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# Theoretical Aspects of Computing – ICTAC 2005

Second International Colloquium  
Hanoi, Vietnam, October 17-21, 2005  
Proceedings



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# Preface

This volume contains the proceedings of ICTAC 2005, the second ICTAC, *International Colloquium on Theoretical Aspects of Computing*. ICTAC 2005 took place in Hanoi, Vietnam, October 17–21, 2005.

ICTAC was founded by the International Institute for Software Technology of the United Nations University (UNU-IIST) to serve as a forum for practitioners, lecturers and researchers from academia, industry and government who are interested in theoretical aspects of computing and rigorous approaches to software engineering. The colloquium is aimed particularly, but not exclusively, at participants from developing countries. We believe that this will help developing countries to strengthen their research, teaching and development in computer science and engineering, improve the links between developing countries and developed countries, and establish collaboration in research and education. By providing a venue for the discussion of common problems and their solutions, and for the exchange of experiences and ideas, this colloquium supports research and development in computer science and software technology. ICTAC is attracting more and more attention from more and more countries.

Topics covered by ICTAC include:

- automata theory and formal languages,
- principles and semantics of programming languages,
- logic and its applications,
- software architectures and their description languages,
- software specification, refinement and verification,
- model checking and theorem proving,
- formal techniques in software testing,
- models of object and component systems,
- coordination and feature interaction,
- integration of formal and engineering methods,
- service-oriented and document-driven development,
- models of concurrency, security and mobility,
- theory of parallel, distributed and Internet-based (grid) computing,
- real-time and embedded systems,
- type and category theory in computer science.

Research papers in these topics are always considered by ICTAC.

ICTAC 2005 received 122 paper submissions from 29 countries, and accepted 35 papers. We would like to thank the authors of all submitted papers.

Selecting papers for a program from the large number of submissions in a fair and competent manner is a hard job. Luckily, ICTAC 2005 had an excellent Program Committee with highly qualified members from diverse backgrounds to carry out the job. Each submission was reviewed carefully by at least three referees working in relevant fields. Borderline papers were further discussed during an intensive on-line meeting of the Program Committee. We believe that

the program resulting from this excellent job of the Program Committee was scientifically very strong. In addition to the contributed papers, the proceedings also include contributions from invited speakers: Reiko Heckel, Zhiming Liu, José Meseguer, Rocco De Nicola, and Do Long Van.

Five tutorials were selected as affiliated events of ICTAC 2005. The abstracts of the tutorials are also included in the proceedings. We express our thanks to all of the people who submitted tutorial proposals.

Special thanks are due to the Program Committee members and all the referees, whose names are listed on the following pages, for their assistance in reviewing and selecting papers. The help from the Advisory Committee, especially Zhiming Liu, was invaluable. We express our appreciation to the Organizing Committee, especially Ho Si Dam, Le Hai Khoi, Le Quoc Hung and Bui The Duy, and the Publicity Chair, Bernhard Aichernig, for their efforts in making ICTAC 2005 such a successful and enjoyable event. We would particularly like to thank Kitty Iok Sam Chan of UNU-IIST for her hard work in maintaining the conference administration system. We would also like to express our thanks to all UNU-IIST staff for their active support of ICTAC 2005. Last but not least we are grateful to Springer for its helpful collaboration and quick publication.

October 2005

Dang Van Hung and Martin Wirsing

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ICTAC 2005 was organized by the International Institute for Software Technology of the United Nations University, the College of Technology of the Vietnam National University, Hanoi, and the Institute of Information Technology of the Vietnam Academy of Science and Technology.

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