Guest editorial: “New trends in scheduling”

Centre CNRS “La Villa Clythia” Frejus Workshop, September 12–17, 2010

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Received: 22 March 2013 / Accepted: 17 April 2013 / Published online: 1 May 2013
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Traditionally, machine scheduling research is concerned with the sequencing of tasks on one machine or on several parallel or different machines, subject to a set of constraints. Over the years, researchers have studied a huge variety of problems, developing numerous heuristics, approximation and exact algorithms, and complexity results. Some of these problems are interesting because of their intractability. Others are interesting because of their applications in production planning, personnel planning, scheduling in parallel, and distributed systems, etc. For the most recent introduction to the state of the art, see [Blazewicz et al. \(2007\)](#).

In recent years, researchers have begun studying the scheduling problems derived from new applications and settings. For example, there are scheduling problems in decentralized systems and selfish organizations, Grid computing, bioinformatics, and logistical airport operations management processes. Some of these scheduling problems reflect

real-life situations by including learning effects or non-constant job processing times because of deteriorating jobs. This listing is only a small sample of the many new applications and resulting scheduling problems that researchers are studying.

Between 12th and 17th September 2010, a workshop entitled “New trends in scheduling” was held in the Centre CNRS “La Villa Clythia” Frejus. (We greatly appreciate the friendly atmosphere created by the CNRS team.) The objective of the workshop was to explore new ideas in scheduling theory and applications that have emerged in recent years.

The papers in this special issue highlight some of the results of this workshop. We received many high-quality submissions. After the normal thorough and rigorous refereeing process that is expected of the *Journal of Scheduling*, only three papers were chosen for the inclusion in the special issue. The papers are listed below alphabetically by the first author.

The paper “Exact algorithms for inventory constrained scheduling on a single machine” by D. Briskorn, J. Jaehn, and E. Pesch deals with the problem of scheduling tasks on a single machine subject to minimizing the total-weighted completion time. Motivated by the pickup or delivery of containers by truck, the processed tasks remove or add items to an inventory which must always be non-negative. The paper contains some observations of optimal solutions and several exact solution methods based on branch and bound as well as dynamic programming. The paper was included in volume 16.

The paper “Multi-criteria Scheduling: An agent based approach for expert knowledge integration” by C. Grimme, J. Lepping, and U. Schwiegelshohn, describes how to flexibly combine elementary heuristics that may be optimal for corresponding single-criterion problems. It allows to derive more

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complex heuristics for multi-criteria combinatorial optimization problems from atomic local heuristics that are known to solve fractions of the complete problem.

In “Hierarchical scheduling strategies for parallel tasks and advance reservations in grids” K. Kurowski, A. Oleksiak, W. Piatek, and J. Weglarz consider advance reservation functionality in grids which highly influences the flow time of batch tasks and the overall resource utilization due to unknown batch processing times and insufficient flexibility of altering allocations of advance reservations. This paper contains a common model, online scheduling policies, and generic approaches for improvements. Comprehensive computational tests provide an insight on the influence of advance reservations on resource utilization, mean flow time, and mean tardiness.

Editing this issue would not have been possible without the help of many referees. We greatly appreciate their critical and encouraging evaluation of the submissions.

Acknowledgments The work of the second editor has been partially supported by National Science Center Grant N N519 643340.

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