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THE EDITORIAL VIEW

INTRINSITY TURNS A CORNER

by Tom R. Halfhill {9/24/07–02}

This month's issue of Microprocessor Report has an article about ARM's Cortex-R4X processor, a new hard-macro version of the previously released Cortex-R4 synthesizable core. What's special about this particular hard core is that it uses Intrinsity's Fast14 technology—a type of dynamic domino logic that has been demonstrated to significantly improve microprocessor performance. (See *MPR 9/17/07-01*, "Cortex-R4X: Extreme Makeover.")

This is the second time we've written about Intrinsity and its Fast14 intellectual property (IP) in recent months. In our July issue, we reported on another interesting collaboration between Intrinsity and a processor vendor. For that project, Intrinsity's partner was AMCC. Instead of improving the performance of an existing processor core, Intrinsity worked with AMCC to design a completely new microarchitecture based on the Power Architecture. Code-named Titan, the new 32-bit embedded-processor core will appear in future standard parts from AMCC—most likely, networking and storage processors. (See *MPR 7/23/07-01*, "AMCC's Titan Core.")

Intrinsity appears to be successfully redefining itself as an IP provider and design shop specializing in speed-optimized embedded-processor cores. Intrinsity can transform any existing processor core into what it calls an "RTL FastCore," or it can follow a customer's specifications to design an entirely new "ISA FastCore." In concept, Intrinsity is like the racing shop that will drop a faster engine into a muscle car or reprogram a sports car's engine controller for higher performance. With Titan, Intrinsity showed it could use Fast14 technology to create a new microarchitecture. With the Cortex-R4X, Intrinsity is showing it can speed up an existing microarchitecture. Intrinsity's business model combines expert design services with unique IP.

It's been a long journey for Intrinsity. The roots of this company go deep, all the way back to Exponential Technology in the mid-1990s. Exponential used bipolar logic to create a fast PowerPC-compatible processor intended for the Apple Macintosh. Exponential was doomed when Apple changed direction and the speed-demon processor turned out to be a heat demon as well—a preview of things to come for Intel. (See *MPR 6/2/97-1107msb*, "Exponential Decays, Bipolar Flames Out.") Some Exponential survivors founded a new company named EVSX. (See *MPR 12/29/97-1117msb*, "EVSX Emerges From Exponential Ashes.") A few years later, that company became Intrinsity. (See *MPR 6/5/00-04*, "EVSX Changes Name to Intrinsity.")

At first, Intrinsity was a fabless semiconductor company. Using its newly developed Fast14 technology, Intrinsity introduced two swift MIPS-compatible processors called FastMIPS and FastMath. (See *MPR 1/6/03-01*, "Intrinsity Delivers On Its Promise," and *MPR 5/27/03-03*, "Update on Intrinsity Fast Products.") But the fabless-semi model requires huge investments and pits a company against rich, powerful competitors. In 2004, Intrinsity signaled a new strategy by licensing Fast14 technology to another party for the first time. (See *MPR 2/23/04-01*, "Intrinsity Licenses Fast14 to ATI.") In 2005, Intrinsity confirmed its course change from the fabless-semi model to IP licensing and design services. (See *MPR 1/10/05-02*, "Intrinsity Takes Its IP on the Road.")

Another company struggling to make the same journey, at the same time, was Transmeta. Intrinsity and Transmeta

both began as fabless-semiconductor vendors with new microprocessors based on innovative ideas. Exponential/Intrinsity aimed for speed, starting with BiCMOS logic and progressing to a new twist on dynamic logic. Transmeta aimed for low power with its LongRun voltage/frequency scaling and achieved back-door x86 compatibility with its code-morphing emulation. (See *MPR 2/14/00-01*, "Transmeta Breaks x86 Low-Power Barrier.") Both companies had brilliant engineers with a penchant for doing something different.

However, each company spent itself near to the breaking point while trying to batter its way into a resistant microprocessor market. Transmeta suffered worse, having chosen Intel as its target. Now, both Intrinsity and Transmeta have switched to design services and IP. (See *MPR 5/2/05-01*, "The Transformation of Transmeta.") Despite early success by landing Sony as a client, Transmeta is further from a turnaround. Lately, Transmeta has been trading volleys of patent-infringement lawsuits with Intel, not a good sign.

Unfortunately for Transmeta, voltage/frequency scaling is no longer unique, and x86 emulation is not in high demand. In contrast, Intrinsity's recent collaborations with AMCC and ARM help establish the value of Intrinsity's Fast14 technology and design tools. At a time when developers fret over the difficulties of programming complex multi-core processors, any technology that can deliver greater performance while preserving a single-core programming model is likely to attract business. If Intrinsity can further automate its design tools and generate FastCores more quickly, the company could lower its prices and support more customers.

One path forward for Intrinsity is to continue growing as a design/IP shop. Another possibility is acquisition. A microprocessor vendor could acquire Intrinsity and reserve Fast14 for its own processors. Or an EDA company could acquire Intrinsity, then license the technology and tools to all comers. At MPR, we are technology analysts, not business analysts, and we have no special insight into Intrinsity's private finances. However, Intrinsity appears to have successfully completed two major FastCore projects with two different partners. We like to see good technology rewarded in the marketplace. If Intrinsity can complete its turnaround, there may be hope for other companies trying to follow a similar path. ◇