



24th International Conference on
RELIABLE SOFTWARE TECHNOLOGIES
Ada-Europe 2019

11-14 June 2019, Warsaw, Poland

ADVANCE PROGRAM

<http://www.ada-europe.org/conference2019>

In cooperation with



Ada Resource Association

PRESENTATION

The 24th International Conference on Reliable Software Technologies - Ada-Europe 2019 visits Poland, for the first time, hosted in Warsaw, from the 11th to the 14th of June. The conference is the latest in a series of annual international conferences started in the early 80's, under the auspices of Ada-Europe, the international organization that promotes knowledge and use of Ada and Reliable Software in general, into academic education and research, and industrial practice.

The conference offers an international forum for researchers, developers and users of reliable software technologies. The presentations featured in the program address applied and theoretical work conducted to support the development, operation and maintenance of reliable software systems. The conference program includes two core days with keynote talks, refereed papers, industrial presentations, vendor presentations, and an exhibition, bracketed by one day of tutorials, and a co-located workshop, the 6th edition of “Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering” (DeCPS) workshop series.

The conference program features two social events: a welcome aperitif on Tuesday 11th, after the Ada-Europe General Assembly, and a banquet on Wednesday 12th. The conference takes place in Warsaw, the capital city of Poland, itself is at the heart of Europe, an apt location for political, scientific, business and cultural events. Its modern architecture, user-friendly infrastructure and creative inhabitants make Warsaw the beating heart of business. Behind the hustle and bustle of the business world, beats the rhythm of city life. Try the varied delights of the city's many restaurants, take a stroll along the banks of Vistula, or just wander around and discover the fascinating reality of life in a modern European city. Warsaw is a city that wants exploring. Constantly changing and modernizing, it rapidly becomes almost unrecognizable if you do not take time to acquaint yourself with it. Yet, many aspects of its quirky character and cult places persist and just call for discovery. Whether you are visiting Warsaw on business or for pleasure, the city offers everything you need to make your stay here maximally enjoyable.

The Ada-Europe conference series provides a unique opportunity for dialogue and collaboration between academics and industrial practitioners interested in reliable software.
The 2019 edition of the conference features numerous innovations: check them out on page 10!

OVERVIEW OF THE CONFERENCE PROGRAM

	Morning	Before Lunch	After Lunch	Afternoon
Tuesday, June 11th Tutorials, Opening & Welcome Aperitif	Tutorial: P. Munts, <i>Controlling I/O Devices with Ada using the Remote I/O Protocol</i>			Exhibition Opening & Ada-Europe GA & Welcome Aperitif
	Tutorial: J.P. Rosen, <i>An introduction to Ada</i>			
Wednesday, June 12th Sessions & Exhibition	Keynote Talk: <i>OpenMP API: A Story about Threads, Tasks, and Devices</i> Michael Klemm (OpenMP, Germany)	Presentation Session: <i>Assurance Issues in Critical Systems</i>	Presentation Session: <i>Tooling Aid for Verification</i>	Presentation Session: <i>Best Practices for Critical Applications</i>
Thursday, June 13th Sessions & Exhibition	Keynote Talk: <i>A 2020 View of Ada</i> Tucker Taft (AdaCore, USA)	Presentation Session: <i>Uses of Ada in Challenging Environments</i>	Presentation Session: <i>Verification Challenges</i>	Presentation Session: <i>Real-Time Systems</i>
Friday, June 14th Workshop & by-invitation meetings	Workshop: <i>Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering (DeCPS)</i>			
	WG 9 meeting		ARG meeting	

KEYNOTE SPEAKERS

OpenMP API: A Story about Threads, Tasks and Devices

Michael Klemm

OpenMP, Germany

(Wednesday, June 12th)

The OpenMP Architecture Review Board has released Version 5.0 of the OpenMP API in November 2018. Since its inauguration in 1997, the OpenMP API has become the standard programming model for multi-threading in HPC applications and beyond. The OpenMP API is based on directives to augment code written in C/C++ and Fortran with parallelization hints to the compiler. The talk will provide a glimpse at the key concepts of the OpenMP API and provide insight into the different programming paradigms supported, ranging from threading to tasking and support for heterogeneous programming.

