Throughput Maximization for Speed-Scaling with Agreeable Deadlines

Type of talk

PhD seminar

Speaker

Vincent Chau, IBISC, Arob@s Team, Evry, France

Abstract

We are given a set of n jobs and a single processor that can vary its speed dynamically. Each job J_j is characterized by its processing requirement (work) p_j , its release date r_j and its deadline d_j . We are also given a budget of energy E and we study the scheduling problem of maximizing the throughput (i.e. the number of jobs which are completed on time). We show that the problem can be solved by dynamic programming when all the jobs are released at the same time in $O(n^4 \log n \log P)$, where P is the sum of the processing requirements of the jobs. For the more general case of agreeable deadlines, where the jobs can be ordered such that for every $i < j$, both $r_i \leq r_j$ and $d_i \leq d_j$, we propose a dynamic programming algorithm solving the problem optimally in $O(n^6 \log n \log P)$. In addition, we consider the weighted case where every job j is also associated with a weight w_j and we are interested in maximizing the weighted throughput. For this case, we prove that the problem becomes $\mathcal{NP}$-hard in the ordinary sense and we propose a pseudo-polynomial time algorithm.

References

E. Angel, E. Bampis, V. Chau, D. Letsios: Throughput Maximization for Speed-Scaling with Agreeable Deadlines. TAMC 2013, LNCS, 7876, p10-19