

Software Evaluation Guide for Virtual Dub 1.8.1 with DivX 6.8.3



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About this Document

This document is a guide measuring performance of the Intel® Processors on application software. The primary audience for this document includes individuals, publications, OEMs and technical analysts whose goal is to test or evaluate the performance benefits and features of the Core 2 Duo Processor. If there are questions that are not answered here on software application performance evaluation of the Core 2 Duo Processor, please contact your Intel representative.

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Chapter 1

Virtual Dub 1.8.1 with DivX 6.8.3

1.0 Application Description

Virtual Dub is a video capture/processing utility licensed under the GNU general purpose license. It is streamlined for fast linear operations over video and allows users to batch process multiple tasks on multiple video files. For more information go to <http://www.virtualdub.org>.

DivX* is a format for digital video, much like MP3 is a format for digital music. The DivX* codec is based on the MPEG-4 compression standard and can reduce an MPEG-2 video (the same format used for DVD) to ten percent of its original size. The DivX* technology provides excellent compression and the resulting visual quality is virtually indistinguishable from a DVD. For more information on DivX, go to <http://www.divx.com>

1.1 Workload Description

This workload models a user who is taking digital home video content and converting it to an MPEG4 format (DivX) for better compression while still maintaining high image quality.

The workload for VirtualDub is a 66.2 MB 110sec MPEG2 video file in 720x480 resolution at 5Mbps. It is converted to DivX format with 720x480 resolution with a total size of ~10.3MB.

Chapter 2

Measurement Methodology

The following is a description of the measurement methodology that should be used to evaluate performance and energy efficiency of the platform while running this scenario.

2.0 System Setup

This section outlines the system setup recommended for benchmarks under Microsoft Windows* Vista Ultimate Edition:

- Always start with a clean, formatted hard disk.
- Set your system to boot from CD/DVD drive in the bios.
- Begin installation Windows* Vista Ultimate Edition* from the operating system CD.
- Format the file system to NTFS during installation if the drive if you have not already done so.
- After installation of the OS is complete restart your system.
- Immediately after installing the Windows Vista operating system, install the latest drivers (INF files) to allow the operating system to recognize the chipset and all the components on the motherboard. The drivers can be downloaded from the chipset software link at <http://downloadfinder.intel.com>
- Install the latest Intel Matrix Storage Manager. The install file can be downloaded from the chipset software link at <http://downloadfinder.intel.com>. (Windows Vista installs the basic driver for Intel Matrix Storage, and you should update the driver once the OS boots up.) The Intel® Matrix Storage Driver can provide better system performance because features like Native Command. Some system benchmarks with an I/O component, like BAPCo* SYSmark*, may show increased performance with the Intel Matrix Storage Driver installed and the system set to raid-ready.
- Install the Intel integrated sound driver from <http://support.intel.com> or from your motherboard CD.
- Install the latest LAN driver from <http://support.intel.com>.
- Download and Install the latest Windows Vista graphics driver for your graphics card from the manufacturer website.
- The table below describes how to perform an initial setup of Windows Vista.

