The Intel® Core™ 2 Extreme Processor

World’s Best Gaming Processor

Field Performance Guide

http://www.intel.com/performance/desktop/extreme

Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See [http://www.intel.com/products/processor_number](http://www.intel.com/products/processor_number) for details.

Intel® Active Management Technology requires the platform to have an Intel® AMT-enabled chipset, network hardware and software, connection with a power source and a network connection.

Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

Intel® EM64T requires a computer system with a processor, chipset, BIOS, operating system, device drivers and applications enabled for Intel® EM64T. Processor will not operate (including 32-bit operation) without an Intel® EM64T-enabled BIOS. Performance will vary depending on your hardware and software configurations. See [www.intel.com/info/em64t](http://www.intel.com/info/em64t) for more information including details on which processors support Intel® EM64T or consult with your system vendor for more information.

For processors with HT Technology, performance and functionality will vary depending on (i) the specific hardware and software you use and (ii) the feature enabling/system configuration by your system vendor. See [www.intel.com/products/ht/hyperthreading_more.htm](http://www.intel.com/products/ht/hyperthreading_more.htm) for information on HT Technology or consult your system vendor for more information.

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit [http://www.intel.com/performance/resources/index.htm](http://www.intel.com/performance/resources/index.htm)

SPECint® and SPECfp® benchmark tests reflect the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit applications. SPECint, SPECfp, SPECrate are trademarks of the Standard Performance Evaluation Corporation, see [http://www.spec.org](http://www.spec.org) for more information. SPEC® benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing. For more information about SPEC®, including a description of the systems used to obtain these test result, and other information about microprocessor and system performance and benchmarks, visit Intel's World Wide Web site at www.intel.com or call 1-800-628-8686.

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Contents:

• 3rd Party Rave Reviews

• Intel® Core™ Microarchitecture

• Extreme Gaming
  – Intel to Intel
  – Intel to Competition

• Platform Capabilities Overview
  – Intel to Intel
  – Intel to Competition

• Call to Action
3rd Party Rave Reviews:

Intel’s Core 2 Extreme & Core 2 Duo: The Empire Strikes Back  (Anandtech 7/06)
“… the most impressive piece of silicon the world has ever seen … the fastest desktop processor we've ever tested.”

Intel Goes for the Jugular  (Extremetech, 7/06)
“…Core 2 looks like the must-have CPU for enthusiast and mainstream user alike.”

First "Conroe" Core 2 PC Delivers Amazing Benchmark Results  (PC Magazine online, 7/06)
“… the new desktop performance champ … the one others will be chasing around the track for quite a while…”

AMD chips hammered by Conroe (Inquirer, 7/06)

“… Make no mistake, the Core 2 Duo and Core 2 Extreme are very real, and their performance is undeniable... they seem to be everything Intel promised and then some.”  (HotHardware.com, 7/06)
### Intel® Core™ Microarchitecture:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Function</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Execution Engine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intel® Wide Dynamic Execution</strong></td>
<td>Executes 4 instructions per clock cycle</td>
<td>Better performance on multiple application types and user environments</td>
</tr>
<tr>
<td></td>
<td>• vs. 3 per clock with Intel Netburst®, Intel mobile and competitor microarchitectures</td>
<td></td>
</tr>
<tr>
<td><strong>Intel® Advanced Smart Cache</strong></td>
<td>Increases efficiency of L2 cache to processor core data transfers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Entire L2 cache can be allocated to one core (vs. dedicated L2 for each core in PDP and AMD* K8 DC)</td>
<td></td>
</tr>
<tr>
<td><strong>Intel® Smart Memory Access</strong></td>
<td>Efficiently feeds data to Intel Wide Dynamic Execution engine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maximizes main memory to processor bandwidth and reduces latency</td>
<td></td>
</tr>
<tr>
<td><strong>Media &amp; FP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intel® Advanced Digital Media Boost</strong></td>
<td>Allows many 128 bit SSE/2/3 instructions to execute in a single clock cycle</td>
<td>Better performance on apps that use SSE instructions:</td>
</tr>
<tr>
<td></td>
<td>• Same instructions execute in 2 cycles Intel Netburst®, Intel mobile and competitor microarchitectures</td>
<td>• Video, speech, gaming, multimedia, photo processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Encryption, financial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engineering, scientific</td>
</tr>
<tr>
<td><strong>Power Efficiency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intel® Intelligent Power Capability</strong></td>
<td>• Conroe 65W desktop mainstream TDP</td>
<td>Can help enable quieter, more power efficient system designs</td>
</tr>
<tr>
<td></td>
<td>• Woodcrest 80W server mainstream &amp; 40W ultra dense TDP</td>
<td>Can help reduce overall power consumption</td>
</tr>
<tr>
<td></td>
<td>• Continued low power mobile platform</td>
<td></td>
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**New levels of performance and power efficiency based on Intel® Core™ Microarchitecture**
Key Messages:

