Microsoft Focuses on Multimedia

WinHEC Shows Better 3D, DVD Quality But Few New Features

by Peter N. Glaskowsky

With system designs for Windows 98—described by Microsoft Chairman Bill Gates as "the simplest upgrade we've ever offered"—long since set in virtual stone, the 1998 Windows Hardware Engineering Conference (WinHEC) provided a look at long-term trends in the PC industry.

As expected, 3D graphics and DVD video attracted the most attention at the show. Today's implementations of these capabilities are fairly basic by professional standards, and the most interesting WinHEC presentations offered ways to enhance the visual quality of 3D and DVD on the PC platform.

Some of these techniques are already possible with existing systems, needing only improved peripheral devices (or device drivers) to realize their potential. Others must wait for future Microsoft operating-system extensions or application programming interfaces (APIs).

Microsoft Schedules Release of DirectX 6.0

At the February Meltdown conference for the DirectX multimedia APIs, Microsoft declined to announce a schedule for the release of DirectX version 6. Instead, Microsoft pledged to ship DX6 "when it's ready" and warned it might not be ready until late in the year. At WinHEC, this pledge melted away. Ready or not, DX6 will ship in July.

Microsoft insists this new stance will have no adverse impact on the quality of the final code. The company says it was able to move up the release date by cutting a few noncritical features rather than cutting time from the beta-test program or other quality-assurance functions. The DX6 beta release is still planned for May 9, however, which limits the beta program to about two months instead of the previously open-ended timetable.

The change in plans, Microsoft says, is a response to developer dissatisfaction with the original schedule. While developers appreciated Microsoft's interest in quality, they couldn't accept the possibility that DirectX 6.0 might ship too late in the year to be included in the wave of entertainment software titles planned for the Christmas season. The new July release date ensures developers can take advantage of the new features in DX6 with their new titles, making them more attractive to customers.

Fortunately for 3D-game developers, Microsoft didn't cut anything from the announced list of new Direct3D features. Texture compression, bump mapping, stenciling, and multitexturing will all be supported in D3D 6.0 (see MPR 3/9/98, p. 14). The only announced DX6 features cut to meet the new deadline were in the DirectDraw 2D-graphics API, and most of these dropped features were relatively minor. Some, like stereoscopic display support, would have been useful to 3D developers as well, but in the final analysis they weren't important enough to justify delaying the entire product.

Chrome Brightens User Interface

Some of the most intriguing demonstrations at WinHEC involved proposed enhancements to the Windows user interface and Microsoft's Internet Explorer Web browser.

The Windows display manager is due for a significant overhaul in a future release of the Windows NT operating system, probably around the same 2000/2001 timeframe when Windows NT will displace Windows as Microsoft's consumer operating system.

These enhancements will require a new, more flexible set of software interfaces to graphics devices, which Microsoft refers to generally as the GDI2K initiative. For example, Microsoft would like to treat every open window on the computer screen as a separate DirectDraw "surface" with its own frame buffer, either in system memory or in local graphics memory. Graphics chips will combine the various open windows to produce the final displayed screen image. Applications will no longer need to redraw background windows when a foreground window is moved around on top of them, making the windowing system faster and easier to use.

Giving each window its own surface will allow the user interface to treat them as 3D texture maps, opening the door to new 3D user-interface models. Just as an opening door reveals more of the view through the doorframe, pivoting a 3D window back into a 3D virtual desktop can leave more space on the desktop for other windows. (We hope Microsoft will develop a new set of physical metaphors to replace the current set of windows, doors, and desktops.)

Also at WinHEC, Microsoft showed a separate but related set of enhancements to the Windows user interface and Internet Explorer, which the company dubbed Chrome. Applications using these new techniques are said to be Chrome-plated. Chrome provides an early preview of some GDI2K capabilities. For example, Chrome will enable frame-based Web-site menus mapped onto 3D surfaces that can be pivoted partially out of the way to leave more space for the main document.

The essence of Chrome is a new set of APIs that enables these features, but some of Chrome's Web-specific capabilities will require extensions to HTML. For example, Chrome would make it possible for a Web browser to display 3D text without having to download any extra files from the Internet. The Web page would simply specify the text, font, and

other display parameters, much as current Web pages describe normal 2D text. This is simpler but less flexible than the virtual reality modeling language (VRML) that provides today's only standard means of displaying 3D objects on Web pages. VRML is a cross-platform specification, however; it seems unlikely that Microsoft would license the necessary technology to make Chrome-plated Web sites work on non-Windows systems.

