International Conference "Mathematical Modeling and Computational Physics, 2017" (MMCP2017)



Contribution ID: 192

Type: not specified

ON THE LOAD BALANCING PROBLEM

We present new results on the Load Balancing Problem that concerns and assignment of given jobs to a set of machines each of which can process a subset of jobs. Each job requires one unit of processing time and must be assigned to some machine that can process it. The jobs have to be assigned in such a manner that minimises the total completion time. We exploit graph theory models and the divide-and-conquer nature of the semi-matching problem. We derive three algorithms for the optimal semi-matching problem. The first one runs in time $O(\sqrt{n} \cdot m \cdot \log n)$ on a graph with n vertices and m edges. The second one is randomized and computes an optimal semi-matching with high probability in time $O(n^{c} \cdot \log^{(1+o(1))} n)$, where c is the exponent of the best known matrix multiplication algorithm. Since < 2.38, this algorithm breaks through $O(n^{2.5})$ barrier for dense graphs. In the case of planar graphs, the third one computes an optimal semi-matching in deterministic time $O(n \cdot \log^{4} n)$. The character of designed algorithms allows parallelisation and distributed computing.

Primary author: Prof. SEMANIŠIN, Gabriel (Faculty of Science, P.J. Šafárik University Košice, Slovakia)

Co-authors: Dr GALČÍK, Frantisek (Institute of Computer Science, Faculty of Science, P.J. Šafárik University in Košice, Košice, Slovakia); Dr KATRENIČ, J. (Institute of Computer Science, Faculty of Science, P.J. Šafárik University in Košice, Košice, Slovakia)

Presenter: Prof. SEMANIŠIN, Gabriel (Faculty of Science, P.J. Šafárik University Košice, Slovakia)