test
- **Gaming 2**
 - HDD: game HDD
- **Gaming 3**
 - Two simultaneous threads
 - CPU game test
 - Data decompression: level loading
- **Gaming 4**
 - Three simultaneous threads
 - GPU game test
 - CPU game test
 - HDD: game HDD



Music Suite

The tests in the Music Suite have been selected to represent the Windows Vista Music Consumer Scenario. The combination of test sets covers the common Music usage. Music Suite gives a separate PCMark Music Score which does not affect the overall PCMark Score.



Online music shops have changed the way we purchase music, letting us buy exactly the tracks we want, right from home. Cataloguing your music library is a breeze for fast and powerful HDDs. The most common audio file formats decrease your music's audio quality which is undesirable. Luckily, lossless audio file formats are becoming more popular. Transcoding from non-compressed audio to a lossless format is heavily taxing on the CPU. Transcoding your audio files from one format to another is much quicker and easier using high performance CPUs.

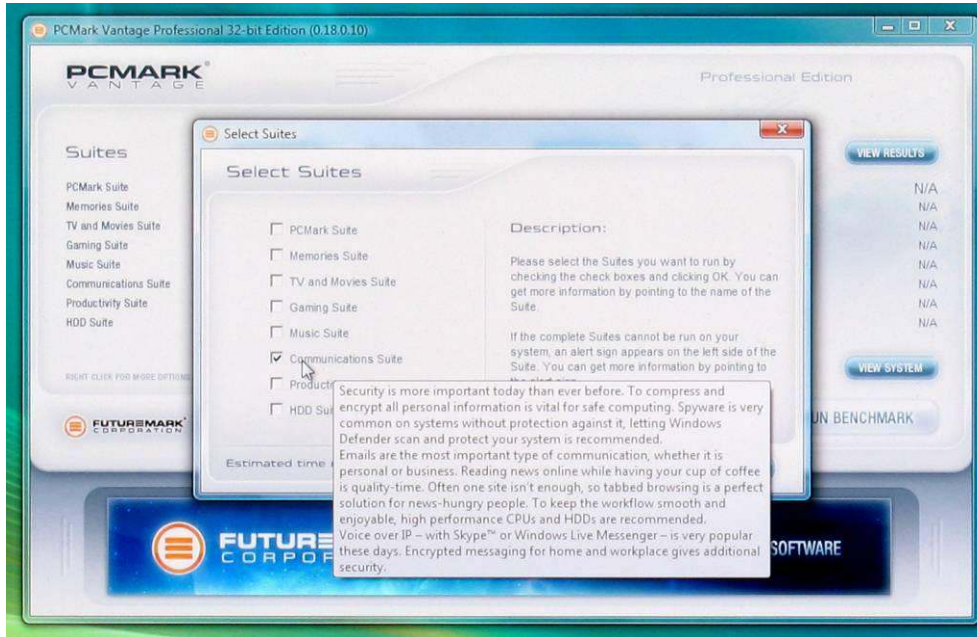
Music Suite includes the following tests:

- **Music 1**
 - Three simultaneous threads
 - Web page rendering - w/ music shop content
 - Audio transcoding: WAV -> WMA lossless
 - HDD: Adding music to Windows Media Player
- **Music 2**
 - Audio transcoding: WAV -> WMA lossless
- **Music 3**
 - Audio transcoding: MP3 -> WMA
- **Music 4**
 - Two simultaneous threads
 - Audio transcoding: WMA -> WMA
 - HDD: Adding music to Windows Media Player



Communications Suite

Tests in the Communications Suite have been selected to represent the Windows Vista Communications Consumer Scenario. The combination of test sets covers the common Communications usage. Communications Suite gives a separate PCMark Communications Score which does not affect the overall PCMark Score.



Security is more important today than ever before. To compress and encrypt all personal information is vital for safe computing. Emails are the most important type of communication, whether it is personal or business. To keep the workflow smooth and enjoyable, high performance CPUs and HDDs are recommended. Reading news online while having your cup of coffee is quality-time. Often one site isn't enough, so tabbed browsing is a perfect solution for news-hungry people. Spyware is very common on systems without protection against it, letting Windows Defender scan & protect your system is recommended. Voice over IP – with Skype™ or Windows Live Messenger – is very popular these days. Encrypted messaging for home and workplace gives additional security.

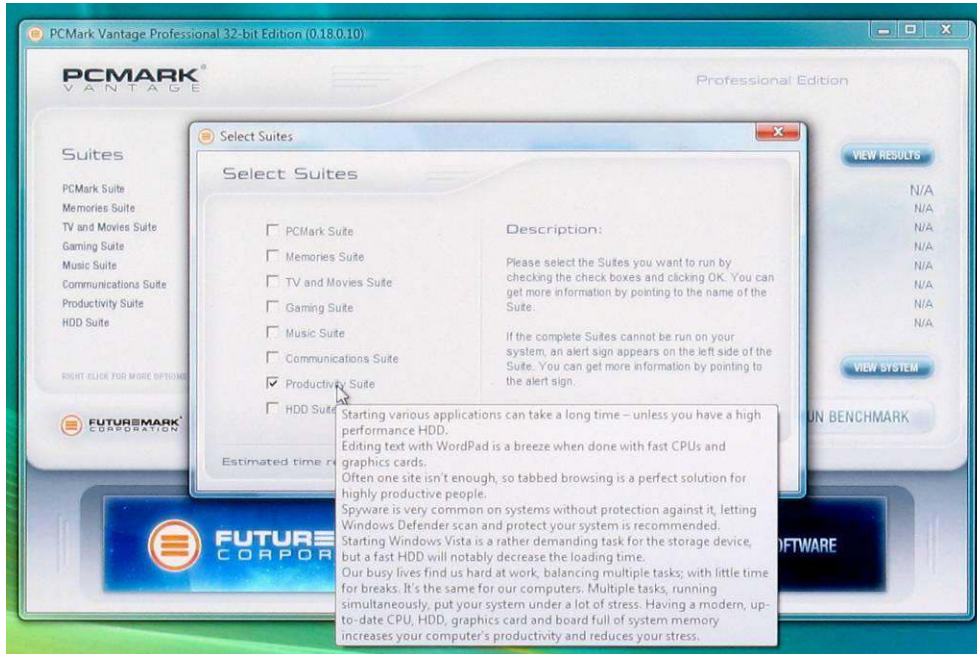
Communications Suite includes the following tests:

- **Communications 1**
 - Three simultaneous threads
 - Data encryption: CNG AES CBC
 - Data compression
 - Web page rendering: graphics content, 1024x768, windowed
- **Communications 2**
 - Three simultaneous threads
 - Web page rendering: open various news pages from IE 7 Favorites in separate tabs, close them one by one
 - Data decryption: CNG AES CBC
 - HDD: Windows Defender
- **Communications 3**
 - Windows Mail: Search
- **Communications 4**
 - Two simultaneous threads
 - Data encryption: CNG AES CBC
 - Audio transcoding: WMA -> WMA - to simulate VOIP



Productivity Suite

Tests in the Productivity Suite have been selected to represent the Windows Vista Productivity Consumer Scenario. The combination of test sets covers the common Productivity usage. Productivity Suite gives a separate PCMark Productivity Score which does not affect the overall PCMark Score.



Starting various applications can take a long time – unless you have a high performance HDD. Editing text with WordPad is a breeze when done with fast CPUs and graphics cards. Often one site isn't enough, so tabbed browsing is a perfect solution for highly productive people. Spyware is very common on systems without protection against it, letting Windows Defender scan & protect your system is recommended. Starting Windows Vista is a rather demanding task for the storage device, but a fast HDD will notably decrease the loading time. Our busy lives find us hard at work, balancing multiple tasks; with little time for breaks. It's the same for our computers. Multiple tasks, running simultaneously, put your system under a lot of stress. Having a modern, up-to-date CPU, HDD, graphics card and board full of system memory increases your computer's productivity and reduces your stress.

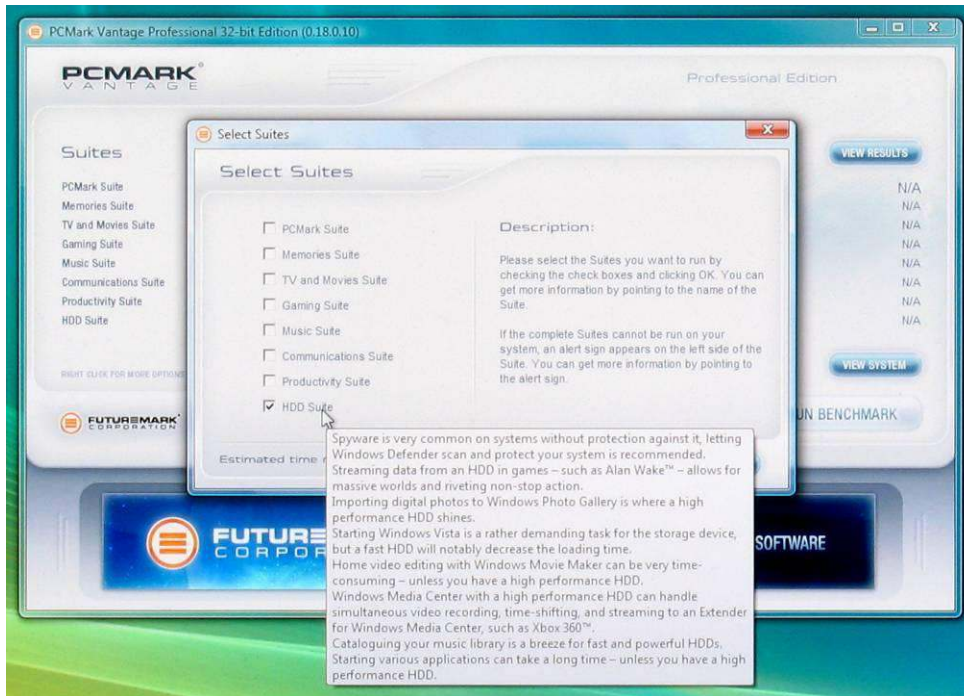
Productivity Suite includes the following tests:

- **Productivity 1**
 - Two simultaneous threads
 - Text editing
 - HDD: application loading
- **Productivity 2**
 - Two simultaneous threads
 - Windows Contacts: search
 - HDD: Windows Defender
- **Productivity 3**
 - HDD: Windows Vista start-up
- **Productivity 4**
 - Three simultaneous threads
 - Windows Contacts: search
 - Windows Mail: Run Message Rules
 - Web page rendering: simultaneously open various pages from IE7 Favorites in separate tabs, close them one by one



HDD Suite

Tests in the HDD Suite are a combination of tests covering the common HDD usage. HDD results use the new 4K block size. HDD Suite gives a separate PCMark HDD Score which does not affect the overall PCMark Score.



Spyware is very common on systems without protection against it, letting Windows Defender scan & protect your system is recommended. Streaming data from an HDD in games – such as Alan Wake™ – allows for massive worlds and riveting non-stop action. Importing digital photos to Windows Photo Gallery is where a high performance HDD shines. Starting Windows Vista is a rather demanding task for the storage device, but a fast HDD will notably decrease the loading time. Home video editing with Windows Movie Maker can be very time-consuming – unless you have a high performance HDD. Windows Media Center with a high performance HDD can handle simultaneous video recording, time-shifting, and streaming to an Extender for Windows Media Center, such as Xbox 360™. Cataloguing your music library is a breeze for fast and powerful HDDs. Starting various applications can take a long time – unless you have a high performance HDD.

