AMD Processor Performance Evaluation Guide

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Revision History

Date	Revision	Description
June 2005	3.71	Corrected title for Travel Ready Scenario.
June 2005	3.70	Updated for the AMD Athlon™ 64 FX-57 processor and the AMD Athlon 64 processor 4800+ relative to the Intel Pentium® 4 550 processor, which operates at 3.8 GHz. Removed the Performance Analysis (64-bit) section, as these tests will be shown in a separate document. Removed obsolete processor information.
October 2004	3.61	Incorporated documentation edits.
October 2004	3.60	Updated for the AMD Athlon™ 64 FX-55 processor and the AMD Athlon 64 processor 4000+ relative to the Intel Pentium® 4 550 processor, which operates at 3.4 GHz. Removed obsolete processor information. Added the following tests to the standard benchmarking suite: • "Dr. DivX (Version 1.0.6)2" on page 56 (Replaces RawAVI to MPEG2 and Xmpeg) • "Return to Castle Wolfenstein Enemy Territory (version 2.60)" on page 61 (Replaces Return to Castle Wolfenstein) • "FarCry (version 1.3.1)" on page 62 • "FarCry pier" on page 57 ***Note:*** *The two FarCry benchmarks were combined in revision 3.70.* • "Painkiller (version 1.64)" on page 63 Within the Performance Analysis test suite, 64-bit versus 32-bit test results have been combined with the 32-bit and 64-bit results, where applicable. ***Note:*** *These changes are obsolete, as the Performance Analysis test suite has been removed from this document.*

Date	Revision	Description
June 2004	3.50	Updated to reflect the AMD Athlon™ 64 FX-53 (939) processor and the 3700+ and 3800+ processors relative to the Intel Pentium® 4 Extreme Edition 3.4 GHz and the Pentium 4 3.4 GHz processors. Removed obsolete processor information. Added the following tests to the Performance Analysis test suite: ***Note:*** *These changes are obsolete, as the Performance Analysis test suite has been removed from this document.* • Table 64, "Panorama Factory Ver. 3.1 64-Bit Benchmark" on page 69 • Table 65, "Crafty Factory Ver. 19.12 64-Bit Benchmark" on page 69 • Table 64, "Panorama Factory Ver. 3.1 Benchmark Results" on page 72 • Table 65, "Crafty Ver. 19.12 32-Bit Benchmark" on page 72 ***Note:*** *Tables 61 and 62 have been obsoleted as of version 3.60 of this document.*
March 2004	3.43	Updated legal attribution for various benchmarks.
March 2004	3.41	As of revision 3.60, these tables are obsolete. Updated the following tables: • Table 35 on page 63 • Table 45 on page 66 • Table 48 on page 68 • Table 51 on page 69 • Table 77 on page 78
March 2004	3.40	Replaced the obsolete AMD Athlon™ 64 FX-51 processor information with the AMD Athlon 64 FX-53 processor. This change affects Table 3 on page 23 and each benchmark result. Replaced the older Intel Pentium® 4 3.2 GHz configuration and performance data with the Intel Pentium 4 3.2 GHz Extreme Edition Processor. This change affects Table 4 on page 22 and each benchmark result. Replaced the benchmark result tables with graphs and corresponding tables.

Date	Revision	Description
January 2004	3.32	Corrected instructions for "Ziff Davis Media Inc. Business Winstone® 2004" on page 31, "Ziff Davis Media, Inc. Business Multitasking Winstone® 2004" on page 31 and "Ziff Davis Media Inc.'s Content Creation Winstone® 2004" on page 36. Moved 64-Bit performance results from non-optimized rows to optimized rows in Table 7 on page 49 and Table 8 on page 51. ***Note:*** *These changes are obsolete, as the Performance Analysis test suite has been removed from this document.*
January 2004	3.31	Updated performance results for Table 7 on page 49 and Table 8 on page 51. Corrected minor typos throughout.
December 2003	3.30	Updated to reflect 3400+ launch. Figure 3 was removed. Additional instructions were added for the DivX Encoder for 64-Bit installation and run. Now refer to "Mini-GZIP" on page 61.
December 2003	3.25	Removed Revision bars.
December 2003	3.24	On Page 13, removed references to WinACE, because it is no longer tested. Within "Operating System Configuration" on page 26, added instructions to skip steps 12 and 13 because they do not apply if Microsoft® Windows® is not yet installed. Instead, skip to step 14. On page 30 added notations that ASUS and MSI drivers are applicable only to their respective motherboards.
December 2003	3.23	Updated benefits for 64-bit processing in "64-bit processing" on page 14. ***Note:*** *This changes is now obsolete, as the Performance Analysis test suite has been removed from this document.* Corrected attribution in "WinZip Computing WinZip 8.1" on page 20.
November 2003	3.22	Added figure label to Figure 3 on page 46. Corrected two column format balancing in various locations.
November 2003	3.21	Applied new document template.
October 2003	3.2	Revision to Table 3 on page 23 to correct memory manufacturer. Revision to update configuration steps for *To install the video clip to use for DivX Encoder* on page 45.
September 2003	3.1	Revision to include NVIDIA video driver and ASUS chipset installation.
September 2003	3.0	Initial Public Release

About This Document

This document is intended for use by those, particularly in the hardware review community, who are interested in evaluating AMD64 performance, as demonstrated by the AMD Athlon™ 64, AMD Athlon 64 X2 and AMD Athlon 64 FX processors.

Introduction

This document describes AMD's method of performing processor performance evaluation, and details the steps taken to arrive at the results posted on the web.

Audience

This document is intended for use by those, particularly in the hardware review community, who are interested in evaluating AMD64 technology performance, as demonstrated by the AMD Athlon 64 and AMD Athlon 64 FX family of processors.

Life of Document

This document is intended for use when comparing the AMD Athlon 64 processor model 4000+, the AMD Athlon 64 X2 model 4800+, and the AMD Athlon™ 64 FX-57 processors against processors available from other vendors at the time of publication of this document. As new speed grades become available, this document may become obsolete or revised as necessary.

AMD64 Processor Architecture

Optimal benchmarking of AMD processors does not require detailed knowledge of processor or system architecture. However, knowledge of the benefits of AMD64 processor-based systems will help enable benchmarks to show the different ways of how this processor performs relative to its competition. AMD designed a 64-bit processor that offers industry-leading performance and native compatibility with current 32-bit applications. Architectural improvements specifically designed to increase instructions per clock (IPC) include:

- AMD64 Technology

  When utilizing the AMD64 Instruction Set Architecture, 64-bit mode is designed to offer:
  - Support for 64-bit operating systems to provide full, transparent, and simultaneous 32-bit and 64-bit platform application multitasking.
  - A physical address space that can support systems with up to 1 terabyte of installed RAM, shattering the 4 gigabyte RAM barrier present on current x86 implementations.
  - Sixteen, 64-bit general-purpose integer registers that quadruple the general purpose register space available to applications and device drivers.
  - Sixteen, 128-bit XMM registers for enhanced multimedia performance to double the register space of current SSE/SSE2/SSE3 implementations.
- Integrated DDR memory controller, as shown in Figure 1 on page 15.
  - This feature allows for a reduction in memory latency, thereby increasing overall system performance.
  - Benchmarks like Business Winstone® and WinRAR Data compression, and AquaMark3 all help show the benefit of reduced latency.
- An advanced HyperTransport™ link, as shown in Figure 2 on page 16.
  - This feature dramatically improves the I/O bandwidth, enabling much faster access to peripherals such as hard drives, USB 2.0, and Gigabit Ethernet cards.
  - HyperTransport technology enables benchmark programs like Business Winstone and WinRAR Data compression to illustrate higher processor performance due to a reduced I/O interface throttle.

- Very large level one (L1) and level 2 (L2) on-die cache
  - With 128 kbytes of L1 cache and 1 Mbyte of L2 cache, the AMD Athlon 64 processor is able to excel at performing matrix calculations on arrays.
  - Programs that use intensive, large matrix calculations will benefit from fitting the entire matrix in the L2 cache.
- Processor core clock-for-clock improvements, including larger TLB (translation look-aside buffers) with reduced latencies and improved branch prediction through four times the number of bimodal counters in the global history counter, as compared to seventh-generation processors.
  - These features drive improvements to the IPC, delivering a more efficient pipeline for CPU-intensive applications.
  - CPU-intensive games like Comanche 4 and Unreal Tournament benefit from these core improvements.
- Introduction of the SSE3 instruction set, which along with support of 3DNow!™ Professional, (SSE and 3DNow! Enhanced) completes support for all industry-standard x86 32-bit instruction set extensions.
- 64-bit processing
  - A 64-bit address and data set enables the processor to process in the terabyte space.
  - Microsoft® Windows® XP 64-Bit Edition for 64-Bit Extended Systems supports up to 32 GB of RAM and up to 16 TB of virtual memory.
  - Gamers can preload entire three-dimensional worlds into memory for a fully immersive experience.
  - Amateurs can edit home videos with ease, providing professional results.
  - The 64-bit space is designed to bring home the digital experience.
- The Industry's first true on-die dual core x86 PC processor
  - Inter-core communication at CPU speed
  - Direct access to memory controller and HyperTransport technology link

Figure 1 is a generic diagram showing the architecture that is internal to all AMD64 technology-based processors.

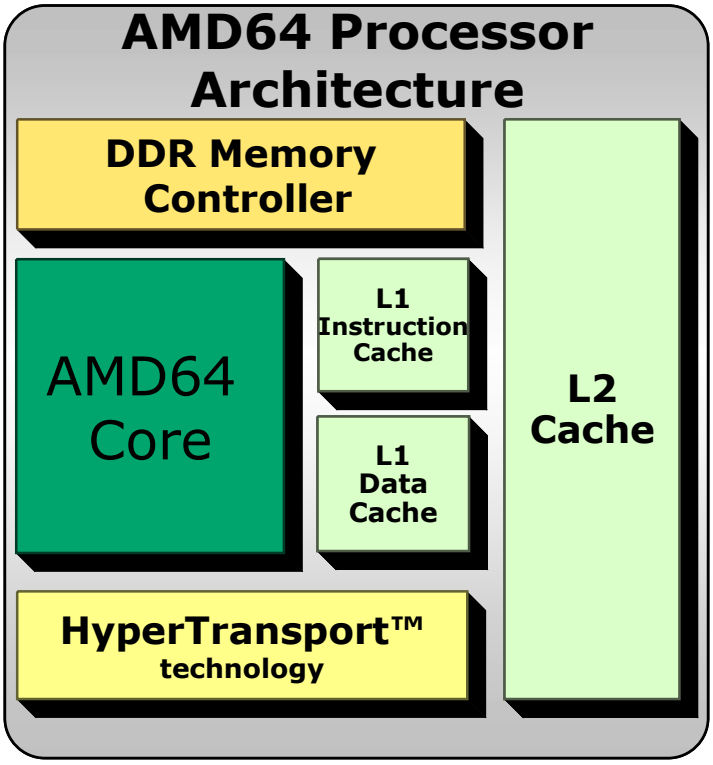


Figure 1. AMD64 Processor Architecture

Figure 2 is a block diagram of a system using HyperTransport™ technology.

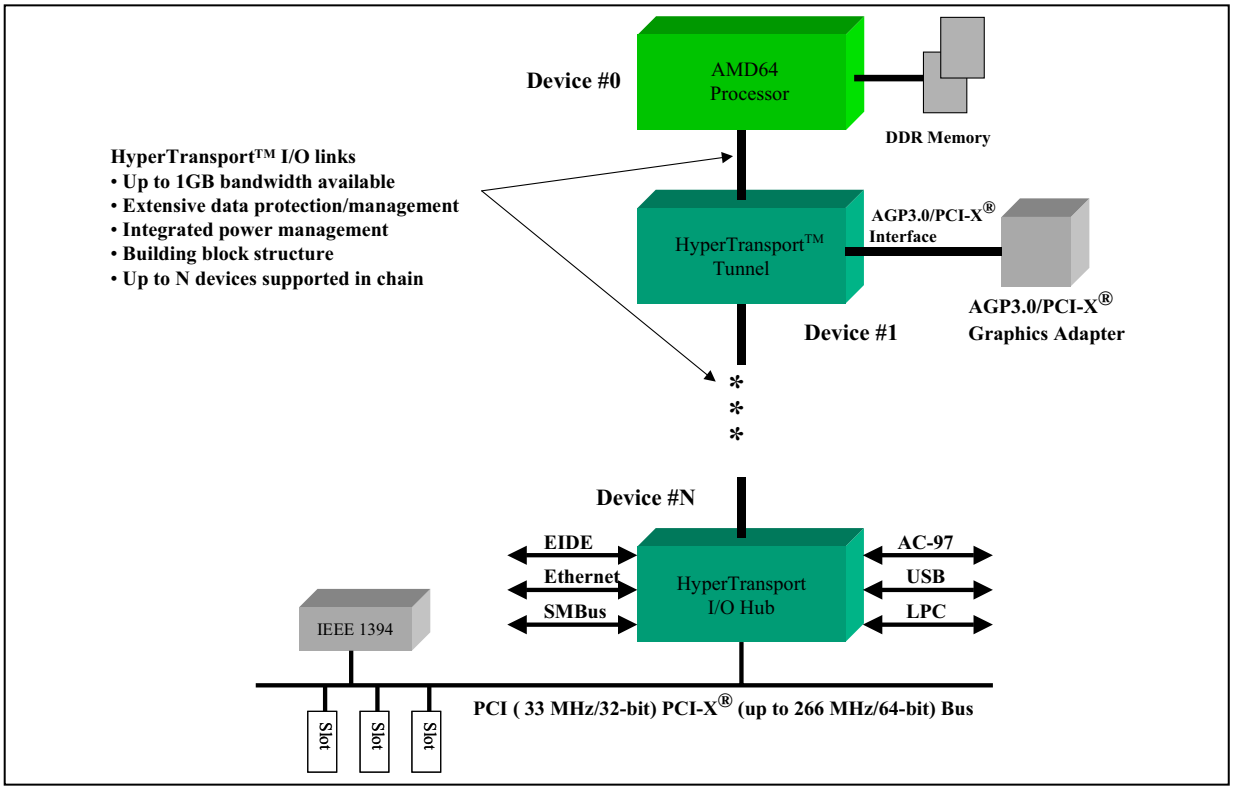


Figure 2. HyperTransport™ Technology Block Diagram

Figure 3 is a block diagram of the AMD Athlon™ 64 X2 Dual-Core processor architecture.

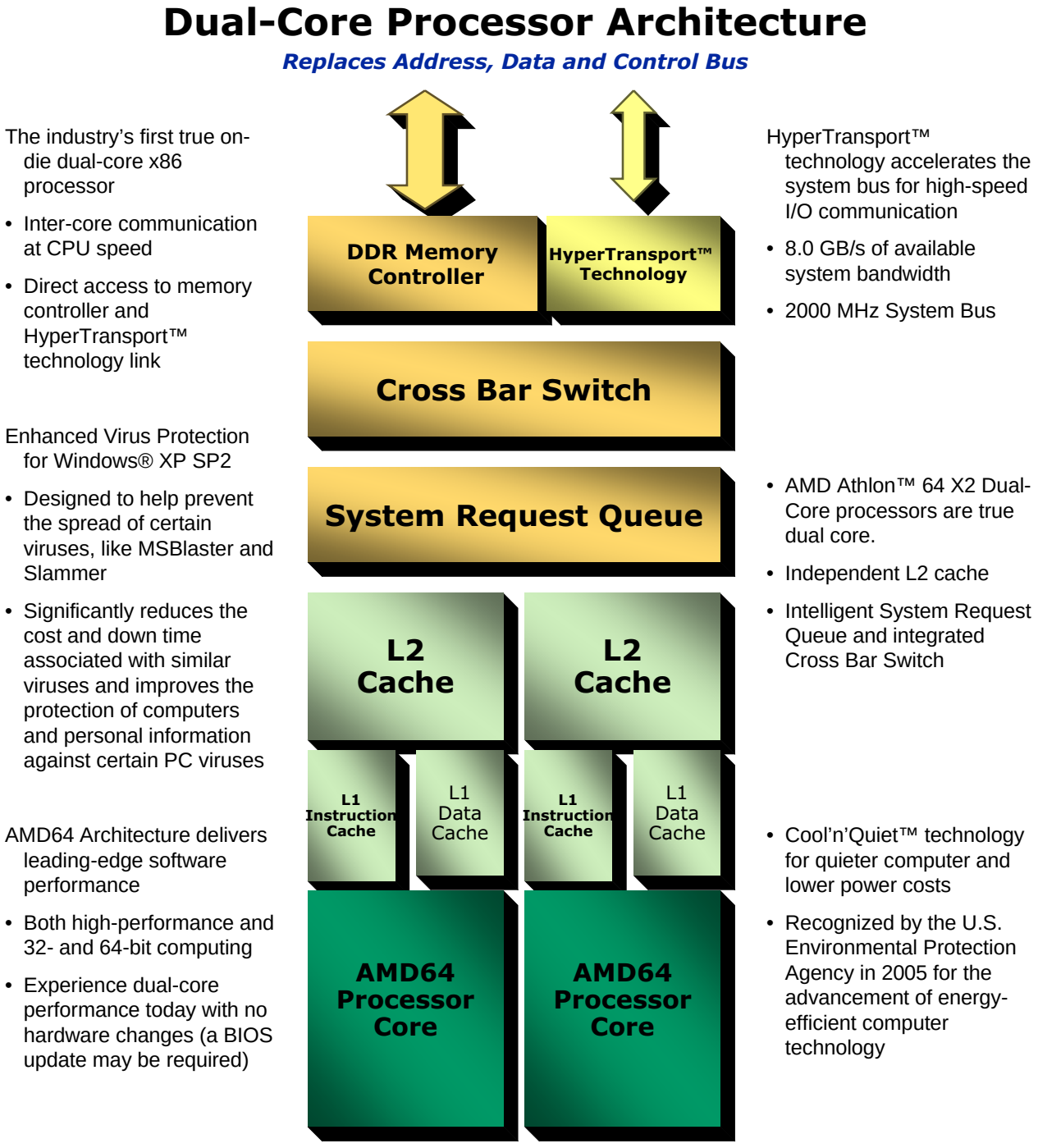


Figure 3. AMD Athlon™ 64 X2 Dual-Core Processor Architecture

AMD's Benchmarking Methodology

AMD assembled a suite of industry standard benchmarks and applications designed to reflect typical end user applications. Specifically, AMD has identified three usage models which we believe best exemplify the commercial and consumer end-user PC experience:

1. Office Productivity
2. Digital Media
3. Gaming

From this list, AMD chose the following benchmarks and applications to represent these end-user experiences. AMD recommends the use of the following benchmarks for proper, balanced, real-world performance analysis.

Office Productivity

AMD Athlon™ 64 and AMD Athlon 64 X2 processors run multiple tasks efficiently. Work productivity may increase because you can perform more tasks and wait less for an application to deliver a response. The following applications simulate a workload likely to be seen in an office workplace environment.

