

Low-Cost Hardware Infrastructure for Runtime Thread Level Energy Accounting

Authors:

Marius Marcu

Politehnica University of Timisoara, Timisoara, Romania

Oana Boncalo

Politehnica University of Timisoara, Timisoara, Romania

Madalin Ghenea

Politehnica University of Timisoara, Timisoara, Romania

Alexandru Amaricai

Politehnica University of Timisoara, Timisoara, Romania

Jan Weinstock

Institute for Communication Technologies and Embedded Systems, RWTH Aachen, Aachen, Germany

Rainer Leupers

Institute for Communication Technologies and Embedded Systems, RWTH Aachen, Aachen, Germany

Zheng Wang

Institute for Communication Technologies and Embedded Systems, RWTH Aachen, Aachen, Germany

Georgis Georgakoudis

Queen's University Belfast, Belfast, UK

Dimitrios S. Nikolopoulos

Queen's University Belfast, Belfast, UK

Cosmin Cernazanu-Glavan

Politehnica University of Timisoara, Timisoara, Romania

Lucian Bara

Politehnica University of Timisoara, Timisoara, Romania

Marian Ionascu

Politehnica University of Timisoara, Timisoara, Romania

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The ever-growing need for energy efficient computation requires adequate support for energy-aware thread scheduling that offers insight into a systems behavior for improved application energy/performance optimizations. Runtime accurate monitoring of energy consumed by every component of a multi-core embedded system is an important feature to be considered for future designs. Although, important steps have been made in this direction, the problem of distributing energy consumption among threads executed on different cores for shared components remains an ongoing struggle. We aim at designing a generic low-cost and energy efficient hardware infrastructure which supports thread level energy accounting of hardware components in a multi-core system. The proposed infrastructure provides upper software layers with per thread and per component energy accounting API, similar with performance profiling functions. Implementation results indicate that the proposed solution adds around 101%±2% resource overhead to the monitored system. Regarding the power estimates, the one derived by our solution achieves a correlation degree of more than 953%±2% with the ones obtained from physical power measurements.

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