Optimized for performance leading, extreme gaming

- The Intel® Core™ 2 Extreme processor is the best gaming processor available on the market.¹
- The five key architectural improvements offered by the Intel® Core™ Microarchitecture improve handling of complex physics and artificial intelligence
- Game changing dual-core performance for an incredible game experience and more realistic game play

Revolutionary levels of dual-core performance powering vivid, high definition experiences

- More energy efficient with more performance² in desktop systems for cooler-running PCs
- Designed to work without expensive cooling solutions

Vivid, high definition experiences

Enables more energy efficient PCs

¹ Performance measured using 3DMark*06 – CPU Test and SPECint*_rate_base2000. Actual performance may vary.
² Energy efficiency based on Thermal Design Power (TDP) measurement.
Extreme Gaming
Extreme Gaming:

Intel® Pentium® Processor Extreme Edition 965 (2x2MB L2, 3.73GHz, 1066MHz FSB) with dual graphics

Intel® Core™2 Extreme Processor X6800 (4MB L2, 2.93GHz, 1066MHz FSB) with dual graphics

Games used medium settings and 1024x768x32 resolution. These settings are used for comparing CPU contribution to game performance.

3DMark® 2006
CPU_Test

Quake® 4
v1.2

Unreal® Tourn.
2004 v3369
"Botmatch"

F.E.A.R.®
v1.05

Half-Life® 2
Build_2707
"Lost_Coast"

Doom® 3
v1.0.1062

Normalized to Intel Pentium Processor Extreme Edition 965

Intel’s Core 2 Extreme & Core 2 Duo: The Empire Strikes Back
“... the most impressive piece of silicon the world has ever seen ... the fastest desktop processor we’ve ever tested.” (Anandtech 7/06)

Source: Intel. Configuration: Processor as listed above, Intel 975X Express Chipset on Intel D975XBX board, Intel chipset software installation file 7.2.2.1007, Intel Matrix Storage Manager 5.5.0.1034 RAID-0 Ready, Dual ATI® Radeon® X1900 XTX PCIe, ATI Catalyst Driver 6.6 driver 8.305.0.3, 2x1GB OCZ® DDR2 800 4-4-4-12, Maxtor® DiamondMax™ 10 300GB NCQ Serial ATA 7200RPM, Windows® XP Professional Build 2600 SP2 NTFS, DirectX 9.0c. Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit http://www.intel.com/performance/resources/index.htm

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Extreme Gaming:

Games used medium settings and 1024x768x32 resolution. These settings are used for comparing CPU contribution to game performance.

Intel’s Core 2 Extreme & Core 2 Duo: The Empire Strikes Back

“... the most impressive piece of silicon the world has ever seen ... the fastest desktop processor we've ever tested.” (Anandtech 7/06)

Source: Intel. Configuration: 1st Platform: Intel Core 2 Extreme Processor X6800 (4 MB L2, 2.93 GHz, 1066 MHz FSB), Intel 975X Express Chipset on Intel 879/5XBX board, Intel chipset software installation file 7.2.2.1027, Intel Matrix Storage Manager 5.5.0.1036 RAID-d Ready, dual ATI* Radeon* X1900 XTX PCIe, ATI Catalyst Driver 6.6 driver 8.263.0.0. 2nd Platform: AMD* Athlon* 64 FX62 (2x1 MB L2, 2.80 GHz), nVidia* nForce* 5900 on Asus* M2N32-SLI Deluxe board, nVidia nForce driver Smbus 4.52, dual nVidia 7900 GTX graphics with driver 84.21. Both Platforms: 2x1GB OCZ* DDR2 800 4-4-4-12, Maxtor* DiamondMax* 300GB NCQ Serial ATA 7200RPM, Windows* XP Professional Build 2600 SP2 NTFS, DirectX 9.0c. Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit http://www.intel.com/performance/resources/index.htm

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Platform Capabilities Overview

(Intel to Intel)
## Harness Extreme Capabilities:

