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Commenced Publication in 1973
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# Practice and Theory of Automated Timetabling V 

5th International Conference, PATAT 2004 Pittsburgh, PA, USA, August 18-20, 2004 Revised Selected Papers

Volume Editors

Edmund Burke<br>University of Nottingham<br>School of Computer Science \& Information Technology<br>Jubilee Campus, Nottingham, NG8 2BB, UK<br>E-mail: ekb@cs.nott.ac.uk

Michael Trick
Carnegie Mellon University
Tepper School of Business
Pittsburgh, PA 15213, USA
E-mail: trick@cmu.edu

Library of Congress Control Number: 2005936696

CR Subject Classification (1998): F.2.2, G.1.6, G.2, I.2.8
ISSN 0302-9743
ISBN-10 3-540-30705-2 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-30705-1 Springer Berlin Heidelberg New York

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springeronline.com
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Printed in Germany
Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India Printed on acid-free paper $\quad$ SPIN: $11593577 \quad 06 / 3142 \quad 54210$

## Preface

This volume contains a selection of papers from the 5th International Conference on the Practice and Theory of Automated Timetabling (PATAT 2004) held in Pittsburgh, USA, August 18-20, 2004. Indeed, as we write this preface, in the Summer of 2005, we note that we are about one month away from the tenth anniversary of the very first PATAT conference in Edinburgh. Since those very early days, the conference series has gone from strength to strength and this volume represents the latest in a series of five rigorously refereed volumes which showcase a broad spectrum of ground-breaking timetabling research across a very wide range of timetabling problems and applications.

Timetabling is an area that unites a number of disparate fields and which cuts across a number of diverse academic disciplines. While the most obvious instances of timetabling occur in educational institutions, timetabling also appears in sports applications, transportation planning, project scheduling, and many other fields. Viewing timetabling as a unifying theme enables researchers from these various areas to learn from each other and to extend their own research and practice in new and innovative ways. This volume continues the trend of the conference series to extend the definition of timetabling beyond its educational roots. In this volume, seven of the 19 papers involve domains other than education. Of course, educational timetabling remains at the core of timetabling research, and the papers in this volume represent the full range of this area including exam timetabling, room scheduling, and class rostering.

There are a number of particularly interesting aspects to the research presented in this volume. First, the variety of techniques being used to address these problems is striking. In this book, there are papers exploring optimization, constraint programming, evolutionary algorithms, tabu search, fuzzy approaches, and many other exact and heuristic methodologies. In many ways, timetabling is an ideal testbed for algorithmic approaches. The strength of timetabling in this regard revolves around a number of characteristics. First, timetabling problems are difficult, even for small instances. It is not necessary to have 10,000 students and 1,000 courses to lead to hard instances: even problems one-hundredth the size can be difficult. But it is exactly problems of that size that are of practical interest. Problems of practical interest are neither too large to be possibly solved, nor too small to be trivial. They are "just right": challenging, but possible. Furthermore, there are a lot of data available, and much of those data are available to academics. Finally, there are a number of different problem types available, allowing for a rich field of problems to be addressed. Taken together, these characteristics make timetabling an ideal domain for research on algorithms, and this volume demonstrates this richness through the variety of novel timetabling approaches that are explored and discussed.

Second, it is important to note how grounded in practice these papers are. Most of the papers begin with a real-world problem to solve. It is this interplay
between real practice and theory that gives timetabling its richness. These papers are generally not about theoretical issues but are based on the need to create real timetables. This gives an immediacy to this work that is uncommon in much research.

The downside of this real-world aspect is a lack of standardization, leading to many papers solving only slightly different problems. The third interesting aspect of this volume is a growing interest in standardizing problem definitions and creating robust, flexible definitions of general timetabling problems. This trend is most obvious in the "General Issues" papers, but occurs in many other papers in the volume. While grounding the work in practice, there is a growing interest in generalizations.

Overall, we think this volume shows timetabling as a broad, important field with a rich set of practical models, and a robust and growing set of solution approaches. We thank the authors for their contributions, and are confident in the continuing success of the PATAT conference series.

## Conference Series

The Meeting in Pittsburgh was the fifth in the PATAT series of international conferences. The first four conferences were held in Edinburgh (1995), Toronto (1997), Constance (2000), and Gent (2002). Selected papers from these four conferences appeared in the Springer Lecture Notes in Computer Science series. The full references are:

Edmund Burke and Peter Ross (Eds.): Practice and Theory of Automated Timetabling, 1st International Conference, Edinburgh, UK, August/September 1995, Selected Papers, Lecture Notes in Computer Science, Vol. 1153, Springer, 1996.

Edmund Burke and Michael Carter (Eds.): Practice and Theory of Automated Timetabling, 2nd International Conference, Toronto, Canada, September 1997, Selected Papers, Lecture Notes in Computer Science, Vol. 1408, Springer, 1998.

Edmund Burke and Wilhelm Erben (Eds.): Practice and Theory of Automated Timetabling, 3rd International Conference, Konstanz, Germany, August 2000, Selected Papers, Lecture Notes in Computer Science, Vol. 2079, Springer, 2001.

Edmund Burke and Patrick De Causmaecker (Eds.): Practice and Theory of Automated Timetabling, 4th International Conference, Gent, Belgium, August 2002, Selected Papers, Lecture Notes in Computer Science, Vol. 2740, Springer, 2003.

The sixth conference will be held in Brno, Czech Republic, August/September 2006. See http://www.asap.cs.nott.ac.uk/patat/patat-index.shtml for information on the conference series.

## Acknowledgements

We are very grateful to a large number of people for the success of the Pittsburgh conference and for their efforts in helping to put together this volume. We would like to acknowledge the financial support from the Tepper School of Business, Carnegie Mellon; the Carnegie Bosch Institute, Carnegie Mellon; and the Aladdin Center, Carnegie Mellon. Their generosity helped to give the conference the special atmosphere that made it such a memorable occasion. A particular thank you also goes to Cathy Burstein, who was invaluable in handling the local organization and registration, and the program could not have occurred without her efforts.

The papers that appear in this volume were carefully and thoroughly refereed. Many thanks go to the members of the Programme Committee who spent a significant amount of time ensuring the quality of the conference program itself and, particularly, of the selected papers that appear in this volume. Their hard work plays a major role in ensuring the success and high standards that have come to characterize the conference. We are also grateful to the staff at Springer for their help and encouragement and to Jan van Leeuwen, who, as an editor of the Lecture Notes in Computer Science series, has always given us valuable support and advice since the very beginning of the conference series back in 1995.

We would like to offer a very special thank you to Piers Maddox, our copy editor. The very high formatting and typesetting standards of this volume are entirely due to him. Special thanks should also go to Emma-Jayne Dann for all her hard work in supporting the administration that underpinned the editorial process for this book.

We are, of course, also very grateful to the authors and delegates at the conference who contributed so much towards making it such an enjoyable event. Finally, we would like to thank all the people on the Steering Committee for their hard work in organizing the entire series of PATAT conferences.

We are looking forward to the next conference and to seeing you in Brno in the Summer of 2006.

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