Technical Brief

NVIDIA and Microsoft Windows Vista
Getting the Most Out Of Microsoft Windows Vista

What Is Windows Vista?

"Microsoft Windows Vista is the first operating system that requires a dedicated graphics processing unit (GPU) to realize its full potential. Every aspect of Windows Vista, from the operation of opening and closing desktop windows, to smooth operation of applications and games will be enhanced by the presence of a dedicated GPU." – Jon Peddie, Jon Peddie Research

The PC is undergoing the most significant revolution in its history with the advent of Microsoft® Windows Vista™ operating system (OS), the next-generation Windows® operating system (Figure 1).

Windows Vista is one of the largest product development investments created by Microsoft in collaboration with partners like NVIDIA. Windows Vista makes your data more accessible and allows your applications to run more smoothly. Plus, you can view rich media at higher resolutions—moving your PC into the center of your home-entertainment experience.

Figure 1.   The Power of Microsoft Windows Vista OS Driven by an NVIDIA GPU

For the first time, the entire Windows desktop and all its application windows are drawn with 3D effects that make their functionality more intuitive. And, objects are now drawn with transparency to yield better access to data. What's more, upcoming games and applications—along with high-definition video content including H.264, Blu-ray, and HD-DVD—will leverage the new abilities of the OS.

Experience Windows Vista

Leveraging the GPU

Microsoft Windows Vista offers an incredible range of new advancements on the PC platform. Best of all, it introduces a breakthrough user experience, Windows Aero, that utilizes a GPU to display the entire Windows Vista desktop. The GPU offloads tasks from the CPU, making the entire system more responsive.

Discovering What an NVIDIA GPU Offers

Quickly find files and applications, easily navigate through open windows, and see what a file contains without opening it—all this with the power of Windows Vista and a dedicated GPU (Figure 2 to Figure 5).
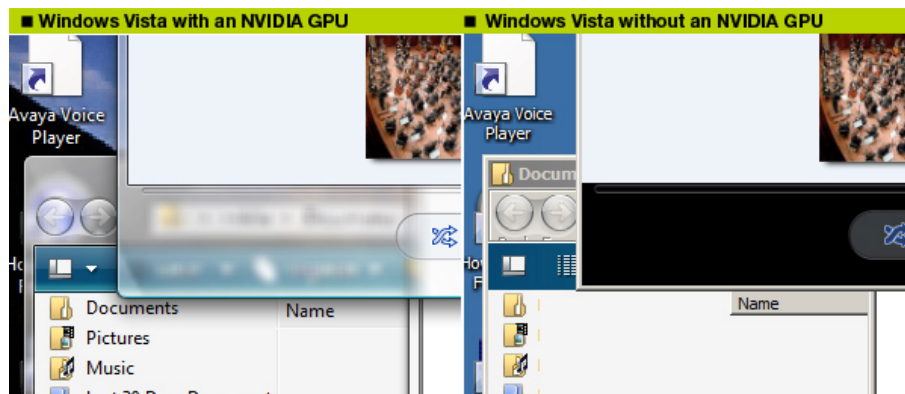

Figure 2.   Enjoy Spectacular Visual Effects, Including Glass-Like Interface Elements You Can See Through
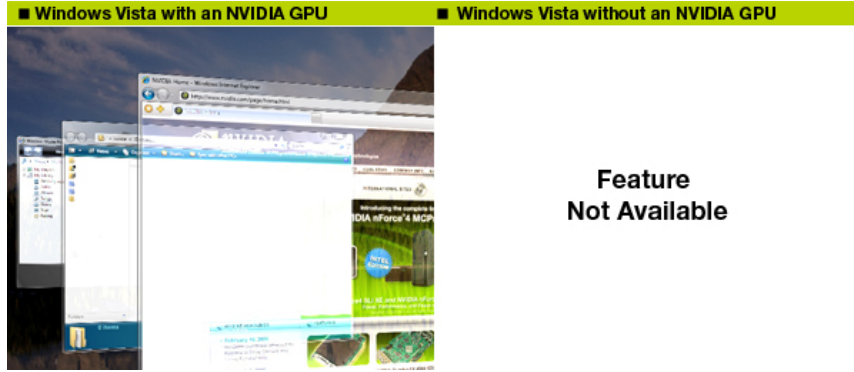
Figure 3.   Use Flip 3D to Navigate Through Open Windows
Using the Scroll Wheel on Your Mouse