- Business Winstone® 2004 v1.01
  - Microsoft® Internet Explorer 6
  - Microsoft Outlook 2002 SP-2
  - Microsoft Project 2002
  - Microsoft Access 2002 SP-2
  - Microsoft PowerPoint 2002 SP-2
  - Microsoft Excel 2002 SP-2
  - Microsoft FrontPage 2002 SP-2
  - Microsoft Word 2002 SP-2
  - Norton AntiVirus Professional Edition 2003
  - WinZip 8.1 SR-1
- Business Winstone 2004 Multitasking v1.01
  - Multitasks applications found in Business Winstone 2004 v1.01
- SYSmark® 2004, Office Productivity version 1.0 patch 2
  - Adobe® Acrobat® 5.0.5
  - Microsoft Access 2002
  - Microsoft Excel 2002
  - Microsoft Internet Explorer 6
  - Microsoft Outlook 2002
  - Microsoft Word 2002
  - Network Associates Mcafee VirusScan 7.0
  - ScanSoft Dragon Naturally Speaking 6 Preferred
  - WinZip Computing WinZip 8.1
- WinRAR ver 3.42
- PCWorldBench 5 (May 10, 2004 edition with SP2 reg edit)
  - ACD Systems ACDSee PowerPack 5.0
  - Adobe PhotoShop 7.0.1
  - Adobe Premiere 6.5
  - Ahead Nero Software Nero Express 6.0.0.3
  - Discreet 3ds max 5.1 (DirectX)
  - Discreet 3ds max 5.1 (OpenGL)

  - Microsoft Office XP - SP2
  - Microsoft Windows® Media Encoder 9.0
  - Mozilla 1.4
  - Musicmatch Jukebox 7.10
  - Roxio VideoWave Movie Creator 1.5
  - WinZip Computing WinZip 8.1
- Remote collaboration (Multi-application Netmeeting ver. 3.01 + Windows Media Encoder ver. 9.00.00.2980)
  - Microsoft Netmeeting launched on two systems
  - Host system shares a Powerpoint presentation on the target system
  - Microsoft Windows Media Encoder converts a MPEG2 file to Mpeg4
- Travel Ready (Multi-application Microsoft Publisher 2003 ver. 11.5525.5606 + Nero Recoder ver 3.1.0.0)
  - Microsoft Publisher runs with a scripted input to create a newsletter
  - Nero recoder runs to convert a MPEG2 file to Nero's MPEG4 format

The Office Productivity suite now includes two likely operating scenarios. The first is a remote collaboration scenario. In this scenario, Microsoft Netmeeting is launched on two systems. The host system then shares a PowerPoint presentation on the target system.

The other scenario combines Microsoft Publisher 2003 (version 11.5525.5606) with Nero Recorder (version 3.1.0.0). The scenario is a script that creates a newsletter while Nero runs and converts a MPEG2 file into Nero's MPEG4 format.

Digital Media

AMD64 processor-based systems take advantage of the newly-designed system features and deliver outstanding performance for digital creation and playback.

- Content Creation Winstone® 2004 (version 1.01)
  - Adobe Photoshop® 7.01, Adobe Premiere 6.50
  - Macromedia Director MX 9.0, Macromedia Dreamweaver MX 6.1
  - Microsoft Windows Media Encoder 9 version 9.00.00.2980
  - Newtek LightWave 3d 7.5b
  - Steinberg Wave Lab 4.0
- Dr. Divx (version 1.06)
- RazorLAME ver. 1.1.5
- POV-Ray version 3.7.4
  - 3D Rendering program
- SYSmark® 2004 Internet Content Creation
  - Adobe Photoshop 7.01, Adobe Premiere 6.5, Adobe After Effects 5.5
  - Discrete 3ds max 5.1
  - Network Associates Mcafee VirusScan 7.0
  - WinZip Computing WinZip 8.1
  - Macromedia Dreamweaver MX, Macromedia Flash MX
- Panorama Factory version 3.3
  - Photo stitching program
- Sony Vegas Studio ver 4.0
  - Video File Conversion
- Microsoft Movie Maker ver 5.1
  - Still picture to movie conversion.

Computer Gaming

The high performance benefits will amaze computer gamers. The following benchmarks focus on the three dimensional capabilities of a system:

Note: *Computer gaming may reveal limitations in a graphics card and may not truly represent relative processor performance.*

- 3DMark® 2003 (360 patch) (Hardware and Software)
- 3DMark 2005 (120 patch) (Hardware and Software)
- Crafty version 19.19
- Doom3 version 1.1
- Far Cry version 1.3.1 (Pier)
- Half-Life 2 version 1.0.1.0 (`at_coast_05_rev7.dem`, and `at_prison_05_rev7.dem`)
- Pain Killer version 1.64
- Quake III version 1.11
- Return to Castle Wolfenstein Enimy Territory version 2.60
- Splinter Cell version 1.2b (tests 1_1_1 and 1_1_2)
- Star Wars - Jedi Knight II: Jedi Outcast version 1.04
- Unreal Tournament 2004 version 3355 (Flyby and Botmatch)

Optimal System Configuration

This section describes the configurations used by AMD to perform the benchmarks. Systems that conform to the configurations shown in Table 1, Table 2 Table 3 on page 23, Table 4 on page 24, and Table 5 on page 24 are the most likely to obtain optimal system performance.

Table 1. AMD Athlon™ 64 Processor 4000+ System Configuration

Component	Manufacturer	Model	Description
Processor	AMD	AMD Athlon™ 64 Processor 4000+	Clock frequency: 2.4 GHz
Operating System	Microsoft®	Windows® XP Professional	Version 2002 (Service Pack 2)
Motherboard	Asus	A8N-SLI Deluxe	nForce4 SLI MCP, SATA driver NVIDIA 5.10.2600.507
Hard drive	Western Digital	Raptor	(2x) SATA RAID 10k RPM 36.0 GB
RAM memory	Corsair	CMX512-3200XLPRO	2 X 512 MB DIMM PC3500 Module
Video Card	NVIDIA	FX6800 ULTRA PCI-Express	256 MB Onboard DDR RAM, Video Driver 7.1.8.4

Table 2. AMD Athlon™ 64 Processor X2 4800+ System Configuration

Component	Manufacturer	Model	Description
Processor	AMD	AMD Athlon™ 64 Processor X2 4800+	Clock frequency: 2.4 GHz
Operating System	Microsoft®	Windows® XP Professional	Version 2002 (Service Pack 2)
Motherboard	Asus	A8N-SLI Deluxe	nForce4 SLI MCP, SATA driver NVDIA 5.10.2600.507
Hard drive	Western Digital	Raptor	(2x) SATA RAID 10k RPM 36.0 GB
RAM memory	Corsair	CMX512-3200XLPRO	2 X 512 MB DIMM PC3500 Module
Video Card	NVIDIA	FX6800 ULTRA PCI-Express	256 MB Onboard DDR RAM, Video Driver 7.1.8.4

Table 3. AMD Athlon™ 64 FX-57 Processor System Configuration

Component	Manufacturer	Model	Description
Processor	AMD	AMD Athlon™ 64 FX-57 Processor	Clock frequency: 2.6 GHz
Operating System	Microsoft®	Windows® XP Professional	Version 2002 (Service Pack 2)
Motherboard	Asus	A8N-SLI Deluxe	nForce4 SLI MCP, SATA driver NVIDIA 5.10.2600.507
Hard drive	Western Digital	Raptor	(2x) SATA RAID 10k RPM 36.0 GB
RAM memory	Corsair	CMX512-3200XLPRO	2 X 512 MB DIMM PC3500 Module
Video Card	NVIDIA	FX6800 ULTRA PCI-Express	256 MB Onboard DDR RAM, Video Driver 7.1.8.4

Note:

1. *This version is for use in the upcoming Windows® 64-bit operating environment.*

Table 4. Intel Pentium® 4 Processor 3.8 GHz System Configurations

Component	Manufacturer	Model	Description
Processor	Intel	Intel Pentium® 4 processor with HT technology	Clock Frequency: 3.8 GHz, 800 MHz System Bus
Operating System	Microsoft®	Windows® XP Professional	Version 2002 (Service Pack 2)
Motherboard	Intel	925XCV, BIOS CV92510A.86A.0218	Intel i925 Chipset, Intel 82801FR SATA Raid Controller 4.6.06758
Hard drive	Western Digital	Raptor	2 X SATA RAID 10 k RPM 36.0 GB
RAM memory	Corsair	CM2X512-5400C4PRO	2 X 512 MB DIMM Module
Video Card	NVIDIA	FX6800 Ultra PCI-Express	256 MB Onboard DDR RAM, Video Driver 7.1.8.4

Table 5. Intel Pentium® 4 Processor Extreme Edition 3.73 GHz System Configurations

Component	Manufacturer	Model	Description
Processor	Intel	Intel Pentium® 4 processor with HT technology	Clock Frequency: 3.73 GHz, 800 MHz System Bus
Operating System	Microsoft®	Windows® XP Professional	Version 2002 (Service Pack 2)
Motherboard	Intel	925XCV, BIOS CV92510A.86A.0218	Intel i925 Chipset, Intel 82801FR SATA Raid Controller 4.6.06758
Hard drive	Western Digital	Raptor	2 X SATA RAID 10 k RPM 36.0 GB
RAM memory	Corsair	CM2X512-5400C4PRO	2 X 512 MB DIMM Module
Video Card	NVIDIA	FX6800 Ultra PCI-Express	256 MB Onboard DDR RAM, Video Driver 7.1.8.4

The following sections detail how to set up the BIOS and the operating system, and which settings AMD uses for running each benchmark.

BIOS Configuration for the AMD Athlon™ 64 Processors on the ASUS A8N SLI Deluxe

The following setup instructions apply to all AMD Athlon™ 64 processor models in this document. Modifications should be made to any other configuration where applicable.

Use the following steps to set up the BIOS for optimal operation with the AMD Athlon 64 processors. Use the arrow keys (Right Arrow →, Left Arrow ←, Up Arrow ↑, and Down Arrow ↓) to navigate through the BIOS screens, to select menus, and to highlight specific options to change. For most options, use the + and – keys to change the setting. After selecting each setting press **Enter** to set the selection and move to the next step.

1. Press **Del** to enter the BIOS setup screens
2. Select **Exit** menu.
   a. Select **Load Setup Defaults**.
   b. Press **Y**.
3. Under **Advanced** > **CPU Configuration** > **HyperTransport Frequency**, select **5X.**
4. Select the **Advanced** > **CPU Configuration** > **DRAM Configuration** menu.
   c. For **Timing Mode**, select **Manual**.
   d. For **Memclock Index Value (MHz)**, select **400MHz**.
   e. For **CAS# latency (Tcl)**, select **5T**.
   f. For **Min Ras# active time (TRAS)**, select **5T**.
   g. For **RAS# to CAS# delay (Trcd)**, select **2T**.
   h. For **Row precharge Time (Trp)**, select **2T**.
   i. For **1T/2T Memory Timing**, select **1T**.
5. Press **Esc** twice to return to the main menu.
6. Select the **Onboard Device Configuration** > **NVRAID Configuration** menu.
   a. For **RAID Enable**, select **Enabled**.
   b. For **First SATA Master**, select **Enabled**.
   c. For **Second SATA Master**, select **Enabled**.
   d. For **Third SATA Master**, select **Enabled**.
   e. For **Forth SATA Master**, select **Enabled**.
7. Press **Esc** to reach the **Onboard Device Configuration** menu.
8. Select the **Onboard Device Configuration** > **USB Configuration** menu.
   a. For **USB Controller**, select **Disabled**.
   b. Press **Esc** to reach the **Onboard Device Configuration** menu.
   c. For **Onboard NV Lan**, select **Disabled**.
   d. For **PCI IEEE 1394a**, select **Disabled**.
   e. For **Silicon SATA Controller**, select **Disabled**.

f. For **Serial Port1 Address**, select **Disabled**.

g. For **Parallel Port Address**, select **Disabled**.

h. For **Game Port Address**, select **Disabled**.

i. For **Midi Port Address**, select **Disabled**.

9. Press **Esc** to reach the **Advanced** menu.
10. Select the **Speech Configuration** menu.
    a. For **Speech IC Reporter**, select **Disable**.
11. Press **Esc** twice to exit to the **Main** menu.
12. Press **F10** to Save and Exit**.**
13. Press **Enter** to select Yes.

Operating System Configuration

The following setup instructions apply to all processors. The operating system should be installed on the platform using an NTFS partition. The default settings should be used during the installation. The following system setup instructions can be used to fully achieve optimal system performance.

Operating System Setup

1. During the boot sequence, press **Enter** to boot the system from the CD-ROM.
2. Press **F6** to install the drivers for serial ATA.
3. Press **S** to specify an additional device.
4. Insert the floppy disk that containst the downloaded ATA drivers.

Note: *Leave the disk in the drive until the procedure asks you to reboot. The disk is needed during the initial setup sequence.*

5. Press **Enter** to continue.
6. Select **WinXP NVIDIA Class Raid Driver** and press **Enter**.
7. Press **S** to specify an additional device.
8. Select **WinXP NVIDIA Nforce Storage Controller**.
9. Press **S** to specify and additional device.
10. Select **WinXP NVIDIA Nforce Storage Controller**.
11. Press **Enter** to continue the installation of **Windows® XP PRO** software.
12. Press **F8** to agree to the license agreement.

Note: *If the drive is not yet formatted, or formatted with another operating system, steps 13 and 14 do not apply. Skip to step 15.*

13. Select **ESC=Don't Repair** to install a fresh copy of Windows XP without repairing.
14. Select **D=Delete Partition** to delete all existing partitions.

Note: *If there are no existing partitions, step 14 will not appear.*

15. Select **C** to create a partition.
    a. Enter **35000** as the partition size field for the first partition.

   b. Press the **Down Arrow** key until the unpartitioned space is highlighted and then press **C** to create this partition.
   c. Press **Enter** to accept the default value. There will be 8 Mbytes of unpartitioned space.
16. Select **Format the partition using the NTFS (Quick) file system**.
17. Click **Yes** to verify installation of serial all ATA drivers.
18. Click **Next** to continue with Regional and Language Options.
19. Type in your name and organization.
20. Type in a valid Windows XP product key and click **Next**.
21. Type the administrator password twice and click **Next**.
22. Click **Next** on **Date and Time Settings**.
23. Click **Next** on **Networking Settings** to confirm **Typical Settings**.
24. Click **Next** on **Workgroup and Computer Domain**.
25. Click **Ok** to confirm display settings.
26. Click **Ok** to confirm new monitor settings.
27. Click **Next** to continue with **Welcome to Microsoft® Windows®**.
28. Click **Skip** to bypass **Networking Settings**.
29. Select **No** to bypass **Activate Windows** and click **Next**.
30. Type in your user name and click **Next**.
31. Click **Finish**.
32. Open **My Computer**.
33. Right-click on drive **D:**.
34. Click **Format**.
35. Select Quick format.
36. Click **Start**.
37. Click **Ok** to confirm format.
38. Click **Ok** to acknowledge the message *Format Complete.*
39. Click **Close.**

Install Windows® XP Service Pack 2

1. Install *Microsoft Windows XP Service Pack 2* Network Installation self-extracting cabinet: WindowsXP-KB835935-SP2-ENU.exe
2. Click **Next** to continue.
3. Select *I agree* and click **Next**.
4. Click **Next**.
5. Click **Finish** to restart computer on the **Help Protect MY PC** screen.
6. Select **Not right Now** and click **Next.**
7. Close the balloon **Your computer might be at risk** in the Windows security center window.
8. Select **Windows firewall** under **manage security settings**.
9. Select ***Off*** and click **Ok.**
10. Select **Change the way security center alerts me**, under **Resources**.
11. Deselect all the boxes on the dialog box, and click **OK.**
12. Close the window.

13. Right-click on **My Computer** on the Desktop.
14. Select **Properties** and click the **Advanced** tab.
15. Select **Performance Options**.
16. Click **Settings** and click **Advanced**.
17. Click **Change for Virtual Memory**.
18. Select drive **C:** and select **No paging file** under **Change virtual memory (paging file)**.
19. Click **Set**.
20. Select drive **D**
21. Select **Custom size**.
22. Type **1536** MB for Initial Size.
23. Type **3072** MB for Maximum Size.
24. Click **Set**.
25. Click **Ok** and restart computer.
26. Right-click **My Computer** on the desktop.
27. Select **Properties** and click **Automatic Updates**.
28. Select **Turn off Automatic Updating. I want to update my computer manually**.
29. Click **Apply**.
30. Click **System Restore** and select **Turn off System Restore on all drives**.
31. Click **Apply**.
32. Click **Yes** to verify Turn Off System Restore.
33. Right-click **My Computer** icon on the desktop.
34. Select **Properties** and click the **Advanced** tab.
35. Click **Settings** under **Performance**.
36. Select **Adjust for best performance**.
37. Click **Apply**.
38. Right-click the task bar and select **Properties**.
39. Deselect **Keep the taskbar on top of other Windows**.
40. Click **Apply**.
41. Open the **Control Panel** and double-click **Power Options**.
42. Select **Always On** from **Power Schemes** and select **Never** to **Turn off monitor**.
43. Click **Apply**.
44. Right-click on the desktop and select **Properties**.
45. Click **Screen Saver** and select **None**.
46. Click **Apply**.

Install Asus A8n-SLI Deluxe Motherboard Drivers

1. Install the Nforce_6.36_winxp2k_whql_english.exe chipset drivers.
2. Double-click the .**exe** file.
3. Click **Run** to start the installation.
4. Click **Yes** to the antivirus window.
5. Click **Yes** to agree to the license.
6. Click **Next**.
7. Click **Next** to install default components.
8. Click **Next** to install NVIDIA IDE SW.
9. Click **Yes** to install NVIDIA IDE SW.
10. Click **No** to install NVIDIA Firewall.
11. Click **Finish** to reboot the system.

NVIDIA Video Card Setup

1. Download the video card driver from the *http://www.nvidia.com* Web site.
2. Install the driver: 71.84_win2kxp_english.exe
3. Click **Yes** to continue when asked if antivirus software has been installed.
4. Click **Yes** at the next window.
5. Select the button next to **I accept the terms in the license agreement**.
6. Click **Next** to accept the license agreement terms.
7. Click **Next** to install the shield wizard.
8. Click **Next** to continue the setup.
9. Click **Yes** to accept the license.
10. Click **Continue anyway** on hardware installation window.
11. Click **Yes** to restart the computer.
12. Right-click on the desktop and select the **Properties** sub-menu item.
13. Select the **Settings** tab.
14. Change color depth to **32-bit**.
15. Change the screen resolution to **1024 by 768 pixels**.
16. Click **Apply** to implement settings.
17. Click **Yes** to save settings.
18. Select the **Monitor** tab and select **85 Hz** for **Set Screen Refresh**.
19. Select the **GeForce FX 6800 Ultra** tab.
20. Select **OpenGL Settings** under **Performance and Quality Settings**.
21. Select **Vertical Sync**, and deselect **Application Control**.
22. Do not change other OpenGL settings.
23. Click **OK.**
24. Click **Yes** to keep settings.
25. Click **OK** to close window.

Your operating system should now be configured properly.

Benchmark Configuration and Testing

With a properly configured system, benchmarking can begin. Each installation program is located on your install disk and is subject to the licensing terms contained therein. Several benchmarks in this test suite are run with scripts created at AMD. All scripts are available upon request. Send an email to AMD64.info@AMD.com with all requests for the scripts. A text version of the scripts are included in an appendix.

The following procedures are recommended to achieve optimal and accurate benchmark scores:

Office Productivity

BAPCO® SYSmark® 2004 Internet Content Creation and Office Productivity

Note: *Results for both Internet Content Creation and Office Productivity are generated during each run of the benchmark.*

1. Install the **BAPCO® SYSmark® 2004** DVD.
2. Click **Run** on the **Open File Security Warning** dialog box.
3. Run the setup to install SYSmark 2004: `c:\sm2004src\setup.exe`
4. Click **Next** at the **Welcome** screen.
5. Read the license agreement at the **Licence** screen, and select **I accept**, then click **Next**.
6. Click **Next** at the Customer Information screen.
7. Click **Next** at the Destination Directory screen.
8. Click **Next** at the Select Program Folder screen.
9. Click **Yes** at the Question screen.
10. Click **Finish** at the Install Complete screen.