<table>
<thead>
<tr>
<th>Harness Extreme Capabilities</th>
<th>Intel® Pentium® 4 Processor Extreme Edition 3.73GHz with HT Technology</th>
<th>Intel® Pentium® Processor Extreme Edition 965</th>
<th>Intel® Core™2 Extreme Processor X6800</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HD Videography</strong>¹</td>
<td>~ 9.6 hours</td>
<td>~ 5.8 hours</td>
<td>~ 4.3 hours</td>
</tr>
<tr>
<td>Spend less time to produce a 1 hour professional video</td>
<td>33 photos</td>
<td>44 photos</td>
<td>53 photos</td>
</tr>
<tr>
<td><strong>Digital Photos</strong>²</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Edit more high resolution pictures for your photo album in 20 minutes</td>
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<tr>
<td><strong>High End Rendering</strong>⁵</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Render much faster on the 3D ray tracing benchmark from POV-Ray*</td>
<td>389 pixels / sec</td>
<td>765 pixels / sec</td>
<td>1088 pixels / sec</td>
</tr>
</tbody>
</table>

### Source:
Intel® System configurations: shown on following slides.

**Run Description:** Calculations base on:
1) XMPEG® 5.03 with DivX® 6.2.5 converting a 24 sec HDV MPEG2 into a compressed HD DivX file.
2) Adobe® Photoshop® CS2 filtering pictures (11.3 to 14.4MB) with resolution 2592x1944 and uses web gallery to automatically create a web page.
3) Apple® Quicktime® Pro 7.1 taking a 121 sec DV file (416MB, 720x480 resolution, 29.97fps) and creates an output file using the Broadband-High profile with H.264 compression, 672kbps video bitrate, multi-pass encoding, 480x360 resolution, AAC audio and a 128kbps audio bitrate.
4) Adobe® After Effects® 7.0 applying different effects to several input file types (PSD, EPS, TIF, MOV) and then renders to an AVI movie file.

**All** Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit [http://www.intel.com/performance/resources/limits.htm](http://www.intel.com/performance/resources/limits.htm). *Other names and brands may be claimed as the property of others*
HD Videography

Create high definition videos

- ~4.3 hours for Intel® Core™2 Extreme Processor X6800
- ~5.8 hours for Intel® Pentium® Processor Extreme Edition 965
- ~9.6 hours for Intel® Pentium® 4 Processor Extreme Edition 3.73GHz with HT Technology

How much time\(^1\) you need to produce a 1 hour professional video using XMPEG* 5.03 with DivX* 6.2.5

Compress, store, and share your home videos in high definition quality!

You want to look back on those special moments, so you preserve wedding memories and past vacations on video.

Compress all your latest MPEG-2 HD videos to HD DivX format for improved file manageability.

With the Intel® Core™2 Extreme processor X6800, you will easily save hours of precious time for each hour of HD video you reformat!

---

1 - Calculation based on XMPEG* 5.03 with DivX* 6.2.5 converting one 24 sec HDV MPEG2 into a compressed HD DivX file.

Source: Intel. Configuration: Processor as listed above, Intel 975X Express Chipset on D975XBX, Chipset Install file 7.2.2.1007, OCZ* 2x1GB DDR2 800 4-4-4-12, Maxtor*DiamondMax*10 300GB NCQ SATA 7200RPM, Intel Matrix Storage Manager 5.5.0.1035 RAID-0 Ready, ATI® Radeon® X1900 XTX PCIe, ATI® Catalyst® 6.6 driver suite 8.263.0.0, Windows* XP Professional Build 2600 SP2 NTFS, DirectX 9.0c. Performance tests and ratings are measured using specific systems and/or components and reflect approximate performance of Intel products as measured by those tests. Any difference in system hardware, software, or configuration may affect actual performance. Buyers should consult other sources of information to evaluate performance of systems or components they are considering purchasing. For more information on performance tests and performance of Intel products, visit http://www.intel.com/performance/resources/limits.htm

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Digital Photos

Enhance your digital images

53 photos
Intel® Core™2 Extreme Processor X6800

44 photos
Intel® Pentium® Processor Extreme Edition 965

33 photos
Intel® Pentium® 4 Processor Extreme Edition 3.73GHz with HT Technology

How many digital photos you can enhance\(^1\) in 20 minutes using Adobe® Photoshop® CS2

Add pizzazz to your digital pictures and create your own photo album!

Edit family photos and create an album to share with your family and friends.

Apply filters to your high resolution images and create a web page to give your pictures the professional looking finish they deserve.

With the Intel® Core™2 Extreme processor X6800, you can refine many more photos in less time!

\(^1\) - Calculation based on Adobe® Photoshop® CS2 filtering 5 pictures (11.3 to 14.4MB) with resolution 2592x1944, then use web gallery to automatically create a web page.

