

Methods for Multicore Programming

“Multicore architectures and their associated software give many new opportunities to reduce the energy consumption of computers. Heat generation/power dissipation necessitates expensive cooling systems and is a serious and increasing problem in most IT systems. Furthermore, reduced energy consumption in IT equipment is a goal in all market segments (i.e. from sensor networks, via mobile phones, laptops, servers and up to compute clusters and supercomputers). Common for all these platforms is the widespread and increasing use of multicore technology. These new multicore solutions must balance the desire for low energy consumption against the need for high performance. Consequently, they are at the heart of the collective endeavor named “Green IT”.

In this research project, we will study the trade-off between low energy consumption and high performance. A crucial choice is the degree of parallelization, e.g. the distribution of the computations on one, a few or many processor-cores. The project includes evaluation of existing methods, techniques and tools for optimizing the metric performance/watt, as well as proposing and exploring new programming methods. System level simulations of both architecture and software will be used to evaluate the proposed techniques. Modern approaches such as design space exploration, autotuning and use of performance & energy counters is relevant. The research will be related to the activity in the research cluster “Programming model and OS” of EU-7FP HiPEAC2 NoE (Network of Excellence).”

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