DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
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# COMPUTER SCIENCE COLLOQUIUM

## Resource Augmentation in Load Balancing

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**CWI**

**Tuesday, June 27, 2000, at 12:30 PM**
**The Seminar Room**

**Abstract:** We consider load balancing in the following setting. The on-line algorithm is allowed to use $n$ machines, whereas the optimal off-line algorithm is limited to $m$ machines, for some fixed $m < n$. We show that while the greedy algorithm has a competitive ratio which decays linearly in the inverse of $n/m$, the best on-line algorithm has a ratio which decays exponentially in $n/m$. Specifically, we give an algorithm with competitive ratio of $1 + 1/2^{\frac{n}{m}(1-o(1))}$, and a lower bound of $1 + 1/e^{\frac{n}{m}(1+o(1))}$ on the competitive ratio of any randomized algorithm.

We also consider the preemptive case. We show an on-line algorithm with a competitive ratio of $1 + 1/e^{\frac{n}{m}(1+o(1))}$. We show that the algorithm is optimal by proving a matching lower bound.

We also consider the non-preemptive model with temporary tasks. We prove that for $n = m + 1$, the greedy algorithm is optimal. (It is not optimal for permanent tasks).

This is joint work with Yossi Azar and Leah Epstein.

Host: Kim Skak Larsen