Figure 4.   Use Flip to View and More Easily Navigate Through
Open Windows

Figure 5.   See Thumbnail Views of Items in Your Taskbar by
Resting Mouse Pointer on Them

The Architecture Explained

Windows Vista introduces a breakthrough experience that can reach its full potential when it's powered by a GPU. To appreciate its features, let's look at a brief overview of the existing Windows user interface and its replacement.

Before Windows Vista

The current Win32-based Windows XP user interface graphics system (which is almost 20 years old) does not fully utilize a graphics processing unit (GPU) to display the user interface. The block diagram for displaying all graphics on this architecture is illustrated in Figure 6.
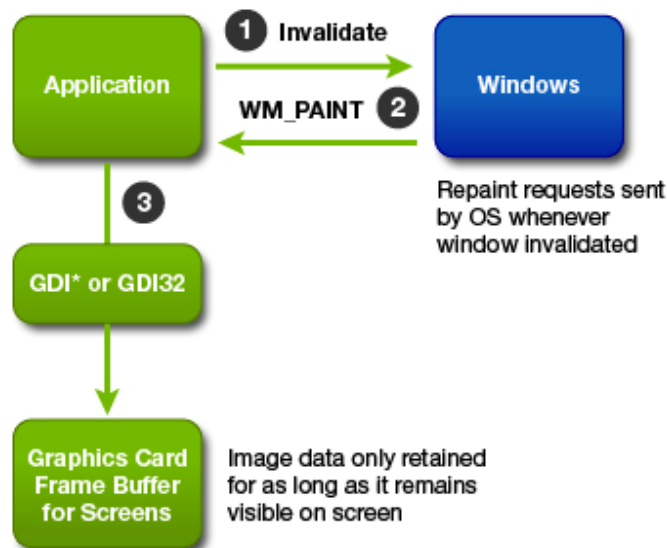

Figure 6.   Block Diagram for Displaying Graphics on Win-32

Notice that the Windows system has to paint directly to the system's screen, drawing details on demand by invalidating the relevant areas on the screen in order to repaint. Plus, it uses a hardware and software path separate from the GPU's dedicated acceleration and frame buffer.

In addition, when you launch a 3D application or a video today, not all of the Windows user interface accesses the GPU's advanced rendering technology to display high-quality 3D and video; only the portions that need 3D/video acceleration access it.

As shown in Figure 7, this limits the areas of the screen that have access to high DPI scaling, multitexturing, and high-quality shader effects.
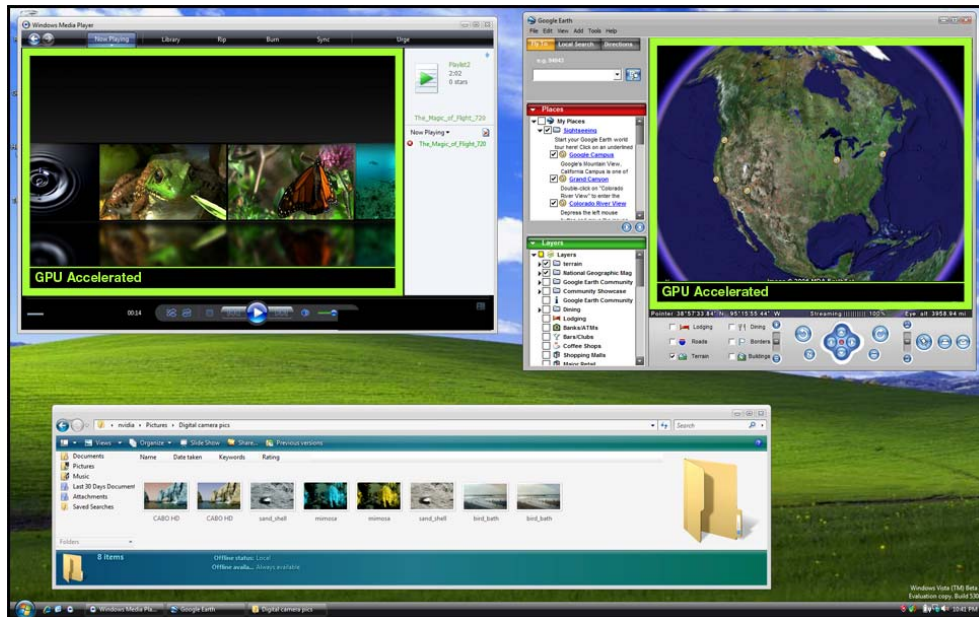