Install the Patch:

1. Double-click on the patch: `Sysmark2004Patch2.exe`
2. Click **RUN.**
3. Click **Yes** to install the patch.
4. Click **Finish**.

Run the Benchmark:

1. Execute SYSmark 2004 from the Windows **Start** menu.
2. Click **Run**.
3. Click **Official Run**.
4. Type project name and click **Ok**.

Ziff Davis Media Inc. Business Winstone® 2004

1. Select **Install** in the directory where Business Winstone is located.
2. Click **Run** on the Open File Security Warning dialog box.
3. Click **Business Winstone 2004**.
4. Click **Next** at the Welcome screen.
5. Click **Next** at the Choose Destination Location screen.
6. Click **Yes** at the Confirm New Directory screen.
7. Select **Copy Multimedia Content Support Files** on the Select New Components screen, then click **Next**.
8. Click **Next** at the **Program Folders** screen.
9. Click **Next** at the **Start Copying Files** screen.
10. Click **Finish** at the **Setup Complete** screen.
11. Close the readme file.

Install the Patch:

1. Double-click on the patch to install: BWS0401up.exe.
2. Click **Run** on the **Open File Security Warning** dialog box.
3. Click **Yes**.
4. Click **Next**.
5. Click **Yes**.
6. Click **Next**.
7. Click **Finish**.
8. Copy the **wsbp2004.wsr** file to c:\PCMBench\BWS2004\TESTS\Business\appsetup.

Run the Benchmark:

1. Execute *Ziff Davis Media Inc.'s Content Creation Winstone 2004* from the **Start** menu.
2. Read the licence and select **Proceed**, then click **Next.**
3. Click **Yes** at the Registration screen.
4. Select the clock icon next to the **1. Run** item on the Functions dialog screen.
5. Click **Next** to run System Configuration Problem Analysis.
6. Click **Next** for Minimum Resource Requirements.
7. Click **Next** for Other Requirements.
8. Click **Next** for Other Requirements.
9. Click **Next** for Other Requirements.
10. Click **Next** for Content Creation Winstone Requirements.
11. Click **Finish** for System Configuration Problem.
12. Click **Ok** for Automated Defrag.

Ziff Davis Media, Inc. Business Multitasking Winstone® 2004

1. If benchmark is not installed from Veritest Business Winstone 2004 testing, proceed with the steps below. If it is installed, proceed to "Run the Benchmark:" on page 32.
2. Select **Install** in the directory where Business Winstone is located.
3. Click **Run** on the **Open File Security Warning** dialog box.
4. Click **Business Winstone 2004**.

5. Click **Next** at the Welcome screen.
6. Click **Next** at the Choose Destination Location screen.
7. Click **Yes** at the Confirm New Directory screen.
8. Select **Copy Multimedia Content Support Files** on the Select New Components screen, then click **Next**.
9. Click **Next** at the Program Folders screen.
10. Click **Next** at the Start Copying Files screen.
11. Click **Finish** at the Setup Complete screen.
12. Close the readme.txt file.

Install the Patch:

1. Double-click on the patch to install: BWS0401up.exe.
2. Click **Run** on the Open File Security Warning dialog box.
3. Click **Yes.**
4. Click **Next.**
5. Click **Yes.**
6. Click **Next.**
7. Click **Finish.**
8. Copy the wsbp2004.wsr file to: c:\PCMBench\BWS2004\TESTS\Business\appsetup.

Run the Benchmark:

1. Execute *Ziff Davis Media Inc.'s Content Creation Winstone 2004* from **Start** menu.
2. Read the licence and select **Proceed**, then click **Next.**
3. Click **Yes** at the Registration screen.
4. Click in the pull down menu next to the **1. Run** item and select **Multitasking Test** at the **Function** dialog box.
5. Select the clock icon next to the **1. Run** item on the Functions dialog screen.
6. Click **Next** to run System Configuration Problem Analysis.
7. Click **Next** for Minimum Resource Requirements.
8. Click **Next** for Other Requirements.
9. Click **Next** for Other Requirements.
10. Click **Next** for Other Requirements.
11. Click **Next** for Content Creation Winstone Requirements.
12. Click **Finish** for System Configuration Problem.
13. Click **Ok** for Automated Defrag.

PCWorldBench

Note: *This benchmark is not publicly available. It is used only with the express permission of PCWorld.*

1. Insert CD1 into the hard drive.
2. Click **Next** to Welcome note.
3. Click **Yes** at license window.
4. Click **Next** destination location.
5. Click **Next** at select program folder.
6. Insert appropriate CDs when required.
7. Click **Finish**.
8. Click **Finish** to reboot.

Install the Patch:

1. Right click on the file wb5-12aug04 and select **Merge**.

2. Click **Run** on the Open File security warning dialog box.
3. Click **Yes** to *Are you sure*?
4. Click **OK** to the registry editor window.

Setup PCWorldBench

1. Double-click `worldbench5` configuration utility.
2. Click **Defaults.**
3. Click **OK** at updates to taskbar error.
4. Click **Defaults.**
5. Click **Finish** in the window, and your system will reboot.
6. Click **exit** after reboot.

Run PCworldbench:

1. Double click `worldbenchtm 5` the Real-World System Benchmark icon
2. Enter the appropriate data in the Vendor and Model edit box in the upper right corner.
3. Enter system ID in system id box in the upper right corner.
4. Click **Full run**.
5. Click **OK** to warning window.
6. Click **OK** to information window.
7. Enter administrator password if exists, then click **OK**.
8. System will reboot, and the test will run.

Remote Collaboration (Multi-Application Netmeeting + Windows® Media Encode)

Note: *This benchmark requires the setup of two machines. A crossover Ethernet cable long enough to connect both computers is required for this test. Each additional piece of software must be installed before the script can execute completely.*

1. Label one machine *Client* and the other *Host*.
2. Steps 3 through 19 are to be peformed on the client machine.
3. Setup the resolution on the machine.
4. Right click on the desktop.
5. Click on the display properties.
6. Select the **settings** tab.
7. Change resolution to **1280x1024.**
8. Click **OK.**
9. Select **RUN** from *start* menu.
10. Type **CONF**.
11. Click **Next.**
12. Enter the user information click **Next.**
13. Select *Do not list my name in directory*.
14. Select *local area network*, Click **Next.**
15. Click **Next** to each question in the audio tuning wizard.
16. Click **Finish**.
17. Connect the crossover Ethernet cable from the client to the server computer.
18. Click on the netmeeting on desktop.
19. Select **call** from menu, select **automatically accept calls**.
20. Steps 21 through 55 are to be peformed only on the server machine.
21. Select **RUN** from *start* menu.
22. Type **CONF**.
23. Click **Next**.
24. Enter the user information click **Next**.
25. Select *Do not list my name in directory*.
26. Select *Local Area Network*.

27. Click **Next** to each question.
28. Click **Finish.**

Install Moonlight Codec

29. Double click **moonlight user pro 1.0 prerelease.exe (**demo version).
30. Click **Run** at security error.
31. Click **Next** at welcome screen.
32. Select *Yes, I agree…* then click **next**.
33. Click **Next** on install location.
34. Click **Next** on program group window.
35. Click **Next** at ready to install.
36. Unselect *Run register*, click **Finish.**
37. Run **Moonlight Component Manager** from the Start menu for moonlight.
38. Click **Next**.
39. Click **Finish**.

Install Windows® Media Encoder 9

40. Download from Microsoft: `http://www.microsoft.com/windows/windowsmedia/9series/encoder/default.aspx`
41. Click **Next** at the welcome screen.
42. Select *I accept the user license*.
43. Click **Next** twice.
44. Click **Install**.
45. Click **Finish**.

Install Windows® PowerPoint viewer

46. Download the PowerPoint viewer from Microsoft:

http://www.microsoft.com/downloads/details.aspx?FamilyID=428d5727-43ab-4f24-90b7-a94784af71a4&displaylang=en

47. Double-click **ppviewer.exe.**
48. Click **Run** at security.
49. Click **Yes** at install office PowerPoint view2003.
50. Clock **OK** at completion.
51. Double click on PowerPoint viewer from start menu, all programs.
52. Click **Accept** at license agreement.
53. Click **Cancel** at the file open box.
54. Close PowerPoint viewer application.
55. Copy the folder msoft_MEDIA_encode from the AMD CD to `c:\`.

To Run Benchmark

1. Open an explorer window.
2. Navigate to: c:\msoft_MEDIA_encode\netmeetingtestfiles\wmeplusnm.
3. Edit the `wmeplusnm.bat` file to make sure the IP address (the first IP address in the file) is the client system IP address.
4. Double-click the *netmeeting* icon in the server system.
5. Enter the IP address of the client system.
6. Click **Call**.
7. Netmeeting should connect to the client. If the connection fails, ensure that the IP addresses are correct on both the host and the client, and that the cable is correctly connected.
8. Close Netmeeting on server.
9. Double-click **wmeplusnm.bat.**
10. Results are located in c:\msoft_MEDIA_encode\netmeetingtestfiles\wmeplusnm\wmeout.csv.

Travel Ready Scenario (Multi-Application Microsoft® Publisher + Nero Recoder)

Install Nero Recorder

1. Purchase Nero Recoder from Nero
2. Install Nero recoder according to manufacturers instructions.
3. Copy from the AMD CD the clipart folder to c:\.
4. Copy from the AMD CD the pubrecode folder to c:\.
5. Copy from the AMD CD the recodebench folder to c:\.

Install Microsoft® Publisher

1. Purchase Microsoft® Publisher from Microsoft.
2. Install *Microsoft® Publisher* by selecting the *Microsoft Publisher* option during the install routine for *Microsoft® Office Professional Edition 2003*.
3. Enter the product key.
4. Click **Next.**
5. Click **Next** at user information.
6. Select **I Accept License**.
7. Select **Custom Install**.
8. Unselect all applications except Microsoft Publisher.
9. Select **Choose Advance Customization of Applications**. Ensure that Microsoft Publisher is selected for install.
10. On the next screen select **Microsoft Publisher**.
11. Select **Run from my computer**.
12. Select **Office shared features**.
13. Select **Run from my computer**.
14. Select **Office tools**.
15. Select **Run from my computer**.
16. Click **Next**.
17. Click **Install**.
18. Click **Finish**.
19. Setup clipart manager.
20. From start menu select all programs, Microsoft office, Microsoft office tool, select Microsoft clip organizer.
21. At the welcome screen click **Now** to *scan for files*.
22. From the main menu bar, select **File > Add clips to organizer > Automatically**.
23. Click **OK** to add clips to organizer.
24. Close the clipart application.
25. Click **Start** > **All programs** > **Microsoft Office** > **Microsoft Publisher 2003.**
26. From the main menu, select **file**, then click **new.**
27. Click **Website and email.**
28. Click **email.**
29. Click on the first template under newsletter.
30. At Personal information screen. Select never show this dialog and click **OK**
31. Close Microsoft Publisher.

To Run Benchmark

1. Open an explorer window to C:\pubrecode.
2. Double-click recodebench.bat.
3. Obtain scores from the c:\recodebench\result.csv.

WinRAR

1. Install activePerl-5.8.6.811-mswin32-x86
2. Click **Next** to begin.
3. Choose **I accept the terms in the license agreement** and click **Next**.
4. Click **Next** for default install.
5. Click **Next** on the privacy policy.
6. Click **Next** to accept the default options.
7. Click **Install** to continue.
8. Click **Finish** to complete install.
9. Double Click **winrar342.exe** .
10. Click **Install** to continue.
11. Click **Ok** to default setup.
12. Click **Done** to complete install.
13. Double-click **My computer** and select the `C:\` drive.
14. Click **File** menu, choose **New folder** and create rartest.
15. Copy rartestpl file from CD to new folder.
16. Copy NPRP2CDcontent, except for the DIVX and VOB files to the new folder.

To run the benchmark:

1. Double-click the rartestpl file which creates a directory with a text file with the test results.

Digital Media

Ziff Davis Media Inc.'s Content Creation Winstone® 2004

1. Select **install** in the directory where Winstone is located.
2. Click **Run** on the **Open File Security Warning** dialog box.
3. Click **Content Creation Winstone 2004**.
4. Click **Next** at the **Welcome** screen.
5. Click **Next** at the **Choose Destination Location** screen.
6. Click **Next** at the **Confirm New Directory** screen.
7. Select **Copy Multimedia Content Creation Support Files** on the **Select New Components** screen, then click **Next**.
8. Click **Next** at the **Program Folders** screen.
9. Click **Next** at the **Start Copying Files** screen.
10. Click **Next** at the **Welcome to Media Encoder 9 Series** setup screen.
11. Read the license agreement on the EULA screen, select **I accept the terms of this agreement**, then click **Next**.
12. Click **Next** at the Installation Folder screen.
13. Click **Install** at the Ready to Install screen.
14. Click **Finish** at the Completing the Windows Media Encoder 9 Series setup wizard screen.
15. Click **OK** at the Windows Media Encoder 9 Installation Completed Successfully screen.

16. Click **Finish** at the Setup Complete screen.
17. Close the readme file.

Install the Patch:

1. Double-click on the patch to install: `MCC0401up.exe`.
2. Click **Run** on the **Open File Security Warning** dialog box.
3. Click **Yes**.
4. Click **Next**.
5. Click **Next**.
6. Click **Yes**.
7. Click **Next**.
8. Click **Next**.
9. Click **Finish**.

Run the benchmark:

1. Execute *Ziff Davis Media Inc.'s Content Creation Winstone 2004* from the **Start** menu.
2. Read the licence agreement, and select **Proceed**, then click **Next**.
3. Click **Yes** at the **registration** screen.
4. Select the clock icon next to the **1. Run** item on the **Functions** dialog screen.
5. Click **Next** to run System Configuration Problem Analysis.
6. Click **Next** for Minimum Resource Requirements.
7. Click **Next** for each *Other Requirements* question.
8. Click **Next** for *Content Creation Winstone* Requirements.
9. Click **Finish** for System Configuration Problem.
10. Click **Ok** for **Automated Defrag**.

Note: *Program will run until Adobe Premier tests for the first time.*

1. Click **Change Settings** at the Data Execution Prevention screen.
2. Check the box in the window.
3. Click **OK.**
4. Click **Close Message**.
5. Click **Don't Send** on the error report screen.

Dr. DivX

1. Double click DrDivX106.exe.
2. Click **Run** on the Open File security warning dialog box.
3. Click **Next** to Welcome note.
4. Choose **I accept the terms** in the license agreement and click **Next**.
5. Click **Next** to choose components.
6. Click **Install** to select default location.
7. Click **Finish** upon install.
8. Reboot the system.
9. Copy austinmontauge-3minutes to C:\program files\divx\dr.divx.

To run the benchmark:

1. Double-click `Dr. DivX` on the desktop.
2. Click **Continue** with trial version.
3. Click **Video file** button.
4. Select `austinmontauge-3minutes`.
5. Click **Next** on select audio input.
6. On Choose output select **next.**

7. Select **Encode,** then **Start Timer** on encode video.
8. When encode completes stop timer.

Razor Lame Ver. 1.1.5

1. Install ezcddax6.exe to convert ripping CD to.wav format.
2. Click **Run** on the Open File security warning dialog box
3. Click **Next** to continue ripping from **Easy CD-DA Extractor Setup**.
4. Click **Next** to install program into default folder.
5. Click **Finish**.
6. Insert **Pink Floyd - Wish You Were Here** Audio CD into drive.
7. Go to **Start > Programs > Easy CD-DA Extractor 6 > Easy CD-DA Extractor**.
8. Click **Evaluate the Software**.
   a. Select **Device** to **Hitachi GD-2000 1000** to reflect the CDROM is installed on the computer.
   b. Select all tracks.
   c. Click **Copy** to continue.
   d. In the dialog box, change output folder to **C:\Pink Floyd**.
   e. Go to **Integrated Formats** tab; choose **.wav (standard)** in the first drop down box.
   f. Click **Start Copying** to copy files.
9. Burn the raw files to another CD.
10. Input the burned CD into the computer.
11. Choose the `Pink Floyd` folder.
12. Copy folder from CD to desktop.
13. Install **lamewin32**.
14. Click **I Agree** to license agreement.
15. Click **Next** to install LAME Mp3.
16. Click **Install** to continue install.
17. Clicks **Close**.
18. Open RazorLAME shortcut on desktop.
19. Drag the Pink Floyd folder track items into RazorLAME 1.1.5.
20. Go to Edit menu, choose **Lame Options**.
21. Under General tab, increase Bit Rate to **192**.
22. Under Advanced tab, change Optimization to **Quality**.
23. Under VBR tab, select **Enable Variable BitRate** and change Quality Number to **9**.
24. Click **Ok** to close dialog box.

To run the benchmark:

1. Click **Encode** to run benchmark.

Note: *To view results, Go to View, Last log, and scroll down to end of file. Before running a second run, delete all files from the RazorLAME and re-copy prior to starting run. There is no need to reset the options.*

Panorama Factory

1. Insert the *Panorama Factory* DVD.
2. At prompt type in **3** to run demo with four images in 32-bit mode.
3. Do not touch keyboard or mouse while the demo runs.

4. When the window with the ***STEP-6 Save and Print your Panorama*** appears the benchmark is complete.
5. On the main window select **Tools** > **Timers** from the main toolbar.
6. The benchmark time is shown next to the *Wizard* text.
7. Exit the main Panorama window.
8. Click **No** on the save files window.

POV-Ray

1. Download POV-Ray version 3.6.1a from http://www.povray.org/download/.
2. Double-click `povwin36a.exe`.
3. Click **Run** on the Open File security warning dialog box.
4. Click **Next** to Welcome note.
5. Select *I agree* to then license window then click **Next**.
6. Click **Next** at chose destination location.
7. Click **Next** to backup and replace files.
8. Click **Next** to select program manager groups.
9. Click **Next** at automatically check for updates.
10. Click **Next** for start installation.
11. Click **Next** to supporting us.
12. Click **Next** to post installment.
13. Click **Finish**.
14. Click **OK** when render is complete.

Patch for Multi-Threaded

1. Download POV-Ray version 3.7 (latest version.
2. Double click the povray37.exe file.
3. Click **Run** on the Open File security warning dialog box.
4. Click **Next** to Welcome note.
5. Select **I agree** to then license window then click **Next**.
6. Click **Next** at chose destination location.
7. Click **Next** to backup and replace files.
8. Click **Next** to select program manager groups.
9. Click **Next** at automatically check for updates.
10. Click **Next** for start installation.
11. Click **Next** to supporting us.
12. Click **Next** to post installment.
13. Click **Finish**.
14. Click **OK** when render is complete.
15. Copy the `povraybench` folder from the CD to the desktop.

Running the benchmark

1. Double click the POV-Ray v 3.6 icon on the desktop.
2. Click OK to the brag screen.
3. De-Select Show tip tomorrow and click **OK**.
4. Select **File** > **Open** from the main menu.
5. Select **Desktop** on the left menu bar.
6. Select the povraybench folder.
7. Select benchmark.
8. Select **Render** then **Start render** from the main menu bar.
9. The system begins to render the file.

10. Select **Don't tell me again** to the render complete sound dialog box then select **OK**.
11. Select **Don't tell me again** to the no output file dialog box then select **OK**.
12. Select the **Messages** tab to obtain the score.
13. Record the PPS (pixel per second) results from the line above the last line in the messages box.

