AMD Processor Performance Evaluation Guide

Mark W. Welker
ADVANCED MICRO DEVICES, INC.
One AMD Place
Sunnyvale, CA 94088

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Trademarks

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Revision History

Date	Rev	Description
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 and AMD Athlon 64 FX processors.

AMD64 Processor Architecture

Optimal benchmarking of AMD's 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 PC 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
  - 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 one terabyte of installed RAM, shattering the 4 gigabyte RAM barrier present on all 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 any current SSE/SSE2 implementation.

- Integrated DDR memory controller, as shown in Figure 1 on page 9.
  - This feature allows for a reduction in memory latency, thereby increasing overall system performance.
  - Benchmarks like Business Winstone®, WinACE and WinRAR Data compression, and Aquamark will all help show the benefit of reduced latency.

- An advanced HyperTransport™ link, as shown in Figure 2 on page 10.
  - 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 WinACE and WinRAR Data compression to indicate 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, by 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 SSE2 instruction set, which along with support of 3DNow!™ Professional, (SSE and 3DNow! Enhanced) completes support for all industry-standard 32-bit instruction set extensions.

- 64-bit processing
  - A 64-bit address and data set enables the processor to process in the terabyte space.
  - Many applications improve due to the removal of the 32-bit collar.

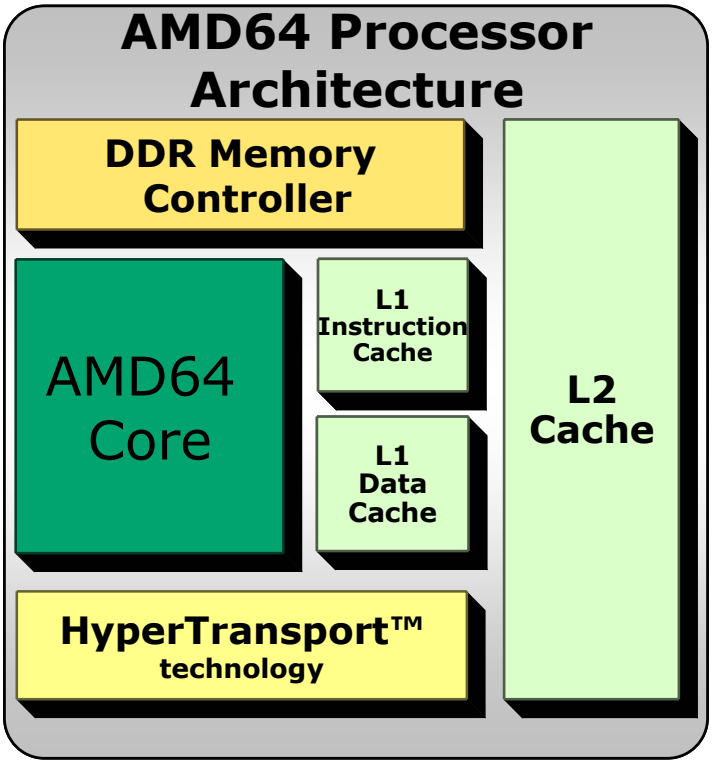

Figure 1 AMD64 Processor Architecture

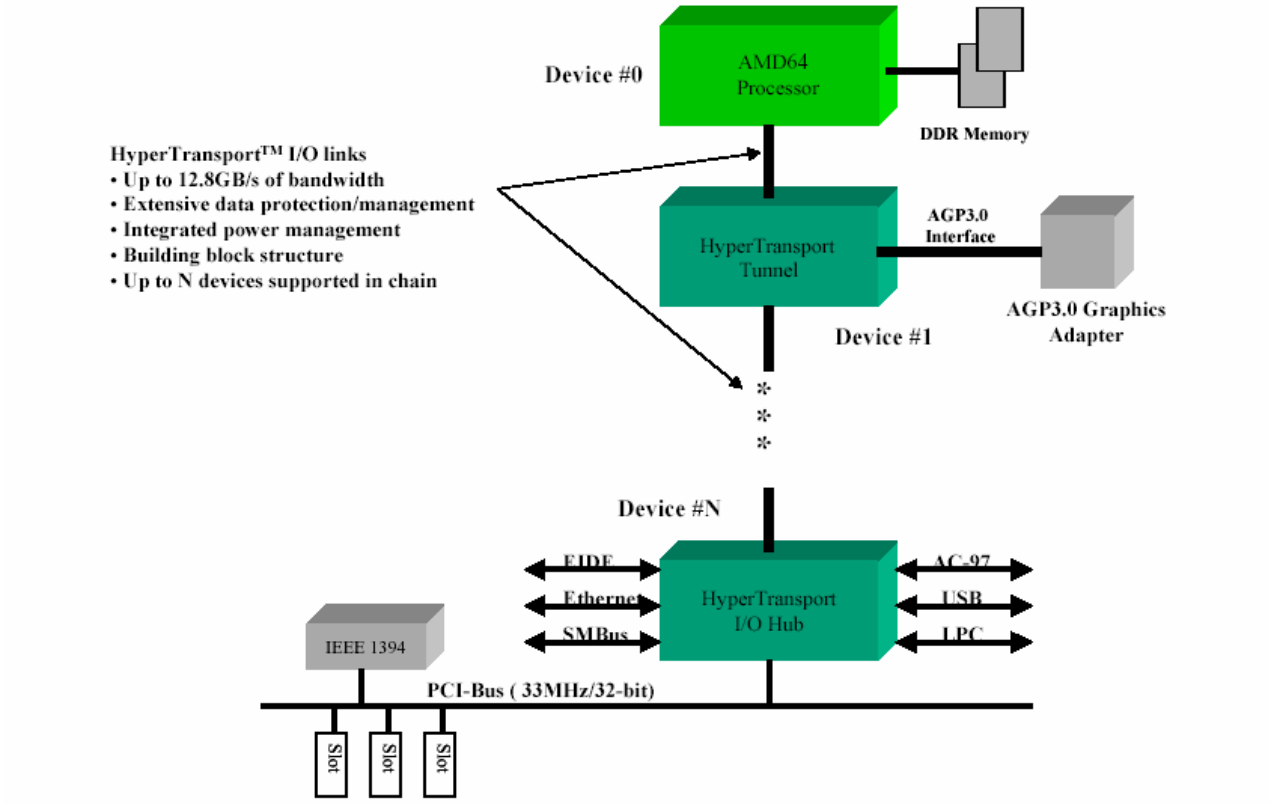

Figure 2 HyperTransport™ Technology Block Diagram

AMD's Benchmarking Methodology

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

- Office Productivity
- Digital Media
- 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 below for proper, balanced, real-world performance analysis.

Office Productivity

AMD Athlon™ 64 and AMD Athlon 64 FX processors with HyperTransport technology run multiple tasks very 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® 2001*
  - Microsoft® Office 2000 (Access, Excel, FrontPage, PowerPoint, Word)
  - Microsoft Project 98
  - Lotus Notes R5
  - NicoMak WinZip
  - Norton AntiVirus
  - Netscape Communicator
- *Business Winstone 2002*
  - Microsoft Office 2002 (Access, Excel, FrontPage, PowerPoint, Word)
  - Microsoft Project 2000
  - Lotus Notes
  - WinZip 8.0
  - Norton AntiVirus
  - Netscape Communicator
- *SYSmark™ 2001, Office Productivity*
  - Microsoft Office 2000 (Access, Excel, Outlook, PowerPoint, Word)
  - Netscape Communicator 6.0
  - Dragon Naturally Speaking Preferred v.5
  - WinZip 8.0
  - McAfee VirusScan 5.13

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® 2002*
  - Adobe Photoshop 6.01, Adobe Premiere 6.0
  - Macromedia Director 8.5, Macromedia Dreamweaver UltraDev 4
  - Microsoft Windows Media Encoder 7.01.00.3055
  - Netscape Navigator 6/6.01, Sonic Foundry Sound Forge 5.0c
- *Content Creation Winstone 2003*
  - Adobe Photoshop 7.0, Adobe Premiere 6.0,
  - Macromedia Director 8.5.1, Macromedia Dreamweaver UltraDev 4
  - Microsoft Windows® Media Encoder 7.01.00.3055, Netscape Navigator 6.2.3,
  - Sonic Foundry Sound Forge 6.0, LightWave 3D 7.5

- *SYSmark™ 2001, Internet Content Creation*
  - Adobe Photoshop 6.0, Adobe Premiere 6.0
  - Macromedia Dreamweaver 4.0, Macromedia Flash 5
- *Microsoft Windows Media Encoder 7*
- *RazorLame*
- *Mpeg2 conversion*
  - BBmpeg to convert 640 MB raw AVI(AustinMontageLong.avi) to Mpeg2
- *Mpeg2 to Mpeg4*
  - XMPEG 5.0 and DivX 5.03 used to convert from Mpeg2 to Mpeg4
- *WinRAR*

3D Gaming

The high performance benefits will amaze 3D gamers. The following benchmarks focus on the three dimensional capabilities of a system. Note that 3D gaming may reveal limitations in a graphics card and does not truly represent relative processor performance.

- 3DMark™ 2001 (Hardware)
- 3DMark 2001 (Software)
- 3DMark 2003 (Hardware)
- 3DMark 2003 (Software)
- AquaMark
- Comanche 4
- Half-Life Smokin'
- Quake III
- Return to Castle Wolfenstein 3D
- Serious Sam: Second Encounter
- Splinter Cell (tests 1_1_1 and 1_1_2)
- Star Wars – Jedi Knight II: Jedi Outcast
- Unreal Tournament 2003 (Flyby and Botmatch)

Optimal System Configuration

This section describes the configurations that AMD used to perform the benchmarks. Systems that conform to the configurations shown in Table 1 on page 13, Table 2 on page 13, Table 3 on page 14, Table 4 on page 15, and Table 5 on page 15 are the most likely to obtain optimal system performance.

