Open internship position

Title:
Learning Techniques for Performance and Energy Prediction in Adaptive Manycore Systems

Keywords:
Machine Learning, Data-Mining, Multicore Architectures, Prediction model, Runtime management, Performance and Energy Monitors, Adaptive Resource Allocation

Description:
The growing demand for smarter high-performance embedded systems leads to the integration of multiple functionalities in on-chip systems with tens (even hundreds) of cores. In the same time, the low energy consumption requirement of such manycore systems has to be preserved. This opens a number of design challenges among which it is worth mentioning the optimal resource allocation that is necessary to reach the best compromise on performance and energy consumption.

This internship aims to investigate the applicability of recent learning approaches in order to help for a more efficient resource allocation in manycore systems[1][2]. Given a set of information monitored from a manycore platform, prediction models could be built so as to forecast relevant metrics, e.g., execution time, power consumption. These information could be collected from system executions performed with either cycle accurate simulators or real multicore compute boards. The predicted metrics are therefore exploited for adapting the resource allocation to workload requirements in terms of performance and power tradeoff.

The duration of the internship is between 3 and 6 months in the LIRMM lab, which is a cross-faculty research entity of the University of Montpellier and the French National Center for Scientific Research (CNRS). Located in Montpellier (France), LIRMM is one of the largest multi-disciplinary research laboratory in Europe. Its Microelectronics department carries out cutting-edge research in the fields of design and testing integrated systems and micro-systems, with a focus on architectural aspects, modeling and methodology.

Contact:
Applications (including a CV, academic records, motivation letter and appreciation letters if available) are to be sent to the following person:

- Abdoulaye GAMATIE (abdoulaye.gamatie@lirmm.fr) -- +33 4 67 14 98 28

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[1] R. Bitirgen, E. Ipek, and J. F. Martinez, "Coordinated management of multiple interacting resources in chip multiprocessors: A machine learning approach," in Proceedings of the 41st Annual IEEE/ACM International Symposium on Microarchitecture, ser. MICRO 41. Washington, DC, USA: IEEE Computer Society, 2008, pp. 318–329.

[2] Abdoulaye Gamatié, Roman Ursu, Manuel Selva, Gilles Sassatelli. **'Performance Prediction of Application Mapping in Manycore Systems with Artificial Neural Networks'**, *International Symposium on Embedded Multicore/Many-core Systems-on-Chip (MCSoC'16)*, Lyon - France September 2016.