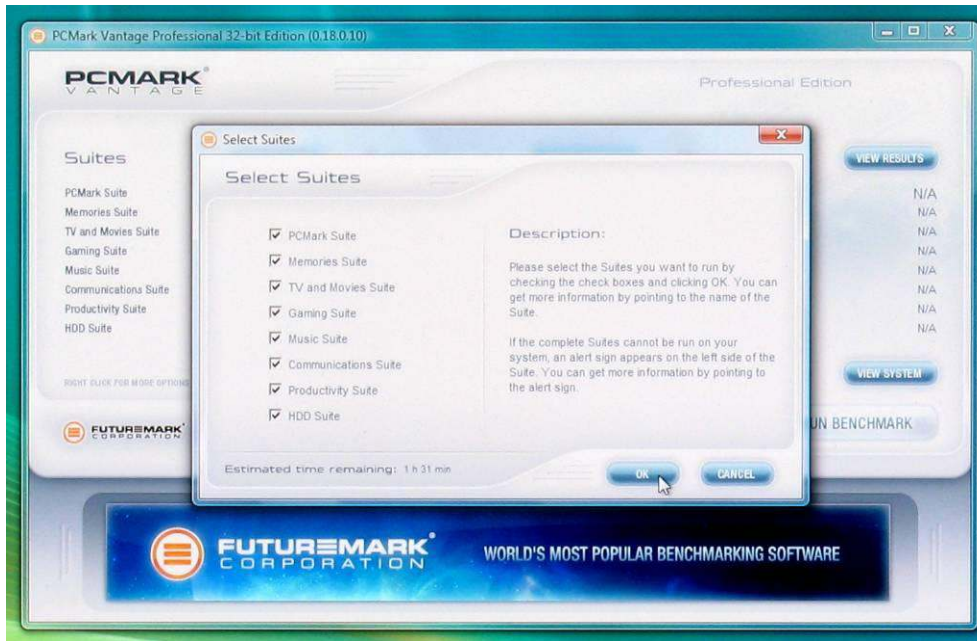
HDD Suite includes the following tests:

- **HDD 1**
 - HDD: Windows Defender
- **HDD 2**
 - HDD: game HDD
- **HDD 3**
 - HDD: importing pictures
- **HDD 4**
 - HDD: Windows Vista start-up
- **HDD 5**
 - HDD: video editing
- **HDD 6**
 - HDD: Media Center
- **HDD 7**
 - HDD: Adding music to Windows Media Player
- **HDD 8**
 - HDD: application loading



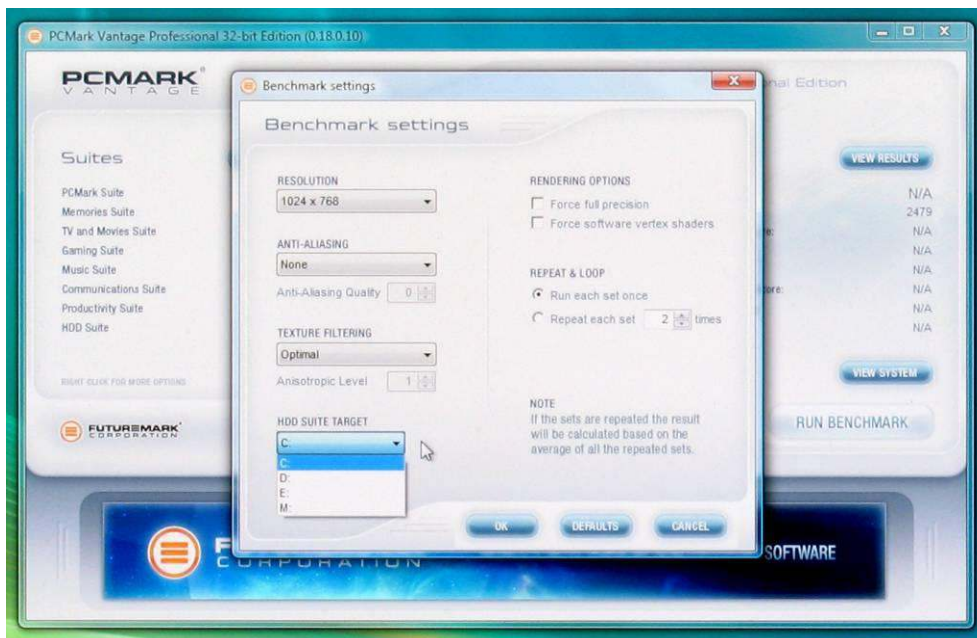
Selecting Multiple Test Suites

Suites can be run singly, or in any combination by clicking the suite check box. Be aware that each test has an estimated run time, and selecting multiple suites will increase the runtime of the benchmark.



Editing Benchmark Settings / Target Hard Drive

Click the "Benchmark Settings" button to change test settings including screen resolution, anti-alias level, texture filtering, rendering options, and repeat. Shown below is the pop-up menu to select which drive to target in the HDD Test Suite described above.

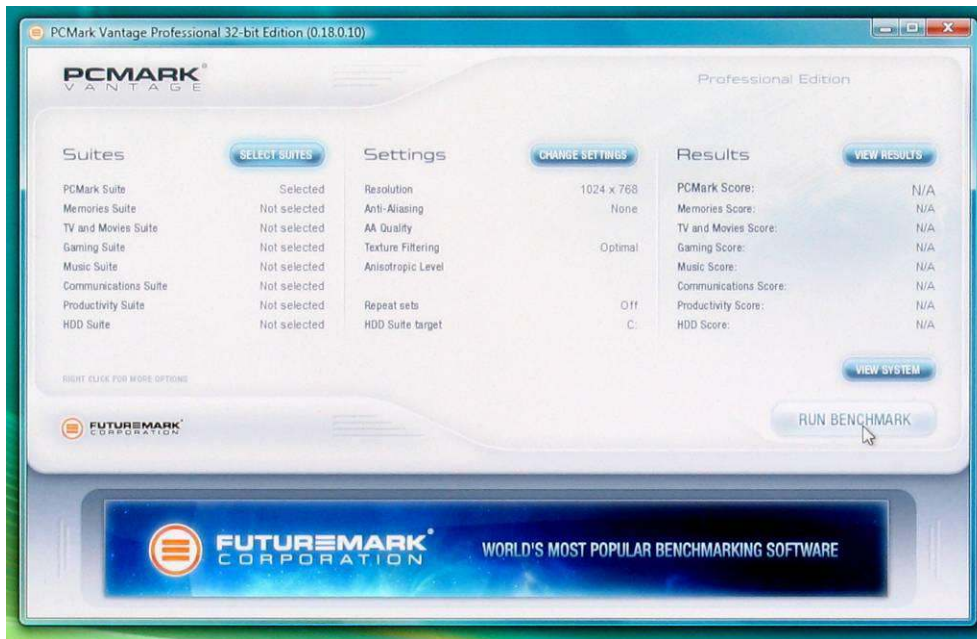




Running PCMark Vantage

Note: The screen shots shown below are those shown when running the PCMark Suite alone. The PCMark Suite runs several tests from each of the suites, and is a great example to show details from each of the individual suites.

1. Close all other applications for consistent results before starting up PCMark Vantage
2. Click on the “Select Suites” button to choose which PCMark Vantage “Consumer Scenario” test suite you’d like to run, suites are described above.
3. Click the “Run Benchmark” button to start the test.



4. PCMark Vantage will perform a full system scan to determine your hardware configuration for the test. The progress bar at the bottom of the screen displays the current test name, application information such as the Alan Wake game logo during the HDD: game HDD test, test progress and estimated time to completion for the benchmark run.