Table 1 AMD Athlon™ 64 Processor System Configuration

Component	Manufacturer	Model	Description
Processor	AMD	AMD Athlon™ 64 3200+	Clock Frequency: 2.0 GHz
Operating System	Microsoft	Windows® XP Professional	Version 2002 (Service Pack 1a)
Motherboard	MSI	6702, BIOS V1.0Ba *	Via K8T800, Onboard SATA drive SATA driver Promise technologies 1.0.0.16.1.26.2002
Hard Drive	Seagate Technology	Barracuda 7200.7 ST3120026AS	120 GB Serial ATA disk drive 8 MB cache
RAM Memory	Corsair	CMX512-3500LL	Qty (2) 512 MB DIMM PC3500 Module
Video Card	ATI	Radeon 9800 128 MB	128 MB Onboard DDR RAM, Video Driver 6.14.10.6368.6.25.2003

Note:
** This BIOS is not publicly available at the time of printing.*

Table 2 AMD Athlon™ 64 Processor System Configuration

Component	Manufacturer	Model	Description
Processor	AMD	AMD Athlon™ 64 3200+	Clock Frequency: 2.0 GHz
Operating System	Microsoft	Windows® XP Professional	Version 2002 (Service Pack 1a)
Motherboard	MSI	6702, BIOS V1.0Ba *	Via K8T800, Onboard SATA drive SATA driver Promise technologies 1.0.0.16.1.26.2002
Hard Drive	Seagate Technology	Barracuda 7200.7 ST3120026AS	120 GB Serial ATA disk drive 8 MB cache
RAM Memory	Corsair	CMX512-3500LL	Qty (2) 512 MB DIMM PC3500 Module
Video Card	NVIDIA	FX5900 Ultra 256 MB	256 MB Onboard DDR RAM, Video Driver 4.4.6.7.6.13.2003

Note:
* This BIOS is not publicly available at the time of printing**.**

Table 3 AMD Athlon™ 64 FX-51 Processor System Configuration

Component	Manufacturer	Model	Description
Processor	AMD	AMD Athlon™ 64 FX-51	Clock Frequency: 2.2 GHz
Operating System	Microsoft®	Windows® XP Professional	Version 2002 (Service Pack 1a)
		Windows XP Professional 64-Bit Edition	**Build 1039 (Notes 2, 3)**
Motherboard	ASUS	SK8N, BIOS 1002.10 (Note 1)	NVIDIA NForce3 Chipset, SATA Driver: Promise Technologies 1.0.1.28.6.3.2002
			SATA Driver: Promise Technologies 1.00.1450.372 (Note 2)
Hard Drive	Western Digital	Raptor	(2x) SATA RAID 10k RPM 36.0 GB
RAM Memory	Corsair	Legacy Electronics 886KDAR-1TDG	2 x 512 MB Registered 2.5 ns DIMM Module
Video Card	NVIDIA	FX5900 Ultra 256 MB	256 MB Onboard DDR RAM, Video Driver 4.4.6.7.6.13.2003
			Video Driver 5.5.1.9.9.05.2003 (Note 2)

***Notes**:*

1. *This BIOS is not publicly available at the time of printing.*
2. *This version is for use in the Windows 64-Bit operating environment.*
3. *This build of the operating system is not publicly available.*

Table 4 Intel Pentium® 4 3.20 GHz (800 FSB) System Configuration

Component	Manufacturer	Model	Description
Processor	Intel	Intel Pentium® 4 processor with HT technology	Clock Frequency: 3.2 GHz, 800 MHz System Bus
Operating System	Microsoft®	Windows® XP Professional	Version 2002 (Service Pack 1a)
Motherboard	Intel	D875PBZ, BIOS BZ87510A.86A.0026.P05	Intel i875 Chipset, EIDE Driver: Intel, Version 5.0.1007.0 1.15.2003
Hard Drive	Western Digital	Raptor	(2x) SATA RAID 10k RPM 36.0 GB
RAM Memory	Corsair	CMX512-3500LL	2 x 512 MB XMS3500 DIMM Module
Video Card	NVIDIA	FX5900 256MB	256 MB Onboard DDR RAM, Video Driver 4.4.6.7.6.13.2003

Table 5 Intel Pentium® 4 3.20 GHz (800 FSB) System Configuration

Component	Manufacturer	Model	Description
Processor	Intel	Intel Pentium® 4 processor with HT technology	Clock Frequency: 3.2 GHz, 800 MHz System Bus
Operating System	Microsoft	Windows® XP Professional	Version 2002 (Service Pack 1a)
Motherboard	Intel	D865GBF/D865PERC , BIOS 86510A.86A0036.P097.0305191051	Intel i865 Chipset, SATA Driver: Intel, Version 5.0.1007.0.1.15.2003
Hard Drive	Western Digital	Barracuda 7200.7	120 GB Serial ATA disk drive 8M cache
RAM Memory	Corsair	CMX512-3500LL	2 x 512 MB XMS3500 DIMM Module
Video Card	ATI	Radeon 9800 128 MB	128 MB Onboard DDR RAM, Video Driver 6.14.10.6368.6.25.2003

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

BIOS Configuration for the AMD Athlon™ 64 Processor 3200+

The setup instructions below apply to the AMD Athlon 64 processor 3200+. 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 FX-51 processor. To navigate through the BIOS screens, use the arrow keys (➔, ←, ↑, and ↓) to select menus and to highlight specific options to change. For most options, use the <+> and <–> keys to change the setting.

1. Press <**DEL**> to enter the BIOS setup screens.
2. Reset the system options.
   a. Press the ➔ key, select the EXIT menu, and press <Enter>.
   b. Press the ↓ key to **Load Setup Default** and press <Enter>.

A dialog box opens that says "**Load Optimized Defaults (Y/N):** *Y*". Ensure the "Y" is highlighted, and press <**Enter**>.

3. Set the M**ain** options.
   a. Press the ➔ key, select the Main menu, and press <**Enter**>.
   b. Use the <+>, and <–> keys to set the **System Date** to *August 19, 2003 Tue.*
4. Set the **Advanced** board options.
   a. Press the ➔ key, select the Advanced menu and press <**Enter**>.
   b. Press the ↓ key to **Chipset** and press <**Enter**>.
   c. Press the ↓ key to **Northbridge** and press <**Enter**>.
   d. Press the ↓ key to **Memory Configuration** and press <**Enter**>.
      Press the ↓ key to **Memclock Mode**. Set the mode to *Manual.*
      Press the ↓ key to **CAS Latency**. Set the value to *2.0.*
      Press <**Esc**> to go to the Northbridge menu.
   e. Press <**Esc**> to exit to the **Chipset** menu.
5. Press the ↓ key to the **Southbridge** menu, and press <**Enter**>.
   a. Press the ↓ key to **AGP** and press <**Enter**>.
   b. Press the ↓ key to **AGP Aperture Size** and select ***256 MB***.
   c. Press <**Esc**> to exit to the **Southbridge** menu.
   d. Press <**Esc**> to exit to the **Chipset** menu.
   e. Press <**Esc**> to exit to the **Advanced** menu.
6. Press the ↓ key to **Integrated Peripherals** and press <**Enter**>.
   a. Press the ↓ key to **Serial Port 1** and select ***Disabled***.
   b. Press the ↓ key to **Serial Port 2** and select ***Disabled***.
   c. Press the ↓ key to **VT8327 SATA – IDE Controller** and select ***Disabled***.
   d. Press the ↓ key to **Onboard LAN Controller** and select ***Enabled***.
   e. Press the ↓ key to **Onboard Promise SATA** and press <**Enter**>.
   f. Press the ↓ key to **Onboard Promise SATA** and select ***SATA***.
   g. Press <**Esc**> to exit to the **Onboard Promise** menu.
   h. Press <**Esc**> to exit to the **Advanced** menu.
7. Press **<F10>** to Save and Exit Setup.
8. Press **<Enter>** to continue booting the system.

BIOS Configuration for the AMD Athlon™ 64 FX-51 Processor

The following setup instructions apply to the AMD Athlon 64 FX-51 processor. 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 FX-51 processor. To navigate through the BIOS screens, use the arrow keys (➔, ➔, ➔, and ➔) to select menus and to highlight specific options to change. For most options, use the <+> and <–> keys to change the setting.

1. Press <DEL> to enter the BIOS setup screens.
2. Reset the system options.
   a. Press the ➔ key, select the EXIT menu, and press <Enter>.
   b. Press the ➔ key to **Load Setup Default** and press <Enter>
3. A dialog box opens that reads "**Load Optimized Defaults (Y/N): *Y***". Ensure the "Y" is highlighted, and press <Enter>.
4. Set the M**ain** options.
   a. Press the ➔ key, select the Main menu, and press <Enter>
   b. Use the <+>, and <–> keys to set the **System Date** to *August 19, 2003 Tue.*

Note: *The only IDE drive is the CD-ROM. The hard drive must be set up on a serial ATA port. If the BIOS detects the hard drive as an IDE drive, turn the power off, and recheck the drive connections.*

5. Set the **Advanced** board options.
   a. Press the ➔ key, select the Advanced menu and press <Enter>.
   b. Press the ➔ key to **Chipset** and press <Enter>.
   c. Press the ➔ key to **Northbridge** and press <Enter>.
   d. Press the ➔ key to **Memory Configuration** and press <Enter>.
   e. Press the ➔ key to **Memclock Mode**. Set the mode to *Manual.*
   f. Press the ➔ key to **Memclock Value**. Set the value to ***400 MHz****.*
   g. Press the ➔ key to **CAS Latency**. Set the value to ***2.5****.*
   h. Press the ➔ key to **TRCD**. Set the value to ***3 CLK****.*
   i. Press the ➔ key to **TRAS**. Set the value to ***5 CLK***.
   j. Press the ➔ key to **TRP**. Set the value to ***3 CLK***.

Do not change any other settings.