Microsoft Windows* Vista Setup	Setting	Description of how to set up Windows Vista
Windows Aero	Enable	Ensure Windows Aero is enabled - Right click on desktop -> Personalize -> Window color and appearance -> click on "Open classic appearance properties for more color options" - Ensure "Windows Aero" is checked. Note: In order for Aero to work on Intel Graphics Media Accelerator X3000 and 3000, Vista drivers should be installed prior to setup Aero feature in Vista.
Search Indexing	Enable	Leave Search Indexing Enabled - You can check if Search Indexing is enabled by Open Control Panel -> System and Maintenance -> Indexing Options. The Indexing location will include: Offline Files, Start Menu, and Users.
Internet Offline Files	Enable	Leave Internet Offline files Enabled - You can check if Offline files is enabled, Open Control Panel -> Network and Internet -> Offline Files. On the general tab, the "Disable Offline Files" button should appear.
Disable Screen saver	Disable	Right click on desktop -> Personalize -> Screen Saver. Set the screen saver to "None"
Disable Power Management	High Performance	Right click on desktop -> Personalize -> Screen Saver -> Change Power settings -> Select "High Performance" and click "Change plan settings" below this option. A new view will appear called "Edit Plan Settings." Change "Turn off display" to "Never." Click Save Change. (Note: Exceptions include MobileMark* and other standardized benchmarks that measure battery life; these should be run with their own power management settings.)
Vista Desktop Display resolution, monitor refresh	Custom	Right click on desktop -> Personalize -> Display Settings. In the "Display Settings" dialog choose Resolution=1024x768 and Colors= Highest (32bit). Click the "Advanced Settings" button. Select the "Monitor" tab and change the "Screen refresh rate" to 75 Hz.
Remove always on top	Disable	Right click on Windows task bar at the bottom -> Properties -> Taskbar -> uncheck "Keep the taskbar on top of other windows"
Remove hide inactive icons	Disable	Right click on Windows task bar at the bottom -> Properties -> Select the "Notification area" tab and uncheck "Hide inactive icons"

Disable Windows Defender	Disable	Open Control Panel -> Security -> Windows Defender. Click on "Tools" in the toolbar at the top. Click on the Options link in the next view. Uncheck all boxes.
Disable Windows "Welcome screen"	Disable	Open Control Panel -> System and Maintenance -> Welcome Center, Uncheck "Run at Startup" at the bottom of the Windows Welcome screen
Disable System Protection (previously "System Restore")	Disable	Open Control Panel -> System and Maintenance -> System. Under the tasks link on the left side select System Protection. Uncheck "Local Disk" found in the "Automatic restore points" section.
Disable Security Center Alerts	Disable	Open Control Panel -> Security Center. On the left side at the bottom click on the link, "Change the way Security Center alerts me." In the dialog select "Don't notify me and don't display the icon (not recommended)"
Adjust Folder Options for hidden files	Custom	Open Control Panel -> Appearance and Personalization -> Folder Options. On the view tab select "Show hidden files and folder" uncheck "Hide extensions for known file types" and uncheck "Hide protected operating system files (Recommended)"
Disable backup on Recycle bin	Disable	Right click on the recycle bin and choose properties. On the general tab select "Do not move files to the Recycle Bin. Remove files immediately when deleted"
Disable Windows Sidebar	Disable	Remove "Windows Sidebar" by right click on the Windows sidebar, click properties, Uncheck "Start Sidebar when windows Starts"
Disable Disk Defragmentation	Disable	Click on "My Computer", right click on the C: drive. Click "Properties", "Tools", "Defragment Now". Uncheck "Run on Schedule"
Disable User Account Control	Disable	Open Control Panel -> User Accounts and Family Safety -> User Accounts -> Turn User Account Control on or off -> Continue -> Uncheck Use User Account Control (UAC) to help protect your computer -> OK -> Restart Computer

2.1 Evaluation of Platform Performance

This section outlines the recommended methodology for evaluating platform performance.

Clean up Windows prefetch

1. Delete the contents of the c:\windows\prefetch directory between testing of **individual**

benchmarks.

Allow your system to settle into an idle state:

1. Reboot your computer.
2. Open the Task Manager by right clicking on the Taskbar and clicking the option for Task Manager. Click on the Performance tab in the Task Manager.
3. Click on the Resource Monitor button in the Task Manager. This will bring up the Resource Monitor Window below.
4. Click on the panel that says Disk. This will allow you to view the various active requests to the disk drive.
5. Watch the Resource Monitor. The number of requests to the disk will gradually decline. Wait until there are no more requests to the disk as shown below.
6. After there are no more requests to disk, close the Resource Monitor.