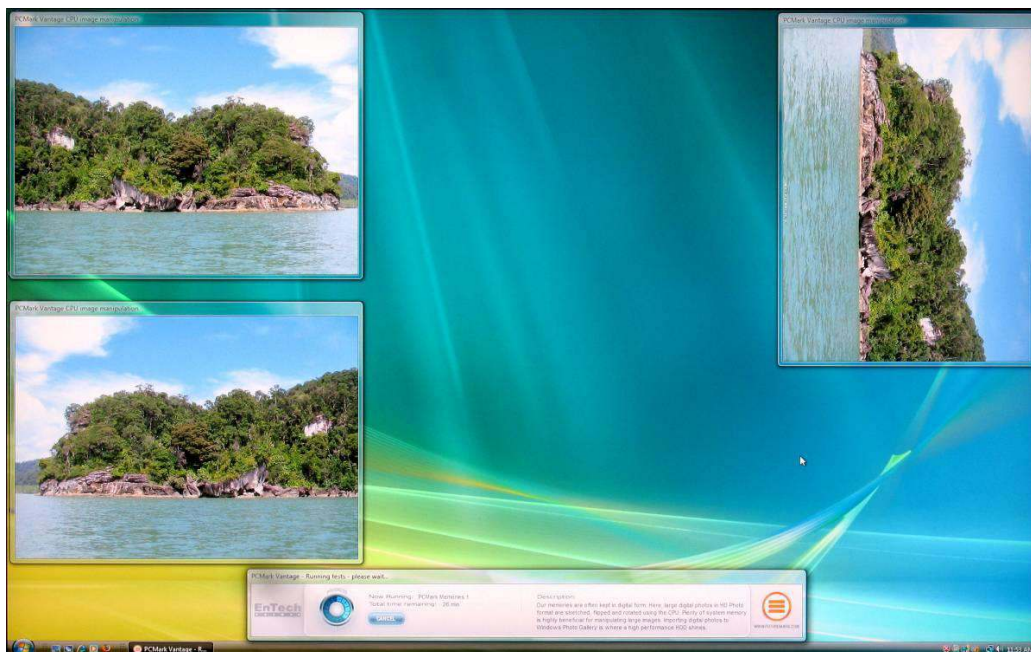


5. PCMark Memories 1 Test

- Two simultaneous threads
- CPU image manipulation
- HDD picture import

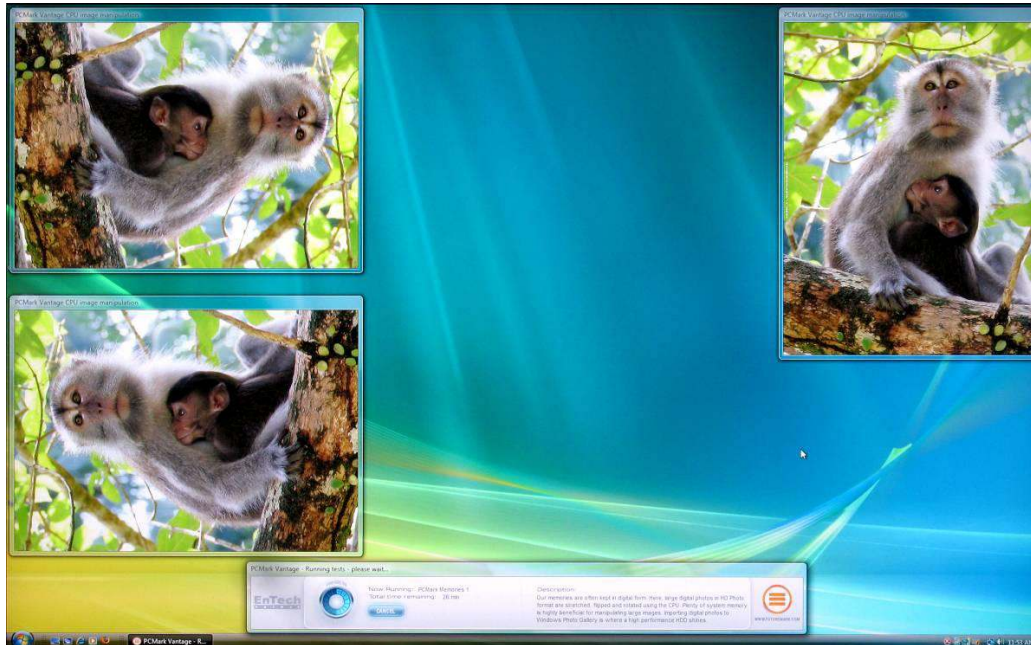


6. PCMark Memories Test 1 continued





7. PCMark Memories Test 1 continued

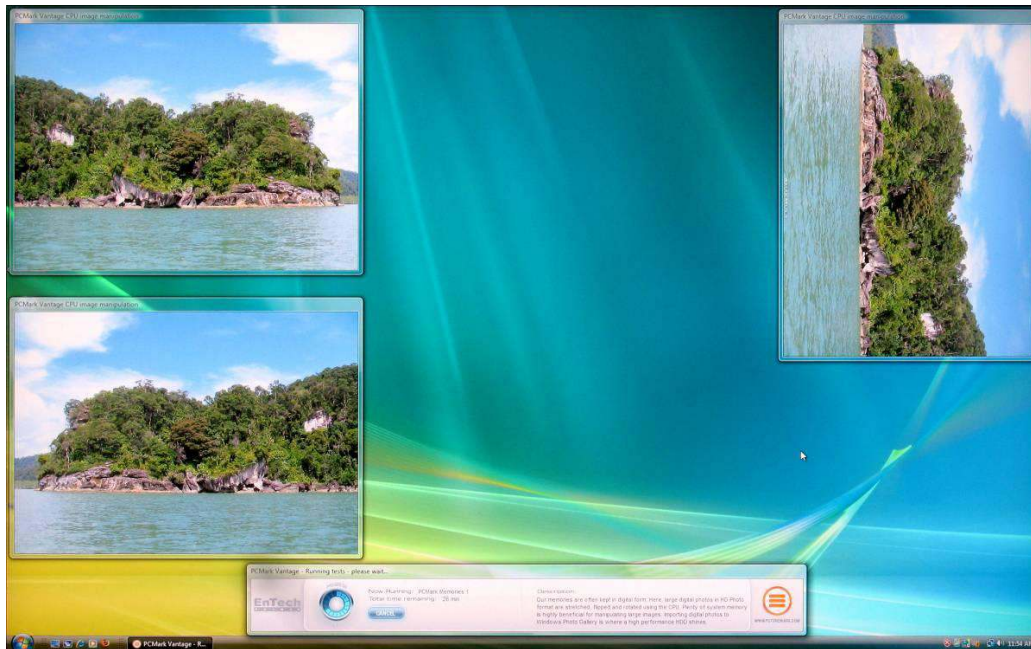


8. PCMark Memories Test 1 continued



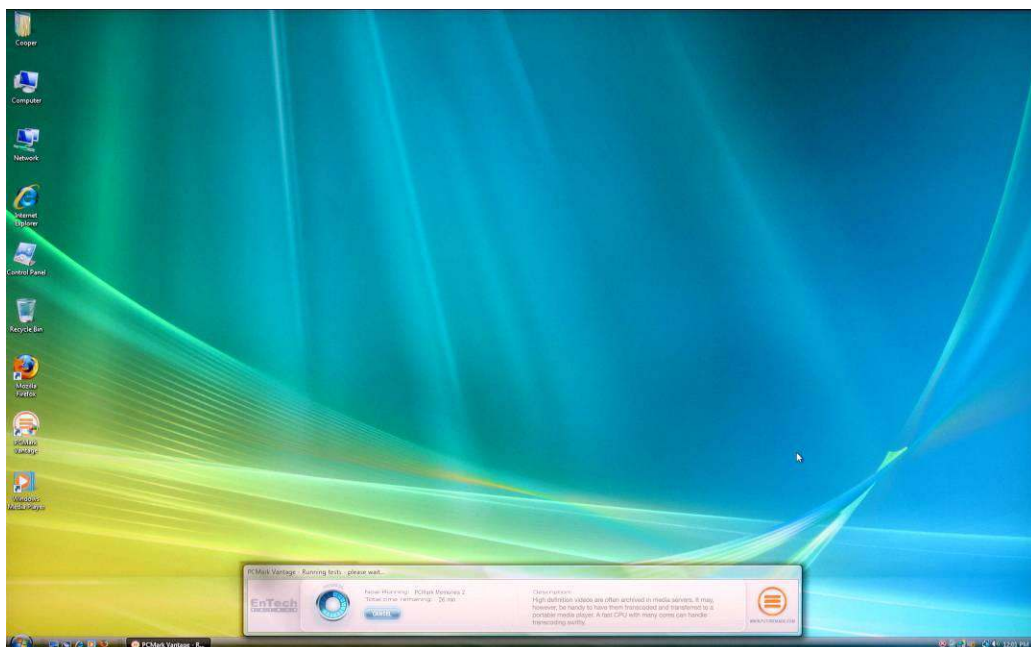


9. PCMark Memories Test 1 continued



10. PCMark Memories Test 2

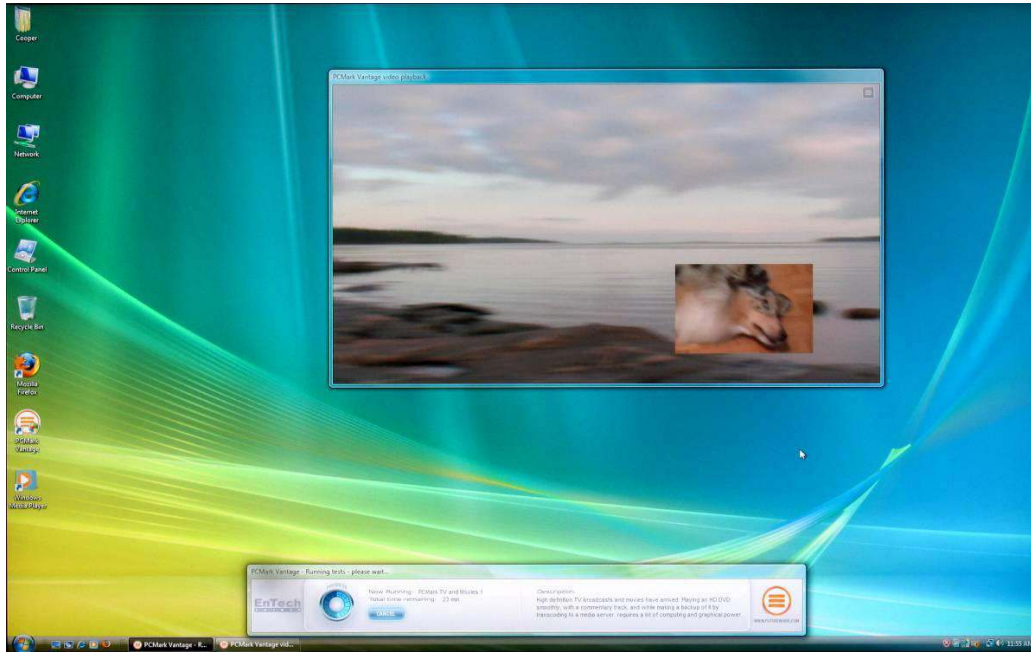
- Video transcoding: Media server archive to portable device





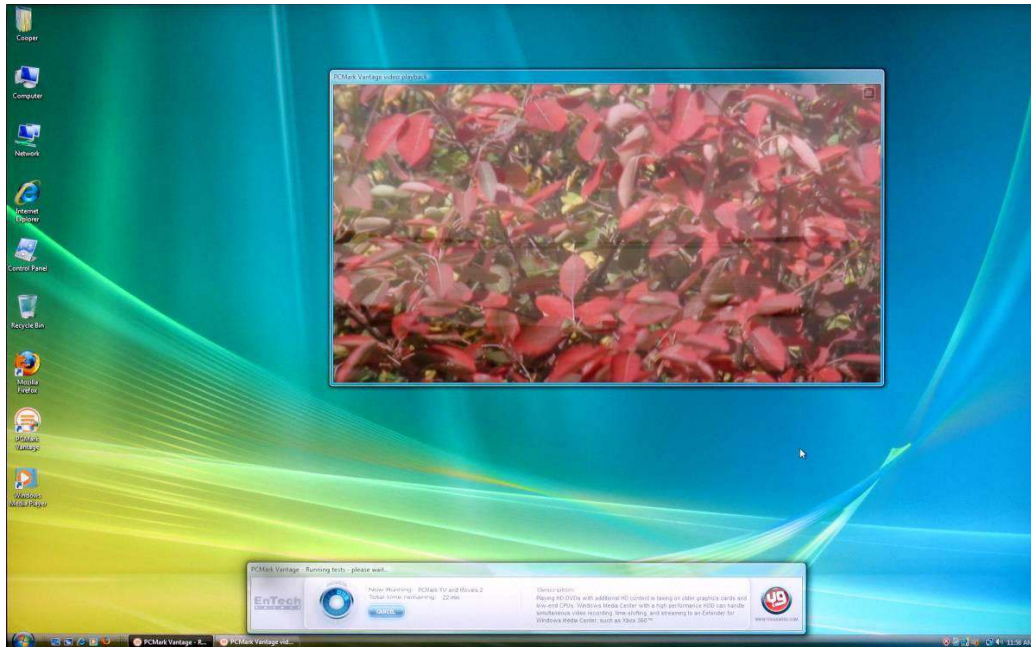
11. PCMark TV and Movies Test 1: **Note- breaks in sound indicate the system is under an extreme load**

- Two simultaneous threads
- Video transcoding: HD DVD to media server archive
- Video playback: HD DVD with standard definition commentary track

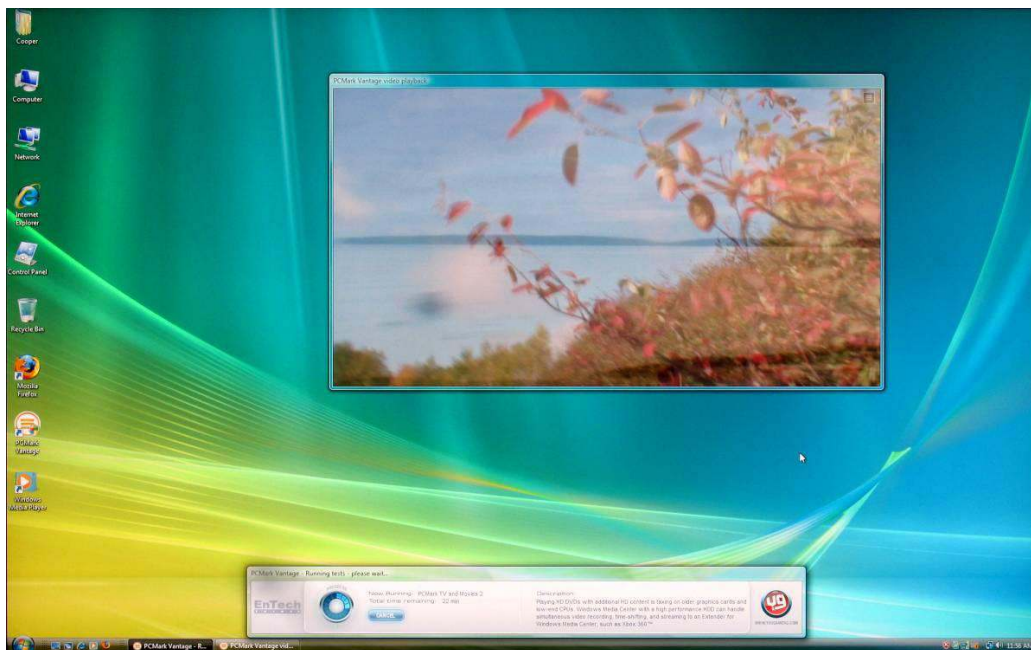


12. PCMark TV and Movies Test 2: **Note- breaks in sound indicate the system is under an extreme load**

- Two simultaneous threads
- HDD: Media Center
- Video playback: HD DVD with additional lower bitrate HD content from HDD, as downloaded from net