MovieMaker

1. Copy everything from the moviemaker directory on the AMD CD to c:\Temp\Movie_Maker on the local system.

To Run Benchmark

1. Run **Movie_Maker_bmark32.exe**.
2. The Benchmark is completed when the Results.csv file opens.

Sony Vegas

1. Purchase Sony Vegas.
2. Install Sony Vegas per the installation instructions from the vendor.
3. Create a folder named c:\temp\vegas.
4. Copy Reef_5min.mpg from AMD CD to C:\Temp\Vegas.
5. Copy Reef.vf from AMD CD to C:\Temp\Vegas\.
6. Copy Vegas_Studio_timing.exe from AMD CD to C:\Program Files\Sony\Vegas Movie Studio 4.0.
7. Double-click on the icon for `Vegas Studio`.
8. Deselect the **Show at Startup** box on the Show Me How splash screen.
9. Open the **Reef.vf** project from the **File** menu
10. Select **Make Movie**.
11. Select **Save to Hard Drive**.
12. Change the file path to: C:\Temp\Vegas\Reef.avi.
13. Select **Next** for the initial encode.
14. Exit the program when encoding is completed.

To Run Benchmark

1. Open a CMD window and change directory to C:\Program Files\Sony\Vegas Movie Studio 4.0.
2. Run Vegas_Studio_timing.exe.
3. Benchmark is completed when the Results.csv file opens.

Note: *If a negative number is displayed in the results file then the benchmark will need to run again.*

Gaming

Futuremark Corporation 3DMark® 2003

1. Double-click *3Dmark2003®* 3dmark03_V360_installer.exe.
2. Click **Run** on the Open File Security Warning dialog box.
3. Click **Next** to install *3Dmark2003®*.
4. Click **Yes** to accept the license agreement.

5. Click **Next** to install the default destination location.
6. Click **Next** to start copying files.
7. Enter the registration code and click **Next**.
8. Click **Ok** for registration code confirmation.
9. Click **Finish** to complete installation.

Run the Software Benchmark:

1. Execute **3Dmark2003**.
2. Select **Do not show this dialog again** > **Close**.
3. Click **Change** in Display and CPU Settings.
4. Select **D3D Software T&L** under Rendering Pipeline.
5. Click **Ok**.
6. Click **Change** under Selected Test.
7. Select only the first four game tests under **Game Performance**.
8. Deselect the remaining test.
9. Click **Ok**.
10. Click **Benchmark** to launch the tests.

Note: *After each run, exit and restart the program.*

Run the Hardware Benchmark:

1. Execute *3Dmark2001 SE Pro*.
2. Click **Change** in Display and CPU Settings.
3. Ensure that **Double Buffering** is set to **Enabled**.
4. Select **D3D Hardware T&L** under **Rendering Pipeline**.
5. Click **Ok**.
6. Click **Change** under **Selected Test**.
7. Select only the first four game tests under **Game Performance**.
8. Deselect the remaining test.
9. Click **Ok**.
10. Click **Benchmark** to launch the tests.

Note: *After each run, exit and restart the program.*

Futuremark Corporation 3Dmark® 2005

1. Execute *3DMark® 2005*: 3dmark05_V120_installer.exe.
2. Click **Run** on the Open File security warning dialog box.
3. Click **Next** to install *3Dmark05*.
4. Select **I accept the terms of the license agreement** and click **Next**.
5. Click **Next** to install to default Destination Location.
6. Click **Install**.
7. Enter the registration code.
8. Click **Ok**.
9. Click **Finish** to complete installation.

To run the software benchmark:

1. Execute **3DMark05** from the desktop.
2. Select **Do not show this dialog again** at the tip of the day dialog and click **Close**.
3. Click **Select** under Tests.
4. Select **Game Test** and deselect the **CPU** test.
5. Click **Ok**.
6. Click **Change** under **Settings**.

7. Click **Force Software Vertex Shader**s box.
8. Click **Ok**.
9. Click **Run 3Dmark**.

Run the Hardware Benchmark:

1. Execute **3DMark05** from the desktop.
2. Click **Select** under Tests.
3. Select **Game Test** and deselect the **CPU** test.
4. Click **Ok**. to the Shaders box.
5. Click **Change** under **Settings**.
6. Click **Run 3Dmark**.

Crafty

1. Copy the Crafty files to the C:\ drive.
2. Double-click craftybench.exe.
3. Open crafty.csv to obtain the scores.

Doom 3

1. Place the Doom3 CD into the CD drive.
2. Click **Run** on the Open File security warning dialog box.
3. Click **Next** to Welcome note.
4. Enter CD key click **Ok**.
5. Click **OK** at valid KEY windows.
6. Click **Next** at welcome screen.
7. Choose *I accept the terms* in the license agreement and click **Next**.
8. Click **Next** on minimum system requirements.
9. Click **Next** at choose destination location.
10. Click **Next** at select program folders.
11. Click **Next** to start copying files.
12. Insert appropriate CD when required.
13. Click **Yes** at create shortcut to desktop.
14. Click **No** to register.
15. Select *No, I do not want to install DirectX at this time* and click **Next.**
16. Click **Yes** to not install DirectX.
17. Click **Next** to make sure we have the latest video drivers.
18. Click **Finish**.
19. Double-click the `Doom3` Icon on desktop.
20. Click **Options.**
21. Click **Systems.**
22. Click screen size to set to 1024x768.
23. Click **Apply** changes.
24. Click **OK** to apply changes.
25. Exit DOOM3.

To Run Benchmark

1. Double-click the DOOM3 icon on desktop.
2. Press **CTRL+ALT+~** to enter console mode.
3. Type **timedemo demo1**
4. Note that the first score run is not representative of subsequent runs.
5. Record score and click **OK**.

Far Cry

1. Place Far Cry CD into the CD drive.
2. Click **Run** on the Open File security warning dialog box.
3. Click **Next** to Welcome window.
4. Choose I accept the terms in the license agreement and click **Next**.
5. Click **Next** on destination location.
6. Click **Next** to select features.
7. De-select *install adobe acrobat reader* then Click **Next**.
8. Click **Next** to start copying files.
9. Insert the CD's when required.
10. Deselect *View readme* and *Register Far Cry* then click **Next**.
11. Click **Finish.**
12. Click **No** to install farcry xfire.

Install the Patch for Far CRY

1. Double click facry_v_1.3.exe.
2. Click **Run** on the Open File security warning dialog box.
3. Click **OK** on choose setup language.
4. Click **Next** on welcome.
5. Choose *I accept the terms* in the license agreement and click **Next**.
6. Click **Next** on destination location.
7. Click **Next** on select features.
8. Choose *I accept the terms* in the license agreement and click **Next**.
9. Click **Next** on start copying files.
10. Click **Finish.**
11. Copy demo folders cooler and pier to c:\program files\ubisoft\crytek\far cry\levels to replace the folders in the directory.
12. Create one shortcut.
13. Copy the far cry shortcut on the desktop.
14. Rename the new far cry shortcut to f**ar cry pier**.
15. Edit the shortcut command line to read:
    `"C:\Program Files\Ubisoft\Crytek\Far Cry\Bin32\FarCry.exe" -devmode "#demo_num_runs=3" "#demo_quit=1" "map pier" "demo cooler01".`
16. Double-click the `far cry` icon on desktop.
17. Click **OK** on far cry configuration tool.
18. Select Video options tab.
19. Select **Very high.**
20. Click **OK.**
21. Exit game when it starts.

Run the Benchmark

1. Double click the **far cry pier** shortcut.
2. Open folder c:\program files\ubisoft\crytek\far cry\levels\pier.
3. Open pier.txt file to view results.

Half-Life 2

1. Purchase Half-Life 2.
2. Install according to manufacturers installation guide.
3. Copy demo files from AMD CD at_coast_05_rev7.dem and at_prison_05_rev7.dem to c:\program

files\\valve\steam\steamapps\"USERNAME"\half-life 2\hl2.

Note: *"USERNAME" is the name of the user that was entered during game installation.*

4. Disconnect the network cable.
5. Double-click the `Halflife 2` icon on the desktop.
6. Click **Start** in offline mode.
7. Click **Options**.
8. Click **Keyboard**.
9. Click **Advanced**.
10. Select **Enable developer content**, click OK.
11. Select the **Video tab**.
12. Change resolution to **1024x768**.
13. Change display mode to **Full screen**.
14. Change aspect ratio to **Normal**.
15. Click **Advanced**.
16. Change model detail to **High**.
17. Change antialiasing mode to **4x**.
18. Change texture detail to **High**.
19. Change filtering mode to anisotropic **8x**.
20. Change water detail to **Reflect World**.
21. Change shader detail to **High**.
22. Change shadow detail to **High**.
23. Change wait for vertical sync to **Disable**.
24. Click **OK**.
25. Click **OK**.

To Run Benchmark

1. Press **shift + ~** to bring up the console.
2. Type `timedemo at_coast_05_rev7`.
3. Read score in FPS from bottom line of console.
4. Type `timedemo at_prison_05_rev7`.
5. Read score in FPS from bottom line of console.

Star Wars – Jedi Knight II: Jedi Outcast (1024x768x32)

1. Click **Install** to install *Jedi Knight II*.
2. Click **Run** on the Open File security warning dialog box.
3. Click **Next** to install *Jedi Knight II: Jedi Outcast*.
4. Click **Yes** to accept License Agreement.
5. Click **Automatic** installation.
6. Click **Yes** to confirm automatic installation.
7. Click **Exit** installation.
8. Install patch **Jkiiup104.exe**.
9. Click **Run** on the Open File security warning dialog box
10. Click **Continue** to install.
11. Click **OK** to continue.
12. Unzip `assets2.pak3` found in `\GameData\Base` folder.
13. Extract the file `jk2ffa.dm_15` to the `\Base\Demos` folder and then rename the demo to **`jk2ffa.dm_16`**.
14. Copy the renamed demo file to a new directory, **Demos** off of the path **`c:\program Files\LucasArts\Star Wars JK II Jedi Outcast\GameData\base`**.
15. Create shortcut to desktop for *Jedi Knight II* Multi Player: **`c:\Program Files\LucasArts\Star Wars JK II Jedi Outcast\GameData\jk2mp.exe`**.

16. Right click **Shortcut to jk2mp** from desktop and select **Properties**.
17. Type **+set sv_cheats 1** at the end of the **Target Location**. For example, Target Location should read:
    `c:\Program Files\LucasArts\Star Wars JK II Jedi Outcast\GameData\jk2mp.exe +set sv_cheats 1.`
18. Click **Ok** to close shortcut.

Run the Benchmark

1. Double-click **Shortcut to jk2mp**.
2. The first time the program is executed a data execution prevention error will occur.
3. In the Data Execution Prevention dialog box, click **Change settings.**
4. Click on the box in the window.
5. Click **OK**.
6. Click **Close**.
7. Click **Don't send** on the error report screen.
8. Reboot.
9. Double-click **Shortcut to jk2mp**.
10. Click **Setup**.
11. Click **Video**.
12. Select **1024x768x32** for Video Mode and **32-bit** for Color Depth.
13. Click **Apply Changes**.
14. Click **Yes** to continue to Main Menu.
15. Press **Shift + ~**.
16. Type `timedemo 1.`
17. Type `demo jk2ffa.`
18. Press **Enter**.
19. Press **Shift + ~** and scroll up to see the score.

Pain Killer

1. Place Pain Killer CD into the CD drive.
2. Click **Run** on the Open File security warning dialog box.
3. Click **Next** to Welcome window.
4. Click **yes** on the license agreement.
5. Click **Next** destination location.
6. Click **next** on program folders.
7. Click **next** to install.
8. Enter CD key press enter.
9. Insert CD's as required.
10. Select **no** to not install gamespy click next.
11. Deselect ***install DirectX 9.0b***
12. Click **Close**.

Install patch

1. Double-click **painkiller_161.exe.**
2. Click **Run** on the Open File security warning dialog box.
3. Click **Next** on welcome.
4. Click **Yes** to Software license agreement.
5. Click **Next** destination location.
6. Click **Close** again.
7. Double-click painkiller_162.exe.
8. Click **Run** on the Open File security warning dialog box.
9. Click **Next** on welcome.
10. Click **Yes** to Software license agreement.
11. Click **Next** destination location.

12. Click **CLOSE** to finish.
13. Double-click painkillerpatch1.64updatefrom1.62withreadme.exe.
14. Click **Run** on the Open File security warning dialog box.
15. Click **Next** on welcome.
16. Click **Yes** to Software license agreement.
17. Click **Next** destination location.
18. Click **Close** to finish.

To run benchmark

1. Double click launch painkiller shortcut.
2. Press **Shift + ~**.
3. Type `benchmark c5L2.`

Quake III Demo2 (1024x768x32)

1. Install *Quake III*: Q3Ademo.exe.
2. Click **Run** on the **Open File Security Warning** dialog box.
3. Click **Next** to install the *Quake 3 Arena Demo*.
4. Click **Yes** to accept the license agreement.
5. Click **Next** twice to install the default destination location.
6. Click **Close** to complete the setup.

Run the Benchmark:

1. Execute **Quake3** from the start menu.

Note: *A data execution prevention error occurs the first time the program is executed.*

2. Click **Change Settings** at the **Data Execution Prevention Screen**.
3. Select the box in the window.
4. Click **OK**.
5. Click **Close Message**.
6. Click **Don't Send** on the **Error Report** screen.
7. Reboot the system.
8. Execute **Quake3** from Start menu.
9. Click **Setup**.
10. Click **System**.
11. Click **Video Mode** to select **1024x768**.
12. Click **Color Depth** to select **32 Bit**.
13. Click **Accept**.
14. Press **Shift+~** for the console command view.
15. Type the following commands to configure and run the demo:

```
s_initsound 0
snd_restart
```
Press **Shift+~**
```
com_maxfps 0
vid_restart
```
Press **Shift+~**
```
timedemo 1
demo demo002
```

16. Press **Enter** to launch the demo.
17. Press **Shift+~** to view results.

Return to Castle Wolfenstein Enemy Territory(1024x768x32

1. Double Click **woldet.exe**
2. Click **Install** and click **Next** to install *Return to Castle Wolfenstein Enemy Territory*.
3. Click **Next** on the Welcome screen.
4. Select **I Agree** to accept the License Agreement.
5. Click **Next** for Minimum System Requirements.
6. Click **Next** to Punkbuster.
7. Click **Yes** to agree to the software license agreement.
8. Click **Next** to install to default Destination Location.
9. Click **Next** to install to default Program Folder.
10. Click **Install** to start the installation.
11. Click **Yes** to create shortcut on desktop.
12. Click **Finish** to complete setup.
13. Double-click the install patch: **et patch_2_60.exe**.
14. Click **Run** on the open file security warning dialog box.
15. Click **Next** to install Patch.
16. Click **I agree** to accept License Agreement.
17. Click **Next** to install to default Destination Location.
18. Click **Install** to Start Installation.
19. Click **Ok** to continue installation.
20. Click **Finish** to complete installation.
21. Create a directory called **demos** in the c:\Program Files\Wolfenstien Enemy territory\ETMain\Demos and copy **ACE2.dm_83** to that directory.
22. Execute *Wolfenstein Enemy Territory* from the desktop.
23. At create profile window, click **connection** and select **lan/cable/ dsl.**
24. Enter a name for the player alias.
25. Click **Create.**
26. Click **Options, System**.
27. Select Video quality to change to **high.**
28. Click **Apply**.
29. Click **Yes**.
30. At *Confirm Video Changes,* click **Yes**.
31. Click **Options > View**.
32. Select the following options:
    a. Click **Mission timer** to select **Off**.
    b. **Reinforcement** timer **Off**.
    c. Cursor Hint **Off**.
    d. Crosshair pulsing **No.**
    e. Ejecting Brass **High.**
    f. Corona distance **Extreme.**
    g. Wall mark lifetime **Long.**
33. Select **Back.**
34. Click **Quit** to exit game.

To run the benchmark:

1. Execute *Wolfenstein* Enemy Territory from the desktop.
2. Press **Shift + ~** to open the console.
3. Type **Timedemo 1.**
4. Type **Demo ACE2**.
5. Press **Shift + ~** to view the demo results.

Splinter Cell

1. Install *Splinter Cell* from CD.
2. Click **Run** on the Open File security warning dialog box
3. Click **Next** to continue.
4. Click **No** to update current version of DX9.0.
5. Click **Next** to accept license agreement.
6. Click **Next** to continue.
7. Click **Next** to continue.
8. Click **Next** to continue.
9. Insert Disc 2 and click **OK**.
10. Insert Disc 3 and click **OK**.
11. Click **Next** to continue.
12. Chose **Never Register** and Click **Cancel**.
13. Click **Finish**.
14. Double click to install patch scus_CA_Patch_1.2B (version 7.1.100.124.8).
15. Click **Ok** to finish patch completion.
16. Go to C:\Program Files\Ubisoft\Splinter Cell\System\sclow.bat.
17. Right click `sclow.bat` and select `Edit`.
18. The source to the batch file is included in the appendix.

To run the benchmark:

1. Create a shortcut to the batch files stored in the directory noted above.
2. Input *Splinter Cell* CD3 into drive.
3. Double-click the *Splinter Cell* file on the desktop.
4. Open the folder c:\program files\ubi soft\splinter cell\system.
5. Open the file **timedemoresults.xls** to view results.

Unreal Tournament 2004

1. Place the *Unreal Tournament 2004* CD into the CD drive.
2. Click **Run** on the Open File security warning dialog box.
3. Select **English** at the language select dialog box and click **Next**.
4. Click I agree at the license screen.
5. Enter the CD-key click **Next**.
6. Click **Next** at the destination location screen.
7. Click **Next** at the components to install screen.
8. Click **Install**.
9. Click **Finish**.

Install the Patch

1. Click on **ut204-winpatch3355.exe** located on the CD.
2. Click **Next**.
3. Click **I agree** at the license screen.

4. Click **Next** at the destination location screen.
5. Click **Install**.
6. Click **Finish**.
7. Copy `bench2k4.exe` from the AMD CD to **c:\ut2004\system**.
8. Copy **maxdetail.ini**, **maxdetailuser.ini**, **flybyexec.txt**, and **botmatchexec.txt** from the AMD CD to c:\ut2004\benchmark\stuff.

To Run Benchmark

1. Double-click **`bench2k4.exe`** from the folder `c:\ut2004\system`.
2. Select **1024x768**
3. Click **Start**.

AMD's Results

Using the system configuration described in Table 3 on page 23, Table 1 on page 22, and Table 4 on page 24, and the benchmark configuration and testing methods recommended on page 30, AMD's results are presented in the following graphs. Contact AMD if you have any questions about the performance of any AMD microprocessor.

