

Microsoft Vista: a Disruptive Graphics Landscape

After several years of anticipation, Microsoft has finally released Vista, the next generation Windows Operating System. What does this mean for engineering software developers? If recent industry media reports are correct, it means many applications will be faced with significant graphics performance degradation unless a large-scale overhaul of their graphics subsystem is undertaken.

The challenges don't stop there. While new PC's are shipping with Vista today, a significant number of end users will still demand robust and stable support for Windows XP for many years to come. In the area of graphics, this means competitive applications will need to support both OpenGL on XP and Direct3D on Vista. In addition, engineering software vendors also need to prepare for a full-scale move to a shader-based graphics subsystem to replace the traditional fixed-function design used in most engineering software applications.

While most elements of software development and programming have gotten easier over time, graphics development has just gotten significantly more difficult!

Like any disruption, these changes create major challenges for software vendors, but they also open up new opportunities. Nimble software firms will be able to gain a competitive advantage by optimally driving their graphics on Vista, while also continuing to deliver high performance to the large base of users on Windows XP. Software companies who fail to respond to this changing landscape will find themselves with a serious competitive disadvantage.

The Current & Near-Term 3D Driver Situation

Currently on Vista very few graphics cards handle engineering applications well because video card drivers are not yet stable or robust – witness the rash of early media reports of slow-downs in CAD software. These performance and stability issues have shown themselves to be true for Direct3D, but they are even more pronounced with OpenGL.

Stable drivers will surely be released in the near term for both OpenGL and Direct3D. However, it's clear that Direct3D will be the best approach for both performance and stability under Vista. Graphics card manufacturers will continue to focus on driving Direct3D, rather than OpenGL for two key reasons. First, the Vista OS itself has a heavy reliance on Direct3D for elements of the UI, so Direct3D needs to be robust and stable just for the OS to run. Secondly, the highly lucrative games industry is heavily reliant on Direct3D and exerts a powerful influence on graphics card vendors. The unfortunate reality is that OpenGL is almost exclusively used within the Engineering and Academic markets, which represent a very small portion of the total user base for 3D today.

While Direct3D will dominate on Windows Vista, OpenGL will continue to be the preferred solution on Windows XP. Of course, under any non-Windows platform (Unix, Linux, MAC), OpenGL will be the only graphics acceleration option.

The Strategic Importance of Supporting Both OpenGL and Direct3D

In order to maintain competitive performance across operating systems, applications will need to support both OpenGL and Direct3D for at least the next 5 years. This creates a major problem for virtually all home-grown graphics subsystems, which have been architected exclusively for driving OpenGL. If these internal subsystems are completely overhauled to leverage Direct3D (a large-scale development undertaking) they will then suffer on XP. Maintaining a pure OpenGL approach leads to competitive disadvantage as these OpenGL-only applications will fall further and further behind those with the ability to drive Direct3D on Vista. Not only is this a challenging technical issue, it's a critical strategic business issue as well.

Fixed-Function vs. Shaders-Based Graphics Approaches

Most applications that support OpenGL or Direct3D (the current version from Microsoft is referred to as DX9) are built on a “fixed-function” graphics pipeline. In the engineering software market this fixed-function approach is a standard graphics architecture, and how virtually all OpenGL-based graphics subsystems are architected today. Using this approach, Direct3D can often be quite good when the scene consist purely of 3D triangles, but on many video cards this approach is often quite poor when there are lines or text in the scene.

Unfortunately for developers, the traditional fixed-function approach does not enable an application to take full advantage of Direct3D’s capabilities. In order to truly get the benefit of Direct3D an application developer needs to fully overhaul their system to take advantage of the shader capabilities of DX9. Shaders allow developers much more control over the rasterisation of the scene, opening up the opportunity to write sophisticated algorithms to perform advanced visual effects such as real-time shadowing and realistic material properties. Unfortunately, this additional programmatic control comes with a serious cost as it also significantly increases the level of development complexity. Writing shader code is the graphics equivalent to writing assembler code.

In short, moving to a shader-based architecture is technically very challenging, expensive and time-consuming. It is also only supported on the newer graphics hardware, so this approach leaves developers unable to properly address a significant portion of the graphics hardware found on Windows XP machines.

More Changes on the Horizon

Changes in graphics development are not limited to fixed-function vs. shader approaches. More changes will continue that will make both the full support of Direct3D and OpenGL a moving target. Microsoft has released DX10 with Windows Vista and this will, over time, replace DX9. The big difference between DX9 and DX10 is that DX10 does not include a fixed function pipeline and so developers will be forced to migrate their graphics subsystems to a shader-based architecture in order to leverage DX10. Furthermore, OpenGL is also moving towards a shader based architecture and so in all likelihood even OpenGL-based fixed function rendering pipelines will ultimately not be supported in future graphics hardware.

This continually shifting graphics landscape is adding new levels of complexity to the development, optimization and support of graphics subsystems. In order to run well on a variety of graphics cards, software vendors must find ways to support not only OpenGL and Direct3D, but also multiple versions of each with both fixed-function or shader-based approaches.

Printing on Vista and XP

Another change with Vista is related to printing. Microsoft has abandoned GDI as the primary method to print, instead moving developers toward using their recently released XPS (XPS stands for XML Paper Specification). The promise of XPS is that it offers a richer color palette, better print fidelity and faster print jobs. Microsoft is working with all the primary print manufacturers to support this new specification in their hardware, so a plan is in place to eventually support XPS on Windows XP. At the moment, however, GDI is still the print driver approach for Windows XP. Applications that provide hard copy output will need to maintain their GDI-based hardcopy pipeline for some time, while also adding support for XPS.

How HOOPS 3D Application Framework Can Help

A vital benefit of building an application with HOOPS as the graphics sub-system is that our advanced framework sits well above the level of OpenGL, Direct3D or GDI. HOOPS drives these, and many other display API’s “under the hood” on a vast array of graphics cards. Tech Soft 3D manages the ongoing changes within these API’s so that your HOOPS-based application is insulated from disruptions and will perform well on whatever hardware a particular end-user is running. With HOOPS v16.0, developers will also be able to take advantage of our new 100% shader-based DX9 driver and a new XPS print driver. Shader-based DX10 and OpenGL drivers will soon follow.



Summary

Windows application developers need to run optimally on Vista while still addressing the needs of their user base using Windows XP. Like any company in a competitive environment, they need to achieve this graphics performance and independence in a resource-efficient and timely manner, with an eye toward flexibility as changes continue. HOOPS will ensure that your application gets the full benefit of the latest advances in graphics, while still performing optimally for your users on today's (and yesterday's) hardware. A move to HOOPS is an opportunity for developers to deliver rich display across a variety of platforms and devices, minimize development costs and dramatically speed time-to-market.

To Learn More:

Contact us at info@techsoft3d.com

Visit the HOOPS 3D Application Framework Page:

<http://www.techsoft3d.com/products/3daf.html>

We would also be glad to work provide you with a **Free 90-Day Evaluation**. Sign up here:

<http://www.techsoft3d.com/downloads/eval.html>