

# PerformanceTest by PassMark Software - Overview



PerformanceTest is a fast, easy to use software benchmarking tool that allows everybody to quickly assess the performance of their PC and compare it to a number of standard 'baseline' computer systems.

PerformanceTest allows you to,

- Find out if your PC is performing at its best.
- Compare the performance of your machine to similar machines.
- Measure the effect of configuration changes and upgrades.
- Avoid paying big bucks for poor performance.
- Make objective independent measurements on which to base your purchasing decision.

This program is a little different compared to other benchmark programs because it is designed to be small enough that it's possible to install from a floppy drive. This means you can take it with you when you go out shopping for a new or second hand PC. The other major advantage is the built in 'baseline' results that enable a reasonable comparison to be made between computer systems. Additional new baselines can also be downloaded from PassMark's Web site (<http://www.passmark.com>)

The results are presented as easy to read bar charts so that you don't need to spend hours studying the number to know the result.

Timing for the tests is done using high resolution timers, which are accurate to approximately 1 millionth of a second on most PC's.

Of course for a measurement to be accurate and fair, several precautions need to be taken. Failure to take into account these factors will result in measurements that are inaccurate.

The application includes the following additional features

- Comprehensive online help
- Support for printing results
- The ability to save your benchmark results to disk as a new baseline.
- A 'Notes' field for storing your own information along with the saved Benchmark result.
- Support for copying the results to other applications (eg. MS-Word)
- The ability to export results to HTML, text, GIF, BMP and EMF formats
- The ability to graph detailed disk performance
- Single test execution, execution of a test suite or execution of all tests with a single mouse click.
- A summary 'Mark' figure for each test suite plus the calculation of the PassMark Rating figure.
- An easy to use point and click interface
- A summary system information screen including CPU type, CPU speed, Total RAM, etc..

- The ability to compare the performance of your computer to multiple 'Baseline' computers at the one time.
- Advanced test windows that allow you to create your own customized benchmark test.

Click on the contents button for more help topics.

# Test descriptions

Several standard test suites are built into the software. Each of these test suites contains a number of different tests designed to measure different aspects of your computer system. These tests can be run as a group or as individual tests. The result of each test is presented using a particular unit of measurement

The following standard test suites are currently available.

## **Math test suite**

Integer & floating point mathematical operations

## **Graphics test suite**

Tests of standard two dimensional graphical functions

## **Disk test suite**

Reading, writing files

## **CD/DVD test suite**

CD read speed test

## **MMX test suite**

Tests of the MMX (multimedia extensions) within newer CPU's

## **3D Graphics test suite**

Tests the DirectX 3D graphics system

In general the tests are run for the amount of time specified in the field "Test Duration" Preferences dialog box. In cases where a long test period is required to obtain a more accurate result a multiple of this "Test duration" value is used.

The time required to set-up a test is never included in the test duration or the calculation of the test result.

## **See also**

Advanced test windows

## Units of measurement

The result of each test is presented using a particular unit of measurement. In each case the higher the number, the higher the performance of the computer. For some tests there is a differentiation between integer and floating point numbers. Integers are whole numbers such as 23, 459532, -26. Floating point numbers contain a fractional part, eg. 1.003, 98394.2. These two types of numbers are treated quite differently inside a computer, which is why PerformanceTest differentiates between the two.

MBytes / Sec      MegaBytes transferred per second

Used to measure the amount of information transferred to and from a disk or memory.

Add's / Sec      Millions of additions per second

Used to measure the number of integer or floating point mathematical operations. Also used for the MMX instruction tests.

Subs's / Sec      Millions of subtractions per second

Used to measure the number of integer or floating point mathematical operations. Also used for the MMX instruction tests.

Mult's / Sec      Millions of multiplications per second

Used to measure the number of integer or floating point mathematical operations. Also used for the MMX instruction tests.

Div's / Sec      Millions of divisions per second

Used to measure the number of integer or floating point mathematical operations.

Lines / Sec      Thousands of lines per second

Used to measure the number of lines that can be drawn in a window per second. This is a measure of the 2D graphics performance.

Images / Sec      Thousands of bitmap images per second

Used to measure the number of bitmap images that can be drawn in a window per second. This is a measure of the 2D graphics performance.

Shapes / Sec      Thousands of shapes per second

Used to measure the number of shapes that can be drawn in a window per second. This is a measure of the 2D graphics performance.

Frames / Sec      Number of different image frames displayed per second

Used to measure the performance of animation using 3D graphics. High frame rates produce a smoother, more realistic picture.

MegaFLOPS (or FLOPS)

FLOPS is the number of floating point operations that can be performed per second. As this figure is normally in the millions the term MegaFLOPS is used. 1,000,000 FLOPS = 1 MegaFLOPS. This is an industry standard measurement, that is used to compare the performance of diverse computer systems.

Composite Average

This is an extra heading used for the summary section. It doesn't really represent a particular unit of measurement as it is a combination (weighted average) of several other measurements.

# Baselines

A baseline is a standard set of results from another computer. These baseline results can be used to determine how fast your computer is in comparison with other computer systems. Baselines are stored in files on the computer's disk. These files end with the extension ".pt" and are normally found in the PerformanceTest installation directory. When PerformanceTest starts up the installation directory is scanned for Baseline files.

A number of standard baselines are available for selection from the [Select Baselines](#) menu option. After a baseline has been selected the results from your computer will be compared against this baseline system. See [interpreting the results](#) for more information.

Baselines are selected for display from the "Select Baselines" dialogue window. New baselines can also be installed from another location so that they can then be selected. This allows you to load a new baseline that you have previously created or that you have received via E-Mail, etc..

PerformanceTest is backwardly compatible. This means that those baseline files created with older versions of PerformanceTest can be used with version 4.0. The additional test results present in version 4.0 will not however be available from the older baseline files.

There are two different types of baseline files. Licensed baselines files and Unlicensed baseline files. Files contained in the PassMark database of results are licensed and can only be used by registered users. Files supplied with the Shareware version are unlicensed and can be used by anybody. Files created by both the Shareware and Registered versions are also unlicensed.

Some information about the computer system that generated the baseline is held in the baseline file. For more details about the information stored with the baseline see the [Baseline information menu option](#).

## ***Adding new baselines***

If new baselines are available they can be added to the [Baseline selection](#) window by copying them (by using Windows explorer for example) to the directory where PerformanceTest is installed. PerformanceTest will automatically include them in the selection list the next time it starts.

Baselines files must have a ".pt" file name extension and PerformanceTest must be restarted before it searches for new baselines files.

The second method is to use the "Install baseline from file" menu option. This copies the baseline file to the PerformanceTest installation directory and adds it to the selection list.

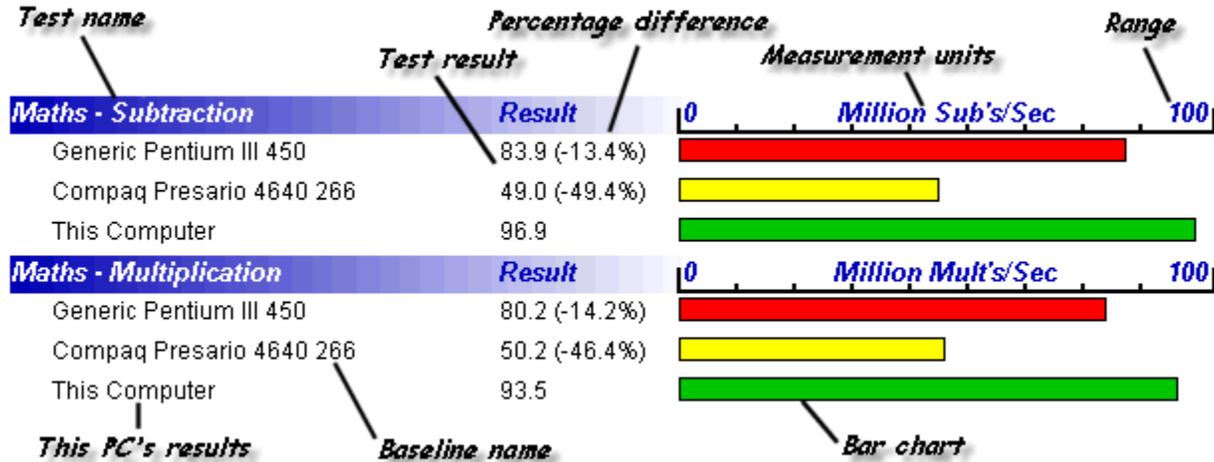
Any baseline file saved to the PerformanceTest installation directory using the "Save as baseline" menu option will also automatically be added to the selection list.

