

Scheduling Jobs with Equal-Processing-Time
on Parallel Machines with Non-identical Ca-
pacities to Minimize Makespan

Jun-Qiang Wang, Joseph Y.-T. Leung



www.elsevier.com/locate/ijpe

PII: S0925-5273(14)00202-3
DOI: <http://dx.doi.org/10.1016/j.ijpe.2014.06.019>
Reference: PROECO5804

To appear in: *Int. J. Production Economics*

Received date: 27 August 2013
Accepted date: 27 May 2014

Cite this article as: Jun-Qiang Wang, Joseph Y.-T. Leung, Scheduling Jobs with Equal-Processing-Time on Parallel Machines with Non-identical Capacities to Minimize Makespan, *Int. J. Production Economics*, <http://dx.doi.org/10.1016/j.ijpe.2014.06.019>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Scheduling Jobs with Equal-Processing-Time on Parallel Machines with Non-identical Capacities to Minimize Makespan

Jun-Qiang Wang

1. Performance Analysis Center of Production and Operations Systems (PacPos)

Northwestern Polytechnical University

Xi'an, Shaanxi, 710072, P. R. China

2. Key Laboratory of Contemporary Design and Integrated Manufacturing Technology

Ministry of Education

Xi'an, Shaanxi, 710072, P. R. China

Joseph Y-T. Leung

Department of Computer Science

New Jersey Institute of Technology

Newark, NJ 07102.

Abstract: We consider the problem of scheduling a set of equal-processing-time jobs with arbitrary job sizes on a set of batch machines with different capacities. A job can only be assigned to a machine whose capacity is not smaller than the size of the job. Our goal is to minimize the schedule length (makespan). We show that there is no polynomial-time approximation algorithm with an absolute worst-case ratio less than 2, unless $P = NP$. We then give a polynomial-time approximation algorithm with an absolute worst-case ratio exactly 2. Moreover, we give a polynomial-time approximation algorithm with asymptotic worst-case ratio of $3/2$. Finally, we perform a computational experiment and show that our approximation algorithm performs very well in practice.

Keywords: Batch machines; makespan; NP-hard; approximation algorithm; absolute worst-case ratio; asymptotic worst-case ratio.

1. Introduction

In a parallel batch machine, several jobs can be processed simultaneously as a batch. Parallel batch machines are encountered in many industries such as semiconductor industry, metal industry, pharmaceutical industry, etc., see [16] for more information. As an example, consider the burn-in operations in a semiconductor company, in which integrated circuits are put into

Download English Version:

<https://daneshyari.com/en/article/5080031>

Download Persian Version:

<https://daneshyari.com/article/5080031>

[Daneshyari.com](https://daneshyari.com)