Figure 7.   Only the Media Player Video and 3D Google Earth Globe Are Taking Advantage of the GPU

With Windows Vista

New Interfaces

Windows new user interface, Aero, has higher visual quality levels than the current Win32-based Windows XP user interface and a faster response time. Aero features an additional level of visual sophistication, one that is more responsive and manageable and provides better clarity and more confidence to Windows users.

Windows Presentation Foundation (WPF), which uses a completely new programming style, will replace the Windows XP interface. WPF uses the GPU's 3D hardware and software to draw objects on all surfaces, as shown in Figure 8.

Essentially, with Windows Vista, the operating system renders the entire desktop in real-time 3D using GPU acceleration (Figure 9). Windows Vista utilizes the advancements in 3D graphics technology to deliver the most feature-rich visual experience.
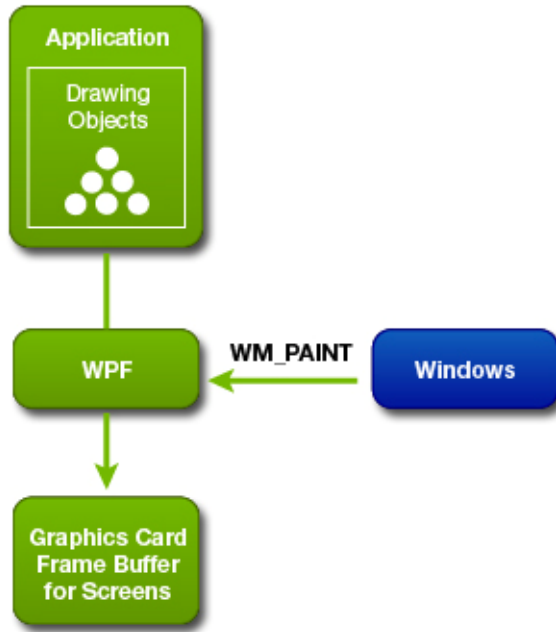
Figure 8.   On WPF, the GPU's 3D Hardware and Software Draws Objects on All Surfaces
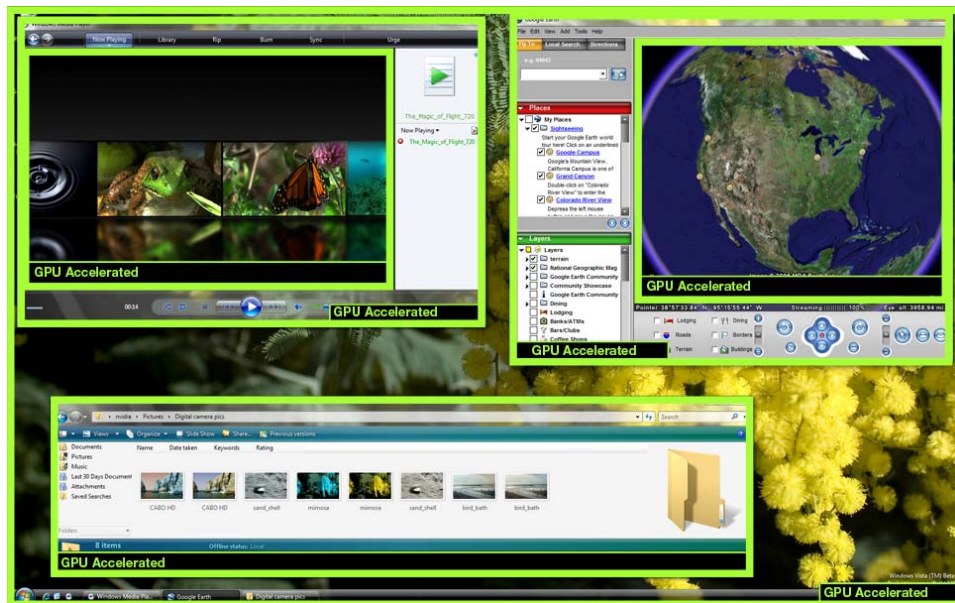

