

Preface

The 21st edition of the International Conference on Reliable Software Technologies (Ada-Europe 2016) took place in the city of Pisa, hosted by Scuola Superiore Sant’Anna, an internationally renowned university school. This was the return of the conference to Italy, after Venice in 2008. Previous editions of the conference were held in Spain (Santander, 1999, Palma de Mallorca, 2004, Valencia, 2010, and Madrid, 2015), France (Toulouse, 2003, Brest, 2009, and Paris, 2014), the UK (London, 1997, York, 2005, and Edinburgh, 2011), Switzerland (Montreux, 1996, and Geneva, 2007), Sweden (Uppsala, 1998, and Stockholm 2012), Germany (Potsdam, 2000, and Berlin, 2013), Belgium (Leuven, 2001), Austria (Vienna, 2002), and Portugal (Porto, 2006). The conference series is run and sponsored by Ada-Europe, in collaboration with local organizations. This year Scuola Superiore Sant’Anna led the organization, with the support of a truly international team.

The conference took place during June 13–17, 2016, with a rich program on both the technical and social sides. The scientific part of the conference program featured 12 presentations selected among 28 peer-reviewed papers, which were grouped into four regular sessions spread out on the central days of the conference, on topics ranging from concurrency and parallelism to real-time systems via testing and verification and program correctness and robustness. The program also included eight industrial presentations, split across two industrial sessions. A session featuring presentations from students of the ITS EASY post-graduate school, which co-located its meeting with the conference, a poster session, and one vendor session with an accompanying vendor exhibition completed the core program. In addition to this rich set of contents, eight tutorials for the equivalent of 10 half-day sessions were scheduled on Monday and Friday. Also on Friday, the week featured the third edition of the Challenges and New Approaches for Dependable and Cyber-Physical Systems Engineering Workshop.

The submissions to scientific and industrial tracks of the conference program came from 25 countries and 96 distinct authors, from Europe, Asia, North and South America, and Africa. The final result was a truly international program with contributions from Australia, Austria, Canada, France, Germany, Italy, Portugal, Spain, Sweden, Tunisia, UK, and USA.

Each day of the core conference program opened with a keynote talk centered on topics of high interest within conference focus:

- “Why the Expressive Power of Languages Such as Ada Is Needed for Future Cyber Physical Systems.” Alan Burns, from the University of York, UK, presented the challenges put forward to the developer of cyber physical systems to fully exploit the wealth of real-time systems theory, and how these are addressed with the high-level programming abstractions of Ada.
- “Challenges for the Automotive Platform of the Future.” Valerio Giorgetta, from Magneti Marelli, Italy, presented how the concept of a car will be impacted by the

challenges put forward such as autonomous vehicles and functional safety and reliability.

- “The HiPEAC Vision.” Marc Duranton, from CEA, France, presented an overview of the HiPEAC vision, a bi-annual document produced by the HiPEAC network of excellence, with the upcoming challenges in computing systems.

The proceedings contained in this volume cover the opening keynote talk and the full set of peer-reviewed papers. The remainder of the conference contributions are published, in successive instalments, in the *Ada User Journal*, the quarterly magazine of Ada-Europe.

The tutorial program covered a wide range of topics in the scope of the central themes of the conference, as follows:

- “A Semi-formal Approach to Software Development,” William Bail, The MITRE Corporation, USA
- “Software Test and Verification Techniques for Dependable Systems,” William Bail, The MITRE Corporation, USA
- “Embedded ARM Programming with Ada 2012,” Patrick Rogers, AdaCore, USA
- “Ada 2012 (Sub)types and Subprogram Contracts in Practice,” Jacob Sparre Andersen, JSA Research & Innovation, Denmark
- “Towards Energy Awareness and Predictability in the Linux Kernel,” J. Lelli, ARM Ltd., Italy
- “Access Types and Memory Management in Ada 2012,” J.P. Rosen, Adalog, France
- “Using Gnoga for Desktop/Mobile GUI and Web Development in Ada,” J.P. Rosen, Adalog, France
- “Parallelism in Ada, C, Java and C#, Today and Tomorrow,” Brad Moore, General Dynamics Canada, and Stephen Michell, Maurya Software, Canada