Short Bio



Dr. Michael Klemm is the Chief Executive Officer of the OpenMP Architecture Review Board. He has joined the OpenMP Language Committee in 2009 and since then has worked on the development of various OpenMP features since

OpenMP Version 3.1. Michael contributed to features such as support for SIMD, tasking, and heterogeneous programming. Michael is also a Principal Engineer at Intel Germany and works in the Compute Ecosystem Engineering division on High Performance and Throughput Computing. Michael's research interests include compiler construction, design of programming languages, parallel programming as well as performance analysis and tuning.

A 2020 View of Ada

Tucker Taft

AdaCore, USA

(Thursday, June 13th)

The Ada language continues to evolve. Ada 95 brought us object-orientation, hierarchical libraries, and protected objects. Ada 2005 brought us multiple inheritance of interfaces, "Object.Operation" syntax, and a container library. Ada 2012 brought us contract-based programming, iterators, and quantified expressions. So where is Ada 2020 going? And what about Ada 2099? This talk will illustrate some highlights of the features anticipated in the forthcoming Ada 2020 standard, and speculate about how Ada will or should continue to evolve in the 21st century.

Short Bio



S. Tucker Taft is VP and Director of Language Research at AdaCore, and Senior Advisor for AdaCore's "QGen" Model-Based Development toolsuite. Tucker led the Ada 9X language design team, culminating in the February 1995 approval of Ada 95 as the first ISO standardized

object-oriented programming language. His specialties include programming language design, advanced static analysis tools, formal methods, real-time systems, parallel programming, and model-based development. Tucker is a member of the ISO Rapporteur Group that developed Ada 2005 and Ada 2012. Tucker has also been designing and implementing a parallel programming language called "ParaSail," and defining parallel programming extensions for Ada as part of the forthcoming Ada 2020 standard.



Test PASS – new approach to testing!

- One generic platform for testing of many avionics devices
- Support of tests in different levels
 - Low level software tests
 - Systems tests
 - Integration tests
 - Production tests
- Qualifiability, usage in formal processes
- Unified and consistent reports



Republic
of Poland

European Union
European Regional
Development Fund



Project: „An innovative tool for automated software testing for safety critical systems in aviation as a confirmation of the competences of Polish scientific staff of WIA on the international arena”. Founding agreement with NCBIR, Programme: Smart Growth Operational Programme 2014-2020, No: POIR.04.01.04-00-0121/16 signed 04/13/2017

TUTORIALS

T1 – Controlling I/O Devices with Ada, using the Remote I/O Protocol

P. Munts, Sweden

(Tuesday, June 11th, full day)

This tutorial will demonstrate how to write Ada programs to control external hardware devices using the Linux Simple I/O Library and the Remote I/O Protocol. Attendees will gain hands-on experience with interface hardware based on the Raspberry Pi and other microcomputer and microcontroller boards. The tutorial will explain the Ada packages that form the I/O libraries employed to communicate and control the devices, which attendees will use to access and control a number of external devices.

Level: *Intermediate*

Attendees should be familiar with the Ada language, but no other knowledge is required. Attendees will need to bring a laptop (MacOS, Windows, or Linux) with AdaCore's GNAT Community 2018 installed. They will also need to clone or download the Linux Simple I/O Library and Ada Remote I/O Tutorial source code repos.

Reasons for attending

Attendees will learn how to develop Ada programs that control external devices with simple interface hardware such as USB or network interfaces, and equally basic utilities like the Linux Simple I/O Library. During the tutorial, attendees will run their programs using various kinds of I/O servers connected to different hardware boards.