Baseline files can be exchanged via E-Mail, found on the Web or be created by yourself using the Save As Baseline option in the File menu.

## ***Downloading Extra Baselines from PassMark***

If you are a registered licensed user of PerformanceTest, additional Baselines can be downloaded from PassMark's Web site (<http://www.passmark.com>). PerformanceTest will not allow the use of these additional Baseline files unless the program has been registered !

## Interpreting the results



If you don't have a lot of computer knowledge, interpreting the results can be confusing. There are, however, a few simple concepts that can help you.

- The bigger the number, the faster the computer.
- The test results are not a percentage figure. They are relative figures. This means, a computer with a result of 40 can process roughly twice as much data as a computer with a result of 20.
- You can compare the result of your computer with other computers using the supplied baselines.

### Test Name

The name of the test suite and the individual test within the suite.

### Baseline Name

The name of the baseline. This corresponds to the name of the baseline file on the disk. In most cases this name will be the name of a particular computer or particular CPU.

### Test Result

The result obtained from the particular test for the selected baselines and this computer. When the color scheme is set to two colors, the baseline results are shown in red. The results for this computer are shown in green. Each test is associated with a unit of measurement.

### Percentage Difference

This value shows the percentage difference in speed between this computer and the baseline computer. A value less than zero indicates that the baseline is slower than the computer under test, and a value greater than zero indicates that the baseline is faster than the computer under test.

### Measurement Unit (Scale)

This area displays the unit of measurement used for the suite. See Unit of Measurement for more information.

### Bar Chart

The values obtained are displayed as a bar graph. The bars are scaled to the size of the window or the size of the

paper when the results are printed. The color scheme of the bars can be selected using the color menu option. Above the bars, a scale is displayed. The scale has the minimum and maximum value. The maximum value of the scale is selected so that all the results can be displayed.

### ***Result range***

As the values obtained from the tests can vary enormously between different computer systems, PerformanceTest picks a range that enables the display of all the baseline results for a particular test. This means that the maximum possible value on the bar chart will always be slightly bigger than the largest result for that test. This maximum value is displayed at the right of the window.

### ***Summary / Marks***

For each test suite there is a "mark" value. This mark represents a summary of the test suite. These mark values only appear if all the tests in a particular suite have been run. They represent a scaled average of the individual results in the test suite.

### ***PassMark Rating***

For each computer displayed the "PassMark rating" is calculated. This is a weighted average of all the other results and gives a single overall result for the computer. It is only displayed if the results from all other tests are available. See the [PassMark rating section](#)

### ***See also***

The [PassMark rating](#).

Interpreting [disk performance graphs](#).

# Menu Options

## **File**

### **Save as baseline**

Allows the current set of results, for the computer being tested, to be saved as a new baseline. Various additional information is saved with a baseline. For a complete description of this information see the [baseline information section](#). It's also possible to enter some additional words into the notes field.

### **Save as image**

Allows the main window (or it's contents) to be saved in one of 3 different graphics file formats. Bitmap (BMP), GIF and Enhanced Meta file format (EMF). See the [save as image dialog box](#) for more information.

### **Export (as text or HTML)**

Allows the current set of results to be exported as text or HTML.

#### **html**

A set of exported results in HTML format can be immediately inserted into a Web page or transferred to a variety of other applications that support HTML

#### **txt**

This writes out the current results to a text file. Each column of information is separated by a tab character.

#### **csv**

This writes out the current results to a text file. Each column of information is separated by a comma character.

### **Print**

Displays the print dialog to allow the current set of results to be printed.

### **Exit**

Exits from the application.

## **Edit**

### **Copy**

Allows the current set of results to be copied to the clipboard in an Enhanced Metafile Format. The results can then be pasted as a graphical image into other documents that support this format, eg. Word, Paint Shop Pro. If you are using an application that doesn't support this format try the "Save as image" or "Export" menu options.

### **Clear**

Clear the results produced so far.

### **Preferences**

This option allows the user to customize some aspects of the way PerformanceTest works. See the description of the [preferences dialog box](#) for more details.

## **View**

### **Show PassMark rating**

Shows the [PassMark Rating](#) for this computer.

### **Show Read Graph & Show Write Graph**

After the disk tests have been run it is possible to display the results as a [line graph](#)

## **Colors**

### **Two color bar chart**

Displays the results for your computer in green and all other baseline results in red.

### **Multi-color bar chart**

A different color is used for each of the baseline results.

## **Test**

### **Run all tests**

Runs all the tests in all the test suites

### **Test suites...**

The test details are described in the [Test Descriptions section](#)

## **Advanced Testing**

### **Disk**

Opens the [Advanced disk test window](#)

### **CD Drive**

Opens the [Advanced CD/DVD test window](#)

### **3D graphics**

Opens the [Advanced 3D test window](#)

### **Networking**

Opens the [Advanced network test window](#)

### **Memory**

Opens the [Advanced memory test window](#)

## **Baseline**

### **Select Baselines**

See the section on the [Select Baseline](#) dialog.

### **Baseline information**

See the [Baseline Information](#) section for more details

***Install Baseline from file***

This option copies a single Baseline file to the PerformanceTest installation directory and inserts the Baseline into the baseline selection list.

# Contacting PassMark Software

## ***On the Web***

You can contact PassMark on the web at

<http://www.passmark.com>

## ***E-Mail***

For technical support questions, suggestions

[support@passmark.com](mailto:support@passmark.com)

For sales & commercial issues

[sales@passmark.com](mailto:sales@passmark.com)

{button Purchase PerformanceTest Online Now,EF('http://www.passmark.com/sales','',1)}

See also, the [Ordering information page](#).

For any other issues

[info@passmark.com](mailto:info@passmark.com)

## ***FAQ***

You may also want to check out the list of [Frequently Asked Questions](#).

## **System Requirements**

Windows 98, Me, 2000 Professional, XP Home, and XP Professional

(Windows 95 and NT are not supported)

(Windows 98 requires Internet Explorer V5.0 or higher)

800 x 600 pixel display

DirectX 8.0 or higher

32MB RAM

2MB of free hard disk space

(plus additional hard disk space to run the Disk test)

# Ordering information

## **Price**

US Dollars:      \$24 (single user)

{button Purchase Online,EF('http://www.passmark.com/sales','1')} from the [PassMark Software web site](http://www.passmark.com)

You can also find details of special offers, multi-user licenses, site licenses and offline order options (Phone, fax and purchase order), on this web page.

## **What happens when you order**

After the order is processed, a License Key will be returned (via E-Mail). This Key is then entered with the User Name into the initial window. At this point the program then changes permanently into the full licensed version.

## **What you get when you license the software**

- Free unlimited technical support via E-Mail and Web

<http://www.passmark.com/support>

[support@passmark.com](mailto:support@passmark.com)

- Free minor upgrades & bug fixes as they become available

<http://www.passmark.com/download>

- Free access to new Baseline result files on our Web site as they become available.

<http://www.passmark.com/baselines>

- The removal of the initial shareware startup window and the time restriction associated with the shareware evaluation period.

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All personal details supplied when placing an order will be strictly confidential. Online orders will only be accepted over a secure, encrypted connection.

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<http://www.passmark.com/sales>

## **Questions & more information**

If you have any questions we would be happy to hear about them. Contact

[sales@passmark.com](mailto:sales@passmark.com)

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***Additional information***

For questions regarding the copyright, end user license contact, multi-user licenses and site licenses, contact.

[info@passmark.com](mailto:info@passmark.com)

## Precautions for accurate measurement

For a measurement to be accurate and fair, several precautions need to be taken. Failure to take into account these factors will result in measurements that are inaccurate and misleading.

- Stop all other applications before running PerformanceTest. This includes Internet connections, active desktops, stopping music CDs etc...
- Turn off virus checkers when running the disk tests. Most virus checkers don't have a serious effect on performance, but some might.
- Once a test has been started, leave the test to run without starting or interacting with other applications. i.e. Don't touch the mouse, Alt-tab to other applications, etc..
- How full the disk is and its cluster size can affect the read / write performance of a disk. The position of the test file on the disk (inner cylinder or outer cylinder) can also affect the performance. The only way to avoid this problem is to only test newly formatted disks that have the same cluster size. To give an example, compare the following results (in MB / Sec).

Test Name	Drive C:	Drive D:
Disk Sequential cached read	1.9	3.9
Disk Sequential cached write	2.3	3.8
Disk Random Seek + RW	0.4	0.6

In fact both Drive C: and Drive D: are the same physical hard drive split into two different partitions. Drive C: is almost full. Drive D: is almost empty.

