

### ■ Lexra Reverse-Engineers MIPS R3000 Core

Massachusetts startup company Lexra Computing Engines ([www.lexra.com](http://www.lexra.com)) has designed its own MIPS microprocessor core for ASIC developers. The core is interesting, in part, because Lexra does not have a MIPS license. Lexra believes its reverse-engineered core is legal and does not infringe any patents; Silicon Graphics has expressed "interest" in the legality of Lexra's design techniques.

Lexra's LXR-4080 core is said to execute most of the MIPS-I instruction set, making it equivalent to IDT's 3041 or LSI Logic's CW4010. The exceptions are unaligned loads and stores as well as multiply and divide. The core has a five-stage pipeline and runs at 100 MHz in a 0.35-micron process, according to the company. Separate instruction and data caches are mandatory parts of the core design, although customers can add additional memories, coprocessors, bus interfaces, and even execution units or user-specific instructions. The core is provided as an RTL model, allowing straightforward synthesis and integration into most ASIC design processes. Lexra is qualifying various foundries for production.

Lexra touts its comparatively low licensing fee (around \$250,000), the core's synthesizability, and a promise to "fully indemnify [customers] against patent and IP issues" as major selling points. While there are many precedents for chip companies copying others' instruction sets (to wit, the 386, 486, and Pentium), it is not always clear what legal grounds may prevent or allow such cloning. Lexra clearly believes it is in the right; time will tell if its customers are as sanguine. —*J.T.*

### ■ NEC R4305 Cuts Cost of R4300

NEC has announced a special version of its popular R4300 MIPS processor that sells for less than half the price of the original. The new chip, called the R4305, runs at 80 MHz and carries a list price of just \$9.70. That price, however, is good only for annual commitments of 20,000 units per month (nearly a quarter million units/year).

Technically, the R4305 is identical to the existing R4300. There are no internal changes to the part, only a packaging switch. Specifically, the R4305 comes in a 120-lead plastic QFP that lacks a heat spreader. The inexpensive package allows NEC to reduce the price of the part but also limits its speed to 80 MHz. By comparison, R4300 and R4310 chips (which are also internally identical) currently run at 100, 133, and 167 MHz. NEC rates the R4305 at 1.5 W (typical) and 1.8 W (maximum) at 3.3 V and 80 MHz.

Clearly, the R4305 is intended for high-volume applications; NEC refuses to even specify a standard 10,000-piece price for the part. There are presumably many potential R4300 customers that can live with an 80-MHz speed limit. There are certainly fewer, however, that can commit to such large quantities. —*J.T.*

### ■ Microsoft Unveils "Gryphon" Palm PC

At the recent Consumer Electronics Show (CES), Microsoft provided the first public look at "Gryphon," its latest incarnation of Windows CE for PDAs. Officially called Palm PC, Gryphon units are smaller than existing handheld PC (HPC) units running Windows CE and are aimed straight at 3Com's successful Palm Pilot organizer.

In almost every aspect, Palm PCs are nearly identical to the Pilot. The devices themselves are slightly larger than a Pilot and retain the touch-sensitive monochrome LCD, pen-stroke input, docking cradle, automatic synchronization, four instant-on buttons, and built-in software for calendar, address book, notes, to-do list, calculator, and games. Microsoft also demonstrated Pocket Word and Pocket Excel running on the Palm PC, though these applications will not be included by default.

For handwriting recognition, Microsoft licensed CIC's Jot, which is similar to Palm's Graffiti. One significant feature that all Palm PCs will have is a voice-recorder function, something Pilot users currently long for.

The user interface, however, is pure Windows CE. The ubiquitous Start button and other Windows paraphernalia are intact, though smaller and harder to see on the tiny LCD screen. In general, the systems demonstrated had more built-in features than a Pilot but were more complex to use. Given Pilot's elegant simplicity, the unwieldy interface may limit interest in Palm PCs. —*J.T.*

### ■ TCI Chooses Windows CE, PersonalJava

Cable-television giant Tele-Communications Inc. (TCI) has settled on a combination of Windows CE and PersonalJava as the basis for a new round of television set-top boxes to be deployed beginning in 1999. Still undecided is the microprocessor for the boxes, which will number from 5 million to 12 million, according to the company.

The plan is for TCI to distribute to its customers high-end boxes that run the Windows CE operating system, with PersonalJava acting as the applications programming interface (API). The rationale is that by using PersonalJava, TCI can change the hardware of the boxes in the future with some hope of maintaining its existing software.

TCI has never made clear how many of its upcoming "advanced set-top" boxes will actually use either Windows CE or PersonalJava. Sources indicate that fewer than 5 million of them will use either brand of software. The rest will presumably use some other operating system and/or API. TCI has also said that these future boxes will not support the high-resolution HDTV format but instead convert satellite and cable transmissions to "standard resolution" images (i.e., the same as today's television), with the remaining bandwidth devoted to alternative sideband information, such as Web content. —*J.T.* ☐