Presenter



Philip Munts has been an Ada practitioner since 1983. His career has concentrated on embedded systems development, ranging from single chip microcontrollers to a NASA satellite tracking station. He currently works as a software engineer consultant based in Malmö, Sweden. He is particularly interested in running programs written in Ada for very small Linux-based computers such as the PocketBeagle and the Raspberry Pi. Philip will enjoy sharing his passion with tutorial attendees.

T2 – An introduction to Ada

Jean-Pierre Rosen, Adalog, France

(Tuesday, June 11th, full day)

This tutorial is an overview of the Ada programming language, from basic syntax to its most sophisticated features. It focuses on what makes Ada different from other languages, and on the benefits that it provides for safety, reliability, maintainability, reusability, and efficiency. The tutorial covers all the main components of the language, accompanied with many examples. It illustrates the benefits of strong typing, the accurate model of numerical computations, the Ada's approach to object oriented programming, its unique features for programming by contract, and its support for the concurrency and low level embedded systems programming. It concludes with an overview of the standard libraries (including the annexes), an introduction to SPARK – the high-reliability provable subset of Ada –, an overview of the tools available, and examples of industrial users.

The tutorial is for those (program managers, QA managers, or software developers) who want to understand the benefits of using Ada. Choosing the right language for a project may have a considerable impact on its success. Do not miss this opportunity of including Ada in the panel of considered languages for your next development.

Level: *Intermediate*

Familiarity with any other programming language. No previous knowledge of Ada is required.

Reasons for attending

- Understand the benefits of using Ada
- Learn what makes it different to other mainstream programming languages. Appreciate where this is a bonus.

Presenter



J.P. Rosen is a professional teacher, teaching Ada (since 1979, it was preliminary Ada!), methods, and software engineering. He runs Adalog, a company specialized in providing training, consultancy, and services in all areas connected to the Ada language and software in France. Adalog regularly offers on-site and off-site training sessions in Ada. This tutorial builds on the “advanced Ada’ course offered by Adalog. Jean-Pierre is chairperson of AFNOR's (French standardization body) Ada group, AFNOR's spokesperson at WG9, member of the Vulnerabilities group of WG9, and chairperson of Ada-France.

The tutorial sessions run in two parts, a morning part, 9:30 - 13:00, and an afternoon part, 14:00 - 16:00. The program includes a seated lunch, 13:00-14:00, and two refreshment breaks, 11:00-11:30, and 16:00-16:30. The exhibition opens at 16:30, followed by a welcome aperitif at 18:00: all tutorial attendees are invited to them both.

CO-LOCATED WORKSHOP

On Friday, June 14th, the conference program features the 6th edition of the *International Workshop on Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering (DeCPS)*.

The DeCPS workshop series aims to facilitate the exchange of ideas, research results and experience in the field of dependable and cyber-physical systems engineering, from theoretical and practical perspectives. For more information, visit the workshop website at <http://www.ada-europe.org/conference2019/workshops.html>.

The DeCPS workshop runs full day, 9:30-17:00, and enjoys two refreshment breaks, 11:00-11:30 and 15:00-15:30, and lunch, 12:30-13:30. To favour integration and interaction between the DeCPS workshop and the conference core, the full conference registration includes complimentary access to the workshop.



Revolutionize your software verification

+ *Efficiency, Automation, Reliability* +



Unit testing · System testing · Coverage analysis · Timing analysis

V&V services · Multicore timing services · DO-178C training

Ada · C · C++

www.rapitasystems.com

VENDOR PRESENTATIONS AND EXHIBITION

The conference will feature an exhibition located in a central hall of the hosting site, where all the session breaks will take place. Exhibitors and vendors will also make technical presentations, scattered throughout the conference program.