- If the disk is fragmented this can badly affect performance (see the table above). Windows includes a utility for defragmenting the disk. Look up "defrag" in the Windows online help for more details.
- Windows can sometimes fire a process that can interfere with the accuracy of a test. You may need to run a test a couple of times or over a longer period of time to get an accurate result.
- Performance result can be dramatically worsened if Windows doesn't have enough memory & needs to swap out to disk too often. Make sure you have enough RAM if you want to get a real indication of the system performance.
- In general, higher color depths mean slower screen updates as more color information needs to be transferred. When you compare your results to the baseline results, try and use the same color depth. Otherwise you're comparing apples and oranges, not apples and apples. Some video cards provide hardware acceleration at particular color depths and not others. Because of this, increasing the color depth (e.g. 24 to 32) can sometimes increase the video speed.
- Don't expect these tests to run twice as fast on a computer with two or more CPUs. Most of the tests only run on a single CPU at a time.
- Don't expect your expensive new server to wipe the floor with the competition. Servers are in general built for a purpose and don't have great 2D and 3D graphics (because they don't need it). Do pay extra attention to the Math and Disk test results however.

## **Problems and Frequently Asked Questions (FAQ)**

The full list of frequently asked questions is now maintained on our web site.

<http://www.passmark.com/support>

## Test suite - Math

This suite contains three sub categories that contain 9 different tests in total. The three sub categories are floating point tests, integer tests and FLOPS (Standard Floating point operations per second).

Integers are whole numbers such as 23, 459532, -26. Floating point numbers contain a fractional part, eg. 1.003, 98394.2. These two types of numbers are treated quite differently inside a computer, which is why PerformanceTest differentiates between the two.

For each of the integer tests, a large array of random 32 bit integers is processed using the particular mathematical operations listed below. For the floating point tests, single precision floating point numbers (32 bit) are used. All the tests are single threaded, meaning that only a single CPU will be used in a Multi-CPU system. The exception to this is the MegaFLOPS test, which will fully utilize up to four CPUs.

The MegaFLOPS test is also special in another way. In order to measure the maximum FLOPS value, test overhead is removed from the result. Thus the MegaFLOPS value is a theoretically maximum value for the CPU(s); the other results give a better assessment of real life performance (i.e. they include some overhead for looping and branching).

The following tests make up the suite.

Addition

Subtraction

Multiplication

Division

Floating Point Addition

Floating Point Subtraction

Floating Point Multiplication

Floating Point Division

Maximum MegaFLOPS

## **Test suite - Graphics**

This suite contains a number of tests that exercise the standard Windows graphics functions. The results from this suite depend on the speed at which the video card can carry out 2D graphics operations and the color depth currently in use.

### ***Line Drawing***

Lines are drawn into window. The color is changed every 500 lines to enable the lines to be seen in the test window.

### ***Painting Bitmaps***

A bitmap image is painted into a window as quickly as possible. It should be noted that due to the queuing of display requests by hardware accelerated video cards, the duration of this test might be longer than expected.

### ***Outline shapes***

Two different shapes are drawn into a window

- An ellipse
- A square with rounded corners

The color is changed every 64 shapes to enable the shapes to be seen in the test window.

## Test suite - Disk

This suite contains a number of tests that exercise the mass storage units (hard disk or otherwise) connected to the computer. By default drive C: is used but this can be changed from the Preferences Dialog.

For each test a file is created in the root directory of the selected disk. The file size needs to be large in order to get an accurate measurement. In the case where a slow drive is used on a computer with a large amount of RAM this test can take some minutes to complete.

There are a few issues to aware of when interpreting the results of the disk test. These are covered in the precautions section.

### ***Disk Sequential Cached Read***

A large test file is created on the disk under test. The size of this test file is proportional to the amount of RAM available, which stops the entire file from being cached in RAM. The file is read sequentially from start to end. The amount of data read in each individual read operation is always 16KB

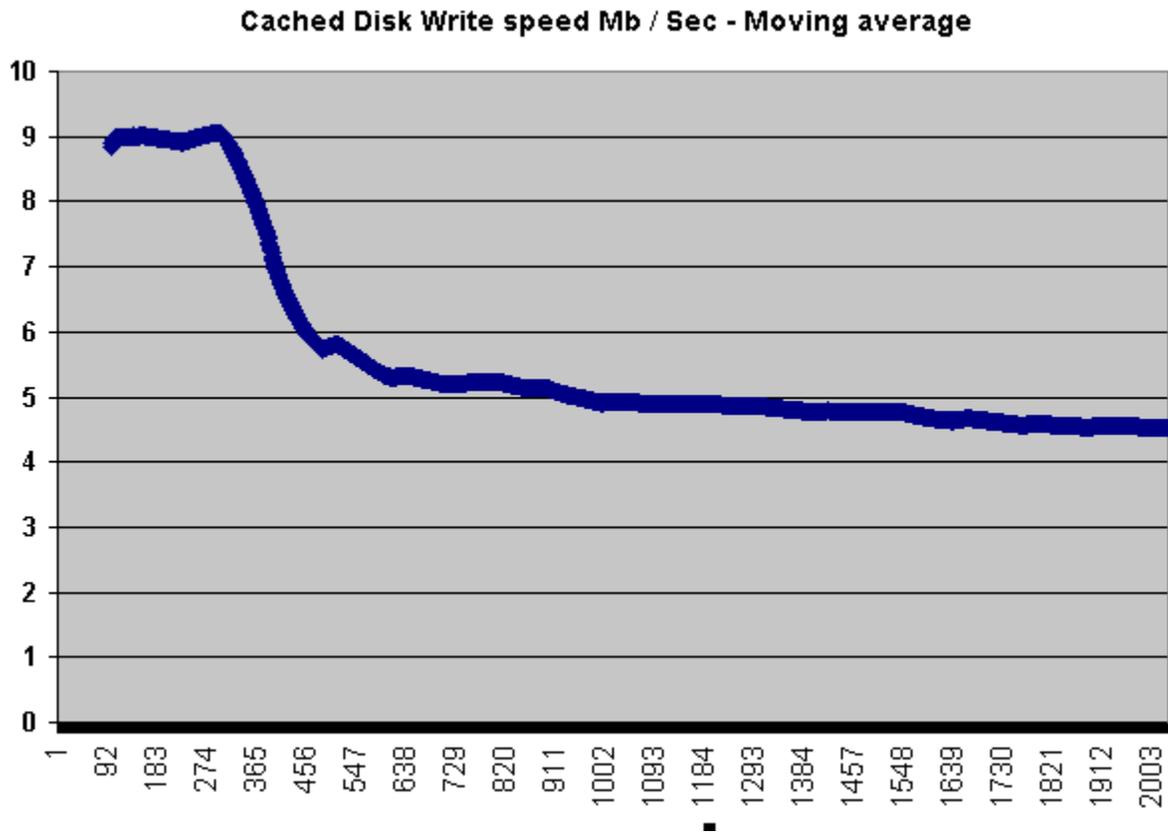
### ***Disk Sequential Cached Write***

A large file is written to the disk under test. The size of this test file is proportional to the amount of RAM available. This stops the entire file being cached in RAM. The file is written sequentially from start to end. The amount of data written in each individual operation is always 16KB

### ***Disk Random cached Seek RW***

A large test file is created on the disk under test. The size of this test file is proportional to the amount of RAM available, this stops the entire file being cached in RAM. The file is read randomly; a seek is performed to move the file pointer to a random position in the file, a 16KB block is read or written then another seek is performed. The amount of data actually transferred is highly dependent on the disk seek time.

Using small files results in inaccurate readings. Here's why..



This graph shows the MB/Sec disk write rate over the period of time required to write 2000 clusters to a hard drive. Caching allows the rate to start very high then drop off as the cache fills and the drive can't keep up. In fact, for writing large files caching can even cause a decrease in performance (compared to the uncached performance). The cache becomes an overhead in this case.

**More detailed results**

By using the [advanced disk testing window](#) it is possible to examine the performance of the disk in more detail.

## Test suite - Memory

This suite contains a number of tests that exercise the memory sub-system of the computer. (Random Access Memory- RAM)

### ***Memory - Allocate small block***

This test measures the time taken to allocate & free small zeroed memory blocks (around 100KB block size)

### ***Memory - Cached***

This test measures the time taken to read a small block of memory. The block is small enough to be held entirely in cache (if one is present)

### ***Memory - UnCached***

This test measures the time taken to read a large block of memory. The block is too large to be held in cache.

### ***Memory - Write***

This test measures the time taken to write information into memory.

### ***More detailed results***

By using the [advanced memory testing window](#) it is possible to examine memory performance in more detail.

