The Changing Impact of Semiconductor Technology on Processor Architecture

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Abstract. We stand on the brink of a fundamental discontinuity in silicon process-technology unlike anything most of us have seen. For almost two decades, a period of time spanning the entire education and careers of many engineers, we have been beneficiaries of a silicon process-technology which would let us build almost anything we could imagine. Now, all of that is about to change. For the past five years, capacitive loading of interconnect has grown to be a significant factor in logic speed, and has limited the scaling of integrated-circuit performance. To compound the problem, recently interconnect resistance has also started to limit circuit speed. These factors can render obsolete current designs and current thinking as interconnect-dominated designs and architectures will become increasingly irrelevant. Given these fundamental interconnect challenges, we must turn to architecture, logic design and programming solutions. The background on these dramatic changes in semiconductor technology will be discussed in the hopes that the solutions for the future may very well come from the attendees of HPCC 2007!

R. Perrott et al. (Eds.): HPCC 2007, LNCS 4782, p. 6, 2007.