Note: *These settings will not display properly in the higher menu until all settings are saved, and the BIOS menus are restarted.*

6. Press <Esc> to go to the **Northbridge** menu.
   a. Press the ➔ key to **DRAM 2.5 Voltage.** Set the value to ***2.6 V.***
   b. Press <Esc> to exit to the **Chipset** menu.
   c. Press the ➔ key to the **Southbridge** menu, and press <**Enter**>.
   d. Press the ➔ key to **USB Configuration** and press <**Enter**>.
7. Press the ➔ key to **USB Function**, and select ***Disable***.
8. Press <Esc> to exit to the **Southbridge** menu.
   a. Press the ➔ key to **AGP** and press <Enter>.
   b. Press the ➔ key to **AGP Aperture Size** and select ***256 MB***.
   c. Press the ➔ key to **Primary Video** and select ***AGP***.
   d. Press <Esc> to exit to the **Southbridge** menu.
   e. Press <Esc> to exit to the **Chipset** menu.
   f. Press <Esc> to exit to the **Advanced** menu.
9. Press the ➔ key to **Onboard Devices** and press <Enter>.
   a. Press the ➔ key to **Serial Port 1** and select ***Disabled****.*
   b. Press the ➔ key to **Serial Port 2** and select ***Disabled****.*
   c. Ensure that the **Parallel Port Address** is set to ***378***.
   d. Press the ➔ key to **Parallel Port Mode** and select ***Normal****.*
   e. Press the ➔ key to **IEEE 1394** and select ***Disable****.*
   f. Press the ➔ key to **Onboard Promise** and press <**Enter**>.
   g. Press the ➔ key to **Operating mode** and select ***RAID****.*

h. Press <**Esc**> to exit to the **Onboard Devices** menu.
10. Press the ↓ key to **PCIPnP** Configurations
    a. Press the ↓ key to **Plug and Play Aware O/S** and select ***Yes***.
    b. Press <**Esc**> to exit to the **Onboard Devices** menu.
    c. Press <**Esc**> to exit to the **Advanced** menu.
11. Press <**F10**> to Save and Exit Setup.
12. Press <**Enter**> to continue booting the system.
13. The **Fasttrak™ 378 BIOS** screen now appears. Press <**CTRL-F**> to enter Fasttrak setup.
14. Press <**1**> to select **Auto Setup**.

Note: Optimize Array *should be set to* ***Performance****. If it is not, press either the* <**+**> *or* <**–**> *key to select* ***Performance****.*

15. Press <CTRL-Y> to save.
16. A dialog box opens that reads "**Do you want to quick initialize or create only? (Yes/No)**". Press <**Y**>.
17. Press <**Enter**>.
18. Press any key to reboot.

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 system setup instructions below can be followed to fully achieve optimal system performance.

Operating System Setup

1. During boot up, hit "**Enter**" to boot from CD-ROM.
2. Hit "**F6**" to install drivers for serial ATA.
3. Hit "**S**" to specify additional device.
4. Insert floppy disk with the downloaded ATA drivers.

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

5. Hit "**Enter**" to continue.
6. For MSI motherboards, choose "**WINXP Promise SATA378™ Controller**".
7. For ASUS motherboards, choose "**WinXP Promise FastTrak 376/378 ™ Controller**".
8. Hit "**Enter**" to continue.
9. Hit "**Enter**" to continue the installation of "**Windows® XP Evaluation software**".
10. Hit "**Enter**" to continue setup of XP.
11. Hit "**F8**" to agree to license agreement.
12. Hit "**ESC**=Don't Repair" to install fresh copy of Windows® XP without repairing.
13. Hit "**D**=Delete Partition" to delete all existing partitions.

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

14. Hit "C" to create a partition.
    a. Type in a partition size of **57232** for the first partition, and press <**Enter**>.
    b. Press ↓ to the unpartitioned space and press "**C**" to create this partition.
    c. Press <**Enter**> to accept the default value. There will be 8 Mbytes of unpartitioned space.
    d. Press <**Enter**> to install the operating system. Drive **C:** (the 57232 MB partition) should be the default.
15. Select "**Format the partition using the NTFS (Quick) file system**" and hit "**Enter**"
16. Click "**Yes**" to verify installations of serial ATA drivers.
17. Click "**Next**" to continue on "Regional and Language Options".
18. Type in name and organization.
19. Type in valid Windows XP product key and click "**Next**".
20. Type administrator password twice and click "**Next**" Password is left blank.
21. Click "**Next**" on "Date and Time Settings".
22. Click "**Next**" on "Networking Settings" to confirm "Typical Settings".
23. Click "**Next**" on "Workgroup and Computer Domain".
24. Click "**Ok**" to confirm display settings.
25. Click "**Ok**" to confirm new monitor settings.
26. Click "**Next**" to continue on "Welcome to Microsoft Windows®".
27. Click "**Skip**" to skip "Networking Settings".
28. Select "**No**" to not "Activate Windows" and click "**Next**".
29. Type in user name and click "**Next**".

30. Click "**Finish**".
31. Open "**My Computer**".
32. Right click on "Drive D".
33. Click "**Format**".
34. Select "Quick format".
35. Click "**Start**".
36. Click "**Ok**" to confirm format.
37. On desktop, right click "My Computer".
38. Select "**Properties**" and click the "**Advanced**" tab.
39. Click "**Performance Options**".
40. Click "**Settings**" and click "**Advanced**".
41. Click "**Change for Virtual Memory**".
42. Select drive "**C**" and select "**No paging file**" under "**Change virtual memory (paging file)**".
43. Click "**Set**".
44. Select drive "**D**" select "**Custom size**".
45. Type "**1536**" MB for "Initial Size".
46. Type "**3072**" MB for "Maximum Size".
47. Click "**Set**".
48. Click "**Ok**" and restart computer.
49. On desktop right click "**My Computer**".
50. Select "**Properties**" and click "**Automatic Updates**".
51. Select "**Turn off Automatic Updating. I want to update my computer manually**".
52. Click "**Apply**".
53. Click "**System Restore**" and select "**Turn off System Restore on all drives**".
54. Click "**Apply**".
55. Click "**Yes**" to verify Turn Off System Restore.
56. On desktop right click "**My Computer**".
57. Select "**Properties**" and click the "**Advanced**" tab.
58. Click "**Settings**" under "**Performance**".
59. Select "**Adjust for best performance**".
60. Click "**Apply**".
61. Right click on task bar and select "**Properties**".
62. Deselect "**Keep the taskbar on top of other Windows**".
63. Click "**Apply**".
64. Open "**Control Panel**" and double click "**Power Options**".
65. Select "**Always On**" from "**Power Schemes**" and select "**Never**" to "**Turn off monitor**".
66. Click "**Apply**".
67. Right click on desktop select "**Properties**".
68. Click "**Screen Saver**" and select "**None**".
69. Click "**Apply**".

Install XP Service Pack 1A

From the disk, install Microsoft Windows XP Service Pack 1A Network Installation:

1. Install Microsoft Windows XP Service Pack 1a Network Installation "**xpsp1a_en_x86.exe**" self-extracting cabinet (version 1.16.121.0).
2. Click "**Next**" to continue.
3. Select "**I agree**" and click "**Next**".
4. Select "**Do not archive files**" and click "**Next**".
5. Click "**Finish**" to restart computer.

Install MSI Motherboard Drivers

1. Install "**VIAHyperion4in1448V.exe**" chipset drivers.
2. Double click on the .**exe** file.
3. Click "**Next**" to start install.
4. Click "**Yes**" to agree to license.
5. Select "**Normal installation**" and Click "**Next**".
6. Click "**Next**" to install default components.
7. Select "**Install VIA PCI IDE Bus Driver**" and click "**Next**".
8. Select "**Install AGP driver**" and click "**Next**".
9. Select "**Yes, I want to restart the computer**" and click "**Ok**".

Install ASUS Motherboard Drivers

Note: *ASUS motherboard drivers are not publicly available.*

1. Extract the version 353 driver files from the AMD install CD or download the latest drivers from *http://www.asus.com/*
2. Double click on "**Setup.exe".**
3. Click "**Next**" to continue.
4. If the VGA driver install wizard appears, click on "**Cancel**" to install the VGA drivers after the motherboard drivers are installed.
5. Click "**Next**" after reviewing the latest information for the IDE drivers.
6. Click "**Yes**" to install the NVIDIA IDE SW driver.
7. If the drivers are not WHQL approved, each driver will ask if you wish to continue installing the software. Click "**Continue Anyway**" for each driver in this sequence.
8. Click "**Next**" to install the NVIDIA nForce™ Audio Device.
9. Click "**Finish**" to close the audio device wizard.
10. Click "**Finish**" to restart the computer.

DirectX 9.0A

1. Install "**DirectX 9A_redist.exe**" from CD.
2. Click "**Yes**" to accept "**License Agreement**".

3. Click "**Unzip**" to specified location (for example c:\dX9) and click "**Unzip**".
4. Install DirectX from "**c:\dX9\dxsetup.exe**".
5. Click "**Next**" to accept "**License Agreement**".
6. Click "**Next**" to install DirectX 9.0.
7. Click "**Finish**" to restart computer.

***Note**: DX9.0A must be installed before performing the video card setup*

ATI Video Card Setup

1. Install file from download, "**wxp-w2k-catalyst-7-91-030625a-010027c-efg.exe**".
2. Double click on the **.exe** file.
3. Click "**Next**" to begin installation.
4. Click "**Next**" to confirm location of the file.
5. Click "**Yes to All**" to overwrite protection (if DX9 was not setup before video).
6. Click "**Next**" to install shield wizard.
7. Click to "**Yes**" to agree to license.
8. Click on "**Express**" Installation.
9. Click "**Yes**" to restart computer.
10. Right click on desktop and select "**Properties**" sub-menu item.
11. Choose "**Settings**" tab.
12. Change "**Screen Resolution**" to "**1024 by 768 pixels**".
13. Click "**Apply**" to implement settings.
14. Click "**Yes**" to save settings.
15. Click "**Advanced**" button on settings tab.
16. Choose "**Monitor**" tab and choose "**85 Hertz**" for "**Set Screen Refresh**".
17. Choose "**Display**" tab.
18. Set "**Maximum Resolution**" to "**1024 by 768**".
19. Set "**Maximum Refresh**" to **85 Hz.**
20. Click on "**Open GL**" tab.
21. Change "**Wait for Vertical Sync**" to "**Always Off**".
22. Click on "**Direct3D**" tab.
23. Change "**Wait for Vertical Sy**nc" to "**Always Off**".
24. Click "**Apply**" and "**Yes**" to save settings.
25. Click "**Ok**" to close all dialog boxes.

NVIDIA Video Card Setup

***Note**: The supplied driver for the NVIDIA card is not publicly available. These steps assume you wish to install a publicly-available driver.*

1. Download the latest video card driver from http://www.nvidia.com/content/drivers/drivers.asp
2. Double click the .**exe** file.
3. Click "**Yes**" to continue when asked if antivirus software has been installed.
4. Select the radio button next to "**I accept the terms in the license agreement**".
5. Click "**Next**" to accept the license agreement terms.
6. Allow the install to place files in the default location, like "**C:\NVIDIA\WinXP-2K\45.23**"

***Note**: The install directory may be different if you have a different version of the driver files.*

7. Click "**Next**" to install the shield wizard.
8. Click "**Next**" to continue the setup.
9. Click "**Yes**" to accept the license.
10. Click "**Yes**" to restart the computer.
11. Right-click on the desktop and select "**Properties**" sub-menu item.
12. Choose "**Settings**" tab.
13. Change color depth to **32-bit**.
14. Change "**Screen Resolution**" to "**1024 by 768 pixels**".
15. Click "**Apply**" to implement settings.
16. Click "**Yes**" to save settings.
17. Choose "**Monitor**" tab and choose "**85 Hz**" for "**Set Screen Refresh**".
18. Choose "**GeForce FX 5900 Ultra**" tab. Select "**OpenGL Settings**" under "**Performance and Quality Settings**".
19. Next to "**Vertical Sync**", click on the down arrow, and select "**Always Off**".