Figure 9.   With Windows Vista, the Entire Desktop Experience Is Being Accelerated by the GPU

For more on this topic, visit *"Top Ten UI Development Breakthroughs In Windows Presentation Foundation"*

Better Load Balancing

Many of the enhancements of Windows Vista pertain to its metadata-mining capabilities and its ability to index document content and allow users easy access to their data—for example, pictures, movies, documents, presentations, or Web pages. *Metadata* refers to the "extra" data that describes details of files, such as the IDTags for MP3 files that have the bit-rate, artist, and album information; or the EXIF and IPTC information that includes camera information, shutter speed, flash settings, and more.

All the metadata needs to be collected, cached, and updated in real time by the CPU as users change the view settings in desktop windows or add, delete, and remove files. All this data-crunching intensely increases the load on the CPU. Having a GPU in the system can offload the tasks related to graphics, from the basics of rendering the font/text, drawing window widgets, playing standard and high-definition video, as well as supporting the enhanced Windows Vista features.

The combination of the GPU and CPU allows the tasks best suited and load-balanced for each of the processors (Figure 10).
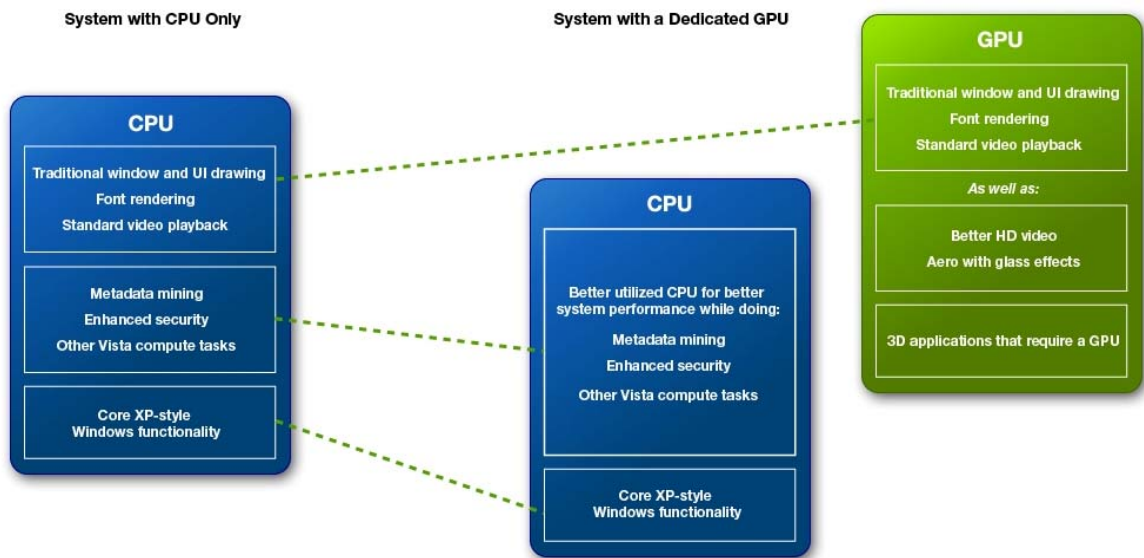

Figure 10.   System Performance with the Addition of a Dedicated GPU

NVIDIA GPUs—
Built for Windows Vista

NVIDIA offers a full line-up of desktop and notebook GPUs that were built for this revolutionary new OS, including its NVIDIA® GeForce® FX, GeForce 6, and GeForce 7 Series GPUs.

With three generations of GPUs designed to take full advantage of the advanced features and functionality of Windows Vista, NVIDIA GPUs are set to deliver the best possible Windows Vista experience.

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