## Test suite - MMX

MMX, SSE & 3DNow! are all sets of new CPU instructions that have been introduced into recent CPUs to enable blocks of data to be processed at higher speeds. At the moment only AMD chips support 3DNow! and only Intel chips support SSE. This may change in the future.

CPUs before the Pentium 100 didn't support even the MMX feature and this means that these tests will not be able to be run on your system.

MMX allows 64bit Integer mathematical and logical operations. SSE allows 128bit floating point mathematical and logical operations. 3DNow! allows 64bit floating point mathematical and logical operations. By comparison, standard CPU instructions process only 32bits at a time. This means that throughput can, in theory, be almost doubled or quadrupled.

For each test a large array of random numbers is processed using the particular mathematical operations list below.

MMX Addition (64bits)

MMX Subtraction (64bits)

MMX Multiplication (64bits)

SSE Math (128bits, floating point addition, multiplication and subtraction)

3DNow! Math (64bits, floating point addition, multiplication and subtraction)

### ***Definitions***

MMX = Multimedia Extensions

SSE = Streaming SIMD extensions

SIMD = Single Instruction Multiple Data

3DNow! = The name that chip maker AMD gave to their new CPU instructions.

## Test suite – 3D Graphics

This test suite attempts to measure the performance of the 3D graphics hardware installed in the machine. This test suite makes use of version 8 of the Microsoft DirectX 3D graphics library. Without DirectX8.0 or above it will not be possible to run these tests.

Three standard tests have been defined. Simple, medium and complex.

	<b>Simple test</b>	<b>Medium test</b>	<b>Complex test</b>
<b>Objects</b>	10	20	40
<b>Textures</b>	1	7	20
<b>Mode</b>	Windowed	Windowed	Full screen (800x600x32)
<b>Other features used</b>	Wireframe	Alpha bending, Specular Lighting,	Alpha bending, Specular Lighting, Fogging, Multitexture

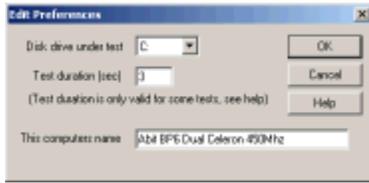
Each texture requires 256KB of video RAM.

Each object has 800 triangular polygons and 381 vertices.

### ***More detailed results***

By using the [advanced 3D testing window](#) it is possible to examine 3D graphics performance in more detail.

# Preferences



## **Disk drive under test**

This field allows the user to select the disk used for all of the disk speed tests. The user can test several disks by running the disk test then changing the drive letter. The system attempts to verify the disk is accessible when the user clicks on OK. When a new disk is selected the disk tests results, for the computer under test, are cleared.

## **Test Duration**

This is the base duration for which the tests will run. Values of 2 seconds to 60 seconds are accepted. In cases where a long test period is required to obtain a more accurate result a multiple of this “Test duration” value is used.

Suite	Test Duration Multiple
Math test suite	1
Graphics test suite (#)	1
Disk test suite (*)	N/A
Memory test suite	1
MMX test suite	1
3D Graphics test suite	3

The time required to set-up a test is never included in the test duration or the calculation of the test result.

(\*) The duration of the disk tests is not affected by this value. The duration depends on the speed of the hard drive.

(#) It should be noted that due to the queuing of display requests by hardware accelerated video cards, the duration of the Bitmap test may be longer than expected.

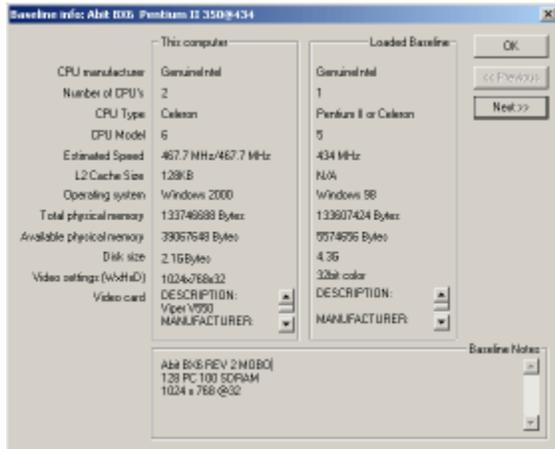
## **This computer's name**

When PerformanceTest is first started, the name of “this computer” is used to identify the results of the computer being tested. This name can be changed by entering a new value into this field. e.g. “Dell Dimension T800”. This can be useful for identifying the computer when publishing / exporting the results.

## **3D graphics**

For the 3D tests, you can either select the maximum refresh rate or a refresh rate that corresponds to the monitor’s refresh rate. In general, it is better to have maximum refresh rate selected as this will show the true performance of the video card. Selecting the monitor’s refresh rate will limit the number of frames displayed so that it matches or is less than the monitor’s refresh rate. This option should only be used on video cards that exhibit a flickering or tearing effect.

# Baseline Information



Using this Window it is possible to view the configuration of the computer under test and the configuration of the baselines. The name of the baseline is displayed in the title of the window. For more information about what a Baseline is, see the [Baseline](#) page.

The next and previous buttons can be used to view the result from each baseline currently displayed.

## **PerformanceTest Version**

This is the version of PerformanceTest that was used to create the baseline file. Newer versions of PerformanceTest store more system information in the baseline file, contain more test results and, in general, contain more accurate results.

## **CPU Manufacturer**

Displays the name of the manufacturer of the CPU. This text is extracted directly from the CPU itself, which is why it may seem a little strange.

## **Number of CPUs**

Display the number of CPU's installed in this system.

## **CPU Type**

Displays the CPU type in text.

## **CPU Model**

Displays the CPU model number.

## **Estimated speed**

Displays an estimate of the CPU(s) speed. Due to the method used to determine the speed, there can often be a slight difference between the reported speed and the real speed. For some processor types (e.g. The Pentium Pro 200) the reported value can be out by a significant factor. Portable computers which dynamically vary their speed to extend battery life can also report low figures.

## **L2 Cache size**

Displays the size of the L2 cache.

**Operating system**

Display the operating system name.

**Total physical memory**

Displays the total physical memory (RAM) installed, in Bytes.

**Available physical memory**

Displays the free physical memory when the baseline was saved. It should be noted that in many cases the disk cache uses a lot of the free available memory. This means that this figure will often be very low.

**Disk size**

The size of the hard disk in the computer, in Gigabytes.

**Disk cluster size**

Files on the hard disk are divided up into chunks of data called Clusters. This field displays the size of the cluster for the hard disk being tested. Cluster size can have some effect on disk performance and disk utilization efficiency.

**File system**

The file system is the standard used to store and index information on the disk. Microsoft standards include FAT, FAT32 & NTFS. The file system in use can have some effect on disk performance.

**Video settings (Width, Height and Depth)**

Displays the screen resolution and the color depth used when the test was performed. The correspondence between color depth and maximum number of colors is shown below. In general, higher color depths mean slower screen updates, as more color information needs to be transferred. The resolution of the screen doesn't generally have a significant impact on the test results as all the graphics tests are performed in fixed sized windows.

<i>Depth</i>	<i>Max Colors</i>
8	256
15	32768
16	65536
24	16777216
32	4294967296

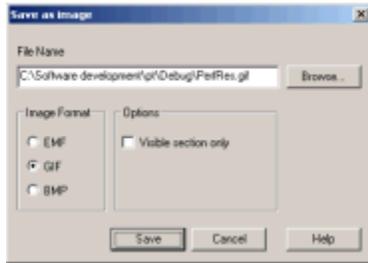
**Video Card**

This is the information about the video hardware installed in the PC. Where possible the model and manufacturer and BIOS information are displayed. This information is new to version 3.0 so baselines created with V2.0 will have this field empty.

**Notes**

This is a free form text field that can be filled in when the baseline is created. Up to 300 characters can be entered in this field.

## Save as Image



This dialog allows the main window (or it's contents) to be saved as an image file which can then be imported into other application or placed on a Web page.

### ***Image format***

One of 3 different graphics file formats can be selected.

- BMP. Stores the image in Bitmap format. Many applications support Bitmaps but as no compression is used the file size is very large.
- GIF Stores the image in GIF87a format. Fewer applications support GIF's and only 256 colors can be used. Powerful compression gives small file sizes and it is one of the standard image formats used on the Internet.
- EMF (Enhanced Meta file format). Saves a scalable vector image that can be resized within other applications. File size is very small but only limited support is available in other applications.

### ***Option – Visible section only***

If this option is selected, the Window (including menu bar, button bar, border, etc) will be saved.

If this option is not selected, only the contents of the window will be saved. This option will also save any part of the window contents that is not currently displayed in the Window.

# The PassMark Rating



The "PassMark rating" is a weighted average of all the other test results and gives a single overall indication of the computers performance. The bigger the number, the faster the computer. For example, a typical old Intel 80486 66Mhz, has a rating of about 4.5.