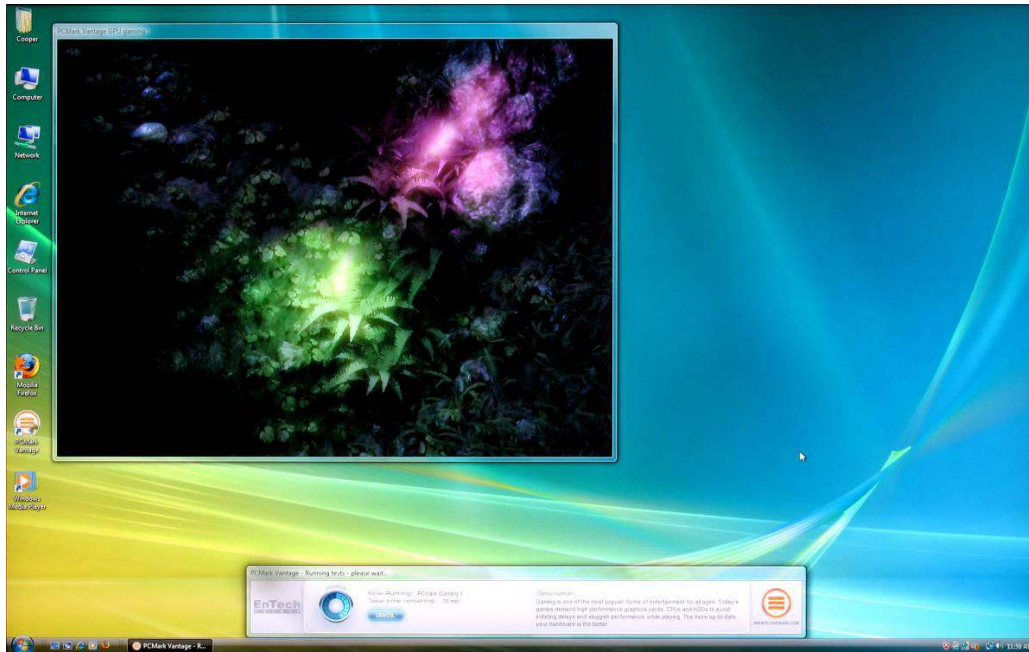


13. PCMark TV and Movies Test 2 continued



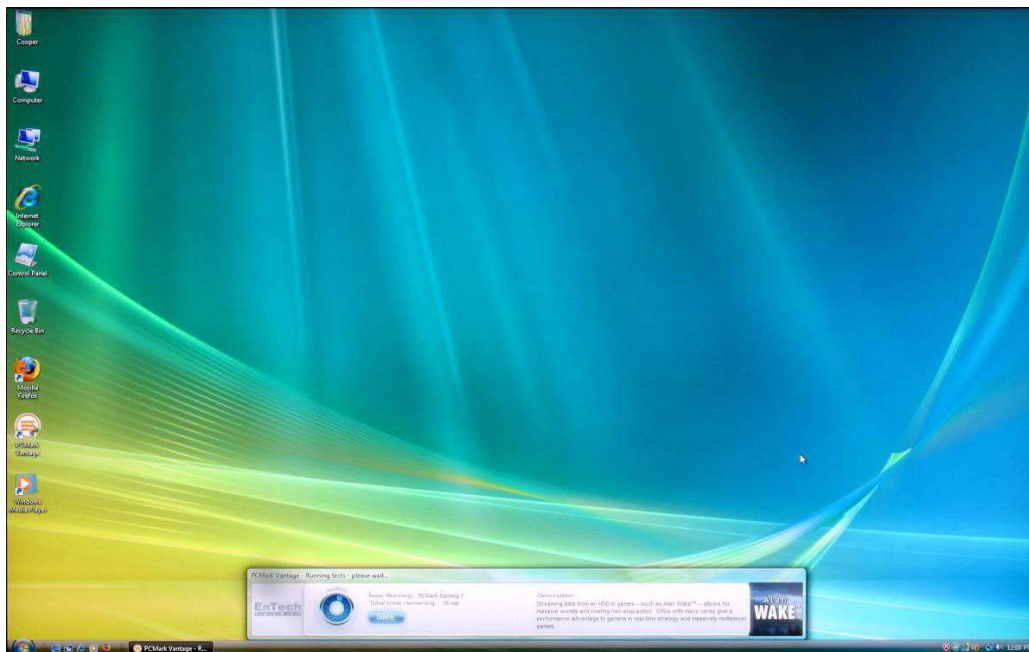
14. PCMark Gaming Test 1

- Two simultaneous threads
- GPU game test
- Data decompression: level loading



15. PCMark Gaming Test 2

- Two simultaneous threads
- CPU game test
- HDD: game HDD

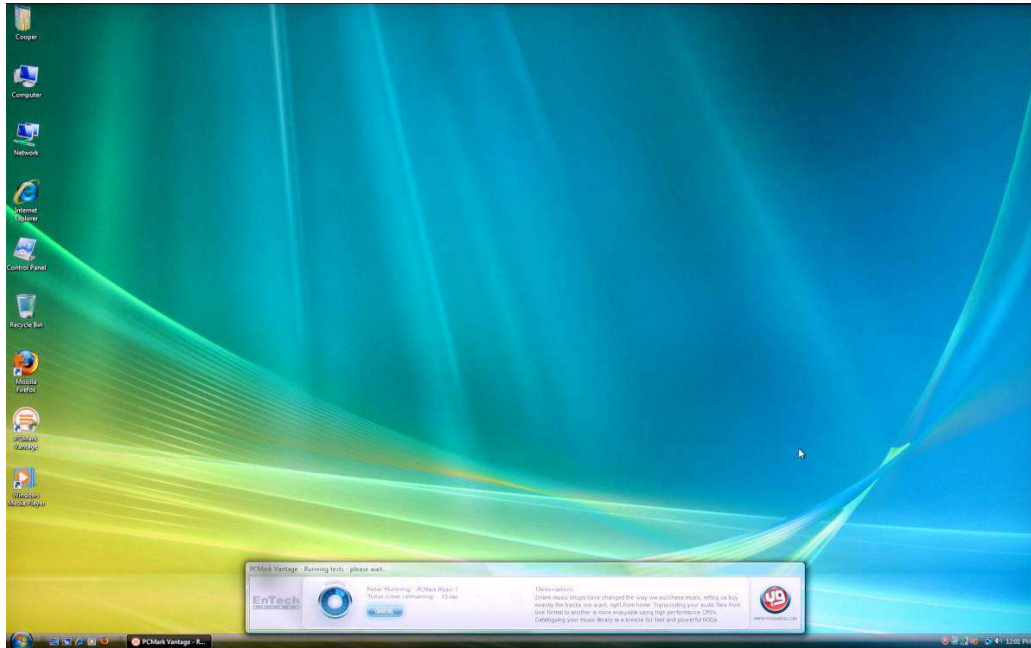


16. PCMark Music Test 1:

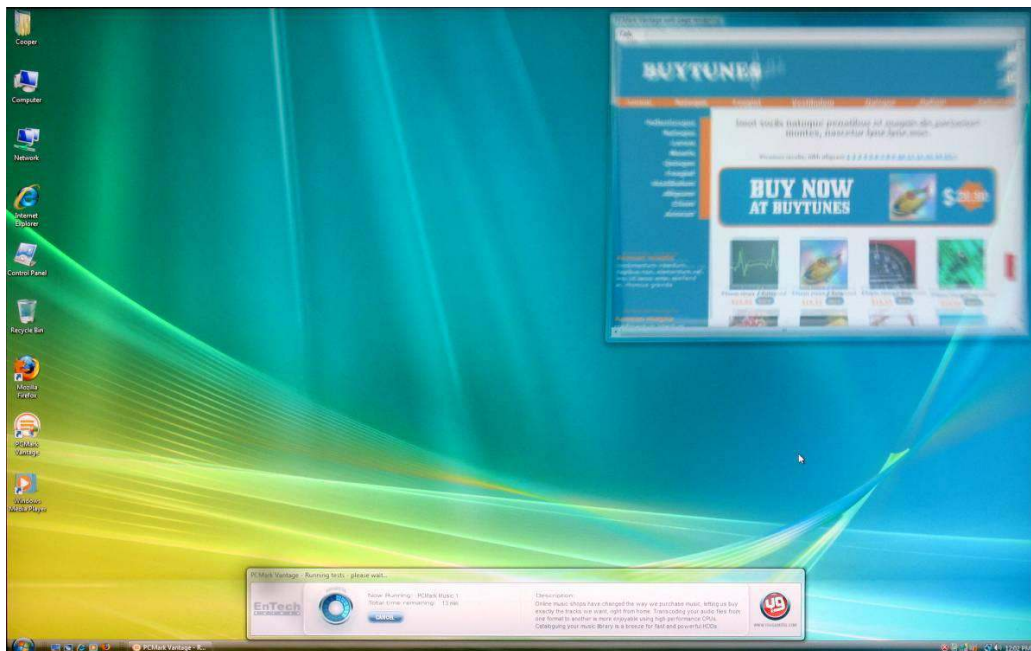
- Three simultaneous threads
- Web page rendering - w/ music shop content



- Audio transcoding: MP3 -> WMA
- HDD: Adding music to Windows Media Player

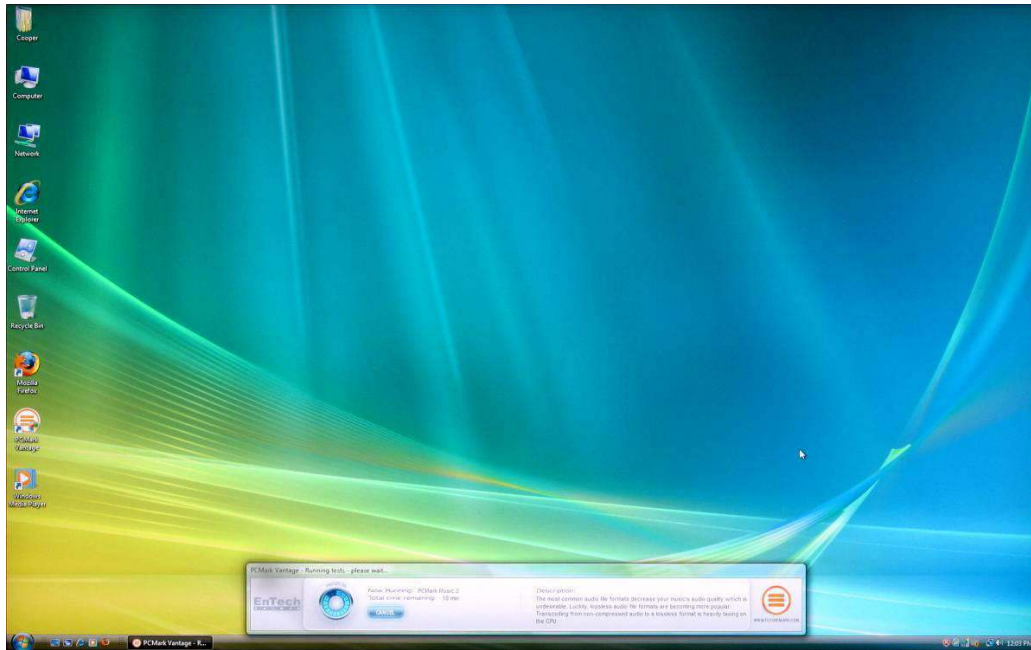


17. PCMark Music Test 1 continued



18. PCMark Music Test 2:

- Audio transcoding: WAV -> WMA lossless



19. PCMark Communications Test 1

- Three simultaneous threads
- Data encryption: CNG AES CBC
- Data compression
- Windows Mail: Run Message Rules

