

The von Neumann Syndrome

The German CS professor Reiner Hartenstein* questions, that von-Neumann-style computing will be still affordable throughout the next decade. A US study predicts, that by the year 2020 in the US the electricity consumption of the entire cyberinfrastructure (all computers, visible and embedded) will total to 35 - 50% of all electricity consumed in the US. Currently this figure has reached already more than 20%. In an essay published recently** and in an invited talk given at SC07 at Reno, Nevada, Hartenstein explains the reason by a long list of overhead phenomena being typical to the extremely instruction-fetch-hungry von Neumann paradigm. Reiner Hartenstein warns, that von Neumann-style computing might become unaffordable already earlier than by 2020, reminding, that last year a famous investment banker has bet on a crude oil price of 200\$ or more per barrel already by the year 2010.

Referring to several celebrities (e. g. Burton Smith, Microsoft fellow and former Cray CTO) calling for a re-invention of computing science, Hartenstein proposes a twin-paradigm approach also including an antimachine paradigm being the counterpart to the von Neumann paradigm by using data counters instead of a program counter. He proposes this antimachine as an educational common model for Reconfigurable Computing having no instruction fetch at run time and being configware-based instead of software-based. Quite a number of researchers have published speed-up factors ranging from one to more than four orders of magnitude obtained from software to configware migrations. Here the side effect of slashing the electricity bill has been mentioned only by two of these publications: a factor of (or better called: a divisor of) slightly more than 10, and (recently by a panelist at SC07) more than 3000.

Hartenstein claims, that the adoption of Reconfigurable Computing methodologies by computing practice is inevitable. However a twin paradigm organization is needed not only because of legacy software. The main problems are educational deficits. Hartenstein frequently bashes our curriculum task forces by calling their recommendations being criminal by sabotaging our competitiveness when permanently ignoring decades old models to bridge the hardware/software chasm, meanwhile having turned into the software / configware chasm already before the end of last century.

*) <http://hartenstein.de>

***) <http://hartenstein.de/Hartenstein-Delft-Sep2007.pdf>