    Do not change other OpenGL settings.

AMD SSE Setup for Windows Media Encoder

1. During boot up, hit "**F8**" to go into Safe Mode.
2. Replace "**wmvdmoe.dll**" in **c:\WINDOWS\system32**.
3. Click "**Yes**" to "replace existing file".

Direct X Setup Using DXDIAG

1. Run "**DXDIAG**" from the command line.
2. Click "**Yes**" to run DirectX Diagnostic Tool.
3. Select the "**More Help**" tab.
4. Click "**Override**" and select "**Override Value**" type "**85**".
5. Click "**Ok**".
6. Click "**Exit**" and restart computer.
7. Deselect "**Show this screen next time you start Windows**" when "**Desktop Help for ATI**" window appears.

WCPUID v3.1 Setup

1. Download "**wcpuid v3.1**" from *http://www.h-oda.com*
2. Install "**wcpuid31Ao c:\wcpuid**".
3. Run "**c:\wcpuid\wcpuid.exe**".
4. Ensure that "**AGP Data Rate**" is set to "**8x**" under the chipset tab.

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

AquaMark (1024x768x32)

1. Install AquaMark: **AquaMark_22.exe** (version 0.4455.0.0).
2. Click "**Next**" to install AquaMark.
3. Click "**Next**" for "**Read Me File**".
4. Click "**Next**" to install to default "**Destination Location**".
5. Click "**Next**" to install to default "**Program Manager Group**".
6. Click "**Next**" to "**Start Installation**".
7. Click "**Finish**" to complete installation.

To run the benchmark:

1. Execute "**AquaMark**" from Windows "**Start**" Menu.
2. Choose "**Programs**" and "**AquaMark**".
3. Hit "**Enter**" to launch test.

BAPCO SYSmark™ 2001 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 **SM2001CD1.exe**, unzip to default directory and unzip.
2. Install **SM2001CD2.exe**, unzip to default directory, unzip, and select "**Finish**".
3. Run setup to install SYSmark 2001: "**c:\sm2001src\setup.exe**".
4. Click "**Next**" to install SYSmark 2001.
5. Click "**Yes**" to accept "**License Agreement**".
6. Click "**Next**" to confirm "**Customer Information**".
7. Click "**Next**" to install to default "**Destination Location**".
8. Click "**Next**" to install to default "**Program Folder**".
9. Click "**Yes**" to move the program files to the alternate key.
10. Click "**Finish**" to complete installation.
11. Install SYSmark 2001 patch: "**SYSmark2001Patch3.exe**".
    a. Click "**Yes**" to install SYSmark 2001Patch 3.
    b. Click "**Finish**" to complete patch installation.
12. Execute "**Netscape**" from desktop.
    a. Click "**Ok**" to acknowledge "**Alert**".
    b. Click "**Ok**" to acknowledge "**Alert**".
    c. Click "**View**" and deselect "**My Sidebar**".
    d. Click "**Edit**" and select "**Preferences**".
    e. Click "**Blank Page**" under "**When Navigator starts up, display**" and click "**Ok**".
    f. Close "**Netscape**".
13. Install Windows Media Encoder: "**c:\sm2001src\MediaEnc.exe**".
    a. Click "**Yes**" to accept "**License Agreement**".
    b. Click "**Next**" to install Windows Media Encoder 7.
    c. Click "**Finish**" to install default "**Installation Directory**".
    d. Click "**Yes**" to create "**Program Folder**".
    e. Select "**Exit Setup**" and click "**Ok**".

To run the benchmark:

1. Execute SYSmark 2001 from Windows "**Start**" menu.
2. Click "**Run**".
3. Click on "**Official Run**".

4. Type project name and click "**Ok**".

bbmpeg (raw AVI to MPEG2)

1. Open folder "**bbmpg12418**".
2. Extract "**bbmpg12418.exe**" to **c:\bbmpg** folder on the desktop.
3. Copy "**AustinMontageLong.avi**" to desktop.
4. Execute "**avimpg2**" from **c:\bbmpg.**
5. When the dialog box opens do the following:
   a. Click "**ADD**" and choose "**AustinMontageLong**" from desktop.
   b. Click "**MPEG filename**".
   c. Type filename "**testfile**".
   d. Click "**Save**" to continue.
   e. Unclick "**Preview with frame operations**".
   f. Click "**Start Encoding**" and then "**Settings**".
   g. Under "**General Settings**" tab, change "**MMX modes**" to "***SSE-fastest**" (Pentium III and Athlon).
   h. Under "**Video Stream Settings**", click on "**MPEG-2**" and Click "**Ok**".

To run the benchmark:

1. Click "**Start**" immediately after the above step.

Comanche 4 Demo (1024x768x32)

1. Install Comanche 4: **C4DEMOX.exe.**
2. Click "**Next**" to install Comanche 4.
3. Click "**Yes**" to accept "**License Agreement**".
4. Click "**Next**" to install to default "**Destination Location**".
5. Click "**Finish**" to complete installation.

To run the benchmark:

1. Execute Comanche 4 Demo Benchmark Test.
2. Select "**Disable Audio**".
3. Select "**1024x768**" for "**Screen Resolution**"
4. Creates an output file. Rename it to "**Comanche Run 1**".

Note: *For the first time run, the system performs a system check.*

5. Click "**Run Benchmark**".
6. Click "**Ok**" to select "**Video Card**".
7. Click "**Ok**" for "**Resolution Test**".
8. Click "**Ok**" for "**Resolution Test Complete**".

eTesting Labs Inc. Business Winstone™ 2001

1. Click "**Business Winstone™ 2001**" and click "**Next**" to install.
2. Click "**Next**" to install in default "**Destination Location**".
3. Click "**Yes**" to create directory.
4. Select "**Copy Business support files**" and click "**Next**".
5. Click "**Next**" to install in default "**Program Folder**".
6. Click "**Next**" to "**Start Copying Files**".
7. Click "**Finish**" to complete setup.

To run the benchmark:

1. Select Ziff Davis Media Benchmarks from Windows "**Start**" menu.
2. Choose "**Ziff Davis Media Business Winstone 2001**".
3. Click "**Proceed**" to accept "**License Agreement**".
4. Click "**OK**" to accept "**Business Winstone Registration License Agreement**".
5. Click "**Run**" Business Winstone 2001.
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 "**Business Winstone Requirements**".
12. Click "**Finish**" for "**System Configuration Problem**".
13. Click "**Ok**" for "**Automated Defrag**".

eTesting Labs Inc. Business Winstone™ 2002

1. Click "**Business Winstone™ 2002**" and click "**Next**" to install.
2. Click "**Next**" to install in default "**Destination Location**".
3. Click "**Yes**" to create directory.
4. Select "**Copy Business support files**" and click "**Next**".
5. Click "**Next**" to install in default "**Program Folder**".
6. Click "**Next**" to "**Start Copying Files**".
7. Click "**Finish**" to complete setup.

To run the benchmark:

1. Execute "**PC Magazine Benchmarks**" from Windows "**Start**" menu.
2. Choose "**PC Magazine Business Winstone 2002**".
3. Click "**Proceed**" to accept "**License Agreement**".
4. Click "**Yes**" to accept "**Business Winstone Registration License Agreement**".
5. Click "**Run**" Business Winstone 2002.
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 "**Business Winstone Requirements**".
12. Click "**Finish**" for "**System Configuration Problem**".
13. Click "**Ok**" for "**Automated Defrag**".

eTesting Labs Inc. Content Creation Winstone™ 2002

1. Click "**Content Creation Winstone 2002**" and click "**Next**" to install.
2. Click "**Next**" to install in default "Destination Location".
3. Click "**Yes**" to create directory.
4. Select "**Copy Content Creation support files**" and click "**Next**".
5. Click "**Next**" to install in default "**Program Folder**".
6. Click "**Next**" to "**Start Copying Files**".
7. Click "**Finish**" to complete setup.

To run the benchmark:

1. Execute "**Ziff Davis Media Content Creation Winstone 2002**" from Windows "**Start**" menu.
2. Choose "**Ziff Davis Media Content Creation Winstone 2002**".
3. Click "**Proceed**" to accept "**License Agreement**".
4. Click "**Yes**" to accept "**Content Creation Winstone 2002 Registration License Agreement**".
5. Click "**Run**" Content Creation Winstone 2002.
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**".

eTesting Labs Inc. Content Creation Winstone™ 2003

1. Click "**Content Creation Winstone 2003**" and click "**Next**" to install.
2. Click "**Next**" to install in default "**Destination Location**".
3. Click "**Yes**" to create directory.
4. Select "**Copy Content Creation support files**" and click "**Next**".
5. Click "**Next**" to install in default "**Program Folder**".
6. Click "**Next**" to "**Start Copying Files**".
7. Click "**Yes**" to install Windows Media Encoder 7.1.
8. Click "**Yes**" to accept "**License Agreement**".
9. Click "**Next**" to install Windows Media Encoder 7.1.
10. Click "**Finish**" complete installation.
11. Click "**Yes**" to create "**Windows Media Encoder directory**".
12. Select "**Exit Setup**" and click "**Ok**".
13. Click "**Ok**" to complete setup.
14. Click "**Finish**" to complete setup.
15. Double Click Install patch for Windows Media Encoder: **WM312125.exe.**
16. Click "**Yes**" to accept "**License Agreement**".

To run the benchmark:

1. Execute "**PC Magazine Media Content Creation Winstone 2003**" from "**Start**" menu.
2. Choose "**PC Magazine Business Winstone 2003**".
3. Click "**Proceed**" to accept "**License Agreement**".
4. Click "**Yes**" to acknowledge you have read the license agreement.
5. Click "**Run**" Multimedia Content Creation Winstone 2003.
6. Click "**Next**" to run "**System Configuration Problem Analysis**".
7. Click "**Next**" for "Min**imum 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**".