SOCIAL EVENTS



The conference program includes two coffee breaks and a seated lunch each day, with ample opportunity for technical discussions, visits to the exhibition, and social interaction. The Ada-Europe General Assembly will take place in parallel to the opening of the exhibition **in the late afternoon of Tuesday**, right after the tutorials. Immediately after that, the local organizers will host a **Welcome Aperitif** on the terrace of the Institute of Aviation, enjoying a wonderful view of the Warsaw airport and city center, accompanied by drinks and typical Polish snacks. **On Wednesday evening**, the **Conference Banquet** will take place at the elegant old-style restaurant "Przepis na kompot", in the small Mazovian town of Zelazowa Wola, where Fryderyk Chopin was born in 1810. Chopin's family moved to Warsaw soon afterwards, returning there for summer holidays, Christmas or Easter. On summertime visits, the grand piano of the house would be taken to the garden, and Fryderyk would give concerts in the shade of firs and lindens. Zelazowa Wola now hosts concerts and musical exhibitions, "Prezentacje Muzyczne", by talented young piano players worldwide. The conference banquet will enjoy Polish cuisine, which is most delicious and renowned in Europe and the whole world, along with drinks and live piano music in the background.



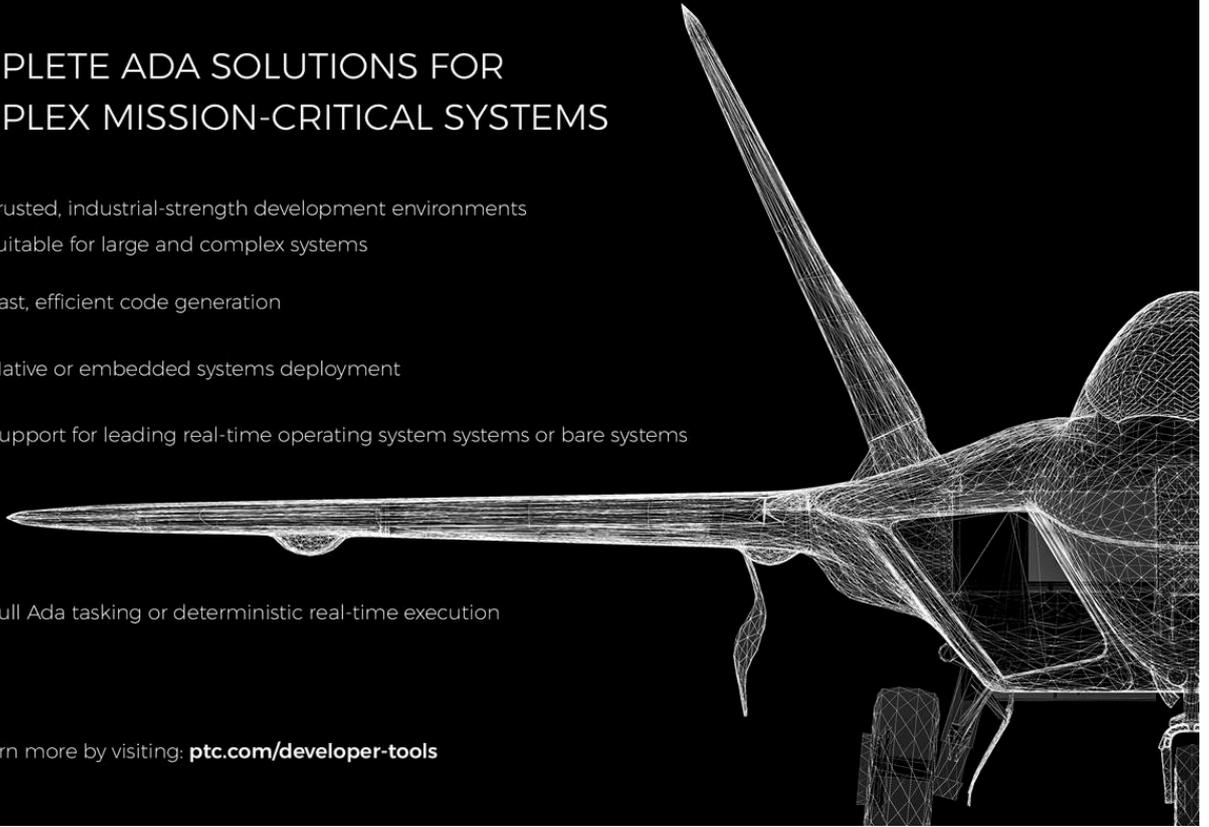


ptc® apexada | ptc® objectada®

COMPLETE ADA SOLUTIONS FOR COMPLEX MISSION-CRITICAL SYSTEMS

- Trusted, industrial-strength development environments suitable for large and complex systems
- Fast, efficient code generation
- Native or embedded systems deployment
- Support for leading real-time operating system systems or bare systems
- Full Ada tasking or deterministic real-time execution