The industrial sessions featured eight presentations centered on various aspects of reliable software development:

- “What Has the ARG Been up to? — Recent and Future Changes to Ada 2012,” Jeff Cousins, ARG Rapporteur, UK
- “Using Ada’s Visibility Rules and Static Analysis to Enforce Segregation of Safety Critical Components,” Jean-Pierre Rosen and Jean-Christophe Van-Den-Hende, Adalog and Alstom-Transport, France
- “Automated Testing of SPARK Ada Contracts (AUTOSAC),” Christopher Bryan, Rapita Systems, UK
- “Ada Usage in HMI for Onboard Safety Critical Applications,” Clara Maria Arcones-Gabriel, Enrique Chicharro-Lopez and Ismael Lafoz-Pastor, Airbus Defence and Space, Spain
- “An Update on Programming Language Vulnerabilities,” Stephen Michell, WG23 Convenor, Canada
- “Middleware for Distributed and Redundant Software,” Vincent Monfort, Systerel, France

- “Model-Based Design and Schedulability Analysis for Avionic Applications on Multicore Platforms,” Wenceslas Godard and Geoffrey Nelissen, Airbus Group SAS, France and CISTER/ISEP, Portugal
- “Fitting the CONCERTO Component Model Approach to AUTOSAR Development Flow,” Andrea Russino, Stefano Puri and Alessandro Zovi, Intecs and Università di Padova, Italy

This edition of the conference featured a focused topic on “Safe and Predictable Parallel Software Technologies.” Ada has been a language that has always excelled with its advanced high-level concurrency support. In the last 20 years, Ada has steadily extended its wealth of concurrency features and capabilities to a considerable extent, yet within the bounds of a sequential task reasoning. With the advances in processor architectures, and in particular the move into a parallel world, it is time to discuss how Ada should be evolved into supporting in the language the notion of fine-grained parallelism. The program included a special session on “Ada and Parallelism,” which discussed the design choices and evolutions of the language to support fine-grained parallel programs. The session included both presentations from experts in the following topics as well as an open discussion to the floor:

- “Paraffin: A Parallelism Library for Ada,” Brad Moore, Gran Dynamics, Canada
- “Ada Container Iterators for Parallelism and Map/Reduce,” S. Tucker Taft, Ada-Core, USA

We would like to acknowledge the work of all the people who contributed, with various responsibilities and official functions, to the making of the conference program. First of all, the authors of the contributions, who were largely responsible for the success of the conference. Then the members of the Program and Industrial Committees, who worked hard to review and select a high-quality set of papers, both for the Springer LNCS volume in the case of peer-reviewed papers and the *Ada User Journal* in the case of the industrial presentations, the special session papers, and the workshop.

Finally, the group of organizers who made the conference program a reality: Giorgio Buttazzo (Conference Chair); Ettore Ricciardi (Local Chair); Marco Di Natale and Tullio Vardanega (Industrial Co-chairs); Jorge Real (Tutorial and Workshop Chair); Geoffrey Nelissen (Publication Chair); Mauro Marinoni and Dirk Craeynest (Publicity Co-chairs); Paolo Gai and Ahlan Marriott (Exhibition Chair). They all deserve our gratitude for their effort.

We hope that the attendees enjoyed the conference, both its technical and social program, as much as we did in organizing it.

June 2016

Marko Bertogna
Luís Miguel Pinho
Eduardo Quiñones

Reliable Software Technologies – Ada-Europe 2016
21st Ada-Europe International Conference on Reliable
Software Technologies, Pisa, Italy, June 13-17, 2016,
Proceedings
Bertogna, M.; Pinho, L.M.; Quiñones, E. (Eds.)
2016, XIV, 213 p. 59 illus., Softcover
ISBN: 978-3-319-39082-6