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CHINA UNVEILS MIPS-LIKE CPU

By Tom R. Halfhill {12/2/02-03}

A research group sponsored by the Chinese government has developed a MIPS-like microprocessor and has licensed the design to a Chinese startup company. The Beijing-based startup, BLX IC Design Corp., is currently sampling the chip and plans to begin

production in 1Q03. It will be China's first commercial 32-bit microprocessor.

Initially, the Godson-1 processor will run at 266MHz and is intended for embedded systems and thin clients. It was designed by the Institute of Computing Technology (ICT), a government research organization. According to David Shen, CEO of BLX, the chip is based on a new architecture with decoupled instruction decoders and is readily adaptable to different instruction sets.

Although the first press reports about the Godson-1 said it was x86-compatible, Shen told *MPR* the processor imitates the MIPS I, MIPS II, and MIPS III architectures, except for a few instructions patented by MIPS Technologies. He said a future version of the processor will be x86 compatible.

The patented instructions omitted from the Godson-1's instruction set are the same ones named in a 1999 lawsuit MIPS brought against Lexra, which at the time was licensing MIPS-like synthesizable processor cores. (See *MPR 12/06/99-03*, "MIPS vs. Lexra: Definitely Not Aligned.") MIPS and Lexra settled their dispute in late 2001. As a result, Lexra withdrew its soft cores from the market, became a MIPS licensee, and changed its business model to become a fabless semiconductor company.

The Godson-1 is sophisticated for a first attempt at a MIPS-like processor. It supports two-way superscalar execution, out-of-order execution, and register renaming. Five

function units include two ALUs, two 64-bit FPUs, and an address-generation unit. The pipeline is seven stages long.

BLX is showing four reference designs based on the Godson-1: a thin-client desktop computer, a firewall adapter card, a small network router, and a storage-device controller. The thin-client design was inspired by the Chinese government's desire to deploy large numbers of low-cost computers in schools.

Work is already under way on the Godson-2, which will support 64-bit memory addressing and is scheduled to reach first silicon in 1Q04. BLX has contracted with TSMC to manufacture both processors in a 0.18-micron CMOS process.

It's not easy to design a microprocessor patterned after an existing architecture without attracting the unwelcome attention of patent attorneys. In addition to Lexra's battle with MIPS, picoTurbo was successfully sued by ARM after reverse-engineering the ARM architecture (see *MPR 11/13/00-04*, "PicoTurbo Takes a Bite Out of ARM"), and Intel has sued almost every company that has cloned the x86.

As a mainland Chinese company that so far is doing no business in the U.S., BLX can probably avoid legal entanglements for a while. But if BLX begins exporting products or cloning other CPU architectures—especially the x86—the Godson processors may become an issue in future trade negotiations and international legal proceedings. ♦

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