Learn more by visiting: ptc.com/developer-tools



CONFERENCE VENUE



Since its inception, the **Institute of Aviation** has engaged in applied research in aeronautics and astronautics, achieving significant results in the operation of aircraft, helicopters, meteorological rockets, engines and instrumentation. At present, the Institute of Aviation continues expanding its areas of research, to include CAD, new materials testing, adaptation systems, micro-/nano-technology, alternative energy sources, application of aviation technologies to medicine and health

protection and local transport. Poland's membership in the European Union has created major opportunities for cooperation in all of these areas. The Institute of Aviation has joined the European research area most successfully and looks forward to working with you. **Address:** Institute of Aviation, Al. Krakowska 110/114 St. 02-256 Warsaw. **Location:** 5XH2+G3 Warszawa

CONFERENCE HOTEL

The local organizers recommend the Warsaw Marriott Hotel and have arranged with the hotel a special price for the dates around the conference. Details on how to obtain the discount will be provided as part of the registration process.





Automate Your Ada Unit Testing

With VectorCAST/Ada



VectorCAST/Ada is an integrated software test solution that significantly reduces the time, effort, and cost associated with testing Ada software components necessary for validating safety- and mission-critical embedded systems.

- > Complete test-harness construction for unit and integration testing
- > Test execution from GUI or scripts
- > Code coverage analysis
- > Regression Testing
- > Code complexity calculation
- > Automatic test creation based on decision paths
- > User-defined tests for requirements-based testing
- > Test execution trace and playback to assist in debugging
- > Integrations with best of breed requirements traceability tools

More information: www.vector.com/vectorcast

REGISTRATION

Conference Registration

The registration fee for the two days of the technical program (June 12th – June 13th) includes lunch and refreshment breaks for every day of the conference, banquet, welcome aperitif, and open access to all peer-reviewed papers. The registration fee for a single day of the technical program includes the refreshment breaks and the lunch on that day.

	Member		Non-member		Author
		Student		Student	
Early registration (before May 20 th)	420 €	260 €	480 €	320 €	220 €
Late/on-site registration (after May 20 th)	480 €	320 €	540 €	380 €	
Single-day registration	270 €				

Author discount: One author per presented paper (peer-reviewed/industrial) is entitled to the discounted author fee.

Members discount: Members of Ada-Europe and members of an “in cooperation with” SIG of ACM (SIGAda, SIGBED, SIGPLAN), and Ada-Europe sponsors are entitled to this benefit. To accrue it, they must specify their membership number in the registration process. Ada-Europe members must provide the name of their national body or the keyword “Direct” if they are direct members.

Student discount: Students applying for this benefit must supply a copy of their student ID as part of the registration process. The reduced registration fee provides the same level of access as the full registration.



AdaCore



25 YEARS OF HELPING OUR CUSTOMERS BUILD SAFE, SECURE AND RELIABLE SOFTWARE

Tutorial Registration

The fee is per tutorial and includes two refreshment breaks and a seated lunch. Students may request free access to a tutorial only if registering early for the full conference.

Workshop Registration

The registration fee for the workshop includes two refreshment breaks and a seated lunch. Access to the workshop is included in the full conference registration.

Tutorial / Workshop	Full day
Early registration (before May 20 th)	40 €
Late registration (after May 20 th)	70 €

Additional Tickets

Additional tickets can be purchased for accompanying persons for the conference banquet (on Wednesday 12th) at the cost of 70 € each, as well for lunch (from Tuesday 11th through to Friday 14th) at the cost of 20 € each.