The easiest way to compare your result with the results of other machines is to use the free [baselines](#) supplied with PerformanceTest. If you purchase PerformanceTest, then additional baseline files can be downloaded from the PassMark Web site.

The "PassMark rating" can only be calculated if the results from all other tests are available. The value is calculated as follows.

Test Suite	Weighting
MMX	4%
Disk	20%
CD / DVD	9%
Memory	18%
3D Graphics	12%
2D Graphics	14%
Maths (CPU)	23%
<b>Total</b>	<b>100%</b>

These weightings are based on the "average" computer usage and are intended to give the user of PerformanceTest an overall indication about how this computer will perform in general use. Needless to say, this weighted average will be inappropriate for some users. Game players will think 3D is more important, while Network admin types will be looking for disk speed. Feel free to roll your own ratings based on the individual test results.

As new versions of PerformanceTest have been released, additional tests have been added and several bug fixes have taken place. These changes have affected the way the PassMark rating is calculated. To compensate for this, baseline files that were created with older versions of PerformanceTest are re-scaled when they are loaded so that a valid comparison can still be made. It is, however, important to state which version of PerformanceTest you are using when comparing results.

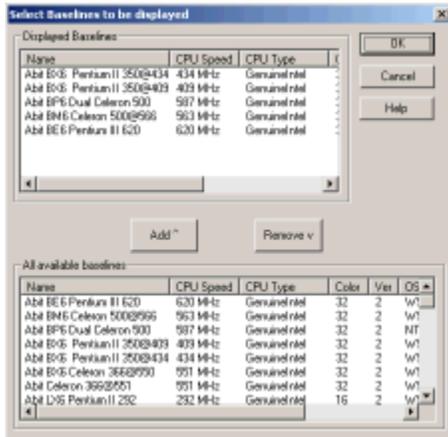
## ***The MegaFLOPS rating***

FLOPS is the number of floating point operations that can be performed per second. As this figure is normally in the millions the term MegaFLOPS is used. 1,000,000 FLOPS = 1 MegaFLOPS. This is an industry standard measurement that is used to compare the performance of diverse computer systems. This figure is an important measure of CPU performance. This test has been designed to make full use of systems with up to four CPUs. (the other math tests only use a single CPU).

***More information***

Have a look in the [frequently asked questions \(FAQ\)](#) section and the [test precautions](#) section.

# Selecting Baselines



This window is divided into two sections. In the bottom section all the available baselines are displayed. To display a baseline's results, select a baseline in the bottom section of the window and click on the "Add" button. Multiple files can be moved at one time. (Use the Shift and Ctrl keys while selecting files with the mouse). The baselines can be sorted by clicking on the column heading.

Various information is listed about each baseline.

## **Name**

This is the name of the baseline from the baseline file on the disk. The name will normally be the make and model of the computer or "Generic", if the machine was home built or not one of the internationally recognized brands. The CPU model and speed is also often included in the name.

## **CPU Speed**

This is the estimated CPU speed of the baseline computer, as extracted from the baselines file.

## **CPU Type**

This is the CPU type text extracted from the CPU itself.

## **Color**

This is the color depth. This is an important factor when comparing baselines. To be fair only compare the graphics performance of baselines using the same color depth.

## **Ver (Version)**

This is the version of PerformanceTest that created this baseline. Older versions of PerformanceTest didn't have as many tests as this version. Baselines created by old versions of PerformanceTest can still be loaded but some results may be missing or distorted.

## **OS (Operating System)**

The operating system under which the baseline was created. eg. Windows2000, NT4 etc..

## **RAM**

The total amount of memory (RAM) in the baseline computer, in bytes.

## **Disk**

The size of the disk in the baseline computer, in bytes.

## What new in Version 4

- Advanced disk testing with graphing.
- Advanced CD/DVD testing with graphing and export function.
- Advanced 3D graphics testing for full screen and windowed DirectX8 testing.
- Advanced network bandwidth testing with graphing and export function.
- Advanced memory bandwidth testing and step size testing with graphing and export function.
- Replacement of the standard 3D test using DirectX 3 with three new DirectX tests using DirectX 8.
- Addition of the standard CD/DVD test and its inclusion is the passmark rating.
- The standard memory test was re-written to be more efficient.
- Translation of into German, French & Japanese.

A complete list of enhancements in all previous versions can be found on the PassMark Web site (<http://www.passmark.com>)

## Running PerformanceTest from a floppy

PerformanceTest was designed to have a small 'footprint'. This means that it can be installed on a floppy disk. This may be useful for a number of reasons, eg.

- You are out shopping for a new or 2nd hand PC and the shop owner will not let you install software on to the PC.
- You're a technician in the field and need to quickly test a PC.
- You're collecting results from many different machines and want to keep all the results together on the floppy disk for later analysis.

Here are the steps to follow to install PerformanceTest on to a floppy disk.

1. Install PerformanceTest as normal on to the hard disk of a single machine
2. Enter your user name and license key (if you have the registered version)
3. Find the installation directory on your hard disk. This is usually, c:\Program Files\PerformanceTest3
4. Copy all the files in this directory to a blank formatted floppy disk
5. You can now uninstall the version from the hard disk (using the Windows control panel, add remove programs icon)
6. You can now run PerformanceTest on any machine from the floppy disk by double clicking on the "pt.exe" file. Baseline result files can also be saved to the floppy disk.

# Performance graphs

There are several different performance graphs that can be displayed. All graphs have the following items in common.

## **Vertical axis (Y axis)**

The vertical axis displays a variable scale. Low values at the bottom, high values at the top. Depending on the graph type this scale will be measured in Megabytes / Sec or Megabits / sec.

## **Horizontal axis (X axis)**

The horizontal axis typically shows either a time period or a number of categories (such as block size) depending on the test selected. In the case of the disk test it is possible to select the X axis unit to be either time or megabytes.

Note that 1000 Milliseconds = 1 Second

## **Instantaneous result**

This is indicated by a red line. This line shows the result that was measured between two samples. Typically 100 samples are taken during the tests to produce the graphs.

## **Average result**

This is indicated by a yellow line. This line shows the average result taken from the start of the test. In general the average speed gives a better indication of performance than the instantaneous speed.

## **Copy button**

Copies the image to the clipboard in an EMF (Windows Metafile) format. This image can then be pasted into applications such as PaintShop Pro, Microsoft Word & FrontPage2000. If a GIF file is preferred, then use the export function.

## **Print button**

Prints the image to a printer that the user selects. The image will be scaled to fit across the page in either landscape or portrait layout.

## **System information**

Just to the right of the graph, system information relevant to the test is displayed (Disk size etc.). This information is the same as what is displayed in the [Baseline information](#) window and more details can be found there. The name of the computer, set by default to "This Computer" can be changed from the [preferences](#) window.

## **Disk graphs (Read and Write)**

These graphs show details of the disk read and write performance. The graph shows the transfer speed (in MB/Sec) over a period of time or compared to the number of megabytes transfer to or from the disk. Depending on the disk test mode selected the Windows cache and hard disk controller cache can have a significant impact on the measured performance. If the file is transferred to or from the cache rather than the disk very high results will be recorded. The size of the cache and its contents are determined by the Windows operating system.

## **CD/DVD read graph**

This graph is very similar to the disk graph, except that for the CD it is only possible to read information from the disc (and not write it). Once again the Windows cache can have a big impact on the results.

## **Memory graphs**

These graphs show details of the memory read and write performance. The graph shows the transfer speed (in MB/Sec) compared to the block size or step size. Like all the tests, higher results are better. Reading or writing small blocks of RAM sequentially, 32 bits at a time, will generally result in the highest transfer speed.

### ***Network graph***

These graphs show details of the TCP/IP network transfer speed (in kilobits / sec) over a period of time. For dial up internet connections, speed will typically be limited by the modem and ISP. For local networks the speed may be limited by the LAN card, the CPU or network infrastructure such as firewalls and switches.

## Command line parameters

There are a number of different command line parameters that can be used with PerformanceTest.

### **Test automation**

The /ah, /ab, /ac and /at arguments can be used to auto-launch PerformanceTest and write the results to a file. The PerformanceTest window will close automatically at the end of the test run.

Syntax.

```
pt.exe <file_format> <result_file> <initialization_file>
```

<file\_format>

/ah = HTML format

/ab = Binary file format (the creates a new baseline file)

/ac = Text with comma separated values (CSV).

/at = Text with tab separated values.

<result\_file>

The full path name of the output filename. It's up to the user to specify the correct file name extension.