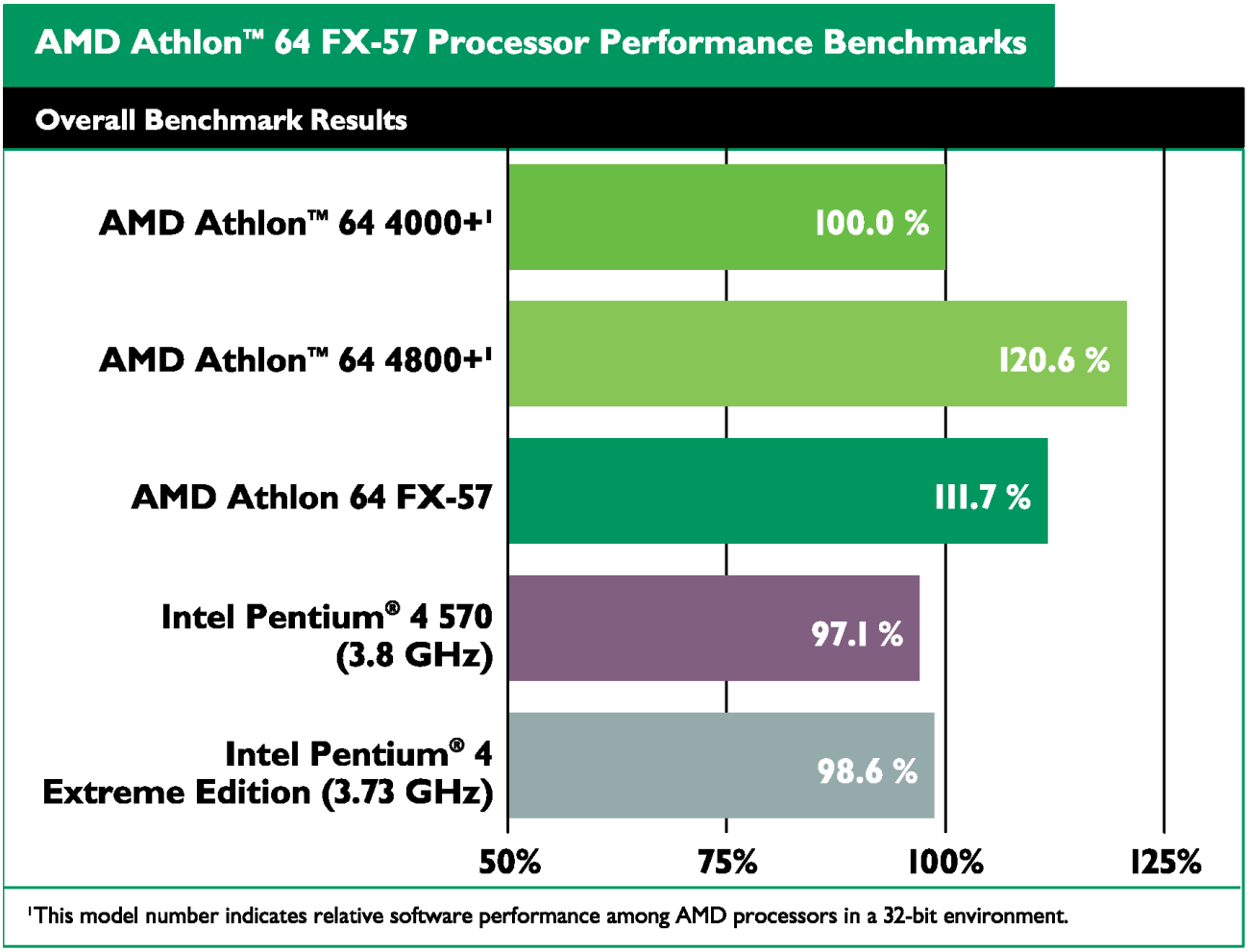


Figure 4. AMD Athlon™ 64 FX-57 Processor Overall

Table 6. Productivity Overall

Processor	Result
AMD Athlon™ 64 4000+[1]	100.0%
AMD Athlon 64 4800+[1]	121.8%
AMD Athlon 64 FX-57	111.0%
Intel Pentium 4 3.8 GHz	101.1%
Intel Pentium 4 Extreme edition 3.73 GHz	102.8%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

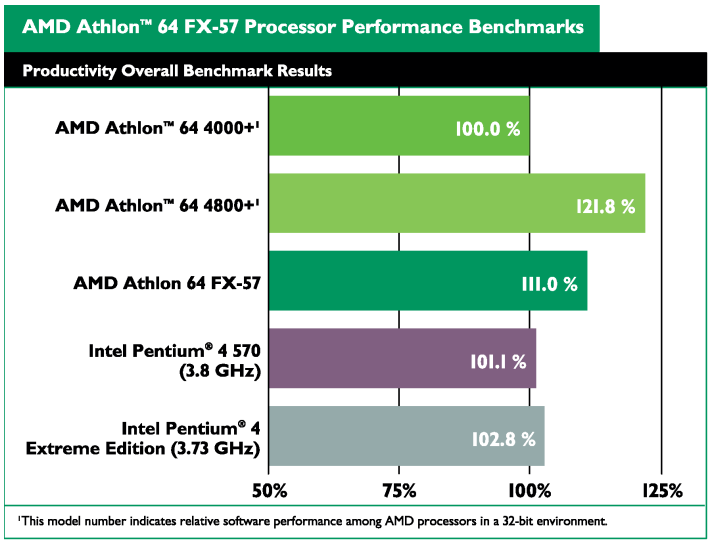


Table 7. BAPCO® SYSmark® 2004 Productivity (ver. 1.0 patch 2)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	214.3	100.0%
AMD Athlon 64 4800+[1]	239.3	111.7%
AMD Athlon 64 FX-57	233.0	108.7%
Intel Pentium 4 3.8 GHz	219.0	102.2%
Intel Pentium 4 Extreme edition 3.73 GHz	224.0	104.5%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

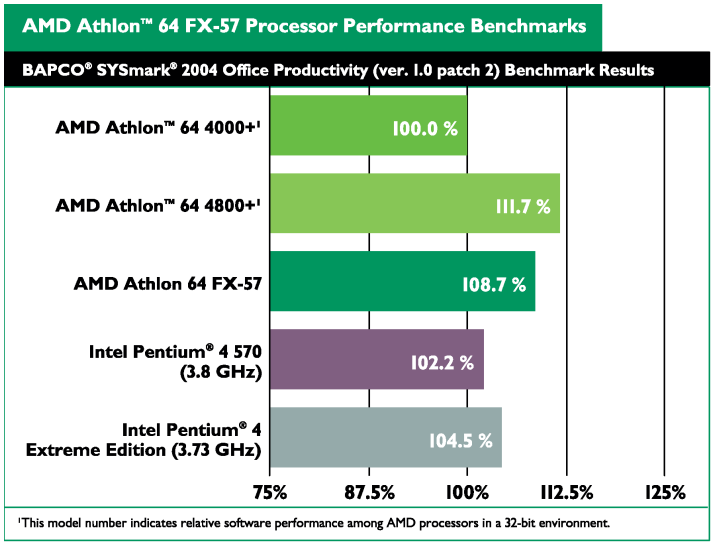
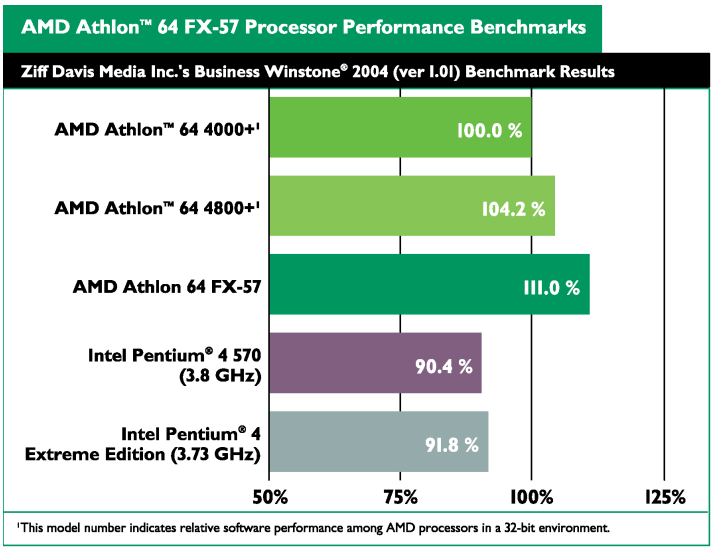


Table 8. Ziff Davis Media Inc.'s Business Winstone® 2004 v1.01[1]

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	30.4	100.0%
AMD Athlon 64 4800+[1]	31.7	104.2%
AMD Athlon 64 FX-57	33.7	111.0%
Intel Pentium 4 3.8 GHz	27.5	90.4%
Intel Pentium 4 Extreme edition 3.73 GHz	27.9	91.8%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.



[1] Tests performed without independent verification by the VeriTest testing division of Lionbridge Technologies Inc. (VeriTest) nor Ziff Davis Media Inc. and that neither Ziff Davis Media Inc. nor VeriTest make any representations or warranties as to the results of the tests.

Table 9. Ziff Davis Media Inc.'s Business Winstone® 2004 Multitasking[1]

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	3.3	100.0%
AMD Athlon 64 4800+[1]	4.3	129.4%
AMD Athlon 64 FX-57	3.7	110.1%
Intel Pentium 4 3.8 GHz	3.6	106.4%
Intel Pentium 4 Extreme edition 3.73 GHz	3.6	107.5%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

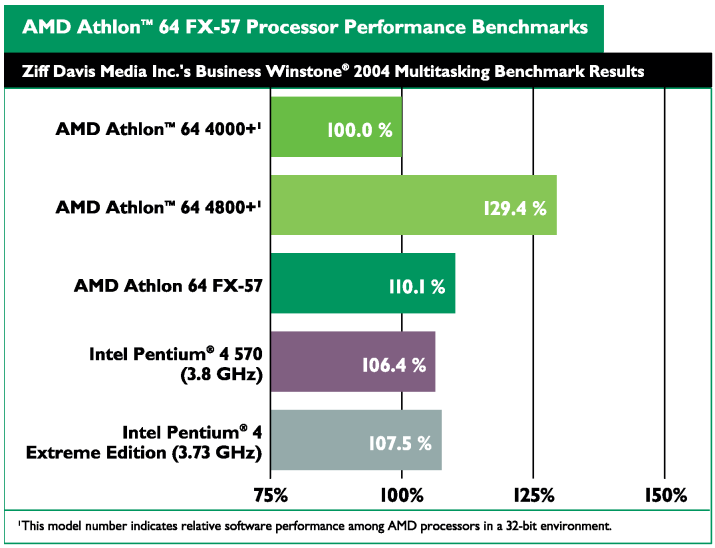


Table 10. WinRAR Overall

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	27.0	100.0%
AMD Athlon 64 4800+[1]	26.7	101.4%
AMD Athlon 64 FX-57	24.1	112.2%
Intel Pentium 4 3.8 GHz	31.6	85.6%
Intel Pentium 4 Extreme edition 3.73 GHz	29.2	92.6%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

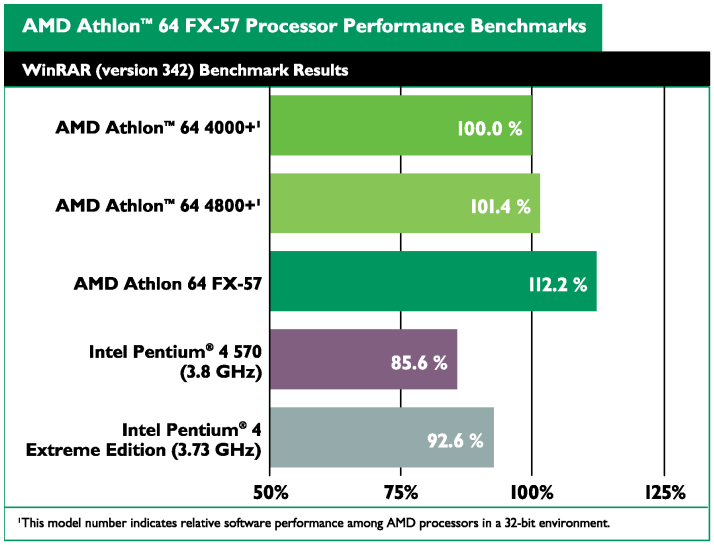
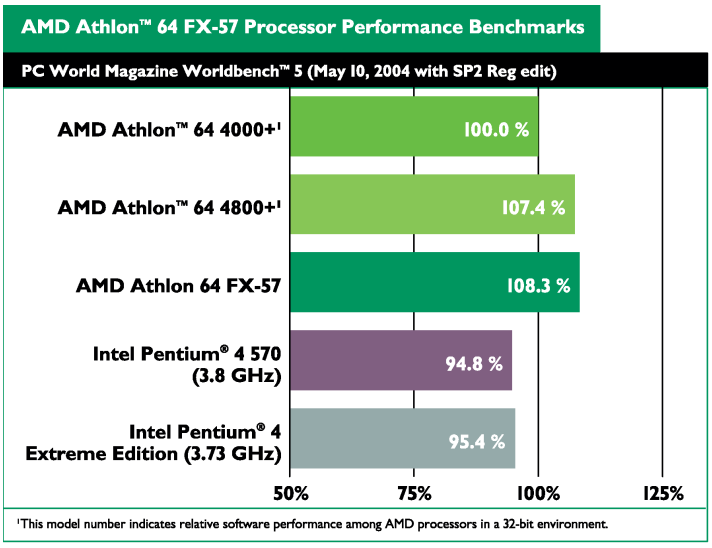


Table 11. PC World Magazine Worldbench™ 5 (May 10, 2004 with SP2 Reg Edit)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	108.0	100.0%
AMD Athlon 64 4800+[1]	116.0	107.4%
AMD Athlon 64 FX-57	117.0	108.3%
Intel Pentium 4 3.8 GHz	102.3	94.8%
Intel Pentium 4 Extreme edition 3.73 GHz	103.0	95.4%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.



[1] Tests performed without independent verification by the VeriTest testing division of Lionbridge Technologies Inc. (VeriTest) nor Ziff Davis Media Inc. and that neither Ziff Davis Media Inc. nor VeriTest make any representations or warranties as to the results of the tests.

Table 12. Remote Collaboration

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	1310.0	100.0%
AMD Athlon 64 4800+[1]	690.0	189.9%
AMD Athlon 64 FX-57	1118.7	117.1%
Intel Pentium 4 3.8 GHz	1081.0	121.2%
Intel Pentium 4 Extreme edition 3.73 GHz	1086.0	120.6%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

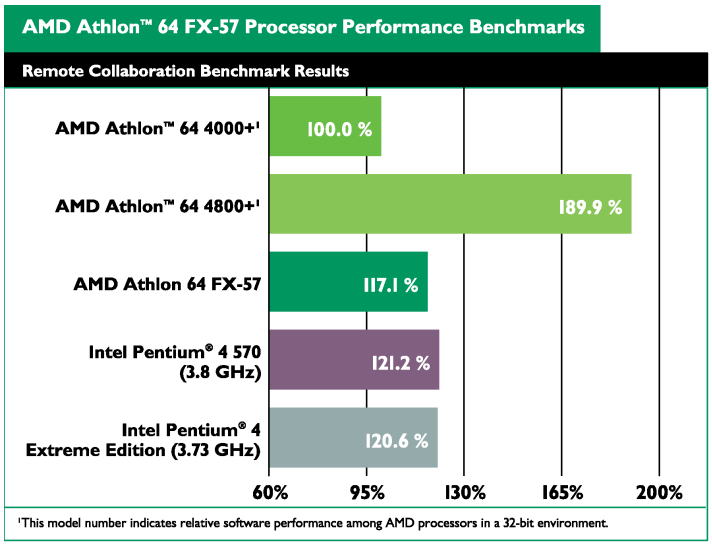


Table 13. Travel Ready

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	295.5	100.0%
AMD Athlon 64 4800+[1]	230.5	128.2%
AMD Athlon 64 FX-57	270.0	109.4%
Intel Pentium 4 3.8 GHz	265.0	111.5%
Intel Pentium 4 Extreme edition 3.73 GHz	267.0	110.7%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

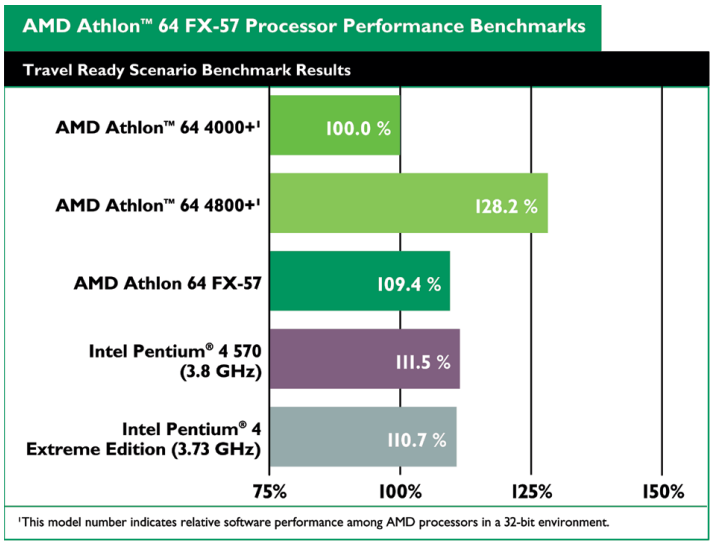


Table 14. Digital Media Overall

Processor	Result
AMD Athlon™ 64 4000+[1]	100.0%
AMD Athlon 64 4800+[1]	134.2%
AMD Athlon 64 FX-57	114.0%
Intel Pentium 4 3.8 GHz	105.6%
Intel Pentium 4 Extreme edition 3.73 GHz	105.1%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

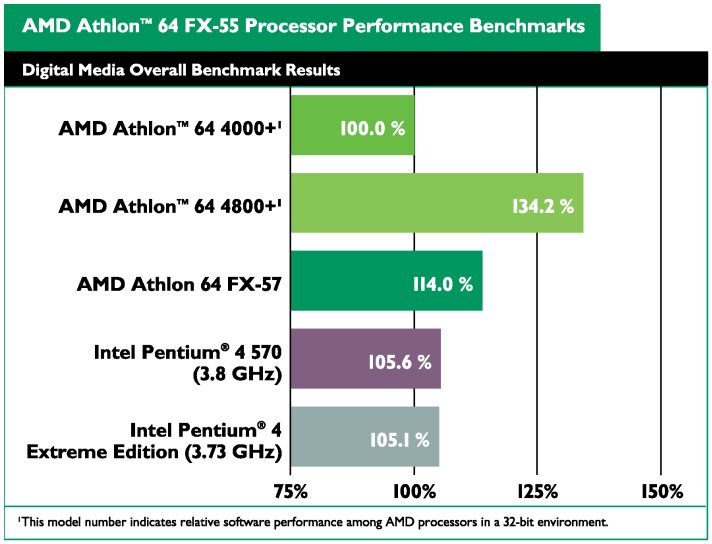


Table 15. BAPCO® SYSmark® 2004 Internet Content Creation

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	230.7	100.0%
AMD Athlon 64 4800+[1]	342.0	148.3%
AMD Athlon 64 FX-57	264.0	114.5%
Intel Pentium 4 3.8 GHz	258.7	112.1%
Intel Pentium 4 Extreme edition 3.73 GHz	258.3	112.0%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

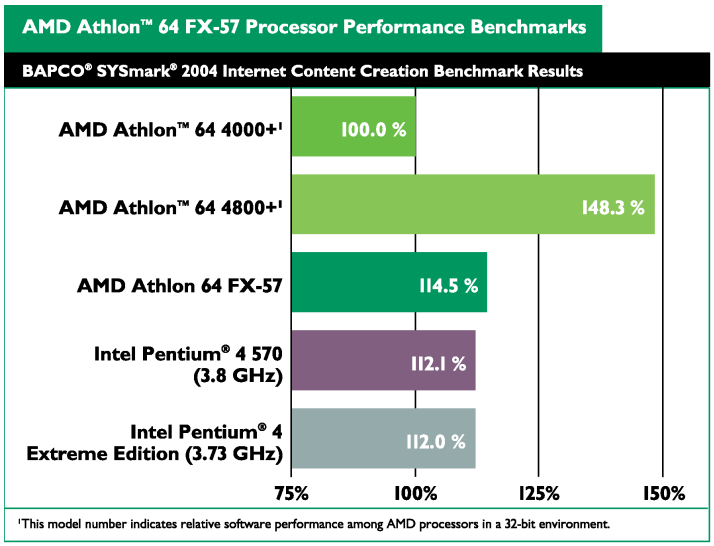


Table 16. Content Creation Winstone® 2004 v1.0

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	38.8	100.0%
AMD Athlon 64 4800+[1]	46.1	118.6%
AMD Athlon 64 FX-57	43.6	112.4%
Intel Pentium 4 3.8 GHz	37.1	95.4%
Intel Pentium 4 Extreme edition 3.73 GHz	36.9	95.0%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