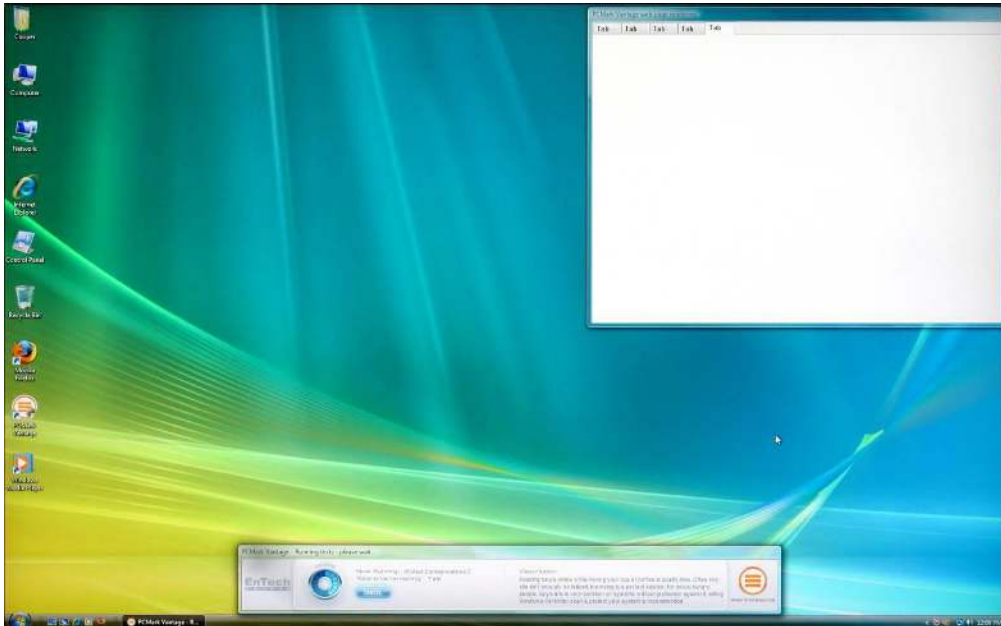


20. PCMark Communications Test 2

- Three simultaneous threads



- Web page rendering: open various news pages from IE 7 Favorites in separate tabs, close them one by one
- Data decryption: CNG AES CBC
- HDD: Windows Defender



21. PCMark Productivity Test 1

- Text editing

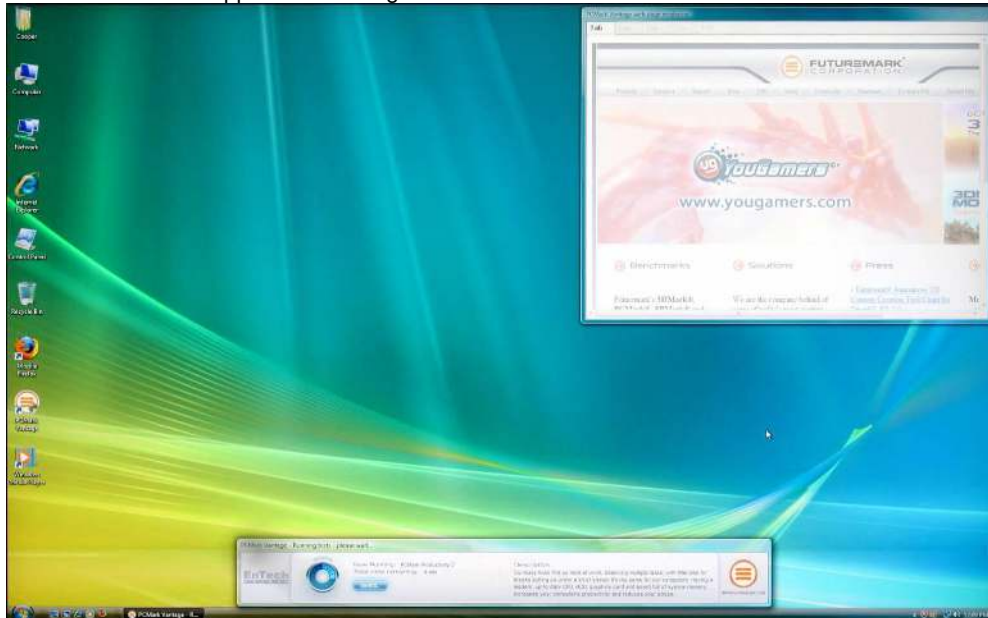


22. PCMark Productivity Test 2

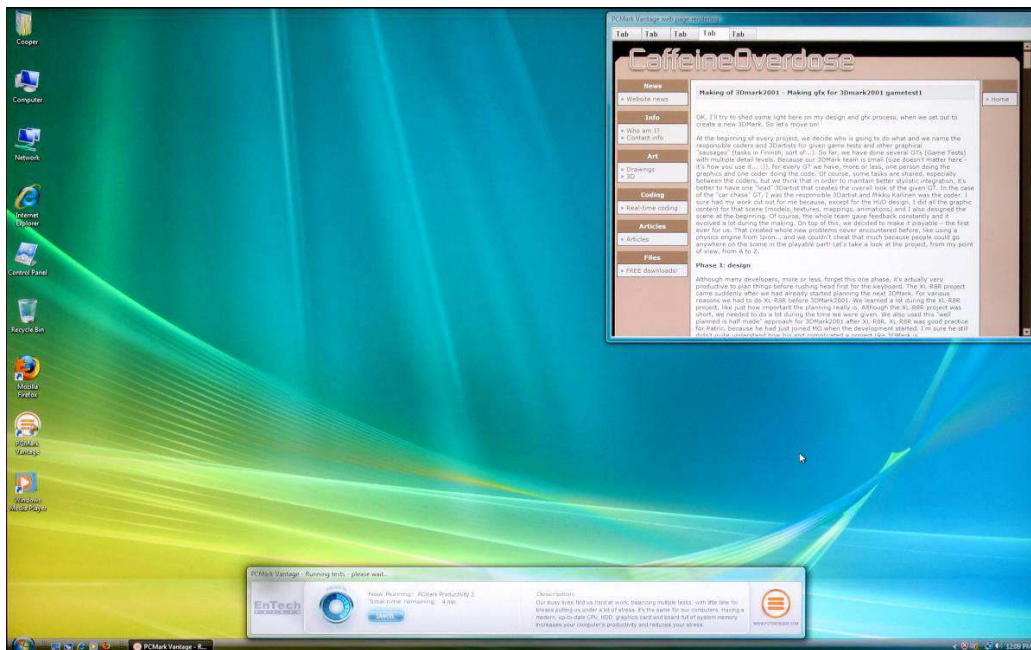
- Four simultaneous threads
- Windows Contacts: search
- Windows Mail: Search



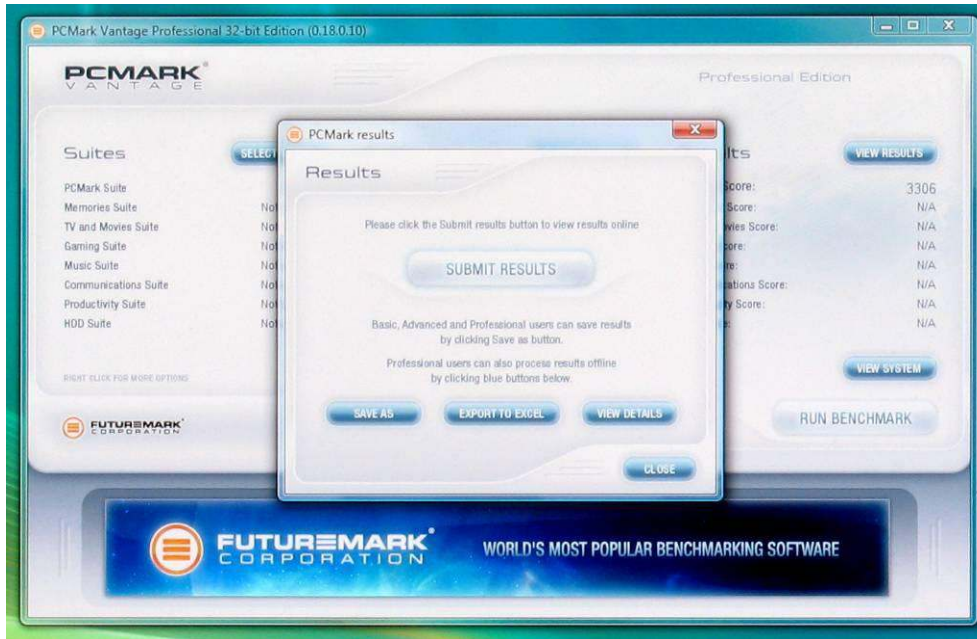
- Web page rendering: Simultaneously open various pages from IE7 Favorites in separate tabs, close them one by one
- HDD: application loading



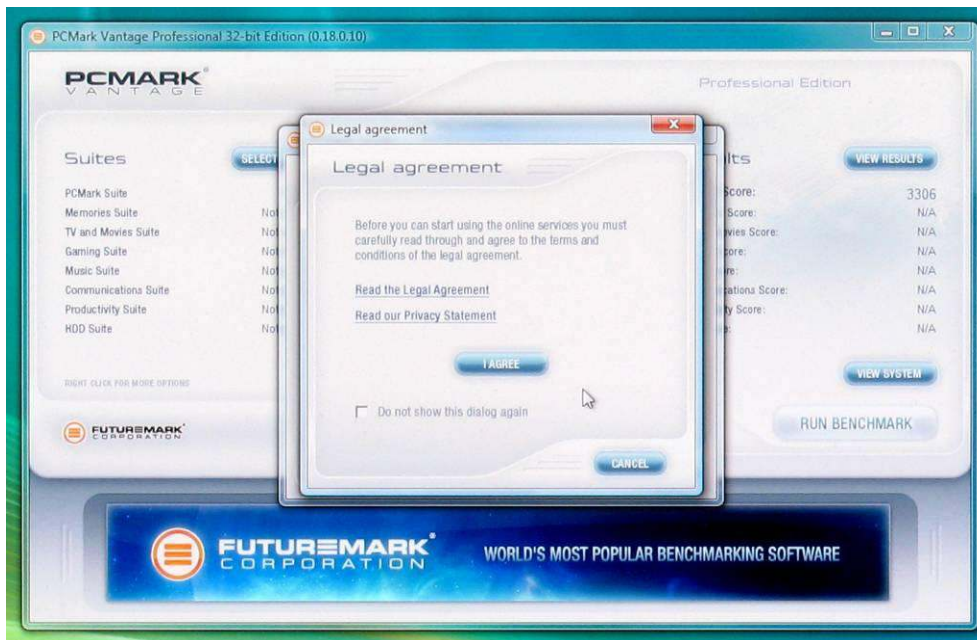
23. PCMark Productivity Test 2 continued



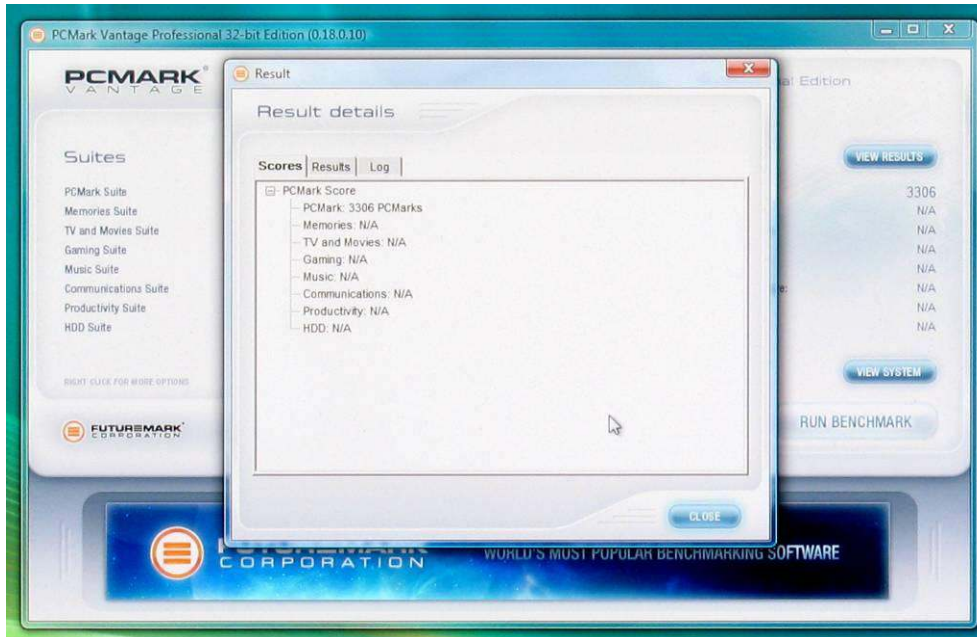
24. Once all tests are complete, you'll be asked to submit test results before viewing them. The results are stored in the PCMark Vantage OnlineResults Browser (ORB). Once the test results are submitted they can be compared against all your other PCMark Vantage benchmark projects and tests.