<initialization\_file>

An initialization file that can be used to help with automated testing, see below or more details.

Example

```
pt.exe /ah c:\temp\results.htm
```

A new HTML file is created in the \temp directory.

### **Loading baselines**

By placing the name of a single binary baseline file on the command line, it will be loaded automatically.

Syntax

```
pt.exe <baseline_file>
```

Example

```
pt.exe "Dell Pentium4.pt"
```

### **Initialization file**

An initialization file can be used to help with automated testing. The name of this file appears on the command line as parameter 3. For example,

```
pt.exe /ac resultfile.csv "E:\test files\run1\test.ini"
```

### **Initialization file content**

The file "test.ini" looks like this.

```
Dell Dimension L 8100
E
10
```

The 1st line is the machine name.

The 2nd line is the drive letter.

The 3rd line is the test duration in seconds.

Note1: Only 3 lines are accepted. The machine name can be up to 200 characters.

Note2: Don't include any extra space characters, tabs or comments.

## **CD/DVD test suite**

The CD/DVD test suite is made up of a single test, which reads data from the CD drive selected in the preferences window.

To use this test you need to have a CD in the CD Drive. The CD should, if possible, have mostly large files on the disc. Having many small files on the disc will lower the result, as the time required to seek between files is included in the result.

# Advanced Test Windows

## ***Advanced disk test***

[Advanced disk test window](#)

## ***Advanced CD/DVD test***

[Advanced CD/DVD test window](#)

## ***Advanced Memory test***

[Advanced memory test window](#)

## ***Advanced 3D test***

[Advanced 3D test window](#)

## ***Advanced Network test***

[Advanced network test window](#)

# Advanced Disk test

This test measures the data transfer speed when reading or writing data to the disk. The speed that data can be transferred between memory and a hard disk drive is one of a system's most important performance aspects. There are a few factors which have a bearing on this speed and the Advanced Disk Drive Test attempts to allow the user to vary most of these factors and compare the results.

Firstly, there is the manufactured access time of a drive. Faster drives tested under the same conditions will simply record higher data transfer speeds. Drive access time is quoted in one or more of four different types - track to track, positioning, random, and full stroke. Consult your manufacturer's documentation for further information.

Another major factor influencing the read and write speeds of a drive is the system cache. The cache is a high speed area of memory which Windows uses to store recently accessed data. If an application makes repeated requests for the same data, it can be taken directly from the cache very quickly, so it reduces the necessity to read from the disk drive each time. Caching is used by default, but an application may request uncached read and write operations.

Programmers have quite a few options open when choosing read and write methods. Windows exposes an Application Programming Interface (API), which allows a large amount of control over I/O factors such as caching and synchronous/asynchronous data transfer. Another choice is the ANSI C/C++ commands, which compile on any platform. Also of note is the method of reading raw data directly from the drive itself. This includes drive formatting data and file allocation tables. Different methods will lead to different access times from system to system.

During the test, a temporary file is created. Data is written to, and read from the file in chunks of data called blocks. The size of these blocks are a major influence on some test types, specifically the Standard Win32 API (Uncached) and Raw Disk Read tests. The other tests are cached. This means that the system determines the block size and the parameter in the Advanced Disk Drive Test dialog will not have a large impact on the results. The size of the temporary file is another factor. Smaller files may lead to incongruous results, as the cache plays a much larger part in the read and write operations.

The PassMark Advanced Disk Drive Test dialog.

## **Drive Letter**

Select the disk drive you wish to carry the test out on.

## **File Size**

The size of the temporary file used during the test. By default this file is set to the size of the system RAM. A file of this size will be large enough to prevent unrealistic results as the result of caching.

## **Block Size**

This is the amount of data, in bytes, that the test writes in every write operation and reads in every read operation. The various block sizes are given in multiples of the drives sector size.

## **Access Method**

### Standard C/C++ API:

This access method uses the C/C++ function calls ( fwrite, fread ). The I/O operations use caching.

### Standard Win32 API (Cached):

This method uses the native interface Windows exposes for file I/O. ( WriteFile, ReadFile ). You should notice a 'peak' at the beginning of the write portion of this test, where data is first written to cache.

### Standard Win32 API (Uncached):

This method uses the same interface as the *Standard Win32 API (Cached)* test, however, it requests that the system carries out no caching. Tests with the same parameters should provide very similar results.

*Raw Disk Read:*

This method uses a low level interface to read directly from the device, sector by sector. Caching is not used. Note that this test is read only, as writing directly to disk at a low level would risk losing data. The Raw disk read function is only available in Windows 2000 and Windows XP.

**Status**

Displays the current status of the test.

**Write Speed**

Displays the current average Write Speed of the tested drive in MB per Second.

**Read Speed**

Displays the current average Read Speed of the tested drive in MB per Second.

**CPU Load**

Displays the current average CPU load on the system.

**Go**

Starts the Disk Drive Access Speed test.

**Stop**

Stops a currently running test. Note that results of an aborted test are not be valid. However if the write section of the test has completed, you will be able to view those results.

**View Write Graph**

Displays a graph of the results of the write portion of the test.

**View Read Graph**

Displays a graph of the results of the read portion of the test

**Export Write**

Exports a HTML document with a graph and a table of results for the write portion of the test.

**Export Read**

Exports a HTML document with a graph and a table of results for the read portion of the test.

**Help**

Opens the Help.

**Exit**

Closes the dialog.

## Advanced CD/DVD test

This test allows the data transfer speed from a CD or DVD drive to be measured. The rate at which a CD Drive can read data from a CD ROM varies about many factors. Firstly, and most importantly, is the speed of the manufactured drive. Older drives list speeds of 2X or 4X, (1X = 0.1536 MB/Sec), whereas top end drives at time of writing are now advertised as having speeds of 48X and 56X.

Another large influence on the data transfer rate from CD is the system cache and the part it plays in storing frequently accessed data. The cache is a section of memory Windows uses to store data for fast access. The first time, for instance, a 10 MB file is read from a CD ROM, it is likely that Windows will copy it to the cache, recognizing that the data may soon be requested again. Upon subsequent requests for the same file, Windows will simply read the file directly from the cache and hence bypass the bottleneck of reading from the CD ROM again. After a certain period of time and/or a certain number of I/O requests, this data will have been replaced in the cache with more recent or essential data. Requesting the file at this stage, will mean Windows must go directly to the CD ROM once more.

NB. The cache size and management policies vary considerably from system to system and are very likely to vary constantly while the system is running.

This test requires that a CD or DVD be present in the selected drive. The file structure of the CD ROM is another factor influencing the data transfer rate. CD ROMs with very few, large files will give better results than those with many small files, as the overhead of opening, closing and seeking to the next file is reduced significantly.

The Advanced CD Drive Test has been designed to test various methods of reading data from a CD ROM.

### ***The PassMark Advanced CD Drive Test dialog.***

#### ***Drive Letter***

Used to select the CD or DVD drive the test is to be carried out on. A valid CD or DVD must be present in the selected drive before beginning the test.

#### ***Block Size***

This is the amount of data, in bytes, that the test requests in every read operation. A larger block may give a slight rise in performance on some systems.

#### ***Test Duration***

The length of time, in seconds, to run the test for. Note that most CD Drives take around 3 – 5 seconds to ‘warm up’ if they haven’t been used in some time. This is a period where the drive accelerates to its read rotation speed and positions the read head. This time lag will definitely affect results for lower test durations and will be clearly evidenced in the graph (see below). To help eliminate this effect, choose a longer test duration, or run the test a second time after the drive has warmed up.

#### ***Access Method***

There are four different methods in which the data can be read from the CD.

##### *Standard Win32 API (Uncached)*

This method uses the native interface Windows exposes for file I/O. It requests that the system carries out no caching. The results of this test typically shouldn’t vary enormously from test to test on the same CD ROM.

##### *Standard Win32 API (Cached):*

This method uses the same Windows I/O interface, but allows caching. The first time this test is run, it will most likely look quite like the Uncached test. However, upon subsequent runs, the cache data is first read, before going to

the CD ROM. This will be evidenced by a higher average read speed and a peak will be seen at the start of the graph where the massive cache read takes place.

Standard C/C++ API:

This test is similar to the Standard Win32 API (Cached): test, except the programming method uses the C/C++ function calls rather than the Windows ones.

Raw Disk Read:

This test directly accesses the CD ROM reading all data sector by sector, including formatting information. No caching is used, and this test probably gives the most accurate system independent rating of the CD Drive device. The Raw disk read function is only available in Windows 2000 and Windows XP.

**Read Speed**

Updated during the test to display the average read speed of the CD Drive.

**CPU Usage**

Updated during the test to display the CPU usage as a percentage during the test.