Source: Intel. Configuration: Processor as listed above, Intel 975X Express Chipset on D975XBX, Chipset Install file 7.2.2.1007, OCZ® 2x1GB DDR2 800 4-4-4-12, Maxtor® DiamondMax® 10 300GB NCQ SATA 7200RPM, Intel Matrix Storage Manager 5.5.0.1035 RAID-0 Ready, ATI® Radeon® X1900 XTX PCIe, ATI® Catalyst® 6.6 driver suite 8.263.0.0, Windows® XP Professional Build 2600 SP2 NTFS, DirectX 9.0c.

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Shows on the Go!

Take entertainment with you

- **+96% faster** Intel® Core™2 Extreme Processor X6800
- **+41% faster** Intel® Pentium® Processor Extreme Edition 965
- Baseline Intel® Pentium® 4 Processor Extreme Edition 3.73GHz with HT Technology

How much faster¹ you can convert TV shows for your iPod* using Apple* Quicktime* Pro 7.1

Convert your TV shows so they are ready to go when you are!

Since you are always on the go, you need entertainment that is easy to take with you. And you don’t have much time to prepare the files.

Quickly convert your favorite TV shows and be ready to go in less time.

With the Intel® Core™2 Extreme processor X6800, you are free to quickly convert all the best video entertainment in a fraction of the time!

¹ - Calculation based on Apple® Quicktime® Pro 7.1 taking a 121 sec DV file (416MB, 720x480 resolution, 29.97fps) and creating an output file using the Broadband-High profile with H.264 compression, 672kbps video bitrate, multi-pass encoding, 480x360 resolution, AAC audio and a 128kbps audio bitrate.

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Special Effects

Make your own movie magic

~7.5 minutes Intel® Core™2 Extreme Processor X6800

~10.4 minutes Intel® Pentium® Processor Extreme Edition 965

~15.2 minutes Intel® Pentium® 4 Processor Extreme Edition 3.73GHz with HT Technology

How long it takes to add special effects into a series of video clips using Adobe® After Effects® 7.0

Become a special effects wizard while creating your own movie magic!

Transform your normal digital video into an electrifying blockbuster movie extravaganza.

Incorporate cutting edge visual effects like motion echoes, action blurring, scene fading, and object shadowing.

With the Intel® Core™2 Extreme processor X6800, greatly reduce the processing time needed to create a visual masterpiece!

1 - Calculation based on Adobe® After Effects® 7.0 applying different effects to several input file types (PSD, EPS, TIF, MOV) and then renders to an AVI movie file.

Source: Intel. Configuration: Processor as listed above, Intel 975X Express Chipset on D975XBX, Chipset Install file 7.2.2.1007, OCZ® 2x1GB DDR2 800 4-4-4-12, Maxtor® DiamondMax® 10 300GB NCQ SATA 7200RPM, Intel Matrix Storage Manager 5.5.0.1035 RAID-0 Ready, ATI® Catalyst® 6.6 driver suite 6.263.0.0, Windows® XP Professional Build 2600 SP2 NTFs, DirectX 9.0c. Performance tests and ratings are measured using specific systems and/or components and reflect approximate performance of Intel products as measured by those tests. Any difference in system hardware, software, or configuration may affect actual performance. Buyers should consult other sources of information to evaluate performance of systems or components they are considering purchasing. For more information on performance tests and performance of Intel products, visit http://www.intel.com/performance/resources/limits.htm.

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High End Rendering

Render amazing scenes

- **1088 pixels/sec** Intel® Core™2 Extreme Processor X6800
- **765 pixels/sec** Intel® Pentium® Processor Extreme Edition 965
- **389 pixels/sec** Intel® Pentium® 4 Processor Extreme Edition 3.73GHz with HT Technology

How fast¹ you can render a highly complicated scene using POV-Ray* 3.7 Beta 13a

**Render incredible three-dimensional scenes with truly blazing speed!**

Quickly render intensely life-like scenes that capture your wildest imagination.

From futuristic worlds to landscapes that defy the laws of physics, witness the speed at which you can look upon these incredible places.

With the Intel® Core™2 Extreme processor X6800, you can render over 1000 pixels per second on the intense POV-Ray landscape!