Futuremark Corporation 3DMark™ 2001 – Second Edition

1. Click "**Next**" to install 3Dmark2001 SE Pro.
2. Enter Registration code and click "**Next**".
3. Click "**Ok**" registration code confirmation.
4. Click "**Yes**" to accept "**License Agreement**".
5. Click "**Next**" to install to default "**Destination Location**".
6. Click "**Next**" to start "**Coping Files**".
7. Click "**Finish**" to complete installation.
8. Install patch: **3Dmark2001SE_patch.exe** (Version 2.11.15.0).
9. Click "**Next**" to install 3Dmark2001 SE patch.
10. Click "**Ok**" to confirm installation.

To run the software benchmark:

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

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

To 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 test.

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

Futuremark Corporation 3DMark™ 2003

1. Execute 3DMark 2003: mg-**3dmark03.exe** (version 7.1.100.1248).
2. Click "**Next**" to install 3Dmark03.
3. Select "**I accept the terms of the license agreement**" and click "**Next**".
4. Click "**Next**" to install to default "**Destination Location**".
5. Click "**Install**" to "**Install the Program**".
6. Enter registration code and click "**Next**".
7. Click "**Ok**" registration code confirmation.
8. Click "**Finish**" to complete installation.
9. Install patch **3Dmark03_patch330.exe** (version 7.1.100.1248).
10. Click "**OK**" for information box about DX9 install.
11. Click "**Next**" to install 3Dmark2001 SE patch.
12. Click "**Finish**" to confirm installation.

To run the software benchmark:

1. Execute "**3DMark03**".
2. Select "**Do not show this dialog again**" and click "**Close**".
3. Click "**Select**" under "**Tests**".
4. Select first four games under "**Game Test**" and deselect the other test.
5. Click "**Ok**".
6. Click "**Change**" under "**Settings**".
7. Click "**Force Software Vertex Shaders**" box.
8. Click "**Ok**".
9. Click "**Run 3Dmark**".

To run the hardware benchmark:

1. Execute "**3DMark03**".
2. Click "**Select**" under "**Tests**".
3. Select first four games under "**Game Test**".
4. Deselect the remaining test.
5. Click "**Ok**".
6. Click "**Run 3Dmark**".

Half-Life Smokin' (1024x768x32)

1. Click "**Install Half-Life**" and click "**Yes**" if you heard a sound (click "**Yes**" if no speakers).
2. Click "**Next**" to install Half-Life.
3. Click "**Yes**" to accept "**License Agreement**".
4. Click "**Next**" to install to default "**Destination Location**".

5. Click "**Ok**" to begin setup.
6. Click "**Ok**" to complete setup.
7. Click "**No**" to not check for available updates.
8. Click "**Ok**" to register now and click "**Register Later**".
9. Click "**Next**" "**Select Components**".
10. Click "**Finish**" to complete setup.
11. Go to Windows "**Start**" menu and select "**Half-Life**".
12. Click on "**Don't show me again**".
13. Click "**Continue**" to acknowledge compatibility issue.
14. Type in registration code and click "**Finish**".
15. Execute "**Half-Life Console**".
16. Click "**Configuration**," "**Video**," and "**Video Modes**".
17. Select "**Open GL**" and click "**Ok**".
18. Click "**Cancel**" for "**New Connection Wizard**".
19. Select "**1024x768**" and click "**Ok**".
20. Click "**Done**" to exit video menu.
21. Click "**Done**" to exit menu.
22. Click "**Quit**" to exit game.
23. Click "**Ok**" to confirm exit.
24. Install Half-Life patch: "**10051009.exe**".
    a. Click "**Next**" to install Half-Life Update 1.0.0.9.
    b. Click "**I Agree**" to accept "**License Agreement**".
    c. Click "**Next**" for "**Read Me File".**
    d. Click "**Next**" to install to default "**Destination Location**".
    e. Click "**Next**" to "**Start Installation**".
    f. Click "**Next**" to place shortcut on desktop.
    g. Click "**Finish**" to compete installation.
25. Move "**smoking.dem**" to "c:\SIERRA\Half-Life\valve\".
26. Move the **maps** folder to "c:\SIERRA\Half-Life\valve\".

To run the benchmark:

1. Insert CD in CD-Rom.
2. Execute "**Half-Life Console**" from start menu.
3. Click "**Console**".
4. Eject CD from CD-Rom so that music does not play.
5. Type "**timedemo smoking**".
6. Hit "**Enter**" to launch demo.

Quake III Demo2 (1024x768x32)

1. Install Quake III: **Q3Ademo.exe.**
2. Click "**Next**" to install Quake 3 Arena Demo.
3. Click "**Yes**" to accept "**License Agreement**".
4. Click "**Next**" to install to default "**Destination Location**".
5. Click "**Next**" to install.
6. Click "**Close**" to complete setup.

To run the benchmark:

1. Execute "**Quake3**" from desktop.
2. Click "**Setup**".
3. Click "**System**".
4. Click "**Video Mode**" to select "**1024x768**".
5. Click "**Color Depth**" to select "**32 Bit**".
6. Click "**Accept**".
7. Hit "**~**" for console command view. Type the following commands to configure and run the demo:
   a. "**s_initsound 0**"
   b. "**snd_restart**"
   c. Hit "**~**"
   d. "**com_maxfps 0**"
   e. "**vid_restart**"
   f. Hit "**~**"
   g. "**timedemo 1**"
   h. "**demo demo002**"
8. Hit "**Enter**" to launch demo.
9. Hit "**~**" to view results.

RazorLame

1. Install "**ezcddax6.exe**" to convert ripping CD to wav format.
2. Click "**Next**" to continue ripping from "**Easy CD-DA Extractor Setup**".
3. Click "**Next**" to install program into default folder.
4. Click "**Finish**".
5. Insert "Pi**nk Floyd - Wish You Were Here**" Audio CD into drive.
6. Go to "**Start**", "**Programs**", "**Easy CD-DA Extractor 6**", and "**Easy CD-DA Extractor**".
7. 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.
8. Burn the raw files to another CD.
9. Input the burned CD into the computer.
10. Choose folder "**Pink Floyd**".
11. Copy folder from CD to desktop.

12. Install "**lamewin32**".
13. Click "**I Agree**" to license agreement.
14. Click "**Next**" to install "**LAME Mp3**".
15. Click "**Install**" to continue install.
16. Clicks "**Close**".
17. Open "**RazorLame**" shortcut on desktop.
18. Drag the "**Pink Floyd**" folder track items into "**Razor Lame 1.1.5**".
19. Go to "**Edit**" menu, Choose "**Lame Options**".
20. Under "**General**" tab "**Increase Bit rate**" to "**192**".
21. Under "**Advanced**" tab, change "**Optimization**" to "**Quality**".
22. Under "**VBR**" tab, "**Enable**" "**Variable BitRate**" and change "**Quality Number**" to "**9**".
23. Click "**Ok**" to close dialog box.

To run the benchmark:

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

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. You do not need to reset the options.

Return to Castle Wolfenstein 3D (1024x768x32)

1. Click "**Install**" and click "**Next**" to install Return to Castle Wolfenstein.
2. Click "**Yes**" to accept "**License Agreement**".
3. Click "**Next**" for "**Minimum System Requirements**".
4. Enter registration key and click "**Ok**".
5. Click "**Ok**" to confirm registration key.
6. Click "**Next**" to install to default "**Destination Location**".
7. Click "**Next**" to install to default "**Program Folder**".
8. Click "**Install**" to "**Start Installation**".
9. Click "**Ok**" for "**Hardware Detected**".
10. Click "**Yes**" to create shortcut on desktop.
11. Select "**Register Later**" and click "**Next**".
12. Click "**Finish**" to complete setup.
13. Install patch: "**wolf_1_1.exe**".
14. Click "**Next**" to install Return to Castle Wolfenstein Patch.
15. Click "**Yes**" to accept "**License Agreement**".
16. Click "**Next**" to install to default "**Destination Location**".
17. Click "**Next**" to "**Start Installation**".
18. Click "**Ok**" to continue installation.
19. Click "**Finish**" to complete installation.
20. Create a directory called "**demos**" in the "**c:\Program Files\Return to Castle Wolfenstein\Main\Demos**" and extract "**checkpoint.dem_57**" to that directory.
21. Execute "**Wolfenstein (Multiplayer)**" from desktop.
22. Click "**Options**," "**System**," and "**Graphics**".
23. Select "**Video mode**" to "**1024x768**".
24. Select "**Texture detail**" to "**High**".
25. Click "**Apply**".
26. Click "**Yes**" to apply video settings.
27. Under "**Options**," "**Game Options**," and "**Performance**":
    a. Select "**Wall Mark Lifetime**" to "**Long**".
    b. Select "**Ejecting Brass**" to "**High**".
    c. Select "**Dynamic Lights**" to "**Yes**".
    d. Select "**Corona Dist**" to "**Extreme**".
28. Under "**Options/Game Options/View**":
    a. Select "**Cursor Hints**" to "**Off**".
    b. Select "**Show Compass**" to "**Off**".
    c. Select "**Team Overlay**" to "**Off**".
29. Hit "**Esc**" to return to main menu.
30. Click "**Quit**" to exit game.

To run the benchmark:

1. Execute "**Wolfenstein (Multiplayer)**" from desktop.
2. Go into "**Options**," "**Game Options**," "**Performance**," and set "**Corona Dist**" to "**Extreme**".
3. Hit "**~**" to open console.
4. Type "**Timedemo 1**".
5. Type "**Demo checkpoint**".
6. Type "**~**" to view demo results.

Serious Sam: Second Encounter – Demo Version (1024x768x32)

1. Double Click to Install Serious Sam: "**serioussamsedemo.exe**".
2. Click "**Next**" to install Serious Sam: The Second Encounter Demo.
3. Click "**Yes**" to accept "**License Agreement**".
4. Click "**Next**" for "**Information text**".
5. Click "**Next**" to install to default "**Destination Location**".
6. Click "**Next**" to install to default "**Program Folder**".
7. Click "**Next**" to install default name for "**Enter text**".
8. Click "**Finish**" to complete installation.
9. Execute Serious Sam.
10. Click "**Ok**" to start Serious Sam for the first time.
11. Hit "**Esc**" to enter main menu.