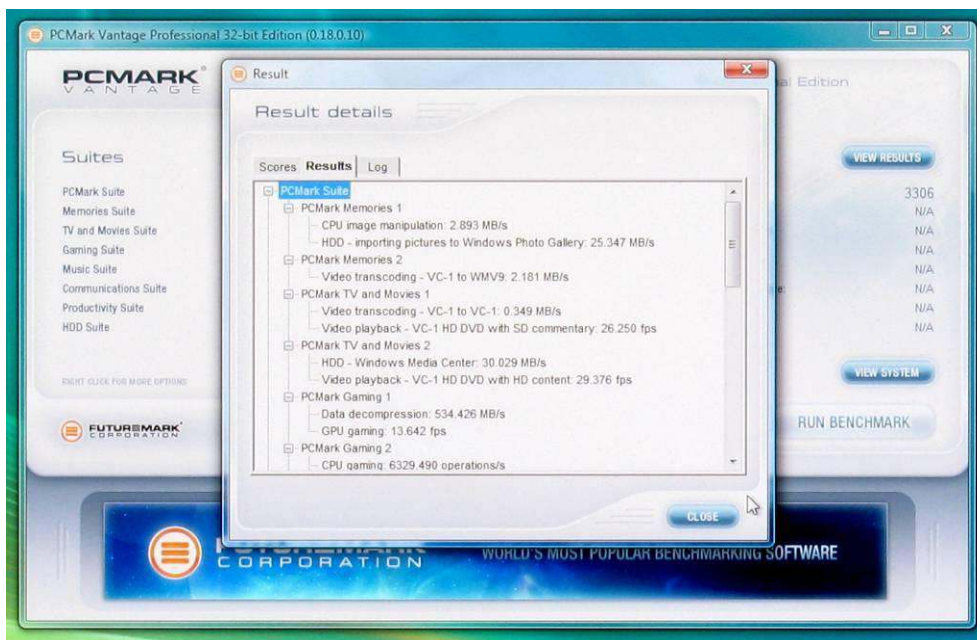
25. To submit results, click the "I agree" button. You can check the "Do not show this dialog again" check box if you want to prevent the Legal Agreement dialog box from displaying in additional result submissions.



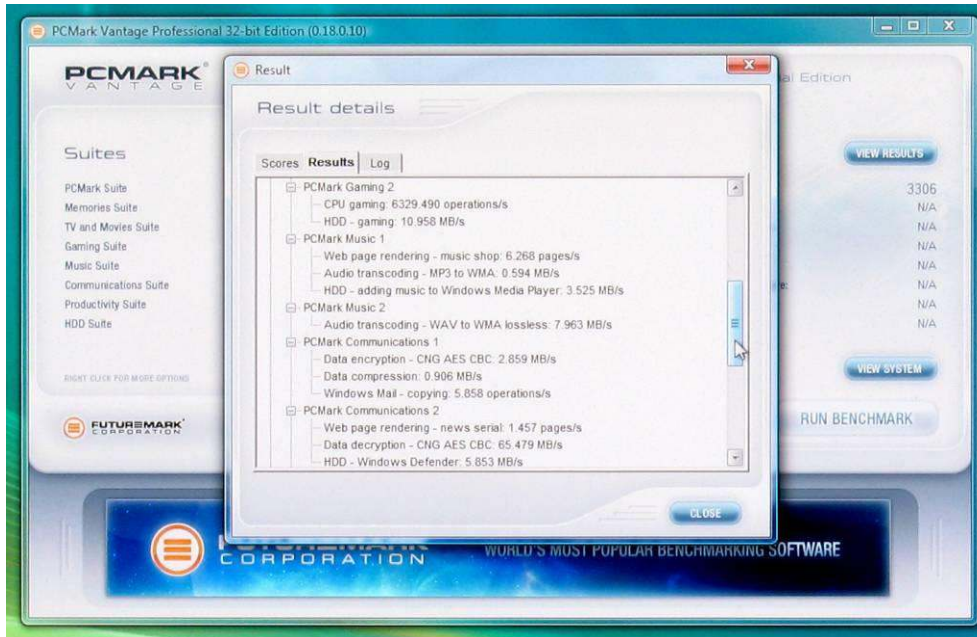
26. The Result Details tabbed dialog shows your test scores for each test suite run.



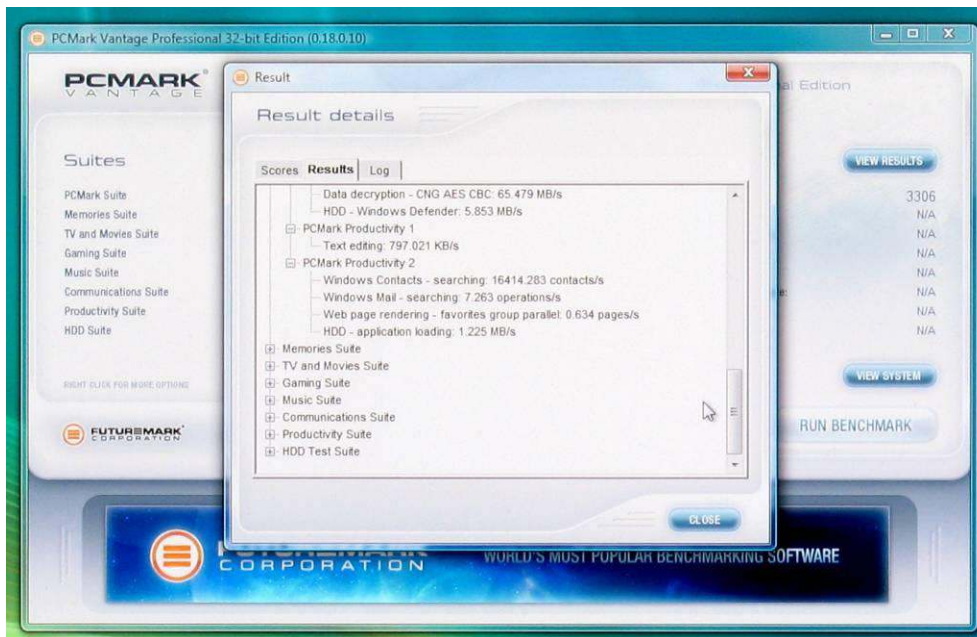
27. Click the “Results” tab to see full performance details for each of the tests you’ve run on your system.



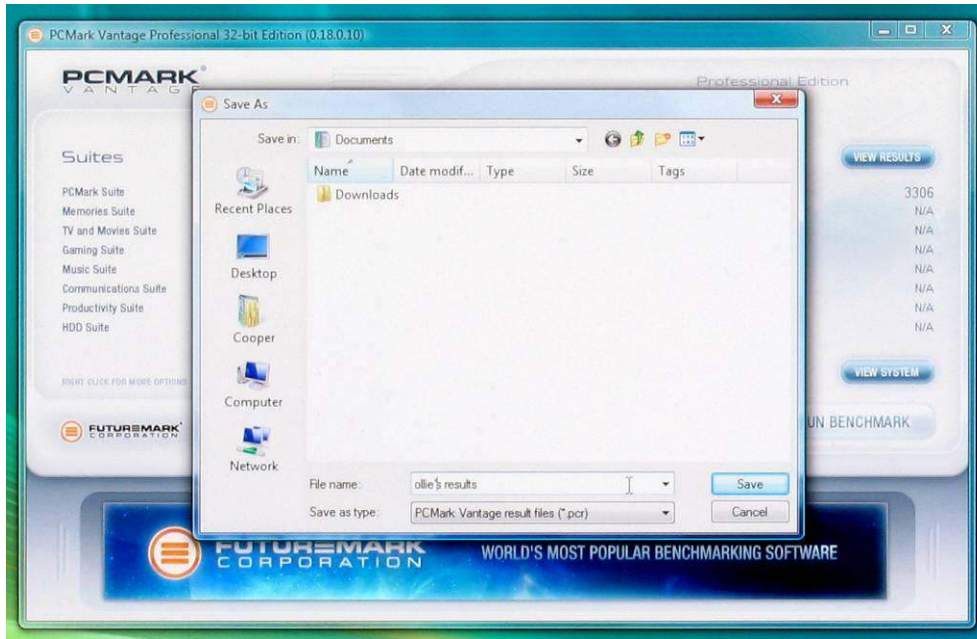
28. Scroll down to review the comprehensive list of Results data.



29. The test suite Results data list can be expanded or collapsed by toggling on the small + and – icons beside each test suite and test set name. If a test suite has not been run on your system, there will be no collapsed data for that suite.



28. In the PCMark Vantage Professional Edition, Results can be saved on your computer as a log file or as a Microsoft Excel file.



29. When you have submitted results, you can check out your system's results in the PCMark OnlineResults Browser (ORB). An Internet Explorer window will open and you will automatically be connected to Futuremark's ORB website to review your system's scores, compare performance to other systems in the database, manage your system test projects and get useful system information and feedback. Click on the "Advanced ResultAnalyzer" to view more detailed results.

Note: Screen capture shown below is the 3DMark ORB, for reference only. The PCMark Vantage ORB was not available at the time of going to press with this Reviewers' Guide.




30. The Advanced ResultAnalyzer provides a more detailed series of data points to review. To return to the basic results, click the "Basic ResultAnalyzer" button.

Note: Screen capture shown below is the 3DMark ORB, for reference only. The PCMark Vantage ORB was not available at the time of going to press with this Reviewers' Guide.



Products // Solutions // Support // Store // ORB // News // Community // Download // Company Info // Contact Info // Search: Go



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Project Manager
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Dynamic Compare
MultiCompare

Tools
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Result Analyzer
Top 3DMark06 Game Scores
Hardware Statistics
Result Statistics
Hall of Fame

Help
Project Manager Help
Publish Project Help
MultiCompare Help
Pro ORB FAQ
Result Analyzer FAQ

What are the most popular...

Project Type: 3DMark06 [Active Project]
Project: [Active Project]

8182
3DMARKS

BASIC RESULTANALYZER

Analysis // Result Details // Configuration // Comparisons

All Results Comparison Your rank: 1867531 out of 2522806. You scored better than 74% of all systems.



