Proposition de recherche doctorale

A Framework for Extending WCET Analysis and Estimation to Multi-Cores Real Time Systems taking into account Scheduling and Shared Ressource Intereference

Mots clés :
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Résumé du projet de recherche (Langue 1)

The first real time computers used relatively simple hardware architectures of the era, processors with basic functional units, deterministic computing times, and straightforward memory interfaces, software were specifically crafted for these computers, and the scheduling theories used simple task models and acceptable simplifications of the reality they described.

As the hardware evolved pushed by the personal computer, video games and servers market, the microelectronics industry focused more on the throughput of their products rather than on real time characteristics, processors became equipped with deep pipelines, out of order and speculative executions, complicated memory hierarchy to reduce the memory gap, and multiprocessors emerged as the way to keep up with the computing power trend that frequency increase could no longer permit (power and heat increase with frequency add footnote or reference).

In addition software grew larger reaching millions lines of code adding third party libraries, outsourcing development and reusing code for obvious economical reasons, all this on top of complex operating systems favouring time shared scheduling and responsiveness over hard real time characteristics.

This thesis provides a framework composed of an analysis tool and an operating system solution keeping deterministic properties on top of non deterministic hardware and bringing real time solutions to supposedly non real time computing systems.