12. Click "**Options**," and "**Video Options**".
13. Select "**Resolution**" to "**1024x768**".
14. Select "**Bits per pixel**" to "**32**".
15. Select "**Preferences**" to "**Speed**".
16. Click "**Apply**".
17. Click "**Yes**" to keep settings.
18. Click "**Esc**" to return to main menu.

To run the benchmark:

1. Launch Serious Sam Second Encounter demo from desktop.
2. Hit "**ESC"** to get to main menu.
3. Hit "**~**" to enter console.
4. Type "**dem_bprofile=1**".
5. Hit "**~**" to return to main menu.
6. Click "**Demo**".
7. Select "**Little Trouble**" demo and hit "**Enter**".
8. Following the demo, hit "**~**".

Splinter Cell

1. Install Splinter Cell from CD.
2. Click "**Next**" to continue.
3. Click "**No**" to update current version of DX9.0.
4. Click "**Next**" to accept license agreement.
5. Click "**Next**" to continue.
6. Click "**Next**" to continue.
7. Click "**Next**" to continue.
8. Insert Disc 2 and click "**OK**".
9. Insert Disc 3 and click "**OK**".
10. Click "**Next**" to continue.
11. Chose "**Never Register**" and Click "**Cancel**".
12. Click "**Finish**".
13. Double click to Install patch "**scus_CA_Patch_1.2B**" (version 7.1.100.124.8).
14. Click "**Ok**" to finish patch completion.
15. Go to "**C:\Program Files\Ubisoft\Splinter Cell\System\sclow.bat**".
16. Right click on "**sclow.bat**" and select sub menu item "**Edit**".
17. Ensure the "**sclow.bat**" file reads as follows:

```
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
```

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 file on the desktop.

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

1. Click "**Install**" to install Jedi Knight II.
2. Click "**Next**" to install Jedi Knight II: Jedi Outcast.
3. Click "**Yes**" to accept "**License Agreement**".
4. Click "**Automatic**" installation.
5. Click "**Yes**" to confirm automatic installation.
6. Click "**Exit**" installation.
7. Install patch "**Jkiiup104.exe**".
8. Click "**Continue**" to install.
9. Click "**OK**" to continue.
10. Unzip "**assets2.pak3**" found in **GameData\Base** folder.
11. Extract the file "**jk2ffa.dm_15**" to the **Base\Demos** folder and then rename the demo to "**jk2ffa.dm_16**".
12. Copy renamed demo file to a new directory, "**Demos**" off of the path **c:\program files\LucasArts\Star Wars JK II Jedi Outcast\GameData\base.**
13. Create shortcut to desktop for Jedi Knight II Multi Player: **c:\Program Files\LucasArts\Star Wars JK II Jedi Outcast\GameData\jk2mp.exe.**
14. Right click "**Shortcut to jk2mp**" from desktop and select "**Properties**".
15. Type "**+set sv_cheats 1**" at the end of the "**Target Location**" for example "**c:\Program Files\LucasArts\Star Wars JK II Jedi Outcast\GameData\jk2mp.exe" "+set sv_cheats 1**".
16. Click "**Ok**" to close shortcut.
17. Run demo from the command line in the multiplayer game by typing "**timedemo 1**" and then "**demo jk2ffa**".

To run the benchmark:

1. Execute Shortcut to jk2mp from desktop.
2. Click "**Setup**".
3. Click "**Video**".
4. Select "**1024x768x32**" for "**Video Mode**" and "**32-bit**" "**Color Depth**".
5. Click "**Apply Changes**".
6. Click "**Yes**" to continue to Main Menu.
7. Hit "**Shift ~**".
8. Type "**timedemo 1**".
9. Type "**demo jk2ffa**".
10. Hit "**Enter**".
11. Hit "**Shift ~**" and scroll up to see score.

Unreal Tournament 2003 (1024x768x32)

1. Install Unreal Tournament 2003 "**ut2003demo2206.exe**".
2. Click ""**Next**"" to install Unreal Tournament 2003.
3. Click "**I Agree**" to accept "**License Agreement**".
4. Click "**Next**" to install to default "**Destination Location**".
5. Click "**Next**" to install default components.
6. Click "**Install**" to install Unreal Tournament 2003.
7. Click "**Finish**" to complete installation.

To run the benchmark:

1. Run "**c:\UT2003Demo\System\Benchmark.exe**".
2. Select "**1024x768**" and click "**Start**" to launch demo.

WinRAR

1. Install "**ActivePerl-5.8.0.806-mswin32-x86**".
2. Click on "**Next**" to begin install.
3. Choose "**I accept the terms in the license agreement**" and click "**Next**".
4. Click "**Next**" for default install.
5. Click "**Next**" to privacy policy.
6. Click "**Next**" to default options.
7. Click "**Install**" to continue.
8. Click "**Finish**" to complete install.
9. Install "**winrar320**" from CD.
10. Click "**Install**" to continue.
11. Click "**Ok**" to default setup.
12. Click "**Done**" to complete install.
13. Go to "**My computer**" and select "**C:\ Drive**"
14. Click "**File**" menu, choose "**New folder**" and create "**rartest**".
15. Copy "**rartestpl**" file from CD to new folder.

To run the benchmark:

1. Double click on the "**rartestpl**" file which creates a directory with a text file with the test results.

XMPEG

1. Install DIVX from CD folder "**DIVX5.03pro**".
2. Click "**Next**" to begin installation.
3. Click "**Next**" to "**Welcome**" note.
4. Click "**Next**" to "**Requirements**" note.
5. Click "**Yes**" to license agreement.
6. Click "**Yes**" twice to "**Gator**" privacy agreement.
7. Select "**Custom**" for "**Type of Setup Program**" and click "**Next**".
8. Click "**Next**" to continue.
9. Click "**Next**" to select default location.
10. Click "**Next**" to install.
11. Click "**Close**" upon install.
12. Reboot the system.
13. Install "**xmpeg50final**" from CD.
14. Choose "**English**" and click "**Next**" for language selection.
15. Click "**Next**" to "**Welcome**" note.
16. Click "**Next**" to "**Readme**" information.
17. Click "**Next**" to choose destination location for install.
18. Click "**Next**" to default folder settings.
19. Click "**Next**" to start file copy.
20. Click "**Finish**" to complete file copy.
21. Click "**Ok**" to illegal information.
22. Click "**Cancel**" to stop video conversion wizard for manual start.
23. Click on reel icon to the left hand side of the "**XMPEG**" title bar.
24. Select "**Open**".
25. Go to desktop and open the "**testfile**" that was created under AVI MPG (See the bbmpeg section on page 22).
26. Click "**Ok**".
27. Select "**Options**" from the menu.
28. Under "**Video**" tab, unclick "**Auto**" and click on "**YUY2**".
29. Under "**Audio**" tab, deselect "**Same as Input**" and select "**48000Hz**".
30. Go to menu and choose "**Set Plug-In Options**".
31. Under "**Advanced**" tab, select "**benchmark mode**" and type in "**5400**" for "**Number of frames asked**".
32. Click "**Ok**".

To run the benchmark:

1. Go to menu and choose "**Start Conversion**".

AMD's Results

Using the system configuration and benchmark configuration and testing methods recommended on page 13, AMD's results are in Table 6 and Table 7 on page 31. Contact AMD if you have any questions about the performance of any AMD microprocessor. Table 6 uses the configurations shown in Table 1 AMD Athlon™ 64 Processor System Configuration on page 13 and Table 5 Intel Pentium® 4 3.20 GHz (800 FSB) System Configuration on page 15.

Benchmark \ Processor Tested	AMD Athlon™ 64 3200+ (1)	Intel Penium® 4 3.2 Ghz	AMD Athlon 64 3200+ (1)	Intel Penium 4 3.2 Ghz
	Results		Normalized Results	
Productivity			121%	100%
eTesting Labs inc. Business Winstone™ 2001	100.2	78.3	128%	100%
eTesting Labs inc. Business Winstone 2002	44.9	35.9	125%	100%
BAPCO SYSmark™ 2001 Office Productivity (modify as needed)	285.0	256.0	111%	100%
Digital			103%	100%
eTesting Labs inc. Content Creation Winstone™ 2002 (modify as needed)	63.3	49.8	127%	100%
eTesting Labs inc. Content Creation Winstone 2003 (WME 8.2 upgrade installed)	61.2	57.5	106%	100%
Raw AVI to Mpeg2 (Bbmpeg, AVItoMpeg2)	566.0	545.7	96%	100%
XMPEG 5.0 patched / Divx (5.03 pro bundle) Mpeg2 to Mpeg4	60.3	48.6	81%	100%
Razor LAME 1.1.5 MP3 encoder	288.3	253.0	88%	100%
BAPCO SYSmark 2001 Internet Content Creation (modify as needed)	325.0	338.3	96%	100%
WinRar	21.3	29.4	138%	100%
Games			113%	100%
Futuremark Corporation 3DMark™ 2001SE (D3D Hardware T&L)	19619.0	17944.0	109%	100%
Futuremark Corporation 3DMark 2001SE (D3D Software T&L)	8493.7	7714.3	110%	100%
Futuremark Corporation 3DMark 2003 Hardware	5781.0	5764.7	100%	100%
Futuremark Corporation 3DMark 2003 Software by Futuremark	2424.3	2435.0	100%	100%
Aquamark (1024x768)	107.9	99.2	109%	100%
Comanche 4 Demo (1024x768x32)	68.9	65.1	106%	100%
Half-life Smokin' (1024x768x32)	126.5	109.4	116%	100%
Jedi Knights II demo (1024x768x32) (Patched to 1.04)	176.2	162.6	108%	100%
QuakeIII Demo2 (1024x768x32)	384.2	373.1	103%	100%
Return to Castle Wolfenstein 3D (1024x768x32)	139.3	126.1	110%	100%
Serious Sam: Second Encounter-Demo version (1024x768x32)	247.6	180.5	137%	100%
Unreal Tournment 2003 Flyby	262.4	233.8	112%	100%
Unreal Tournment 2003 Botmatch	101.2	74.0	137%	100%
Splinter Cell (1_1_1)	96.7	77.5	125%	100%
Splinter Cell (1_1_2)	90.2	72.3	125%	100%
Overall			112%	100%

Note: (1) Processor runs at 2.0 GHz

Table 6 AMD Athlon™ 64 Processor Raw Benchmarking Results

Table 7 uses the configurations shown in Table 2 AMD Athlon™ 64 Processor System Configuration" on page 13, Table 3 AMD Athlon™ 64 FX-51 Processor System Configuration" on page 14, and Table 4 Intel Pentium® 4 3.20 GHz (800 FSB) System Configuration" on page 15.