**Go**

Start the CD Drive Read Speed test.

**Stop**

Stops a currently running test. Note that results of an aborted test are not valid.

**View Graph**

Displays a graph of the test results.

**Export**

Exports a HTML document with a graph and a table of results.

**Help**

Opens the Help.

**Exit**

Closes the dialog.

# Advanced 3D Graphics test

3D Graphics technology has come on in leaps and bounds over the last few years and this test measures how fast 3D images can be created and displayed.

Microsoft provides a set of Application Programming Interfaces (APIs) called DirectX, which allow developers to create games and other high-performance multimedia applications. DirectX provides support for two-dimensional (2-D) and three-dimensional (3-D) graphics, sound effects, music, input devices, and networked applications such as multiplayer games.

Hardware manufacturers are expected to provide support for the relevant DirectX technologies. For instance, in our case, manufacturers of graphics adapters must support the 3D graphics features of DirectX – fogging, various lighting types, texture mapping, etc. In this way, the same DirectX application will work on all graphics cards which properly implement this support. However, DirectX has evolved very quickly over the last few years and many of its newer features are no longer supported by older graphics cards. Also some cards may perform better when dealing with specific DirectX features. For example, card A may record very high frame rates when rendering wire frame 3D objects, whereas card B may not perform so well with wire frame, but may be particularly suited to textured objects.

The Advanced 3D Graphics Test has been designed to test the most commonly used features of DirectX. It renders a number of spheres to the screen in windowed or full screen mode. PerformanceTest requires DirectX version 8 or above.

Apart from individual graphics card speeds and abilities, the test illustrates a single card's drop in performance as the rendered scene becomes more complex. A scene with more objects, more textures and more DirectX features implemented may well look more impressive, but will more than likely result in a reduction in frame rate.

## ***Test Settings***

This section is where you will decide what DirectX features you wish to test and set the complexity of the test. Some areas may be grayed out if your graphics card doesn't support that particular feature set.

### ***Texture 1***

Indicates whether the spheres are rendered with the default texture, which is a simple grid. NB: It is recommended that this button be checked.

### ***Texture 2 (MultiTexture)***

Render the spheres with a second texture. The second texture used is a smaller grid. At time of writing, though DirectX supports up to eight simultaneous textures, virtually all graphics cards available on the market only support two.

### ***Lighting***

Light the spheres. This will give the spheres a more three dimensional appearance. The test uses a directional light.

### ***Specular***

Specular is another type of DirectX lighting. It corresponds to light reflected from objects. One can think of it as the 'shininess' of an object. Specular lighting adds further detail to the three dimensionality of the spheres. NB: Specular lighting can only be used when regular lighting is also enabled.

### ***Fogging Vertex & Pixel***

Fogging gives the impression of fog in an entire scene, or certain area of a scene. In the Advanced 3D Graphics test, you should notice the objects in the scene which are further away being fogged.

In short the difference between Vertex and Pixel fogging is that Vertex fog is implemented in the DirectX 3D

lighting engine, whereas Pixel fog is implemented in the device driver. Pixel fogging should usually provide slightly better performance than vertex fogging.

### ***Alpha Blending***

Alpha Blending is the name given to the method of rendering pixels or objects with varying degrees of transparency. Each pixel, along with having a red, green and blue value has a fourth value called its alpha value or the alpha channel. The alpha of a pixel determines its opacity. With alpha blending enabled, the spheres will take on various degrees of transparency.

NB: On almost all modern graphics cards, lighting will override alpha blending. That is, with lighting enabled, alpha blending will no longer be apparent.

### ***Wireframe Mode***

Renders the spheres in wireframe. It is not unusual for wireframe mode to be slower than normal fully shaded rendering.

### ***Show Device Properties***

Displays information about the graphics adapter, the screen mode that the scene is being rendered in and the frame rate.

### ***Rotate Objects***

Rotates the spheres about their Y-Axis.

### ***Move Objects – X, Y & Z Directions***

Provides movement for all objects in the selected direction(s).

### ***Number of Objects***

The number of spheres in the scene.

### ***Number of Textures***

The number of unique textures used when Texture 1 is selected. For the purposes of this test, textures are checker designs, which vary in color and size.

### ***Test Duration***

The length of the test, in seconds.

### ***Set All***

Sets all checkboxes on.

### ***Clear All***

Clears all checkboxes.

### ***Simple & Medium and Complex Tests***

Provides a series of predefined tests. These are also the tests which are run from the main Performance Test menu and are useful for comparing the results of various graphics cards.

The tests are composed of the following settings...

	<b>Simple</b>	<b>Medium</b>	<b>Complex</b>
<b>Screen Mode</b>	Windowed	Windowed	Full Screen
<b>Screen Resolution</b>	640 x 480	640 x 480	800 x 600
<b>Number of Objects</b>	10	20	40
<b>Number of Textures</b>	1	7	20
<b>Texture 1</b>	On	On	On
<b>Texture 2</b>	Off	Off	On
<b>Lighting</b>	Off	On	On
<b>Specular</b>	Off	Off	On
<b>Fogging Vertex</b>	Off	Off	On
<b>Fogging Pixel</b>	Off	On	On
<b>Alpha Blending</b>	Off	Off	Off
<b>Wireframe Mode</b>	On	Off	Off
<b>Show Properties</b>	On	On	On
<b>Rotate Objects</b>	On	On	On
<b>X – Direction</b>	Off	On	On
<b>Y – Direction</b>	Off	On	On
<b>Z – Direction</b>	On	On	On

### ***Result (Frame Rate)***

This section contains information about the capacities and supported features of your graphics card. The data is obtained during the test, so the fields here will be blank until the test is run once.

### ***Frame Rate***

This is the amount of frames per second, the scene has been rendered. The more complex the scene, the longer it takes DirectX to render each frame and so the lower the frame rate.

### ***EMBM Support***

Indicates if your card supports Environment Mapped Bump Mapping. Bump mapping is a texture blending method that models a realistic rough surface.

### ***DOT3 Support***

Indicates if your card support DotProduct3 texture blending. This is a more sophisticated lighting mechanism which works on a per pixel basis and also supports bump mapping (see above). All recent and upcoming graphics cards should support Dot3.

### ***Pixel Fog Support***

Indicates if your card supports pixel fogging. Vertex fogging is available through the DirectX lighting engine, but most recent and upcoming graphics cards support fogging at a hardware level. This is referred to as pixel fogging.

### ***TnL Support***

TnL stands for Transformation and Lighting. Transformation and Lighting is a standard part of the DirectX rendering process, however some cards provide support for Hardware Transformation and Lighting which speeds up the rendering process further. This field refers to Hardware TnL.

### ***Maximum Texture Stages***

The maximum amount of textures which can be blended on the same object.

### ***Vertex Shader Support***

Like TnL, vertex shading is supported through the DirectX lighting engine. However some graphics cards support hardware accelerated vertex shading. This field indicates whether your card supports vertex shading and if so, the version of the vertex shader.

### ***Pixel Shader Support***

Another element of the process of rendering a 3D scene is pixel shading. This field indicates the version of the cards pixel shader.

### ***Texture Memory Used***

The amount of memory used to render all textures. If you increase the number of textures in the test, you will notice this number increases proportionally. Once all the texture memory on the card is used up, DirectX starts to use system memory.

### ***Rendering Device***

This section allows the user to choose between graphics cards if more than one is present in the system and select between device modes.

#### ***Adapter***

Select the graphics card to test from the list.

#### ***Device***

Choose between Hardware Accelerated and Software Emulation modes. Hardware Accelerated attempts to use the features and resources of the selected graphics card to maximize the frame rate. Software Emulation will not use the graphics card, but may be useful to test your machines native ability to render 3D graphics.

#### ***Rendering Mode***

Here you will select the screen resolution the 3D Graphics Test will use.

#### ***Use desktop window***

Select this option to have the test display in a window at a resolution of 640 x 480.

#### ***Fullscreen mode***

Select this option to run the test in fullscreen mode. You may select the screen resolution and color depth from the list.

NB: Tests should run at a slightly higher frame rate in fullscreen mode, as DirectX has full control over the systems graphics interface.

### ***Refresh Rate***

By default, DirectX will attempt to run as quickly as it possibly can. This may at times be substantially higher than the monitor refresh rate. We have noticed cases with some cards where this behaviour has lead to a green or red flashing flicker on the screen. As a result the option to limit the frame rate to the monitor refresh rate is included.

NB: Most cards will run fine on Maximum Refresh Rate.

### ***Maximum Refresh Rate***

Render the scene at the highest frame rate DirectX can manage.