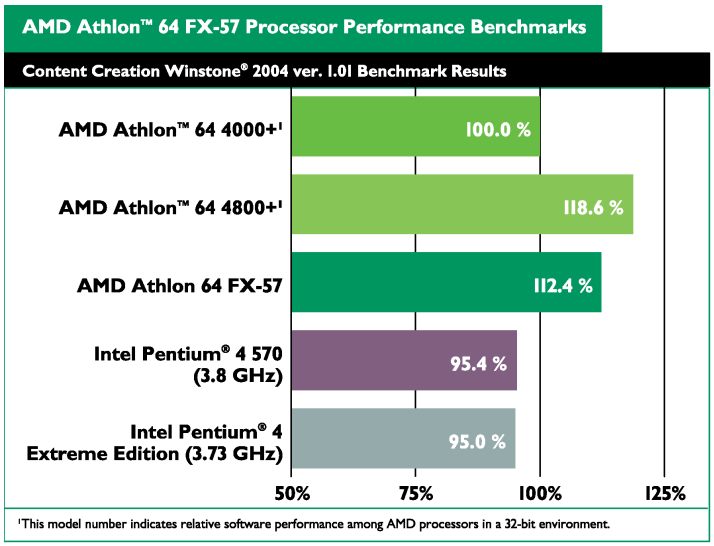


Table 17. Dr. DivX (Version 1.0.6)[2]

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	409.7	100.0%
AMD Athlon 64 4800+[1]	271.3	151.0%
AMD Athlon 64 FX-57	356.0	115.1%
Intel Pentium 4 3.8 GHz	447.3	91.6%
Intel Pentium 4 Extreme edition 3.73 GHz	449.7	91.1%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

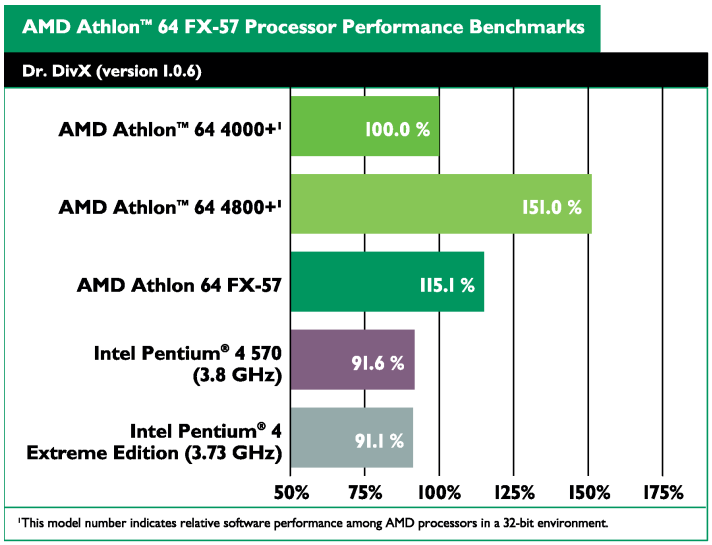


Table 18. RazorLAME MP3 Encoder (version 1.1.5.1342)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	238.0	100.0%
AMD Athlon 64 4800+[1]	238.3	99.9%
AMD Athlon 64 FX-57	204.0	116.7%
Intel Pentium 4 3.8 GHz	246.0	96.7%
Intel Pentium 4 Extreme edition 3.73 GHz	251.0	94.8%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

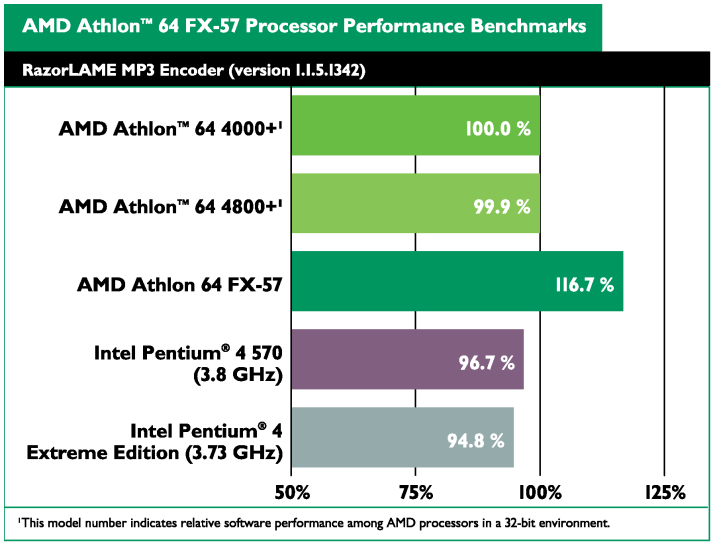
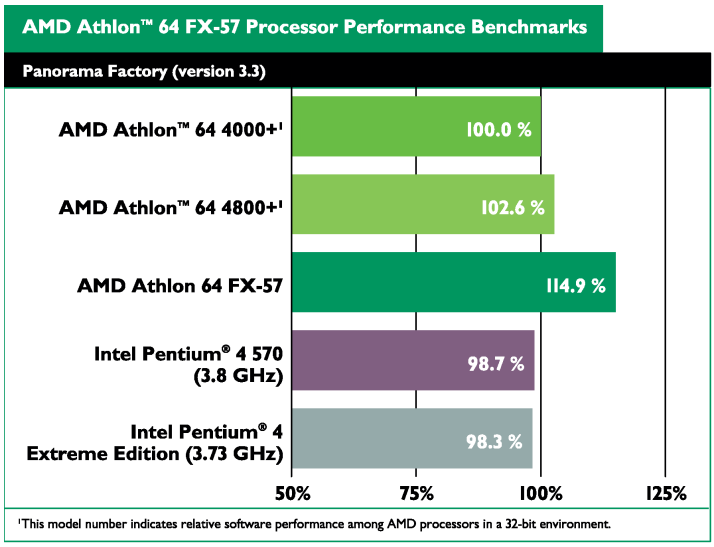


Table 19. Panorama Factory (version 3.3)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	126.5	100.0%
AMD Athlon 64 4800+[1]	123.3	102.6%
AMD Athlon 64 FX-57	110.2	114.9%
Intel Pentium 4 3.8 GHz	128.2	98.7%
Intel Pentium 4 Extreme edition 3.73 GHz	128.7	98.3%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.



[2] Tests performed without independent verification by DivXNetworks, Inc., its parents, subsidiaries, and affiliates. DivXNetworks, Inc., its parents, subsidiaries, and affiliates make no representation or warranty as to the results of the tests.

Table 20. POV-Ray (version 3.7.4)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	21998.2	100.0%
AMD Athlon 64 4800+[1]	34757.1	158.0%
AMD Athlon 64 FX-57	24656.0	112.1%
Intel Pentium 4 3.8 GHz	25065.7	113.9%
Intel Pentium 4 Extreme edition 3.73 GHz	24125.8	109.7%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

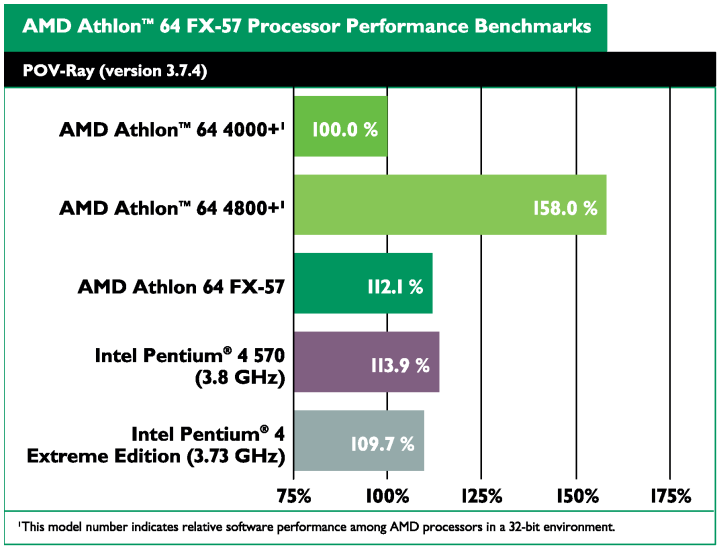


Table 21. Sony Vegas Studio (version 4.0)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	163.0	100.0%
AMD Athlon 64 4800+[1]	87.7	185.9%
AMD Athlon 64 FX-57	146.7	111.1%
Intel Pentium 4 3.8 GHz	131.7	123.8%
Intel Pentium 4 Extreme edition 3.73 GHz	127.7	127.7%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

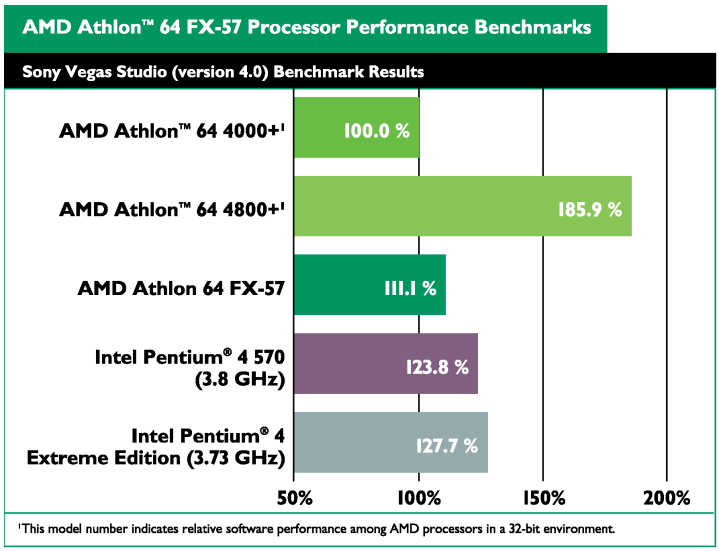


Table 22. Microsoft® Movie Maker (version 5.1)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	169.7	100.0%
AMD Athlon 64 4800+[1]	129.0	131.5%
AMD Athlon 64 FX-57	147.3	115.2%
Intel Pentium 4 3.8 GHz	144.7	117.3%
Intel Pentium 4 Extreme edition 3.73 GHz	144.3	117.6%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

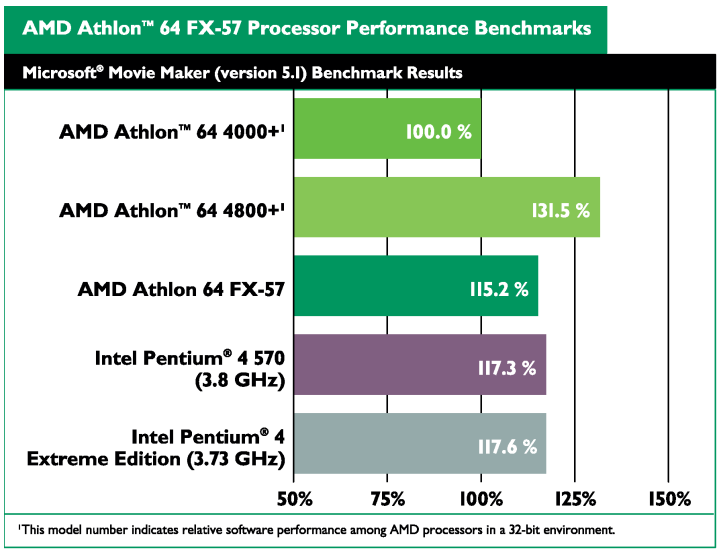


Table 23. Computer Gaming Overall

Processor	Result
AMD Athlon™ 64 4000+[1]	100.0%
AMD Athlon 64 4800+[1]	107.4%
AMD Athlon 64 FX-57	110.2%
Intel Pentium 4 3.8 GHz	85.7%
Intel Pentium 4 Extreme edition 3.73 GHz	88.8%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

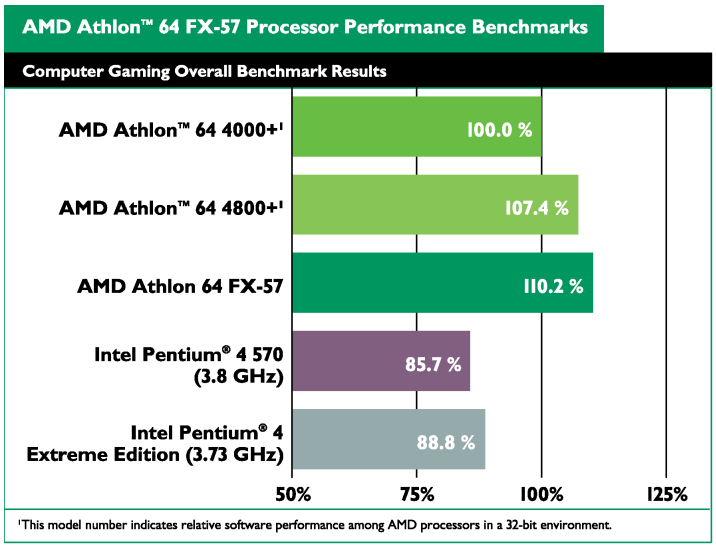


Table 24. Futuremark Corporation 3DMark® 2003 (Hardware) (Patch 340)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	13405.0	100.0%
AMD Athlon 64 4800+[1]	13456.7	100.4%
AMD Athlon 64 FX-57	13748.0	102.6%
Intel Pentium 4 3.8 GHz	13415.0	100.1%
Intel Pentium 4 Extreme edition 3.73 GHz	13615.0	101.6%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

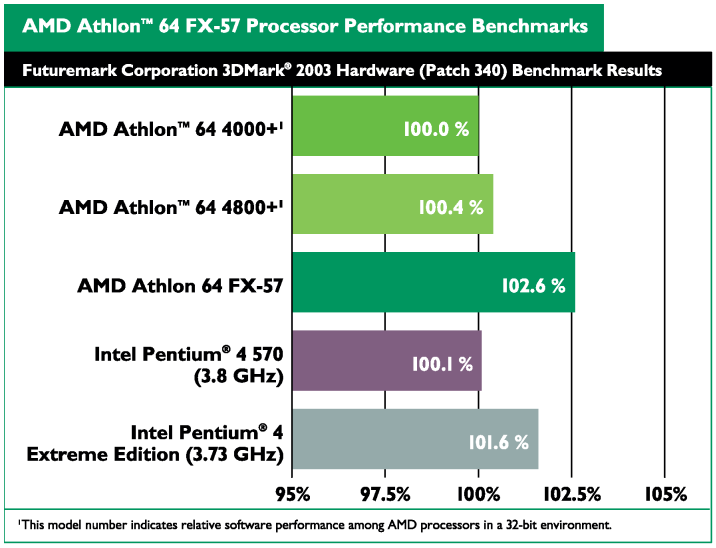


Table 25. Futuremark Corporation 3DMark® 2003 (Software) (Patch 340)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	3666.7	100.0%
AMD Athlon 64 4800+[1]	4203.7	114.6%
AMD Athlon 64 FX-57	4105.3	112.0%
Intel Pentium 4 3.8 GHz	3244.7	88.5%
Intel Pentium 4 Extreme edition 3.73 GHz	3389.7	92.4%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

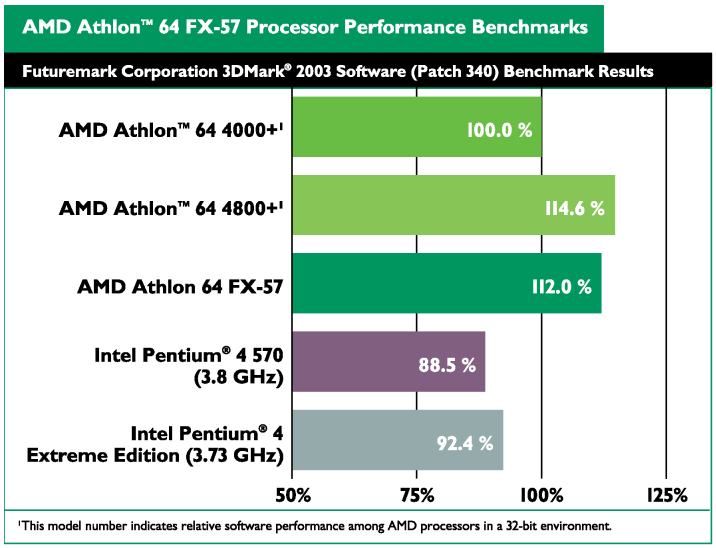


Table 26. Futuremark Corporation 3DMark® 2005 (Hardware T&L)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	5727.0	100.0%
AMD Athlon 64 4800+[1]	5745.0	100.3%
AMD Athlon 64 FX-57	5764.3	100.7%
Intel Pentium 4 3.8 GHz	5712.3	99.7%
Intel Pentium 4 Extreme edition 3.73 GHz	5735.3	100.1%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

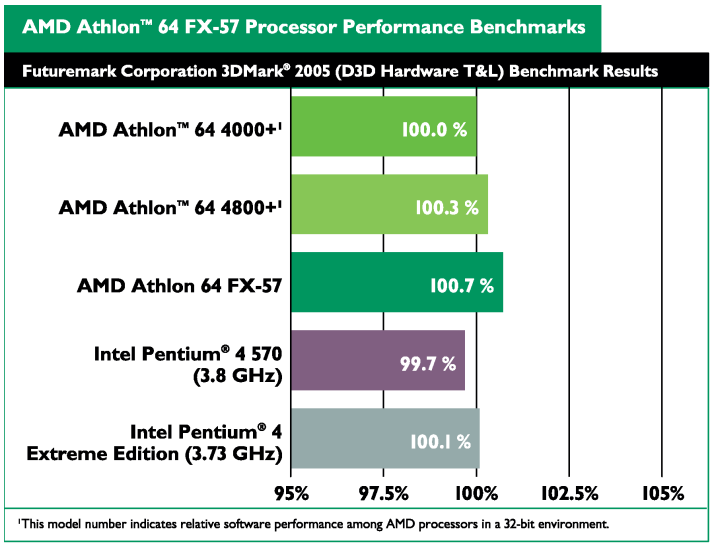


Table 27. Futuremark Corporation 3DMark® 2005 (Software T&L)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	1107.7	100.0%
AMD Athlon 64 4800+[1]	1470.7	132.8%
AMD Athlon 64 FX-57	1244.7	112.4%
Intel Pentium 4 3.8 GHz	996.7	90.0%
Intel Pentium 4 Extreme edition 3.73 GHz	1034.0	93.3%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