Processor Tested / Benchmark	AMD Athlon™ 64 3200+ (1)	AMD Athlon 64 FX-51	Intel Pentium® 4 3.2 GHz	AMD Athlon 64 3200+ (1)	AMD Athlon 64 FX-51	Intel Pentium 4 3.2 GHz
	Results			Normalized Results		
Productivity				113%	120%	100%
eTesting Labs inc. Business Winstone™ 2001	101.5	107.4	88.9	114%	121%	100%
eTesting Labs inc. Business Winstone 2002	44.9	47.3	39.7	113%	119%	100%
BAPCO SYSmark™ 2001 Office Productivity (modify as needed)	294.3	318.7	266.7	110%	120%	100%
Digital				98%	110%	100%
eTesting Labs inc. Content Creation Winstone™ 2002 (modify as needed)	55.2	68.3	50.6	109%	135%	100%
eTesting Labs inc. Content Creation Winstone 2003 (WME 8.2 upgrade installed)	57.8	67.4	59.3	97%	114%	100%
Raw AVI to Mpeg2 (Bbmpeg, AVItoMpeg2)	563.0	517.0	540.3	96%	105%	100%
XMPEG 5.0 patched / Divx (5.03 pro bundle) Mpeg2 to Mpeg4	60.4	54.9	48.3	80%	88%	100%
RazorLame 1.1.5 MP3 encoder	288.0	264.0	254.0	88%	96%	100%
BAPCO SYSmark™ 2001 Internet Content Creation (modify as needed)	317.0	356.3	343.0	92%	104%	100%
WinRar	22.3	20.8	28.7	129%	138%	100%
Games				111%	117%	100%
Futuremark Corporation 3DMark™ 2001SE (D3D Hardware T&L)	19889.7	20088.3	17555.3	113%	114%	100%
Futuremark Corporation 3DMark 2001SE (D3D Software T&L)	8772.0	9208.0	7684.3	114%	120%	100%
Futuremark Corporation 3DMark 2003 Hardware	6054.3	6142.0	6143.3	99%	100%	100%
Futuremark Corporation 3DMark 2003 Software by Futuremark	2465.0	2591.3	2376.0	104%	109%	100%
Aquamark (1024x768)	98.6	105.0	90.8	109%	116%	100%
Comanche 4 Demo (1024x768x32)	67.7	72.4	65.4	104%	111%	100%
Half-life Smokin' (1024x768x32)	131.1	144.6	112.1	117%	129%	100%
Jedi Knights II demo (1024x768x32) (Patched to 1.04)	181.4	194.8	182.1	100%	107%	100%
QuakeIII Demo2 (1024x768x32)	415.1	427.3	405.4	102%	105%	100%
Return to Castle Wolfenstein 3D (1024x768x32)	140.9	154.0	141.1	100%	109%	100%
Serious Sam: Second Encounter-Demo version (1024x768x32)	264.3	293.6	219.4	120%	134%	100%
Unreal Tournment 2003 Flyby	267.2	276.2	226.0	118%	122%	100%
Unreal Tournment 2003 Botmatch	97.2	101.2	71.3	136%	142%	100%
Splinter Cell (1_1_1)	96.3	99.4	77.9	124%	128%	100%
Splinter Cell (1_1_2)	90.4	93.7	77.2	117%	121%	100%
Overall				107%	116%	100%

Note: (1) Processor runs at 2.0 GHz

Table 7 AMD Athlon™ 64 FX-51 Processor Raw Benchmarking Results

AMD's Performance Analysis Tools

This is the first in a series of releases of AMD performance analysis tools and is intended to help measure and analyze the 32-bit and 64-bit performance of AMD Athlon™ 64 and AMD Athlon 64 FX processor-based systems using Microsoft® Windows® operating system products. The 32 bit benchmarks are run on Windows XP service pack 1A and a beta release of Windows 64. The 64-bit applications are run under the Beta release of the Windows 64 operating system.

Analysis Tools Benchmarks

AMD's performance analysis tools use various standard benchmarks to obtain relative performance numbers. When combined with the suggested setup configurations, reviewers and enthusiasts alike should be able to recreate AMD's reported results.

DivX Encoder

The DivX encoder benchmark contains both a 32-bit and a 64-bit benchmark that measures the performance of raw video encoding of the AMD optimized DivX video encoder version 503. The encoder has been optimized for AMD Athlon 64 and AMD Athlon 64 FX systems (both 32-bit and 64-bit).

Mini-GZIP

The Mini-GZIP benchmark contains a 64-bit benchmark that measures the performance of an AMD64-optimized version of *ZLIB*. It also contains a 32-bit benchmark implemented with the standard (unmodified) ZLIB. The source code for this benchmark is included on the CD.

RSA

The RSA benchmarks consist of a set of 32-bit and 64-bit executables that measure the performance of key RSA cryptography routines. The 64-bit executables use RSA code that has been optimized for AMD64. There are a set of 32-bit executables that have also been optimized for AMD64 and a set of 32-bit executables using the standard RSA library routines.

Streams

The Streams benchmarks consist of 32-bit and 64-bit executables that have been optimized for AMD64. Note that these executables have not been optimized for any

other microprocessor and do not run on processors without SSE2 support (such as the AMD Athlon XP processor).

Benchmark Configuration and Testing

To install the benchmarks:

1. Place the CD in the drive and double click **PATSETUP.MSI**.
2. Click **next** to go to the license screen.
3. Read the license and click the **accept** or decline radio button (Declining the license agreement will not allow you to continue).
4. Click **next** to get to the installation folder screen.
5. Click **next** to accept the installation directory or browse to change the directory. (All instructions are written as if you accepted the default installation directory. (The DivX, RSA, and streams benchmark will install in the **C:\AMDPATR1** directory.
6. On the ready to install screen click **next** to install, the files will be copied to the destination folder.
7. Click **finish** to complete the installation.

To install mini_GZIP

1. Copy the **mini_GZIP** folder from the CD to the same installation folder as the above step.

To install the Video clip to use for DIVX encode

1. Copy the file **AustinMontageShort.avi** to the folder **c:\AMDPATR1\DivXEncoderBenchmark**

When you have completed the above steps you should have a folder in the root directory named **AMDPATR1**. That folder should contain four folders named **DivXEncoderBenchmark**, **RSA**, **Streams**, and **mini_gzip**.

To run the DivX Encoder benchmark

First create a file that can be encoded by the DivX encoder:

1. Boot the system in 32-bit Windows mode.
2. Change to the drive where the benchmarks are installed.
3. Type **c:** press <Enter>.
4. Change directory to the installation folder.
   a. Type **cd AMDPATR1** press <Enter>.
5. Change to the DivX directory.
   a. Type **cd DivXencoderBenchmark** press <**Enter**>.
6. Convert the video clip.
   a. Type in **yuvcvt ausitnmontage.avi** and press <**Enter**>.

To execute the 32-bit version of DivX Encode

1. Boot the system in 32-bit Windows mode.
2. Click on **Start** , **Run**
   a. Type in **cmd** and click **OK**
3. Change to the drive where the benchmarks are installed.
   a. Type **c**: press <**Enter**>
4. Change directory to the installation folder.
   a. Type **cd AMDPATR1** and press <**Enter**>.
5. Change to the DivX directory.
   a. Type **cd DivXEncoderBenchmark** press <**Enter**>.

Run the benchmark.

1. Type **em503-32 –d32bit.txt AustinMontageShort.yuv** and press <**Enter**>.

To execute the 64 bit version of MiniGzip

1. Boot the system in 64 bit Windows mode.
2. Click on **Start** , **Run**.
   a. Type in **cmd** and click **OK**.
3. Change to the drive where the benchmarks are installed.
   a. Type **c:** press <**Enter**>.
4. Change the active directory to the installation folder.
   a. Type cd AMDPATR1 press <**Enter**>
5. Change to the DivX directory.
   a. Type **cd DivXencoderBenchmark** press <**Enter**>.

Run the benchmark

1. Type **em503-64 –d64bit.txt AustinMontageShort.yuv**

Mini-Gzip

To execute the 32 bit version of Mini-Gzip:

1. Boot the system in 32 bit Windows mode.
2. Click on **Start** , **Run**.
   a. Type in **cmd** and click **OK.**
3. Change to the drive where the benchmarks are installed.
   a. Type **c:** press <**Enter**>.
4. Change directory to the installation folder.
   a. Type **cd AMDPATR1** and press <**Enter**>.
5. Change to the Streams directory.
   a. Type **CD minigzip** and press <**Enter**>.

Run the benchmark

1. Type **minigzip32 data.txt**

To execute the 64 bit version of MiniGzip

1. Boot the system in 64-bit Windows mode.
2. Click on **Start** , **Run**.
   a. Type in **cmd** and click **OK**.
3. Change to the drive where the benchmarks are installed.
   a. Type **c:** press <**Enter**>.
4. Change directory to the installation folder.
   a. Type **cd AMDPATR1** press <**Enter**>.
5. Change to the Streams directory
   a. Type **CD streams** press <**Enter**>.

Run the benchmark

1. Type **minigzip64 data.txt** and press <**Enter**>.

RSA

Each RSA benchmark simply runs from the command line. No command line parameters or input files are necessary. The benchmarks send their output to the console.

To execute the 32 bit version of RSA

1. Boot the system in 32 bit Windows mode.
2. Click on Start, Run.
   a. Type in **cmd** and click **OK**.
3. Change to the drive where the benchmarks are installed.
   a. Type **c:** press <**Enter**>.
4. Change directory to the installation folder.
   a. Type **cd AMDPATR1** and press <**Enter**>.
5. Change to the RSA directory
   a. Type **CD RSA** press <**Enter**>.
6. Change to the 32 bit directory.
   b. Type **32-bit** and press <**Enter**>.
7. Run the standard library RSA benchmarks.
   a. AES-128 Encrypt / Decrypt.
      i. Type **aesperf603.exe** and press <**Enter**>.
   b. Triple-DES Encrypt/Decrypt.
      i. Type **desperf603.exe** and press <**Enter**>.
   c. RC4 Encrypt/Decrypt.
      Type **rc4perf603.exe** and press <**Enter**>.
   d. RSA Encrypt/Decrypt.
      i. Type **rsaperf603.exe** and press <**Enter**>.
   e. SHA-1 Digest.
      i. Type **sha1perf603.exe** and press <**Enter**>.
8. Run the AMD Athlon 64 Processor optimized library RSA benchmarks.
   a. AES-128 Encrypt / Decrypt.
      i. Type **aesperf61.exe** and press <**Enter**>.
   b. Triple-DES Encrypt/Decrypt.
      i. Type **desperf61.exe** and press <**Enter**>.
   c. RC4 Encrypt/Decrypt.
      i. Type **rc4perf61.exe** and press <**Enter**>
   d. RSA Encrypt/Decrypt.
      i. Type **rsaperf61.exe** and press <**Enter**>
   e. SHA-1 Digest.
      Type sha1perf61.exe and press <Enter>.