Process Idle Tasks

1. Call the ProcessIdleTasks API from advapi32.dll using the command line or create and execute a batch file with the following command: *rundll32.exe advapi32.dll,ProcessIdleTasks*

Benchmark Run:

1. After you have run the ProcessIdleTasks API, run the workload 5 times in a row without reboots in between each run.
2. Take the median of the 5 runs.

2.2 Evaluation of Platform Energy Efficiency

This section outlines the recommended methodology for evaluating platform energy efficiency.

2.2.1 Procedure for Measuring Energy Efficiency

When measuring energy consumption of a system running a given benchmark, the power consumption of the total platform should be measured by an external watt-meter or power analyzer. One common tool used to measure power is the Extech 380803 Power Analyzer Datalogger. The Extech 380803 unit allows the measurement of both AC and DC power measurement and includes software to log the power consumption of the test system on another computer system.

- When measuring the DC power consumption of a system, you will need to isolate the positive and negative power lines running between the notebook power adapter and the system. From the power adapter, attach the power lines to the appropriate red and black power terminals of the “Input Voltage” on the Extech unit. Then attach the power lines from the notebook plug to the red and black power terminals of the “Output Load” of the

Extech unit. Using the Datalogger software, record the power consumption of the system for the duration of the benchmark using 1.0 second sampling intervals. From the resulting power log, you can derive the average DC power consumption (in Watts) of the system while executing the benchmark.

- When measuring the AC power consumption of a system, plug a power cord into the “Input Voltage” on the Extech unit and into an electrical socket. Then plug in the system’s AC power adapter into the “Output Load” of the Extech unit. Using the Datalogger software, record the power consumption of the system for the duration of the benchmark using 1.0 second sampling intervals. From the resulting power log, you can derive the average AC power consumption (in Watts) of the system while executing the benchmark.

Power measurement should begin when the timed portion of the workload begins and should stop when the timed portion of the workload ends. If using the provided script for the scenario then you will be prompted by the script when to start and stop power measurement.

2.2.2 Calculating Workload Energy Consumption in Watt-Hours

Analysis of power consumption results should be performed using the following methodology:

- Calculate the Workload Energy Consumption (WEC) in Watt-seconds by multiplying the average total AC or DC power usage (P_{total}) times the time taken to complete the workload (t_{workload}).

$$\text{WEC (Watt-seconds)} = P_{\text{total}} \times t_{\text{workload}}$$

- Convert the WEC measurement into Watt-hours (Wh) by dividing the WEC in Watt-seconds by 3600 (the number of seconds in an hour).

$$\text{WEC (Wh)} = \text{WEC (Watt-seconds)} \div 3600$$

The resulting quotient in Watt-hours is the amount of energy consumed by the system in completion of the workload.

Chapter 3

Procedure for Evaluating VirtualDub 1.8.1 with DivX 6.8.3

The following is a procedure for evaluating application load performance during content creation using VirtualDub 1.8.0 with DivX 6.8. Run this test on a system running *Windows* Vista*.

Setup Instructions:

