Article Navigation

On the Interplay Between Throughput, Fairness and Energy Efficiency on Asymmetric Multicore Processors

J. C. Saez ✉, A. Pousa, A. E. de Giusti, M. Prieto-Matias

Comput J 1-21. **DOI:** https://doi.org/10.1093/comjnl/bxx038
Published: 27 April 2017 **Article history** ▾

Abstract

Asymmetric single-ISA multicore processors (AMPs), which integrate high-performance big cores and low-power small cores, were shown to deliver higher performance per watt than symmetric multicores. Previous work has highlighted that this potential of AMP systems can be realizable by scheduling the various applications in a workload on the most appropriate core type. A number of scheduling schemes have been proposed to accomplish different goals, such as system throughput optimization, enforcing fairness or reducing energy consumption. While the interrelationship between throughput and fairness on AMPs has been comprehensively studied, the impact that optimizing energy efficiency has on the other two aspects is still unclear. To fill this gap, we carry out a comprehensive analytical and experimental study that illustrates the interplay between throughput, fairness and energy efficiency on AMPs. Our analytical study allowed us to define the *energy-efficiency factor* (EEF) metric, which aids the OS scheduler in identifying which applications are more suitable for running on the various cores to ensure a good balance between performance and energy consumption. We propose two energy-aware OS-level schedulers that leverage the EEF metric; the first one strives to optimize the energy-delay product and the second scheduler can be configured to optimize different metrics on the AMP. To demonstrate the effectiveness of these proposals, we performed

Online ISSN 1460-2067
Print ISSN 0010-4620

To purchase short term access, please sign in to your Oxford Academic account above.

Don't already have an Oxford Academic account? Register

On the Interplay Between Throughput, Fairness and Energy Efficiency on Asymmetric Multicore Processors - 24 Hours access

EUR €24.00 GBP £18.00 USD $31.00

View Metrics

Estimating Ideological Scores of Facebook Pages: An Empirical Study in Taiwan

Divide and Conquer: A Tool Framework for Supporting Decomposed Discovery in Process Mining

On the Interplay Between Throughput, Fairness and Energy Efficiency on Asymmetric Multicore Processors

Detection of Phishing Websites Based on Probabilistic Neural Networks and K-Medoids Clustering

Impulse-Noise Resistant Color-Texture Classification Approach Using Hybrid Color Local Binary Patterns and Kullback–Leibler Divergence