THE EDITOR'S VIEW

Multimedia APIs Spur Hardware Innovation

Windows 95 Interfaces Support Everything from Nvidia to NSP

At last month's Microprocessor Forum, a variety of solutions were proposed to deliver multimedia functions in PCs. These can be divided into two camps: those that do most multimedia processing on the CPU and those that provide dedicated hardware accelerators. Despite the opposing nature of these two approaches, both rely on the same enabling technology: Microsoft's DirectX interfaces. These interfaces allow PC designers to implement innovative hardware solutions without forcing software vendors to rewrite their applications.

DirectX is a set of application programming interfaces (APIs) that programs use to access multimedia functions in the hardware. Specifically, the set includes:

- DirectDraw—Accelerated 2D graphics
- DirectSound—Audio, including mixing
- DirectPlay—Communications for multiplayer games
- DirectInput—Digital or analog joystick

Microsoft also plans a DirectVideo API for accelerating video decompression and compression.

Although considered part of the Win32 interface, DirectX is an SDK (software developers' kit) separate from Windows 95. The final release of DirectX 1.0, including the four APIs listed above, began shipping last month. Microsoft expects to release a second version next spring that will include the DirectVideo API and add support for Windows NT.

Software written for Windows 3.1 or DOS (that is, almost all of today's applications) doesn't use DirectX. Windows programs use the GDI API to access 2D graphics accelerators, but most games makers disdain its poor performance and instead write directly to the graphics card under DOS. Nearly all games that use sound write directly to Sound Blaster registers. To take advantage of a new audio device, such as a high-end wavetable card, these games makers must rewrite their applications. Instead, most are targeting DirectX for their next software release.

Assuming that DirectX applications become common, it will be much easier to slip new hardware under the sheets. As long as the hardware vendors (or some third party) supply DirectX drivers, new chips are fully compatible with pre-existing software. Recent chips from Nvidia and Chromatic, for example, implement audio functions using unique interfaces; with a DirectSound driver, these interfaces are invisible to software.

Microprocessor vendors would like to eliminate the need for these accelerator chips, at least in low-end systems. Intel's native signal processing (NSP) initiative, for example, is being revamped to work with DirectX *(see **0912ED.PDF**)*.

The key to delivering strong multimedia performance without an external accelerator is adding instructions that improve the handling of multimedia data. A prototype for this effort is Sun's VIS extensions *(see **081604.PDF**)*. Intel is developing a still-secret set of extensions known as MMX, while NexGen and Cyrix are also planning to deploy multimedia-enhanced CPUs in 1996. In fact, most new desktop microprocessors next year will have some sort of multimedia extensions. (PowerPC, please wake up!)

These processors, and even nonenhanced chips, can handle multimedia functions under the DirectX umbrella. In this case, the CPU vendor creates a driver that provides audio or video functions without accessing any external accelerator. One problem with this approach is that audio and video can chew up a significant amount of CPU bandwidth, reducing the performance available for other programs.

DirectX includes a function that allows software to determine what features are implemented in hardware. For example, if a wavetable card is installed, a game program might use it to generate enhanced sound; otherwise, it could default to FM synthesis (Sound Blaster). In an NSP system, the CPU may be able to emulate the more complex wavetable sound, but this emulation could slow down the game, an undesirable effect. Future releases of DirectX may allow drivers to indicate that they can perform functions with a specified impact on CPU performance, but the current release allows only a simple yes/no response.

Another problem with all of these new hardware schemes is that there will be a large body of legacy software that does not use DirectX. Nvidia, Chromatic, and Cyrix have implemented features that allow emulation of legacy devices that don't use APIs. Philips, on the other hand, has simply chosen not to support older software with its TM-1 accelerator *(see **091506.PDF**)*.

By overthrowing the tyranny of register-level interfaces, DirectX greatly increases the ability of hardware vendors to offer innovative multimedia support. It remains to be seen which solution (or solutions) will win in the market, but in any case, improved multimedia performance at a lower cost will result. ♦