10800-83800 3DMarks

Most Common Processors:		Most Common Graphics Cards:	
Intel Core 2 (Avg. 25600 MHz)	113233	NVIDIA GeForce 8800 GTX	129272
Intel Core 2 Quad (Avg. 4900 MHz)	42941	NVIDIA GeForce 8800 GTS	20336
AMD Athlon(tm) 64 FX 2012		ATI RADEON X1950 CrossFire Edition	2374
Dual-Core (Avg. 3700 MHz)			

Sponsored Recommendations
Puget
CUSTOM COMPUTERS

**SAPPHIRE HD 2900 XT**
Includes Half-Life 2 Episode 2

FM Approved Drivers
To ensure valid and comparable benchmark results, use only Futuremark approved display drivers.

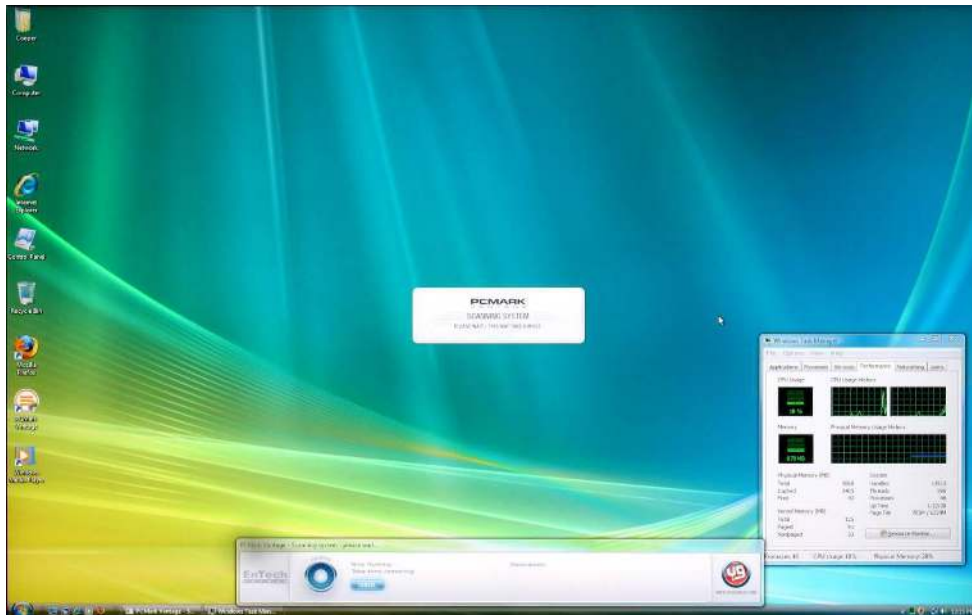


PCMark Vantage: Using with Windows Task Manager

Note: To show how demanding the PCMark Vantage workloads are, in the test below we run the Memories Suite with the Windows Task manager open, to display actual CPU usage during the test on a XEON 5150 dual core workstation.

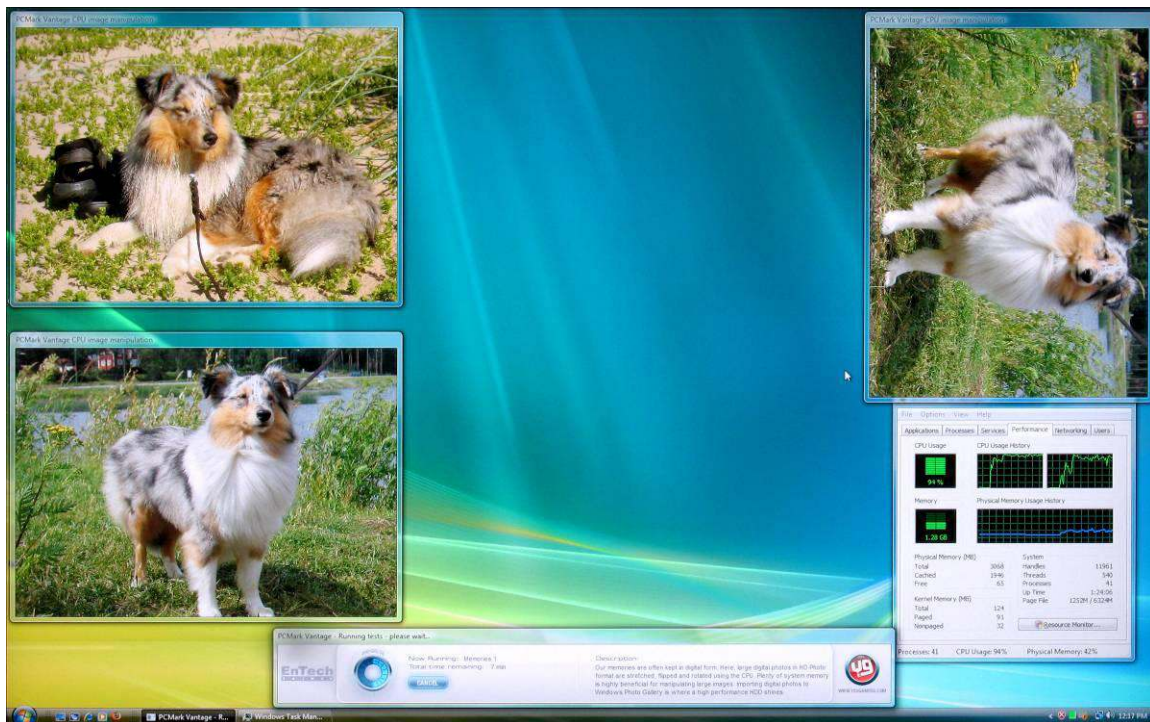


Note: System shows minimal load during the scan.





Note: System shows 94% load on both CPUs at the peak of the Memories Suite test.





PCMark Vantage System Info

Note: The sample screen below is a good reference for the information layout. The amount of data revealed in the system info screens is extremely detailed and shows virtually every tidbit about the system that can be imagined. There are over ten pages of data for you to browse through in the actual PCMark Vantage System Info.

The screenshot displays the 'Futuremark SystemInfo Explorer - Windows Internet Explorer' window. The address bar shows the file path: C:\ProgramData\Futuremark\PCMark Vantage\SystemInfo\si.xml. The page features the PCMark Vantage logo and the Futuremark Corporation logo. The main content is divided into two sections: 'CPU INFO' and 'DIRECTX INFO'.

CPU INFO

Physical processors 1 Logical processors 2

CPU	
Manufacturer	Intel
Family	Intel(R) Xeon(R) CPU 5150 @ 2.66GHz
Architecture	64-bit
Internal Clock	2.7 GHz
Internal Clock Maximum	2.7 GHz
External Clock	1.3 GHz
Socket Designation	Microprocessor
Type	Central
Upgrade	ZIF Socket
MultiCore	2 Processor Cores
HyperThreadingTechnology	N/A
Capabilities	MMX, CMov, RDTSC, SSE, SSE2, SSE3, PAE, NX, SSSE3
Version	Intel(R) Xeon(R) CPU 5150 @ 2.66GHz
Caches	1 32 KB Data, Write Back, Internal - 8-way Set-Associative 2 4 MB Internal, Variant - Single-bit ECC 16-way Set-Associative

DIRECTX INFO

Version 9.0 Long version 4.09.00.0904

DirectDraw Info	
Version	6.0.6000.16386
Primary Device	Radeon X1800 Series (Microsoft Corporation - WDDM)
Linked Display Adapters	false
Display Devices	Display device



APPENDIX: PCMark Vantage Reference Information and Details

PCMark Vantage: Benchmark description

Enables every user to reliably measure Windows Vista PC performance

PCMark Vantage is the first objective hardware performance benchmark for PCs running 32 and 64 bit versions of Windows Vista™. PCMark Vantage is perfectly suited for benchmarking any type of Windows Vista PC from multi media home entertainment systems and laptops to dedicated workstations and hi-end gaming rigs. Regardless of whether the benchmarker is an artist or an IT Professional, PCMark Vantage shows the user where their system soars or falls flat, and how to get the most performance possible out of their hardware. PCMark Vantage is easy enough for even the most casual enthusiast to use yet supports in-depth, professional industry grade testing.

PCMark Vantage provides the PC industry, IT media, and consumers with an overall PCMark performance score based on Windows Vista application tests, single and multi threaded CPU, graphics and hard disk drive (HDD) tests. Additionally, in a departure from previous versions of the product, PCMark Vantage shifts its focus from only providing pure hardware performance-analysis results, to generating accurate performance ratings based on popular Windows Vista Consumer Scenarios ranging from media and entertainment to productivity and communication. PCMark Vantage incorporates an updated interface with easier access to test details and selections, results, system info and other features.

An application based approach to real-world performance testing

PCMark Vantage includes eight distinct test suites; six that provide targeted hardware scores based on typical user scenarios, plus a HDD test set and an overall PCMark performance test score. Consumer Scenario Suites include the Memories Suite for digital image and video applications, the TV and Movies Suite for HD video task applications, the Gaming Suite for game (DirectX9) graphics performance, the Music Suite for audio task applications, and the Communications and Productivity Suites for gauging performance of searching, security tasks, application launch, browser functionality and word processing. Each test suite generates performance scores that replicate real-world system performance for the end-user applications selected.

PCMark Vantage's real-world application based results will allow hardware to be compared and contrasted based on the intended use of the hardware. For instance, a PC editorial review focusing on hardware for image, video and multimedia playback could use the TV and Movie Suite score, along with the Memories Suite score to provide a detailed and truly meaningful comparison of featured systems targeted for that specific market segment. Never before has an industry standard, easy to run benchmark enabled such targeted test suites to objectively reveal real-world performance.

Tracking and comparing results with the Online ResultBrowser

PCMark Vantage's comprehensive online result analysis tools provide honest insight into the performance of your computer. To track system results, the Pro Online ResultBrowser (ORB) is designed and developed exclusively for PCMark Vantage Advanced and PCMark Vantage Professional users. The ORB allows users to upload, store and compare their test results, scores, and system info to do multiple comparisons, access detailed system info, use dynamic compare URLs and even compare uploaded systems to other user systems in the database. The extended PCMark Vantage ORB features are only available via PCMark Vantage Advanced and PCMark Vantage Professional.

Developed in partnership with leading PC industry hardware manufacturers

Futuremark is known throughout the IT industry for producing well designed, unbiased and impartial benchmarks based on real-world, next generation workloads and PCMark Vantage exemplifies that reputation. Developed in conjunction with BDP members AMD, Compal, Dell, Hitachi, Intel, Microsoft, NVIDIA, Seagate, Velocity Micro and Via, this latest offering from Futuremark is a collaborative effort that reflects industry endorsed Windows Vista workloads.



PCMark Vantage Editions, Pricing and Availability

PCMark Vantage is available in Basic, Advanced and Professional editions. All editions are available at http://futuremark.com/products/pcmark_vantage/

Differences between the Basic, Advanced and Professional editions are as follows:

PCMark Vantage Basic

- \$6.95 (download only - limited free trial edition also available)
- PCMark Test Suite
- Network connection required to view results
- Licensed for non-commercial and Personal Use only

PCMark Vantage Advanced

- \$19.95 (download only)
- All Test Suites enabled
- Advanced online services
- Licensed for non-commercial and Personal Use only

PCMark Vantage Professional

- \$495.00/seat (download version)
- \$495.00/seat (CD-ROM)
- All Advanced edition features
- Full benchmark settings
- Technical support
- View results without network connection
- Benchmark automation with command line options
- Export results to Microsoft Excel
- Licensed for Full Commercial Use

PCMark Vantage Benefits

- Industry endorsed benchmark tools provide accurate hardware performance data for computers running Windows Vista
- Application based test suites enable benchmarking that replicates real-world consumer usage
- Tests are incredibly easy to run, and easy to compare with standardized results scores and the Online ResultBrowser
- Fully customizable settings and test suite selections allow users to tailor the benchmark to exactly suit their needs

PCMark Vantage Features

PCMark Vantage Advanced Features:

- Full Sets of Scores for all categories + Use of ORB Functionality
- Multi-threaded test scenarios and support for the latest technologies, including Multi-Core CPU's, and 3D GPU Shading
- Test scenarios for High Definition TV and Movies, Gaming, Our Memories, Music, Communication and Productivity
- Brand New HDD Suite of Tests for the latest Hard Drives
- Approved for private and non-commercial Use Only

PCMark Vantage Professional Features:

- Full Sets of Scores for all categories + Use of ORB Functionality



- View Results without network connectivity
- Command Line Interface and Batch run functions for large scale testing needs
- Results Export Function
- Fully Customizable settings and test selection
- Priority support
- Multi-threaded test scenarios and support for the latest technologies, including Multi-Core CPU's, and 3D GPU Shading
- Test scenarios for High Definition TV and Movies, Gaming, Our Memories, Music, Communication and Productivity
- Brand New HDD Suite of Tests for the latest Hard Drives
- Fully Approved for business and commercial use

PCMark Vantage Test Overviews

PCMark Suite

The PCMark Suite is a collection of various single- and multi-threaded CPU, Graphics and HDD test sets with the focus on Windows Vista application tests. Tests have been selected to represent a subset of the individual Windows Vista Consumer Scenarios. PCMark Suite includes CPU, Graphics, Hard Disk Drive (HDD) and a subset of Consumer Suite tests

Note: Only the PCMark Suite will provide a PCMark Score.