Digital Video Looks to a Brighter Future

Consumer digital-video playback is well supported on Windows. The DirectShow API handles MPEG-2 and DVD playback, while Video for Windows and Apple's QuickTime handle other formats for files found on the Web and distributed with CD-ROM entertainment software.

Professional-quality recording and playback support has been lacking on Windows, but this will soon change. QuickTime 3.0 will likely continue to dominate the video-authoring market, but Microsoft's own efforts are steadily improving the quality of Windows digital-video playback.

In preparation for the impending arrival of digital television in the United States, the current draft of the PC 99 System Design Guide being developed by Intel and Microsoft (available at *www.microsoft.com/hwdev/desguid*) requires that PCs capable of receiving digital TV support the HD0 video formats defined by the Advanced Television Systems Committee (*www.atsc.org*).

HD0 defines a 720 × 480-pixel, 60 frame-per-second format with the same resolution as conventional DVD content, but it improves temporal quality by using a progressive scan sequence rather than DVD's interlaced sequence. For film-based program content, HD0 also includes a 1,280 × 720-pixel, 24-fps progressive-scan format that requires little more processing effort than the 720 × 480-pixel format but provides higher resolution.

WinHEC presentations from Microsoft and several video-chip vendors described improved techniques for displaying digital video on PC monitors, overcoming traditional problems such as motion error induced by the conversion of 60 field-per-second interlaced video to PC-style 75-Hz progressive-scan monitors. The ideal (but expensive) solution, as demonstrated by Gerard de Haan of Philips Research Laboratories, requires sophisticated motion-detection circuitry to compute how regions of the video image are moving from each frame to the next. The video subsystem then synthesizes a new video image as it should appear each time the computer monitor is refreshed. Philips has a multichip implementation of such a circuit for PC applications, which it plans to reduce to a single inexpensive chip later this year.

Converting interlaced video to progressive-scan video is another difficult problem that must be solved to achieve high-quality video playback on PCs, and similar techniques can be used to solve this problem as well. Today's DVD-playback cards switch between the "bob" and "weave" algorithms depending on the program content. The weave algorithm produces near-perfect results for 24-fps movie content, but the bob technique for interlaced video—nothing more than linear interpolation between scan lines in each field—leads to a loss of detail and sometimes to serious motion artifacts. Again, motion detection can help to fill in the proper video data and produce much better results.

These improvements appear to be at least two years away for mainstream PCs, however. PC 99 allows simple bob/weave deinterlacing in lieu of the more effective temporal-rate conversion circuitry, and OEMs are likely to choose the less expensive solution.

Microsoft Prepares for Merced With Win64

While 64-bit computing is far in the future for mainstream users, Intel's Merced processor is now only a year away for system OEMs and software developers, and Microsoft is getting ready to support it. At WinHEC, Microsoft provided more details about a 64-bit version of Windows NT 5.0 that will arrive at about the same time as Merced.

Microsoft's goal is to preserve source-code compatibility between 32- and 64-bit operating environments. All 32-bit applications will run on both 32-bit and 64-bit NT, but once compiled, 64-bit applications will require 64-bit NT.

The major change in the new 64-bit APIs (described at *www.microsoft.com/msdn/news/feature/032398/64bit*) is the redefinition of pointer types as 64-bit objects, along with a new set of integer data types with explicitly defined lengths. For example, Microsoft is advising application developers to replace references to the UINT data type for unsigned integers with UINT32 or UINT64 references (or UINT_PTR for unsigned integers used for pointer manipulation, which will automatically be set to the proper length).

File and application servers will be the first beneficiaries of 64-bit platform technology, but 64-bit operating systems will eventually become attractive to end users as well. A gigabyte of DRAM costs less than $2,000 today. In just a few years, mainstream users will need 64-bit NT to support even larger configurations.

Microsoft: Leading or Just Dominating?

As other operating systems continue their slow fade into obscurity, Microsoft continues its transition from technology marketer to technology innovator. Soon there will be nobody left for Microsoft to imitate, but it seems likely that the Redmond giant is fully capable of leading the development of the PC market.

The announcements at WinHEC include no shattering revelations, but they show that Microsoft is getting good returns on its research and development investments. We are not convinced that better graphics and video will keep the PC boom of the early '90s going into the next decade. With at least two more years before the next major release of Windows operating systems, it seems likely that Microsoft will spend that time looking for the next generation of killer applications to spur another round of system upgrades. M