### ***Default Monitor Refresh Rate***

Limit the frame rate to the monitor refresh rate. This prevents a nasty flicker on some graphics cards.

# Advanced Networking test

Almost all computers these days have a network connection of some description. Whether it be a modem connection to an ISP, or an Ethernet connection to a corporate intranet, sending and receiving data to and from other computers is an essential part of day to day operations. A myriad of applications use networking technology – Email, Web browsers and games to name a few popular choices. In most cases, there is one performance factor the user is most concerned with – the speed or transfer rate.

The PassMark Advanced Network Test is designed to test the data transfer rate between **two computers both of which must be running PerformanceTest**. One of the computers must act as the server and will sit waiting for a connection. The other computer acts as a client. It connects to the server machine and sends data to it for the duration of the test.

The test sequence is as follows.

- 1) Start the Advanced Network Test on the machine which is to be the server.
- 2) Click 'Go' and the test will enter a state where it waits for a remote connection.
- 3) Start the Advanced Network Test on the machine which is to be the client.
- 4) Select the 'Client' option and enter the IP address or host name of the server machine.
- 5) Click 'Go' to connect and send data.

Data will be sent from client to server at the highest transfer rate possible for the duration of the test (which is specified on the client machine).

Both sides of the test will end and the results will be displayed and can also be viewed in graph form or exported to an HTML report.

## ***Mode - Server***

This machine will act as the server for this test.

## ***Mode - Client***

This machine will act as the client for this test.

## ***Remote Server IP Address or Name***

The remote machine details. Note that this section is only enabled when the client option is selected.

## ***Host***

The IP address or host name of the remote machine.

## ***Port***

The TCP/IP port number to be connected to. This defaults to 1040 on both machines. The port may be changed to any relevant value, but if so, it must be changed to the **same value on both machines** involved in the test.

## ***Send Data***

The data is sent from client to server in many blocks. This section contains some extra options which allow the user to customize the nature of the data sent.

NB This section is only enabled when the client option is selected.

### ***Fixed Block Size***

Select this option to have the client use the default block size of 4096 bytes for all data.

### ***Variable Block Size (Start and End block size)***

Select this option to have the client send data using varying block sizes. At the start of the test, data will be sent using the 'Start block size' number of bytes for each send operation. During the course of the test, Performance Test will gradually increase this value based on the test duration. When the test ends, the block size will have reached 'End block size'.

NB: If 'Start block size' is a larger value than 'End block size', the size of the block will decrease during the test.

### ***Test Duration***

The length of time in seconds the test will run for.

### ***Status***

This section is updated during the test to provide real time performance metrics. The first field provides a general description of the current test state.

### ***Nb packets rcv & Bytes***

Only relevant for the server portion of the test. Displays the number of packets or data blocks received so far, and the size of the data in bytes.

### ***Nb packets sent & Bytes***

Only relevant for the client portion of the test. Displays the number of packets or data blocks sent so far, and the size of the data in bytes.

NB: When the test ends, the field 'Nb packets sent' on the client machine should be the same value as the field 'Nb. packets rcv.' on the server machine.

### ***Average Transmission***

The current average transfer rate in KBits/Sec.

### ***CPU Load***

The current CPU load expressed as a percentage.

Note that for some slower machines on fast networks (100Mbit/s and greater), this test is often limited by lack of power in the CPU.

### ***Go***

Start the Advanced Network Speed test.

### ***Stop***

Stops a currently running test.

NB: Unless at least 10 test samples have been taken, the test results will not be valid. Performance Test takes 100 samples during the course of the network test.

***View Graph***

Displays a graph of the test results.

***Export***

Exports a HTML document with a graph and a table of results.

***Help***

Opens the Help.

***Exit***

Closes the dialog.

***Network Test Notes***

Ensure the server is waiting for a connection before attempting to connect with the client.

If the client cannot resolve the DNS name of the server, try using it's IP address. You can obtain the IP address of a machine by typing 'ipconfig' at the DOS command line in the case of Windows NT, 2000, XP or Clicking Start -> Run and entering 'winipcfg' in the case of Windows 98 and Me.

If you are attempting to connect to a machine from outside or inside a firewall, you may need to either change the port number to one accepted by the firewall or ask your network administrator to configure the firewall to allow the default port for the network test, which is 1040.

# Advanced Memory test

The Advanced Memory Test is designed to test several factors which affect the speed which data is accessed in memory.

You can think of computer memory as a long continuous strip. The strip is composed of millions (sometimes billions) of slots. Each slot has a unique identifying value called its address. On 32 bit Windows platforms the size of each slot is 32 bits or 4 bytes ( 1 byte = 8 bits ). Windows moves data onto and off of this strip as required. For instance, running an executable file from a disk causes Windows to copy the file from the disk to memory and then run the executable from there.

One principle of memory design is known as Spatial Locality. It says that memory addresses which are near each other tend to be referenced close together in time. Memory is designed with this principle in mind and so, we should expect to see a decline in memory access time if we continually request addresses that are far apart from each other.

## **Memory Speed Per Access Step Size**

The first test type, 'Memory Speed Per Access Step Size' accesses a large block, of memory in various sized steps. First, it runs through the block of memory sequentially, accessing every value. Next it runs through the same block again, except this time it accesses every second value. On this occasion, it runs through the block twice in order to access the same amount of data as the initial step. Next it runs through the same block again, except this time it accesses every fourth value and so makes four passes. And so on, until a certain maximum step size is reached.

The size of the block of memory used for this test is one quarter the amount of system RAM. The size of the steps vary from 1 (continuous sequential access), to one quarter the size of the block of memory ( i.e. one sixteenth of the system RAM ).

## **Memory Speed Per Block Size**

When a computer program wants to use a section of memory to store data, it makes a request to Windows for the amount of memory it requires. Windows allocates the memory to the program ( unless system resources are very low ) and returns to the requesting program the address of the first memory slot in the allocated block. It is possible that some programs may request very large amounts of memory. The 'Memory Speed Per Block Size' test like the 'Memory Speed Per Access Step Size' test, is composed of many steps. During each step of the test, PerformanceTest requests a block of memory and runs through the block measuring the average access time. However on each subsequent step the size of the requested memory is increased, until finally a block close to the size of the system RAM is requested. In this way it is possible to observe the different access speeds for the different sizes of blocks.

Typically it is possible to see very fast memory access for blocks which are small enough to fit entirely into the L2 RAM cache, and slower access times for larger blocks accessed from main RAM. In the case where system resources are low, swapping to the disk may even be required for very large blocks.

## **Access data type**

One byte is the smallest amount possible, which can be read from or written to memory. As the test runs through each block, the user can also select whether we access the memory one byte at a time, two bytes at a time, or four bytes at a time.

<b>Name</b>	<b>Bytes</b>	<b>Bits</b>
Byte	1	8
Word	2	16
Double Word (Dword)	4	32

Note: The results of this test are most meaningful if viewed in graph form or exported.

**Block Read/Write**

Each test can be executed in either read or write mode. In read mode data is copied from memory to Performance Test. In write mode data is written from Performance Test to memory.

**Memory Speed Per Access Step Size:**

See description of the 'Memory Speed Per Access Step Size' test above.

**Memory Speed Per Block Size**

See description of the 'Memory Speed Per Block Size' test above.

**Access Data Type**

Select the amount of data read or written in each operation of the 'Memory Speed Per Block Size' test.

**Total Physical Memory**

Displays the amount of system RAM in bytes.

**Block Size**

Displays the size of the block of memory Performance Test is currently carrying out operations on for the purpose of this test.

**Progress**

Displays progress information about the test.

**Go**

Start the Advanced Memory Speed test.

**Stop**

Stops a currently running test. Note that results of an aborted test are not valid.

**View Graph**

Displays a graph of the test results.

**Export:**

Exports a HTML document with a graph and a table of results.

**Help**

Opens the Help.

**Exit**

Closes the dialog.

## pcAnywhere compatibility

If you have received an alert about pcAnywhere being detected on your computer, this is because some pcAnywhere settings may conflict with DirectX, which PerformanceTest utilizes when performing 3D tests.

To ensure trouble free operation while running the 3D tests, please ensure that pcAnywhere is set to operate in "Compatibility" mode. To switch to "Compatibility" mode, please follow these simple steps:

1. On the host computer, open pcAnywhere.
2. On the Tools menu, click Options.
3. On the Host Operation tab, in the Video mode selection list, click Compatibility.
4. Click OK.

Note: Some users may need to first select "Accelerator Enabled" in the Video mode selection list, click the apply button and then select "Compatibility" once again, then click the apply button and restart the system.

More information regarding pcAnywhere can be found on the Internet at:

<http://www.symantec.com/techsupp/consumer.html>

