Scheduling Two Competing Agents When One Agent Has Significantly Fewer Jobs

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Abstract. We study the complexity of scheduling non-preemptive jobs of two given agents on one machine, while respecting the upper-bounds on the weighted sum of completion times which are given individually for each agent. Since the problem is known to be hard even for quite restrictive variants, we focus on the case where one agent has significantly smaller number of jobs than the other, and show that the problem becomes much more tangible in this case. Specifically, we present three algorithms for various cases that are all efficient when one agent has a relatively small number of jobs. We complement these algorithms by showing that the general problem is NP-complete even when one agent has a single job.

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