---

¹ - Calculation based on POV-Ray* 3.7 Beta 13a rendering a specified scene located at www.povray.org/download/benchmark.php

Source: Intel. Configuration: Processor as listed above, Intel 975X Express Chipset on D975XBX, Chipset Install file 7.2.2.1007, OCZ* 2x1GB DDR2 800 4-4-4-12, Maxtor*DiamondMax*10 300GB NCQ SATA 7200RPM, Intel Matrix Storage Manager 5.5.0.1035 RAID-0 Ready, ATI* Radeon® X1900 XTX PCIe, ATI* Catalyst® 6.6 driver suite 8.263.0.0, Windows* XP Professional Build 2600 SP2 NTFS, DirectX 9.0c. Performance tests and ratings are measured using specific systems and/or components and reflect approximate performance of Intel products as measured by those tests. Any difference in system hardware, software, or configuration may affect actual performance. Buyers should consult other sources of information to evaluate performance of systems or components they are considering purchasing. For more information on performance tests and performance of Intel products, visit http://www.intel.com/performance/resources/limits.htm

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First “Conroe” Core 2 PC Delivers Amazing Benchmark results

“... the new desktop performance champ ... the one others will be chasing around the track for quite a while ...” (PC magazine online, 7/06)

1) SPECrate copies are set to the number of logical hardware cores seen by the operating system. Using Intel C++ Compiler 9.1 for Windows. SPECint, SPECfp, SPECrate are trademarks of the Standard Performance Evaluation Corporation, see http://www.spec.org for more information. Data collected July 2006.

Source: Intel. Configuration: Processor as listed above, Intel P965 Chipset on Intel DG965WH board, Chipset Install file 8.0.1.1002, Corsair* 2x1GB DDR2 800 5-5-5-15, Maxtor* DiamondMax*10 300GB NCQ SATA 7200RPM, Intel Matrix Storage Manager 6.0.0.1022 RAID-0 Ready, ATI* Radeon* X1900 XTX PCIe, ATI* Catalyst* 6.6 driver suite 8.263.0.0, Windows* XP Professional Build 2600 SP2 NTFS, DirectX 9.0c. Performance tests and ratings are measured using specific systems and/or components and reflect approximate performance of Intel products as measured by those tests. Any difference in system hardware, software, or configuration may affect actual performance. Buyers should consult other sources of information to evaluate performance of systems or components they are considering purchasing. For more information on performance tests and performance of Intel products, visit http://www.intel.com/performance/resources/limits.htm

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Platform Capabilities Overview

(Intel to Competition)
## Harness Extreme Capabilities:

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<th>Digital Photos²</th>
<th>Shows on the Go!³</th>
<th>Special Effects⁴</th>
<th>High End Rendering⁵</th>
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</tr>
<tr>
<td>~ 6.1 hours</td>
<td>42 photos</td>
<td>Baseline</td>
<td>~ 11.7 minutes</td>
<td>~ 11.7 minutes</td>
</tr>
<tr>
<td>~ 11.7 minutes</td>
<td>53 photos</td>
<td>+29% faster</td>
<td>~ 7.5 minutes</td>
<td>~ 7.5 minutes</td>
</tr>
<tr>
<td>~ 11.7 minutes</td>
<td>773 pixels / sec</td>
<td>Higher is better</td>
<td>1088 pixels / sec</td>
<td>Higher is better</td>
</tr>
</tbody>
</table>

### AMD®
- Athlon® 64 FX62

### Intel® Core™2 Extreme Processor X6800
- ~ 4.3 hours
- 53 photos
- +29% faster

---

**Source:** Intel  
**System configurations:** shown on following slides.  
**Run Description:** Calculations base on = 1) XMPEG* 5.03 with DivX® 6.2.5 converting a 24 sec HDV MPEG2 into a compressed HD DivX file. 2) Adobe® Photoshop® CS2 filtering pictures (11.3 to 14.4MB) with resolution 2592x1944 and uses web gallery to automatically create a web page. 3) Apple® Quicktime® Pro 7.1 taking a 121 sec DV file (416MB, 720x480 resolution, 29.97fps) and creates an output file using the Broadband-High profile with H.264 compression, 672kbps video bitrate, multi-pass encoding, 480x360 resolution, AAC audio and a 128kbps audio bitrate. 4) Adobe® After Effects® 7.0 applying different effects to several input file types (PSD, EPS, TIF, MOV) and then renders to an AVI movie file. 5) POV-Ray® 3.7 Beta 13a rendering a specified scene located at www.povray.org/download/benchmark.php.  
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Harness Extreme Capabilities:

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First “Conroe” Core 2 PC Delivers Amazing Benchmark results
“... the new desktop performance champ ... the one others will be chasing around the track for quite a while ...” (PC magazine online, 7/06)
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