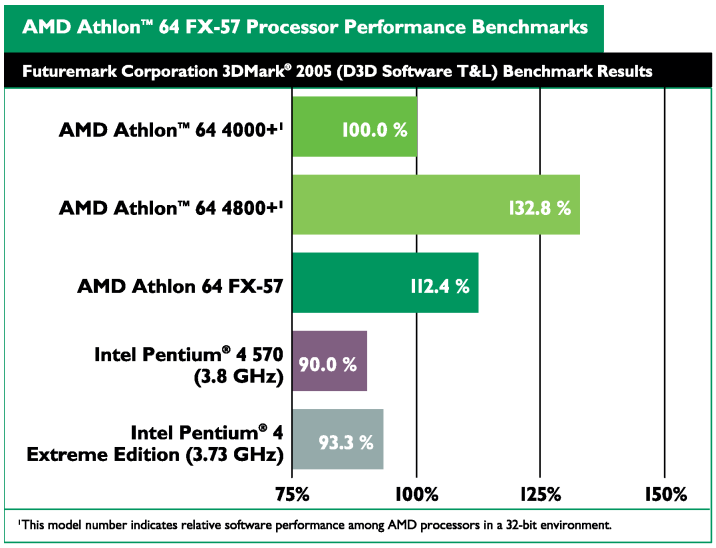


Table 28. Half-Life 2 (version 1.1.0 using at_coast_05_rev7.dem)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	120.4	100.0%
AMD Athlon 64 4800+[1]	121.0	100.6%
AMD Athlon 64 FX-57	131.8	109.5%
Intel Pentium 4 3.8 GHz	93.8	78.0%
Intel Pentium 4 Extreme edition 3.73 GHz	97.8	81.3%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

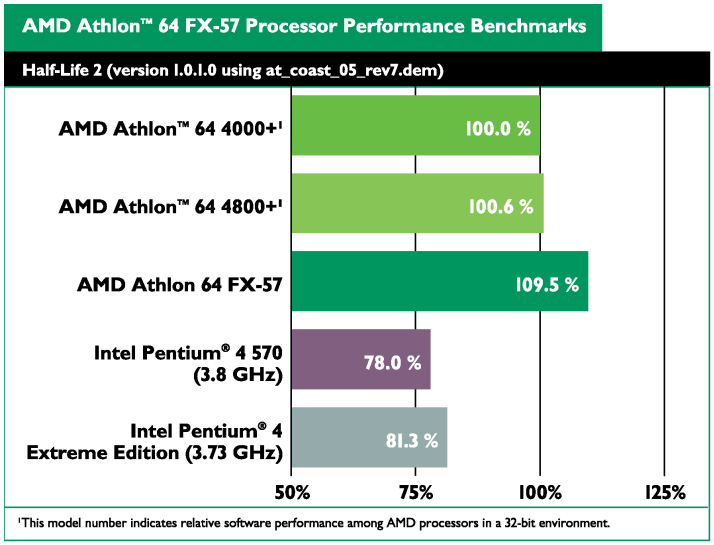


Table 29. Half-Life 2 (version 1.1.0 using at_prison_05_rev7.dem)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	129.7	100.0%
AMD Athlon 64 4800+[1]	131.4	101.3%
AMD Athlon 64 FX-57	135.7	104.7%
Intel Pentium 4 3.8 GHz	102.4	78.9%
Intel Pentium 4 Extreme edition 3.73 GHz	107.5	82.9%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

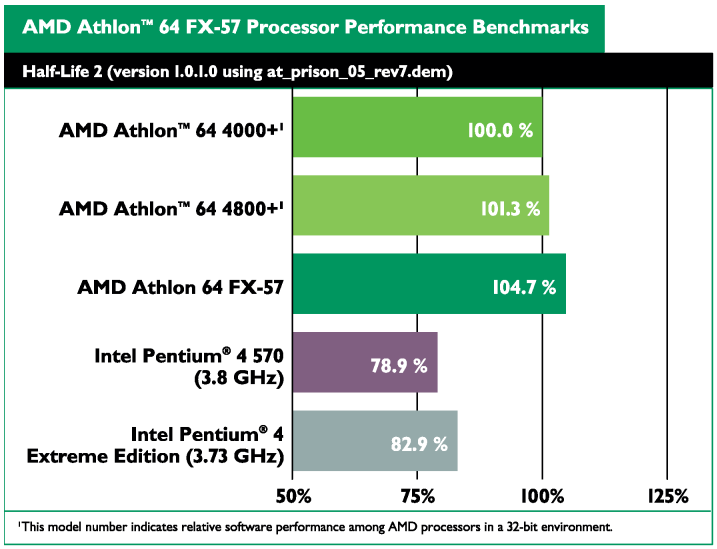


Table 30. Jedi Knights II Demo (Patched to 1.04)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	218.7	100.0%
AMD Athlon 64 4800+[1]	219.0	100.2%
AMD Athlon 64 FX-57	245.8	112.4%
Intel Pentium 4 3.8 GHz	201.0	91.9%
Intel Pentium 4 Extreme edition 3.73 GHz	207.6	94.9%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

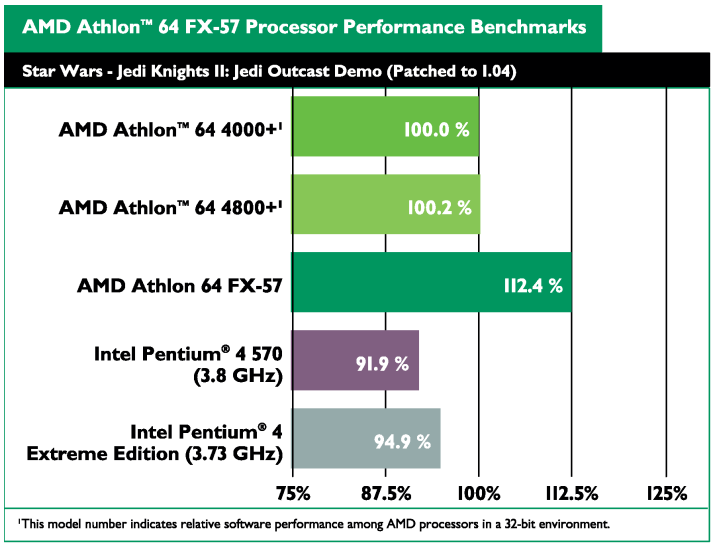


Table 31. QuakeIII Arena Demo2 (version 1.11)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	475.1	100.0%
AMD Athlon 64 4800+[1]	475.1	100.0%
AMD Athlon 64 FX-57	531.6	111.9%
Intel Pentium 4 3.8 GHz	445.3	93.7%
Intel Pentium 4 Extreme edition 3.73 GHz	500.0	105.2%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

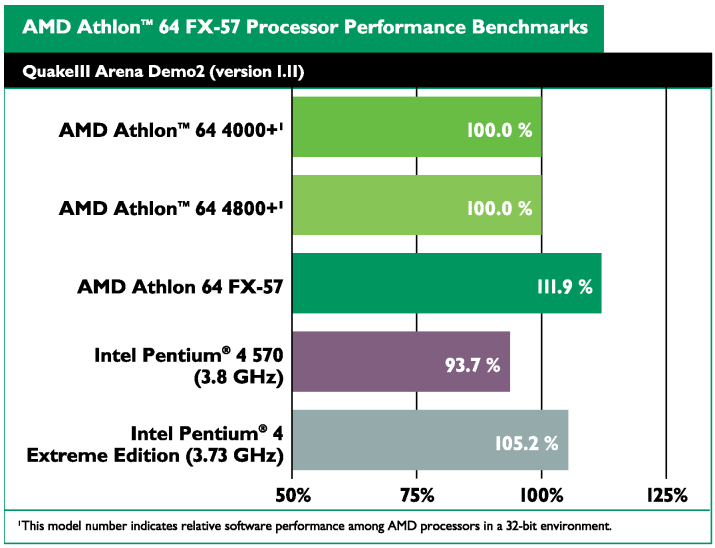


Table 32. Return to Castle Wolfenstein Enemy Territory (version 2.60)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	94.0	100.0%
AMD Athlon 64 4800+[1]	94.2	100.2%
AMD Athlon 64 FX-57	106.5	113.2%
Intel Pentium 4 3.8 GHz	87.7	93.3%
Intel Pentium 4 Extreme edition 3.73 GHz	87.6	93.1%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

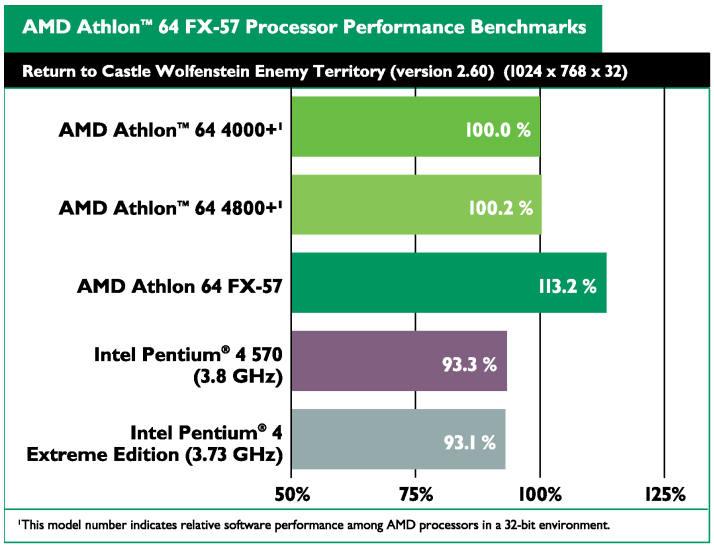


Table 33. Unreal Tournament 2003 Flyby (version 3355)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	366.4	100.0%
AMD Athlon 64 4800+[1]	372.4	101.6%
AMD Athlon 64 FX-57	414.8	113.2%
Intel Pentium 4 3.8 GHz	304.2	83.0%
Intel Pentium 4 Extreme edition 3.73 GHz	326.9	89.2%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

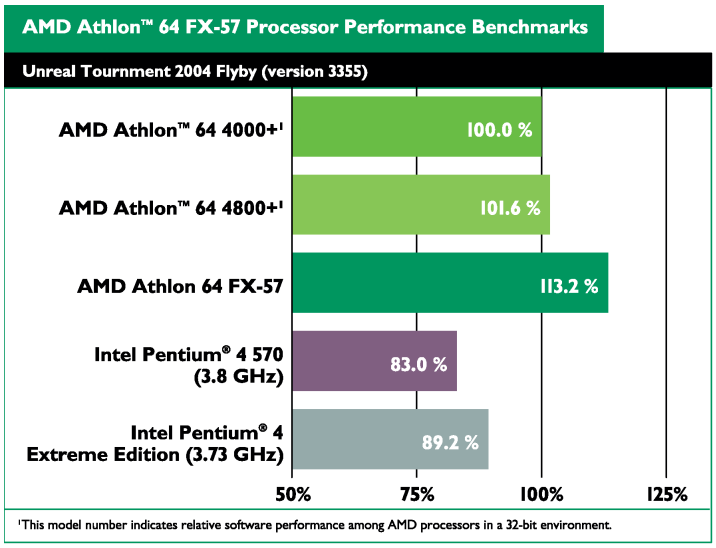


Table 34. Unreal Tournament 2003 Botmatch (version 3355)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	142.1	100.0%
AMD Athlon 64 4800+[1]	142.6	100.3%
AMD Athlon 64 FX-57	160.9	113.2%
Intel Pentium 4 3.8 GHz	112.5	79.1%
Intel Pentium 4 Extreme edition 3.73 GHz	115.7	81.4%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

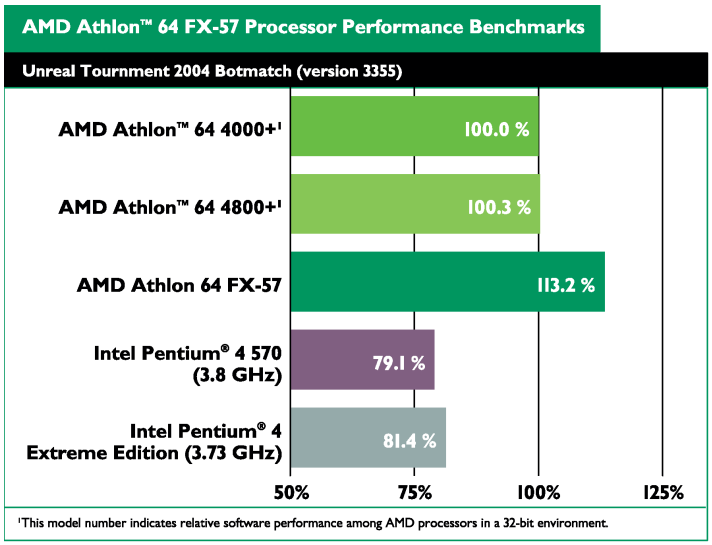


Table 35. Splinter Cell (1_1_1) (version 1.2b)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	114.7	100.0%
AMD Athlon 64 4800+[1]	114.7	100.0%
AMD Athlon 64 FX-57	126.7	110.5%
Intel Pentium 4 3.8 GHz	87.4	76.2%
Intel Pentium 4 Extreme edition 3.73 GHz	91.1	79.5%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

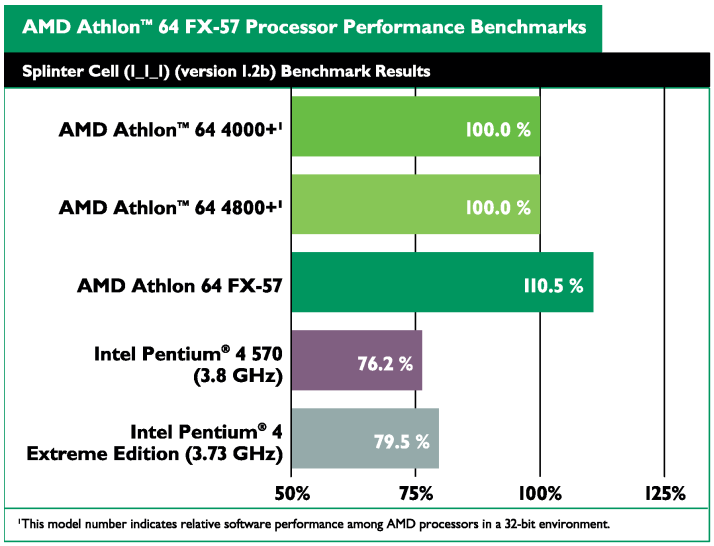


Table 36. Splinter Cell (1_1_2) (version 1.2b)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	106.0	100.0%
AMD Athlon 64 4800+[1]	106.6	100.6%
AMD Athlon 64 FX-57	118.3	111.6%
Intel Pentium 4 3.8 GHz	83.5	78.8%
Intel Pentium 4 Extreme edition 3.73 GHz	87.2	82.3%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

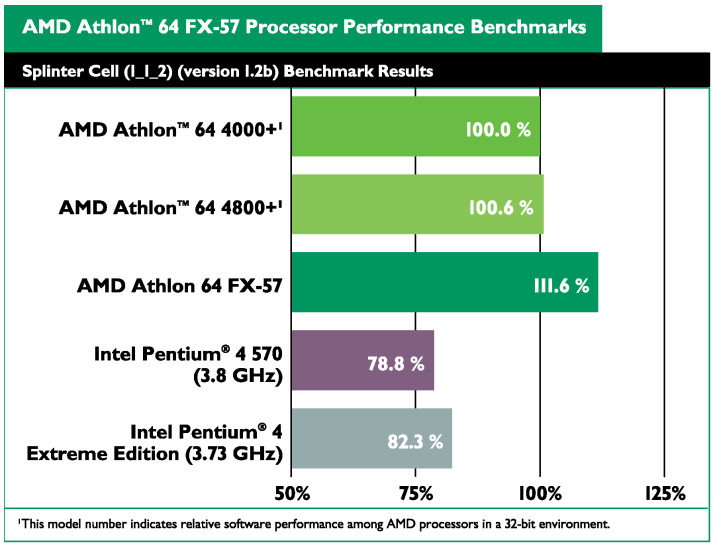


Table 37. FarCry (version 1.3.1)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	90.0	100.0%
AMD Athlon 64 4800+[1]	91.6	101.8%
AMD Athlon 64 FX-57	100.0	111.2%
Intel Pentium 4 3.8 GHz	74.9	83.3%
Intel Pentium 4 Extreme edition 3.73 GHz	77.6	86.3%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

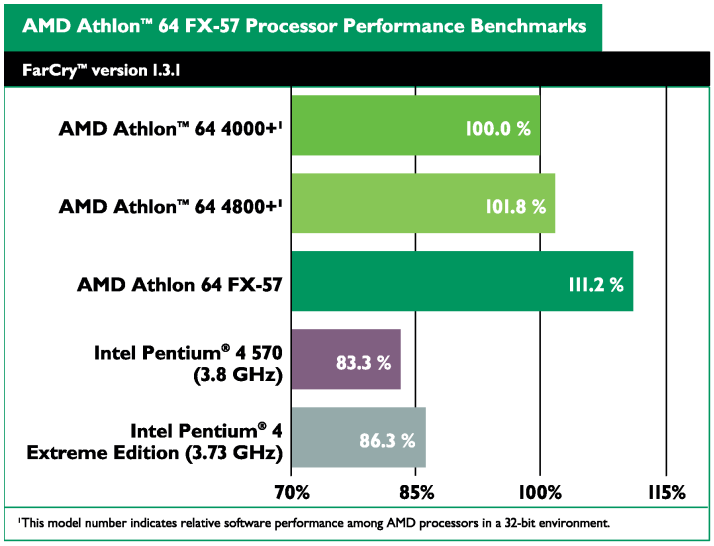


Table 38. Painkiller (version 1.64)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	142.8	100.0%
AMD Athlon 64 4800+[1]	143.1	100.2%
AMD Athlon 64 FX-57	161.2	112.9%
Intel Pentium 4 3.8 GHz	117.3	82.2%
Intel Pentium 4 Extreme edition 3.73 GHz	119.6	83.8%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

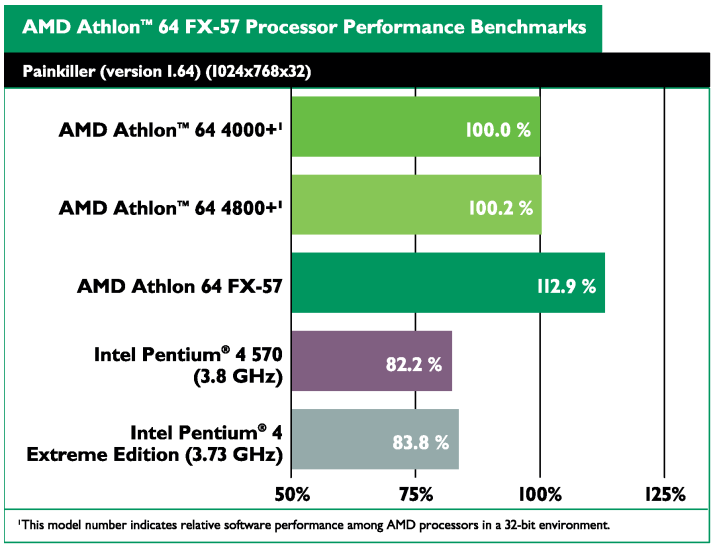


Table 39. Crafty (Version 19.19)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	1670528.0	100.0%
AMD Athlon 64 4800+[1]	3428061.0	205.2%
AMD Athlon 64 FX-57	1958791.0	117.3%
Intel Pentium 4 3.8 GHz	1335650.0	80.0%
Intel Pentium 4 Extreme edition 3.73 GHz	1307641.7	78.3%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.

