The Last Byte

A Brief History of Multiprocessors and EDA

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Multiprocessor computers are not new, but the first ones were built and programmed by the supercomputing community. SoC technology, along with multiple processor cores for MPSoCs, let vendors turn sophisticated systems into commodity items. Many worried that the commoditization of parallelism would cause problems—they were right.

First, Intel made microprocessors, followed by others. In the early 2000s, Intel and AMD went head to head to break the 1-GHz barrier; that led to 2 GHz and beyond, till the power consumption problem arose. The Crusoe processor's announcement from Transmeta led them to optimize their processors, resulting in mobile-processor families such as Centrino. Centrino's low-power profile turned seemingly impossible apps into reality, and consumers bought laptops en masse. Mobile computers were becoming a commodity. Even then, the embedded-processor market was orders of magnitude larger than the desktop and laptop market, but choices were limited, with ARM almost a de facto standard. A concomitant focus on multiple cores on the same chip started with IBM, Sun, Intel, and AMD all announcing multicore products. This was the paradigm to win the performance war without breaking the power ceiling. MPSoC was no longer just an academician's conference topic, and desktop parallel computing became affordable. Nvidia and AMD (ATI) also began using GPU-based parallel computing. More recently, with the Nvidia Tegra and Intel Atom, the competition has heated up still further.

IBM announced the Cell processor around 2005. Cell, a heterogeneous multiprocessing solution for game consoles, captured software professionals' imagination for cheap supercomputing. People assembled tens to hundreds of PlayStation 3's to develop their own lab-grown supercomputers for all kinds of complex research.

As this was happening, system-level design languages such as SystemC and SystemVerilog struggled with the notion and definitions of transaction-level modeling, validation environments, and tools. However, the multicore processors brought forth new challenges and opportunities for EDA companies. With the mainstream processor world demanding high-level modeling, simulation, and validation technology, the embedded world came up with multicore and heterogeneous multiprocessor platforms (e.g., Motorola Zoom, Apple's iPad2, Samsung's Galaxy). Opening the hardware innovation space beyond imagination, these platforms also required sophistication in multimedia processing, coprocessor-based speedup, and touch and gesture recognition software. These forced extreme innovation to solve the challenges for validation and verification at higher levels of abstraction.

The IEEE High Level Design Validation and Test (HLDVT) workshop is in its 16th year. Now, more than ever, we crave high-level modeling, validation, and testing solutions. HLDVT has dedicated itself to this cause for the past 15 meetings. With the current explosion of multicores and heterogeneity, and the mass market economy driving the platform innovations, its relevance is more pronounced than ever. ■

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