To execute the 64-bit version of RSA

1. Boot the system in 64 bit Windows mode.
2. Click on **Start** , **Run**
3. Type in **cmd** and click **OK.**
4. Change to the drive where the benchmarks are installed.
   a. Type **c:** press <**Enter**>
5. Change directory to the installation folder.
   a. Type **cd AMDPATR1** and press <**Enter**>.
6. Change to the RSA directory.
   a. Type **cd RSA** press <Enter>
7. Change to the 64 bit directory
   a. Type **64-bit** press<Enter>.
8. Run the RSA benchmarks.
9. AES-128 Encrypt / Decrypt.
   a. Type **aesperf.exe** and press <**Enter**>.
10. Triple-DES Encrypt/Decrypt.
    a. Type **desperf.exe** and press <**Enter**>.
11. RC4 Encrypt/Decrypt.
    a. Type **rc4perf.exe** and press <**Enter**>.
12. RSA Encrypt/Decrypt.
    a. Type **rsaperf.exe** and press <**Enter**>.
13. SHA-1 Digest.

a. Type **sha1perf.exe** and press <**Enter**>.

Streams

This benchmark is very simple to run and requires no command line parameters or input files. Simply run **stream_d32.exe** and **stream_d64.exe** from the command line.

To execute the 32 bit version of Streams:

1. Boot the system in 32-bit Windows mode.
2. Click on **Start**, **Run**.
   a. Type in **cmd** and click **OK.**
3. Change to the drive where the benchmarks are installed.
   a. Type **c:** press <**Enter**>.
4. Change directory to the installation folder.
   a. Type **cd AMDPATR1** and press <**Enter**>.
5. Change to the Streams directory.
   a. Type **cd streams** press <**Enter**>.
6. Run the benchmark.
   a. Type in **Stream_d32.exe** and press <**Enter**>.

To execute the 64 bit version of Streams

1. Boot the system in 64-bit Windows mode.
2. Click on Start , Run
   a. Type in **cmd** and click **OK**
3. Change to the drive where the benchmarks are installed.
   a. Type **c:** and press <**Enter**>.
4. Change directory to the installation folder.
   a. Type **cd AMDPATR1** and press <**Enter**>.
5. Change to the Streams directory.
   a. Type **cd streams** and press <**Enter**>.
6. Run the benchmark
   a. Type in **Stream_d64.exe** and press <**Enter**>.

Benchmark Results

AMD's analysis tools results are shown here. AMD used the system and operating system configurations shown earlier in this document to achieve these results. Table 8 uses the configurations shown in Table 3 AMD Athlon™ 64 FX-51 Processor System Configuration, on page 14 in Microsoft® Windows® in both 32- and 64-bit computing environments. Contact AMD if you have any questions about the performance of any AMD microprocessor.

	AMD Athlon™ 64 FX-51 Processor Performing on:			AMD Athlon 64 FX-51 Processor Performing on:	
	Windows® XP 32-bit	Windows 64-bit Edition		Windows 64 (32-bit executables) verses Windows XP 32-bit	Windows 64 (64-bit executables) verses Windows XP 32-bit
	Raw Data			Comparison	
	32-bit exe	32-bit exe	64-bit exe		
Minigzip					
Zip (sec)	8.8	8.4	3.8	104%	230%
Unzip (sec)	0.7	0.7	0.3	101%	226%
RSA					
AES-128 Encrypt (sec)	5.4	5.3		102%	278%
AES-128 Decrypt (sec)	5.0	4.9		102%	195%
Optimized AES-128 Encrypt (sec)	3.5	3.5	2.0	101%	182%
Optimized AES-128 Decrypt (sec)	3.6	3.5	2.5	101%	140%
Triple-DES Encrypt (sec)	6.9	6.9		101%	106%
Triple-DES Decrypt (sec)	7.0	6.8		102%	106%
Optimized Triple-DES Encrypt (sec)	6.9	6.8	6.6	101%	105%
Optimized Triple-DES Decrypt (sec)	6.9	6.8	6.6	101%	105%
RC4 Encrypt (sec)	4.2	4.2		101%	212%
RC4 Decrypt (sec)	4.2	4.2		101%	212%
Optimized RC4 Encrypt (sec)	2.3	2.3	2.0	101%	115%
Optimized RC4 Decrypt (sec)	2.3	2.2	2.0	101%	114%
RSA Encrypt key size = 1024, number of primes = 3 (sec)	6.5	5.9		109%	398%
RSA Decrypt key size = 1024, number of primes = 3 (sec)	4.1	4.0		103%	314%
Optimized RSA Encrypt key size = 1024, number of primes = 3 (sec)	3.1	3.2	1.6	100%	193%
Optimized RSA Decrypt key size = 1024, number of primes = 3 (sec)	2.7	2.7	1.3	101%	207%
RSA Encrypt key size = 4096, number of primes = 2 (sec)	3.6	3.6		101%	264%
RSA Decrypt key size = 4096, number of primes = 2 (sec)	11.4	11.3		101%	366%
Optimized RSA Encrypt key size = 4096, number of primes = 2 (sec)	4.6	4.5	1.4	101%	331%
Optimized RSA Decrypt key size = 4096, number of primes = 2 (sec)	14.1	14.0	3.1	101%	455%
SH-1 Digest (sec)	4.2	4.1	3.5	101%	120%
Optimized SHA-1 Digest (sec)	3.8	3.8	3.5	101%	109%
DivX					
DivX 32 (sec) and DivX 64 (sec)	8.8	8.8	7.5	100%	118%
Stream					
Copy (MB/s)	5377.9	5307.1	5236.9	99%	97%
Scale (MB/s)	5415.0	5345.4	5330.5	99%	98%
Add (MB/s)	5244.5	5238.0	5239.6	100%	100%
Triad (MB/s)	5287.3	5294.3	5226.3	100%	99%

Table 8 Analysis Tools Benchmarking Results – AMD64 32-Bit Versus 64-Bit

Table 9 uses the configurations shown in Table 3 AMD Athlon™ 64 FX-51 Processor System Configuration, on page 14 in both Microsoft Windows in 32- and 64-bit computing environments, and compares it to the configuration shown in. Table 4 Intel Pentium® 4 3.20 GHz (800 FSB) System Configuration, on page 15.

	AMD Athlon™ 64 FX-51 Processor Performing on:			Intel Pentium® P4 Processor 3.2 on Windows XP 32-bit	AMD Athlon 64 FX-51 Processor v. Intel Pentium P4 Processor 3.2 GHz	
	Windows® XP 32-bit	Windows 64-bit Edition			AMD on Windows XP 32-bit verses Intel on Windows XP 32-bit	AMD on Windows 64-bit verses Intel on Windows 32-bit
	Raw Data				Comparison	
	32-bit exe	32-bit exe	64-bit exe	32-bit exe		
Minigzip						
Zip (sec)	8.8	8.4	3.8	6.4	73%	168%
Unzip (sec)	0.7	0.7	0.3	0.7	92%	208%
RSA						
AES-128 Encrypt (sec)	5.4	5.3		2.5	46%	128%
AES-128 Decrypt (sec)	5.0	4.9		2.4	48%	93%
Optimized AES-128 Encrypt (sec)	3.5	3.5	2.0	6.8	193%	350%
Optimized AES-128 Decrypt (sec)	3.6	3.5	2.5	4.3	121%	171%
Triple-DES Encrypt (sec)	6.9	6.9		7.4	107%	113%
Triple-DES Decrypt (sec)	7.0	6.8		7.1	102%	108%
Optimized Triple-DES Encrypt (sec)	6.9	6.8	6.6	7.0	102%	107%
Optimized Triple-DES Decrypt (sec)	6.9	6.8	6.6	7.0	102%	107%
RC4 Encrypt (sec)	4.2	4.2		2.3	55%	116%
RC4 Decrypt (sec)	4.2	4.2		2.3	54%	115%
Optimized RC4 Encrypt (sec)	2.3	2.3	2.0	5.6	246%	282%
Optimized RC4 Decrypt (sec)	2.3	2.2	2.0	5.6	246%	282%
RSA Encrypt key size = 1024, number of primes = 3 (sec)	6.5	5.9		8.4	130%	517%
RSA Decrypt key size = 1024, number of primes = 3 (sec)	4.1	4.0		4.0	98%	308%
Optimized RSA Encrypt key size = 1024, number of primes = 3 (sec)	3.1	3.2	1.6	4.9	155%	300%
Optimized RSA Decrypt key size = 1024, number of primes = 3 (sec)	2.7	2.7	1.3	6.8	254%	525%
RSA Encrypt key size = 4096, number of primes = 2 (sec)	3.6	3.6		6.5	180%	475%
RSA Decrypt key size = 4096, number of primes = 2 (sec)	11.4	11.3		7.1	62%	228%
Optimized RSA Encrypt key size = 4096, number of primes = 2 (sec)	4.6	4.5	1.4	6.5	143%	473%
Optimized RSA Decrypt key size = 4096, number of primes = 2 (sec)	14.1	14.0	3.1	31.7	224%	1020%
SH-1 Digest (sec)	4.2	4.1		6.4	153%	183%
Optimized SHA-1 Digest (sec)	3.8	3.8	3.5	4.1	109%	119%
DivX						
DivX (sec)	8.8	8.8	7.5	9.2	104%	122%
Stream						
Copy (MB/s)	5377.9	5307.1	5236.9	3538.1	152%	148%
Scale (MB/s)	5415.0	5345.4	5330.5	3453.7	157%	154%
Add (MB/s)	5244.5	5238.0	5239.6	3570.9	147%	147%
Triad (MB/s)	5287.3	5294.3	5226.3	3574.7	148%	146%

Table 9 Analysis Tools Benchmarking Results – AMD 64-Bit Versus Intel 32-Bit