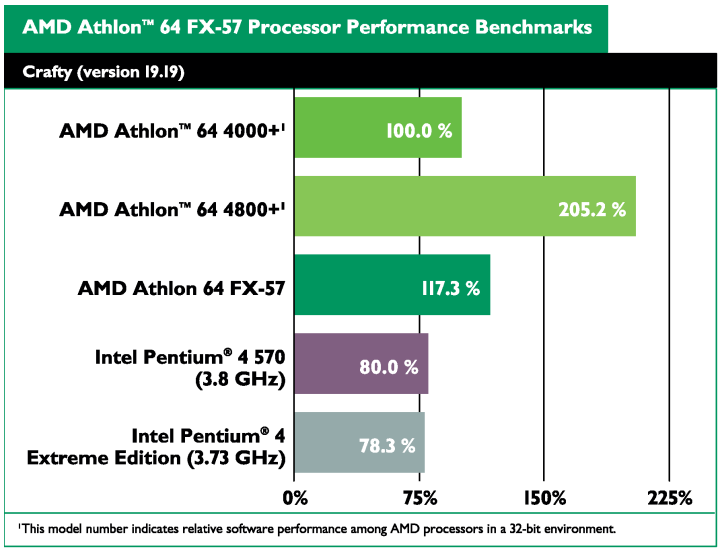
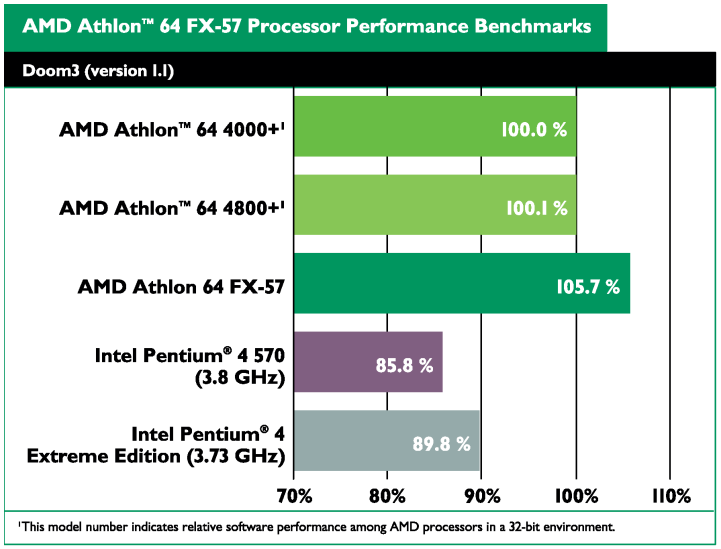


Table 40. Doom3 (Version 1.1)

Processor	Score	Result
AMD Athlon™ 64 4000+[1]	113.4	100.0%
AMD Athlon 64 4800+[1]	113.5	100.1%
AMD Athlon 64 FX-57	119.9	105.7%
Intel Pentium 4 3.8 GHz	97.3	85.8%
Intel Pentium 4 Extreme edition 3.73 GHz	101.9	89.8%

[1]This model number indicates relative software performance among AMD processors in a 32-bit environment.



Appendix A Scripts

This chapter lists the contents of the various batch files AMD used to run benchmark tests.

Spinter Cell Batch File Content

Below is the contents of the `splintercell.bat` batch file.

```
splintercell.exe 1_1_1Tbilisi.scl PLAYTIMEDEMO=1_1_1TbilisiDemo.bin -NOSOUND
RESOLUTION=1024X768 SHADOWLEVEL=LOW SHADOWRESOLUTION=LOW EFFECTSQUALITY=LOW
SHADOWMODE=PROJECTOR

splintercell.exe 1_1_1Tbilisi.scl PLAYTIMEDEMO=1_1_1TbilisiDemo.bin -NOSOUND
RESOLUTION=1024X768 SHADOWLEVEL=LOW SHADOWRESOLUTION=LOW EFFECTSQUALITY=LOW
SHADOWMODE=PROJECTOR

splintercell.exe 1_1_1Tbilisi.scl PLAYTIMEDEMO=1_1_1TbilisiDemo.bin -NOSOUND
RESOLUTION=1024X768 SHADOWLEVEL=LOW SHADOWRESOLUTION=LOW EFFECTSQUALITY=LOW
SHADOWMODE=PROJECTOR

splintercell.exe 1_1_2Tbilisi.scl PLAYTIMEDEMO=1_1_2TbilisiDemo.bin -NOSOUND
RESOLUTION=1024X768 SHADOWLEVEL=LOW SHADOWRESOLUTION=LOW EFFECTSQUALITY=LOW
SHADOWMODE=PROJECTOR

splintercell.exe 1_1_2Tbilisi.scl PLAYTIMEDEMO=1_1_2TbilisiDemo.bin -NOSOUND
RESOLUTION=1024X768 SHADOWLEVEL=LOW SHADOWRESOLUTION=LOW EFFECTSQUALITY=LOW
SHADOWMODE=PROJECTOR

splintercell.exe 1_1_2Tbilisi.scl PLAYTIMEDEMO=1_1_2TbilisiDemo.bin -NOSOUND
RESOLUTION=1024X768 SHADOWLEVEL=LOW SHADOWRESOLUTION=LOW EFFECTSQUALITY=LOW
SHADOWMODE=PROJECTOR
```

MovieMaker

Below is the source to the Moviemaker PERL script file.

```
use Win32::GuiTest qw( :FUNC );
use Getopt::Long;
use File::stat;
use Time::localtime;
use Cwd;
my $dir = getcwd;
$dir =~ s/\//\\/g;
###Creating results.csv file
   open (INPUT, ">results.csv") || die "Could not open file results.csv : $!\n";
   open (OUTPUT, ">>results.csv") || die "Could not open file results.csv : $!\n";
   while (<INPUT>)
{
   chop;
}
   print OUTPUT "Total encode time\n \n";
```

```
   close (INPUT);
   close (OUTPUT);
#get number of test loops
$| = 1;
#print "Please enter how many times you want the test to loop: ";
#$Input = 3;
chop $Input;
print "\nTest will loop 3 times.\n";
for ($x=0; $x< 3; $x++)
{
#Deleting the old files
#Check to see if the file exsists
if (-e "$dir\\demo.wmv")
{
#Delete the file
if (unlink "$dir\\demo.wmv")
{
print "The video file has been deleted.\n";
}
else
{
print "The video file was not deleted: $!\n";
}
}
else
{
print "The video file does not exist.\n";
}
#Starting Vegas Studio
my $Title = "demo32 - Windows Movie Maker";
my $Title2 = "Save Movie Wizard";
my $Title3 = "Progress1";
print "\nWindows Movie Maker Demo\n";
system ("start $dir\\demo32.MSWMM");
sleep 2;
WaitWindowLike (0, $Title, 0, 0, 0, 60);
sleep 0.50;
SendKeys ("%f");
SendKeys ("m");
sleep 1;
$hWnd = WaitWindowLike (0, $Title2, 0, 0, 0, 60);
PushChildButton ($hWnd, "&Next >") or die;
sleep 0.50;
SendKeys ("demo");
PushChildButton ($hWnd, "B&rowse...") or die;
sleep 0.50;
SendKeys ('{TAB 3}');
SendKeys ($dir);
SendKeys ('{ENTER}');
sleep 0.50;
PushChildButton ($hWnd, "&Next >") or die;
```

```
sleep 0.50;
PushChildButton ($hWnd, "&Next >") or die;
#Start of the Encoding Process
    WaitWindowLike (0, $Title3, 0, 0, 0, 60);
    $startTime = ((localtime->min() * 60) + localtime->sec());
    print "Encoding file \n";
######Timing the encoding process######
sleep 10;
    $i = 0;

    $file = "$dir\\demo.wmv";
    $lastTime = ctime(stat($file)->mtime);
    $currentTime = $lastTime;
        while ($i == 0)
    {
    sleep 1;
       if ($lastTime eq $currentTime)
       {
          $lastTime = $currentTime;

          $currentTime = ctime(stat($file)->mtime);
       }
       else
       {
          $i = 1;
       }
    }
###Calculating Encode time###
    $finishTime = ((localtime->min() * 60) + localtime->sec());
    $deltaTime = $finishTime - $startTime;
    print ("\nTotal encode time is $deltaTime.\n");

    {
    #Print the results to results.csv
open (OUTPUT, ">>results.csv") || die "Could not open file results.csv : $!\n";
while (<INPUT>)
{
   chop;
}
        print OUTPUT "$deltaTime, seconds\n";
        close (OUTPUT);
        close (INPUT);
    }
sleep 0.50;
###Closing Movie Maker
$hWnd = WaitWindowLike (0, $Title2, 0, 0, 0, 60);
PushChildButton ($hWnd, "Cancel") or die;
sleep 0.50;
SendKeys ('%{F4}');
sleep 2;
```

```
}
##Opening Results.txt in notepad
   system ("start notepad results.csv");
##Playing Video
#system ("start c:\\temp\\Movie_Maker\\demo.wmv");
```

Sony Vegas

Below is the source to the Sony Vegas PERL script file.

```
use Win32::GuiTest qw(SendKeys);
use Getopt::Long;
use File::stat;
use Time::localtime;
###Creating results.csv file
   open (INPUT, ">results.csv") || die "Could not open file results.csv : $!\n";
   open (OUTPUT, ">>results.csv") || die "Could not open file results.csv : $!\n";
   while (<INPUT>)
   {
      chop;
   }
   print OUTPUT "Total encode time\n \n";
   close (INPUT);
   close (OUTPUT);
#get number of test loops
$| = 1;
#print "Please enter how many times you want the test to loop: ";
#$Input = 3;
chop $Input;
print "Test will loop $Input times.\n";

for ($x=0; $x< 3; $x++)
{
#Deleting the old files
   #Check to see if the file exsists
   if (-e "c:\\Temp\\Vegas\\Reef.avi")
   {
      #Delete the file
      if (unlink "c:\\Temp\\Vegas\\Reef.avi")
      {
         print "The video file has been deleted.\n";
      }
      else
      {
         print "The video file was not deleted: $!\n";
      }
   }
   else
   {
      print "The video file does not exist.\n";
```

```
   }
#Starting Vegas Studio
system ("start moviest40.exe");
print "Starting Vegas \n";
sleep 8;
SendKeys ("%f");
print "Opening File Menu \n";
sleep 1;
SendKeys ("o");
print "Opening Project \n";
sleep 1;
SendKeys ("c:\\Temp\\Vegas\\Reef.vf");
SendKeys ("{ENTER}");
print "Loading Project \n";
sleep 3;
#Creating video file
SendKeys ("%f");
print "Opening Menu 2nd time \n";
SendKeys ('k');
print "Making Movie \n";
SendKeys ('{TAB}');
SendKeys ('{ENTER}');
sleep 1;
SendKeys ('c:\\Temp\\Vegas\\Reef.avi');
print "Chosing save location and file name \n";

    #Start of the Encoding Process
    SendKeys ('{ENTER}');
    $startTime = ((localtime->min() * 60) + localtime->sec());
    print "Encoding file \n";
######Timing the encoding process######
                  $i = 0;
    $file = "c:\\Temp\\Vegas\\Reef.avi";
    $lastTime = ctime(stat($file)->mtime);
    $currentTime = $lastTime;
        while ($i == 0)
    {
    sleep .2;
       if ($lastTime eq $currentTime)
       {
          $lastTime = $currentTime;
                                        $currentTime = ctime(stat($file)->mtime);
       }
       else
       {
          $i = 1;
       }
    }
###Calculating Encode time###
    $finishTime = ((localtime->min() * 60) + localtime->sec());
    $deltaTime = $finishTime - $startTime;
```

```
    print ("Total encode time is $deltaTime.\n");
{
    #Print the results to results.csv
   open (OUTPUT, ">>results.csv") || die "Could not open file results.csv : $!\n";
   while (<INPUT>)
   {
      chop;
   }
        print OUTPUT "$deltaTime, seconds\n";
        close (OUTPUT);
        close (INPUT);
    }
sleep 3;
###Closing Vegas
SendKeys ('{TAB}');
SendKeys ('{TAB}');
SendKeys ('{TAB}');
SendKeys ('{ENTER}');
sleep 1;
SendKeys ('%{F4}');
sleep 1;

}
###Opening Results.txt in notepad
   system ("start notepad results.csv");
```

Travel Ready Scenario

Below is the source to the Microsoft® Publisher + Nero batch file.

```
@echo off
rem -- Run RecodeBench --
set LOOPCNT=5
set RESULTFILE=result.csv
set BENCH=.\DualCore1.exe
REM set BENCH=perl DualCore1.pl
set TMPRESULT=.\iResult.tmp
set INTERIM=.\interim.exe
set RECODESRC=C:\RecodeBench
set RECODETGT=C:\NeroRecode
if "%1"=="" goto useloopdefault
set LOOPCNT=%1
:useloopdefault
if "%2"=="" goto useresultdefault
set RESULTFILE=%2
:useresultdefault
if exist "%BENCH%" goto readytostart
echo Bechmark Program "%BENCH%" not found
goto end
:readytostart
del %TMPRESULT%
for /L %%I in (1,1,%LOOPCNT%) do cmd /c %BENCH%  %TMPRESULT% %%I
```

```
REM for /L %%I in (1,1,%LOOPCNT%) do echo Execute %RESULTFILE%
cmd /c %INTERIM% %RESULTFILE% <%TMPRESULT%
goto end
:usage
echo recodeBench <runCount> <resultFile>
:end
if EXIST %TMPRESULT% del %TMPRESULT%
```

Remote Collaboration

This is the Perl script source for the Netmeeting, media encoder, PowerPoint viewer tests.

```
#File WMEncoder.pl
#File version 1.0
use Env;
use Win32::GuiTest qw( :FUNC :VK );

$Win32::GuiTest::debug = 0;
my $Verbose = 0;

use strict;

=head1 NAME

File name Wme+NM.pl. app name Wme+NM.exe

=head1 SYNOPSIS

   Starts WMEncoder script and NM script to run concurrently.

=head1 DESCRIPTION

   This little application runs starts WMEncoder script and NM script to run
concurrently.
   These two scripts knows how to synch to each. Synching is forced by using using
"mixmode" parameter and a shared semaphore.
   Task of this app is to act like (or better then) a batch file that starts to
apps with params from different folders
   and finishes when they all done.
   Paths to child scripts are passed as command line parameters!

=head2 Important Notes

   perl v5.8.4 for MSWin32-x86-multi-thread (activestate.com)

=head1 AUTHOR

   Boris Chernis, AMD
```

```
=head1 Requirements

   No special requirements, as long as requirements for NetMeeting script and
WindowsMediaEncoder script are met.

=head1 TODO ("+" means done)


=head1 Would be nice ("+" means done)

   Would be nice:
   Optional redirection of the console output of each child script
   Pass all the parameters in a cnf file whose name is passed as a single param
   Same as above with an ability to override a value from cnf file by a value from
command line
   Verify target IP.

=head1 Notes

      TBD = To Be Designed. Search for "TBD" in the code.

=head1 Usage

   Run with no parameters shows Usage and Examples.

=cut
=head1 Comamand line parameters
  Counting from 0:
  0 Path  to NetMeeting script or app. Format: string. Backslashes needs to be
doubled up or replaced by forward slashes.
  1 Target IP
  2 Path to Windows Media Encoder Script
  3 Video clip (like MPEG-2 movie) for Windows Media Encoder to re-code
=cut

main{
   my $AppName = "Wme+NM";
   print "Entering $AppName Benchmark Test program\n";

   my $Usage = "\nUsage:\n" .
            "Wme+NM.exe PathToNM_Script TargetIP PathToWme_Script
VideoClipFileName\n";

   my $Examples = "\nExamples:\n" .
                "Relative paths:\n" .
                "Wme+NM.exe ../../NetMeeting/Script/  163.181.237.220 ../../
WMEncoder/Script/ ../../Movies/NewOrlea1941.mpeg\n" .
                "Absolute paths:\n" .
                "Wme+NM.exe d:\\Benchmarks\\NetMeeting\\  163.181.237.220
d:\\Benchmarks\\WMEncoder\\ d:/movies/MPEG-2_Movies/NewOrlea1941.mpeg\n" .
```

```
                "Current directory:\n" .
                "Wme+NM.exe ./  163.181.237.220 ./ ./NewOrlea1941.mpeg\n" ;

   if(@ARGV == 0){
      print $Usage;
      print $Examples;
      print "Exiting $AppName...\n";
      exit;
   }

   #Debugging Flags
   my $bRunNM = 1;
   my $bRunWME = 1;
   my $mixmode = "mixmode"; # "" to avoid synch om semafore, "mixmode" for synch.
   my $EXEorPL = ".exe";  # ".pl" for scripts, ".exe" or "" for executables.

   #Pre-defined values of parameters
   my $pathNM = "../../NetMeeting/Script/";
   my $TargetIP = "163.181.237.220";

   my $pathWme = "../../WMEncoder/Script/";
   my $FileToRecode = "./NewOrlea1941.mpeg"; # has to be full path

   # Parsing parameters

   $pathNM = $ARGV[0] if(defined $ARGV[0]);
   die "Error: Path for NM script $pathNM does not exist, exiting $AppName\n"
unless(-e $pathNM);

   $TargetIP = $ARGV[1] if(defined $ARGV[1]);
   print "TBD: Skipping verification of target IP\n";

   $pathWme = $ARGV[2] if(defined $ARGV[2]);
   die "Error: Path for WindowsMediaEncoder-9 script $pathWme does not exist,
exiting $AppName\n" unless(-e $pathWme);

   $FileToRecode = $ARGV[3] if(defined $ARGV[3]);
   die "Error: File $FileToRecode to recode does not exist, exiting $AppName\n"
unless(-e $FileToRecode);

   my $pid_NM = fork;
   #Following is forked, shared code till (including) unless statement
   #print "pid = $pid_NM\n";
   unless($pid_NM)
   {
      #NetMeeting process, go to its directory
      chdir $pathNM;
      #my $ClildCMD = "nm_msng.pl 163.181.237.220 10 $mixmode";
      #my $ClildCMD = "nm_msng" . $EXEorPL . " " . $TargetIP .  " 10 " . $mixmode;
      my $ClildCMD = "nm_msng" . $EXEorPL . " " . $TargetIP .  " 0 " . $mixmode;
      print "ClildCMD = $ClildCMD\n";
```

```
      if($bRunNM){
         system($ClildCMD) or die "Failed launch $ClildCMD";
      }else{
         print "Warning: Skipping NM\n";
      }


      print "\nExit Child\n";
      exit;
   }

   #Parent process continues
   defined $pid_NM or die "Error: Fork is failed!\n";

   #Following 10 prints takes 10 sec and show that parent "process" is alive
   #for(my $i=0; $i < 5; $i++){
   #  print "P\n";
   #  sleep 1;
   #}

   #assuming the parent path has not changed, so still can use relative chadir
path
   my $pid_WMEnc = fork;
   #Following is forked, shared code till (including) unless statement
   #print "pid = $pid_WMEnc\n";
   unless($pid_WMEnc)
   {
      #WindowsMediaEncoder process, go to its directory
      chdir $pathWme;
      my $ClildCMD = "WMEncoder" . $EXEorPL . " " .  $FileToRecode . " 1 " .
$mixmode;

      print "ClildCMD = $ClildCMD\n";
      if($bRunWME){
         system($ClildCMD) or die "Failed launch $ClildCMD";
      }else{
         print "Warning: Skipping WindowsMediaEncoder\n";
      }

      print "\nExit Child\n";
      exit;
   }

   #Parent process continues
   defined $pid_WMEnc or die "Error: Fork is failed!\n";

   #
   # Now it's time to synch up copmlition. After WMEncoder completes we don't need
NM any more,
   # so we need to ping it to wrop it up.
   #
```

```
print "Parent: waiting for Child  $pid_WMEnc to finish\n";
waitpid($pid_WMEnc, 0);
print "Parent: Child 2 $pid_WMEnc has finished\n";

print "TBD: (Skipped) Ping NM to wrap up\n";

print "Parent: Waiting for Child  $pid_NM to finish\n";
waitpid($pid_NM, 0);
print "Patrent: Child 1 $pid_NM has finished\n";


print "\nAll done: Exit Parent\n";
exit;
```