Memories Suite

The tests in the Memories Suite have been selected to represent the Windows Vista Memories Consumer Scenario. The combination of test sets covers the common Memories scenario usage. Memories Suite gives a separate PCMark Memories Score which does not affect the overall PCMark Score.

TV and Movies Suite

The tests in the TV and Movies Suite have been selected to represent the Windows Vista TV and Movies Consumer Scenario. The combination of test sets covers the common TV and Movies usage. TV and Movies Suite give a separate PCMark TV and Movies Score which does not affect the overall PCMark Score.

Gaming Suite

The tests in the Gaming Suite have been selected to represent the Windows Vista Gaming Consumer Scenario. The combination of test sets covers the common Gaming usage. Gaming Suite gives a separate PCMark Gaming Score which does not affect the overall PCMark Score.

Music Suite

The tests in the Music Suite have been selected to represent the Windows Vista Music Consumer Scenario. The combination of test sets covers the common Music usage. Music Suite gives a separate PCMark Music Score which does not affect the overall PCMark Score.

Communications Suite

The tests in the Communications Suite have been selected to represent the Windows Vista Communications Consumer Scenario. The combination of test sets covers the common Communications usage. Communications Suite gives a separate PCMark Communications Score which does not affect the overall PCMark Score.

Productivity Suite

The tests in the Productivity Suite have been selected to represent the Windows Vista Productivity Consumer Scenario. The combination of test sets covers the common Productivity usage. Productivity Suite gives a separate PCMark Productivity Score which does not affect the overall PCMark Score.

HDD Suite

The tests in the HDD Suite are a combination of tests covering the common HDD usage. HDD Suite gives a separate PCMark HDD Score which does not affect the overall PCMark Score.



PCMark Vantage Full Test Details

PCMark Suite includes the following tests:

- **CPU Test**
 - Data encryption, Data decryption, Data compression, Data decompression
 - CPU image manipulation (compression/decompression/resize)
 - Audio transcoding
 - Video transcoding
 - Text editing
 - Web page rendering
 - Windows Mail
 - Windows Contacts
 - CPU game test
- **Graphics Test**
 - Video playback
 - GPU game test
- **HDD Test**
 - 6 HDD Tests total
 - HDD Tests use new 4K block size
 - All HDD Tests use RankDisk using Intel's IPEAK Storage Performance Toolkit
 - WinTrace is used to record the HDD traces
 - AnalyzeTrace is used to analyze precisely what the traces are doing
 - RankDisk: a Futuremark modified version that it is non-destructive and runs in a temporary sandbox file.
- **Suite Tests**
 - Memories 1 & 2
 - TV and Movies 1 & 2
 - Gaming 1 & 2
 - Music 1 & 2
 - Communications 1 & 2
 - Productivity 1 & 2

Memories Suite includes the following tests:

- **Memories 1**
 - Two simultaneous threads
 - CPU image manipulation
 - HDD picture import
- **Memories 2**
 - Two simultaneous threads
 - GPU image manipulation
 - HDD video editing
- **Memories 3**
 - Video Transcoding: DV to portable device
- **Memories 4**
 - Video Transcoding: media server archive to portable device

TV and Movies Suite includes the following tests:

- **TV and Movies 1**
 - Two simultaneous threads
 - Video transcoding: HD DVD to media server archive
 - Video playback: HD DVD w/ additional lower bitrate HD content from HDD, as downloaded from net
- **TV and Movies 2**
 - Two simultaneous threads
 - Video transcoding: HD DVD to media server archive
 - Video playback, HD MPEG-2: 19.39 Mbps terrestrial HDTV playback
- **TV and Movies 3**



- HDD Media Center
- **TV and Movies 4**
 - Video transcoding: media server archive to portable device
 - Video playback, HD MPEG-2: 48 Mbps Blu-ray playback

Gaming Suite includes the following tests:

- **Gaming 1**
 - GPU game test
- **Gaming 2**
 - HDD: game HDD
- **Gaming 3**
 - Two simultaneous threads
 - CPU game test
 - Data decompression: level loading
- **Gaming 4**
 - Three simultaneous threads
 - GPU game test
 - CPU game test
 - HDD: game HDD

Music Suite includes the following tests:

- **Music 1**
 - Three simultaneous threads
 - Web page rendering - w/ music shop content
 - Audio transcoding: WAV -> WMA lossless
 - HDD: Adding music to Windows Media Player
- **Music 2**
 - Audio transcoding: WAV -> WMA lossless
- **Music 3**
 - Audio transcoding: MP3 -> WMA
- **Music 4**
 - Two simultaneous threads
 - Audio transcoding: WMA -> WMA
 - HDD: Adding music to Windows Media Player

Communications Suite includes the following tests:

- **Communications 1**
 - Three simultaneous threads
 - Data encryption: CNG AES CBC
 - Data compression
 - Web page rendering: graphics content, 1024x768, windowed
- **Communications 2**
 - Three simultaneous threads
 - Web page rendering: open various news pages from IE 7 Favorites in separate tabs, close them one by one
 - Data decryption: CNG AES CBC
 - HDD: Windows Defender
- **Communications 3**
 - Windows Mail: Search
- **Communications 4**
 - Two simultaneous threads
 - Data encryption: CNG AES CBC
 - Audio transcoding: WMA -> WMA - to simulate VOIP

Productivity Suite includes the following tests:



- **Productivity 1**
 - Two simultaneous threads
 - Text editing
 - HDD: application loading
- **Productivity 2**
 - Two simultaneous threads
 - Windows Contacts: search
 - HDD: Windows Defender
- **Productivity 3**
 - HDD: Windows Vista start-up
- **Productivity 4**
 - Three simultaneous threads
 - Windows Contacts: search
 - Windows Mail: Run Message Rules
 - Web page rendering: simultaneously open various pages from IE7 Favorites in separate tabs, close them one by one

HDD Suite includes the following tests:

- **HDD 1**
 - HDD: Windows Defender
- **HDD 2**
 - HDD: game HDD
- **HDD 3**
 - HDD: importing pictures
- **HDD 4**
 - HDD: Windows Vista start-up
- **HDD 5**
 - HDD: video editing
- **HDD 6**
 - HDD: Media Center
- **HDD 7**
 - HDD: Adding music to Windows Media Player
- **HDD 8**
 - HDD: application loading

How will the benchmark be used?

Chip manufacturers and developers, graphics card manufacturers, CPU manufacturers and developers, PC system integrators, and PC industry users:

PCMark Vantage was developed in conjunction with a diverse collection of leading PC hardware and software companies, by a company that maintains a reputation for creating unbiased and well balanced benchmarks. It is a critical performance measurement tool for the entire PC industry.

A professional testing tool that includes application based real-world workloads will appeal to professional testing labs, providing them with performance metrics to use for testing early implementations during development, evaluating 3rd party hardware and driving purchasing decisions during integration, and for business and consumer targeted performance marketing.

PCMark Vantage Suite, HDD, and Consumer Scenario Suite scores will become universally understood by the industry, by reviewers and testers, and by end users. The performance gains made by testing throughout development and integration will yield better scores, and better reviews.

PC Hardware Reviewers and IT Media

PC hardware reviewers and IT media will need impartial, consistent and reliable Windows Vista hardware tests to evaluate next generation hardware performance for reviews and editorial features. By permitting the use of application based tests in the Consumer Scenario suites,



journalist and editors will be able to rate hardware based upon its intended final use. This will finally permit the creation of accurate test data based on real-world consumer applications.

PCMark Vantage provides media with a well designed, industry endorsed yet independent set of test suites to gauge performance of common Consumer Scenarios, HDD and overall system, as well as market segmented usages, generating trusted hardware review scores. PCMark Vantage scores lend credibility to any hardware review, and provide readers with a performance statistic they both understand and trust.

PC Consumers

Computers play an important role in consumers' lives these days. They rely on them to store and help relive memories as digital photos. They are employed to watch the latest high definition TV broadcasts and movies. They entertain all ages with exciting, graphically detailed games.

Playing today's games, high performance graphics cards, CPUs and HDDs help avoid irritating delays and sluggish performance. Online music shops have changed the way that music is purchased, providing exactly the tracks wanted, right from home. Transcoding audio files from one format to another is much quicker and easier with high performance CPUs. Cataloguing music library is a breeze for fast and powerful HDDs. With more time online, sharing music and files, security is more important than ever before. To minimize security maintenance tasks, high performance CPUs and HDDs are recommended.

Today's busy lives find the typical computer user hard at work, balancing multiple tasks; with little time for breaks. Today's computer needs to exhibit that same balancing act, juggling multiple tasks, seamlessly, efficiently, without causing delays. To help today's consumers find the best hardware, to meet their specific requirements, PCMark Vantage provides the first Windows Vista benchmark that generates real-world PC performance data, based on real-world tasks.

Usage & Distribution Guidelines

These guidelines contain important information about using PCMark Vantage and publishing results. Please consult the guide below before using the software or publishing results. If you have any questions related to these matters, please contact us!

Publishing benchmark results

Only fully licensed, PCMark Vantage Professional Edition users may publish benchmark results in marketing materials or in any media or publication. Make sure that you follow instructions set forth in the license agreement and in our testing guidelines. Also, include the official PCMark Vantage logo with a link or referral to Futuremark. Logos can be downloaded here:

<http://futuremark.com/companyinfo/pressroom/productlogos/>

Default scores

In order to keep the reported scores comparable, we highly recommend that you use the default settings as a reference point. Referring to the default settings will make comprehending the results easier for other users running PCMark Vantage on their systems.

Distribution guidelines

PCMark Vantage or parts of it can not be distributed without a specific written permission from Futuremark.

Please contact sales@futuremark.com for more details on how to obtain a PC media license of PCMark Vantage Professional.

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Additional Information | Futuremark Contact Details

To read the PCMark Vantage White Paper, with detailed background, test methodology, market and development information; send your request via email to ollie@futuremark.com

For press inquiries, please contact:

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+1-408-517-0131

About Futuremark® Corporation

Futuremark® Corporation is the leading provider of performance analysis software and services for PCs and smartphones. Futuremark® is known around the world for its benchmark products, including the 3DMark® and PCMark® Series, SPMark™ and VGMark™ (with more than 30 million copies distributed worldwide) and value-added services powered by a database of almost 20 million real life benchmarking results. Futuremark® maintains offices in Saratoga, California and Helsinki, Finland. For more information, please visit <http://www.futuremark.com>.

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