Proposition de recherche doctorale

Algorithmic problems in power management of computing systems

Mots clés :

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- **Co-encadrant(s)** :
- **Unité de recherche** : Laboratoire d'informatique de Paris 6
- **Ecole doctorale** : École Doctorale Informatique, Télécommunications, Électronique de Paris
- **Domaine scientifique principal**: Divers

Résumé du projet de recherche (Langue 1)

There are technical, ecological and economic incentives, motivating the study of policies for the power management in computing systems. The main objective is to minimize the power consumption of computing devices while keeping temperature at acceptable (viable for processing units) levels. From an algorithmic perspective, we will focus on scheduling problems trying to find a trade-off between a quality of service measure (a usual scheduling objective such as the makespan, the throughput etc) and the energy consumption. The two main mechanisms that have been proposed in the literature so far are: 1) Speed scaling, where the processors may run at variable speeds based on demand and performance constraints and 2) Power down strategies, where the device can always reside in one of several states with individual power consumption rates (active, standby, and sleep states). Bibliography 1. S. Albers, F. M?ller, S. Schmelzer. Speed scaling on parallel processors. In Proceedings of the 19th ACM Symposium on Parallelism in Algorithms and Architectures (2007), 289–298. 2. N. Bansal, T. Kimbrel and K. Pruhs. Speed Scaling to Manage Energy and Temperature. In Journal of the ACM (earlier version in FOCS 2004), vol.54, no.1, article 3, 2007 (JACM'07). 3. K. Pruhs, P. Uthaisombut and G. Woeginger: "Getting the best response for your ERG". ACM Transactions on Algorithms, 4 (2008).

Résumé du projet de recherche (Langue 2)

The expected project outcomes are summarized as follows: – Model power and/or temperature management as a scheduling problem using the existing mechanisms or a mix of them. – Given that the majority of problems are NP-hard even for very simple settings, we aim at developing approximation algorithms, obtaining the best possible approximation guarantees. – We will also study online algorithms for the case where the data of the problem are not known in advance, but are revealed during its execution. – Adapt the performance of the algorithms in realistic instances, i.e. implementation and experimental evaluation of the algorithms in real applications.

Informations complémentaires (Langue 1)

This thesis is a "co-tutelle" thesis co-advised with Ioannis Milis of the Athens University of Economy and Business, Greece.