1. Copy your workload directory (containing a folder entitled "VirtualDubDivX") into c:\SEGs.
2. Download and unzip VirtualDub 1.8.1 into c:\SEGs\VirtualDubDivX\Binaries\VirtualDub-1.8.1\.
(VirtualDub can be downloaded at <http://www.virtualdub.org>) It is recommended that you create a desktop shortcut to the VirtualDub.exe executable for easier access.
3. Install DivX6.8.3 When prompted to install Mozilla Firefox with Google Toolbar, select "Don't install Firefox with the Google Toolbar". Otherwise, select all default installation options. (DivX can be purchased at <http://www.divx.com>)
4. After completing DivX installation, a web browser window will be opened. Close the window.
5. Click on Start->All Programs->DivX->DivXCodec->Register Products.
6. Enter your DivX Serial number and click on Register to register your DivX product.
7. Close the DivX Product Registration window.
8. Launch VirtualDub.
9. If prompted with a security warning, uncheck the "Always ask before opening this file" checkbox and click on Run.
10. When presented with a dialog entitled "GNU General Public License", click on OK.
11. When presented with a dialog entitled "Before we start...", click on Start VirtualDub.
12. When presented with a dialog entitled "VirtualDub warning", check the "I understand - please go away now" box and click on OK.
13. Hit Ctrl-P to bring up a window entitled "Select video compression"
14. Select the "DivX® 6.8.3 Codec".
15. Click Configure. This will bring up the DivX Codec Properties dialog.
16. In the "Main" tab, set your certification profile to "Home Theater Profile", uncheck "Use presets to configure the encoder", set your rate control mode to "1-pass", and set your Bitrate to 780.
17. In the "Codec" tab, set your Encoding mode to "Balanced (Default)", set "Experimental SSE4 full search" to "Enabled using SSE4" (if available, otherwise use "Enabled using SSE2") and check "Enhanced multithreading".
18. Click on OK to close the DivX Codec Properties dialog.
19. Click on OK to close the Select video compression dialog.
20. Close VirtualDub.
21. Restart your system.

Run Instructions

1. Upon reboot your system, defragment your hard disk.
2. Delete the contents of your c:\windows\Prefetch directory.
3. Launch VirtualDub.
4. Press Ctrl-o to open the "Open video file" dialog.
5. Navigate to your workload file (it should be in c:\SEGs\VirtualDubDivX\Workloads\) and select the workload file.
6. Click on Open to open the workload file.
7. Press Ctrl-p to open the "Select video compression" dialog.
8. Select DivX® 6.8.3 codec and click on OK.
9. Under the Audio menu, select "No Audio".
10. Under the Video menu, select "Fast Recompress".
11. Under File, select "Save As AVI..."
12. Enter a location for your output file.
13. Click on Start and type perfmon.exe to launch Perfmon.
14. Expand the Disk sub-window in Perfmon. Wait until all disk activity has subsided and the disk sub-window has no entries listed.
15. Exit Perfmon.
16. Click on Save to begin your encoding task. If you are measuring power, begin measuring power simultaneously.
17. As VirtualDub performs the encoding, a dialog entitled "VirtualDub Status" should appear. It will display a progress bar.
18. When the "VirtualDub Status" dialog has disappeared, stop measuring power.
19. Close VirtualDub.
20. In a command prompt window, navigate to the output file.
21. Using the timestamps tool in the MCCB folder, determine the time it took to create the output file. (You should be able to enter "c:\SEGs\VirtualDubDivX\timestamps.exe <output file>") This is your **task time** for this usage scenario.
22. Be sure to delete the output file before performing this scenario again.
23. Repeat steps 3-22 four more times. Take the **median value** of your five task times as your result.

Running the Test Using a Script (Optional)

- You also have the option of running this workload with an automated script.
- The script will look for application and workload files in specific directory locations. Please make sure that:
 - i. Your VirtualDub application files are in
C:\SEGs\VirtualDubDivX\Binaries\VirtualDub-1.8.1\
 - ii. Your workload file (movmpg.mpg) is in c:\SEGs\VirtualDubDivX\Workloads\
 - iii. The Timestamps.exe executable is in c:\SEGs\VirtualDubDivX\

- Before running the script, install the application. Open the application once and then close all of the application windows.
- When running the script run steps 13 to 15 immediately beforehand to make sure disk activity has settled before script execution.
- Run the application once manually as a cross check on your script times. The script timing measures the same function as measured in hand-timing and is expected to be close to the stopwatch time.
- Close other open windows before running the script.
- Double-click on the script .exe to start execution. It is best to create a desktop shortcut to the .exe so that no other windows are open when the script starts.
- When the script is finished the results will be logged to a file entitled results.txt in the workload directory under the c:\SEGs\VirtualDubDivX directory.
- The script will close all application windows by itself after displaying the results. Wait for it to finish closing all windows before rerunning the script. You do not need to delete any of the output files generated by the workload if you are using the script.