Payment Rules and Cancellation Policies

The registration fee must be paid in full before the start date of the relevant event, using the **online registration system** at the conference web page: www.ada-europe.org/conference2019. Payments by bank transfer or by credit card are accepted. Currency exchange charges and bank collection fees shall be borne by the sender. All peer-reviewed papers selected for publication in the post-conference proceedings must have one author registered for the conference (with author discount). The registration fee will be refunded with a cancellation fee of 30€ if a request is received in writing by the conference chair (tullio.vardanega@unipd.it) by May 20th. No refund will be possible after May 20th.

The 2019 edition of the conference features a number of important innovations:

- Lower registration fee for the conference, unified for all participants.
- Reduced fee for all authors.
- Lower registration fee for all tutorials.
- New, journal-based, open-access, publication model for the peer-reviewed papers
- An educational tutorial offered especially to those who wish to know more about Ada.
- More compact program: two core days (Wednesday and Thursday), and an exhibition opening in the afternoon of Tuesday, in parallel to the Ada-Europe General Assembly, followed by a welcome aperitif.
- Co-located full-day workshop on Friday (complementary registration if taken with the full conference).

CONFERENCE CORE SCHEDULE

Wednesday, 12 th June		Thursday, 13 th June
08:50 - 09:00	Welcome and opening	
9:00 - 10:00	Keynote Talk: <i>OpenMP API: A Story about Threads, Tasks, and Devices</i> Michael Klemm, OpenMP, Germany	Keynote Talk: <i>A 2020 view of Ada</i> Tucker Taft, AdaCore, USA
10:00 - 11:00	Coffee & Exhibition	Coffee & Exhibition
	Presentation Session: <i>Assurance issues in critical systems</i>	Presentation Session: <i>Uses of Ada in challenging environments</i>
11:00 - 11:30	<i>Contract-based design and verification using SPARK 2014</i> S. Buist, S. Matthews and T. Wilson	<i>Enabling Ada and OpenMP runtimes interoperability through template-based execution</i> S. Royuela, E. Quiñones, L.M. Pinho
11:30 - 12:00	<i>Justifying the Service to Low-Criticality Tasks in a Mixed-Criticality System</i> S. Law and I. Bate	<i>Shared-memory multicore synchronization: programmability, scalability and performance</i> B. Burgstaller, J. Blieberger
12:00 - 12:20	Vendor presentation AdaCore	<i>RCLAda, or bringing Ada to the Robotic Operating System</i> A.R. Mosteo
12:20 - 12:40	Vendor presentation PTC	
12:40 - 14:00	Lunch & Exhibition	Lunch & Exhibition

<i>Colour legend</i>	Industrial paper	Peer-reviewed paper
----------------------	------------------	---------------------

	Wednesday, 12 th June	Thursday, 13 th June
	Presentation session: <i>Tooling aid for verification</i>	Presentation Session: <i>Verification challenges</i>
14:00 - 14:30	<i>Integrating an event-based simulation tool into the art2kitekt framework</i> J. Valls, M. García and S. Sáez	<i>Fast, flexible DO-178C tool qualification using a modular approach</i> D. Wright, I. Broster, Z. Stephenson, D. Allsopp and S. Fourmigue
14:30 - 15:00	<i>Automated display testing in TestPASS</i> T. Stanislawski	<i>ECTM : a new communication model for network-on-chip schedulability analysis</i> M. Dridi, F. Singhoff, S. Rubini and J.P. Diguet
15:00 - 15:30	Vendor presentations (15:00 - 15:40) Rapita Vector Software	<i>A “new” C static analyser the compiler</i> M. Martignano
15:30 - 16:00		<i>Verification of Ada Programs with AdaHorn</i> T.A. Beyene, C. Herrera, V. Nigam
16:00 - 16:30	Coffee & Exhibition (15:40 - 16:30)	Coffee & Exhibition
	Presentation session: <i>Best practices for critical applications</i>	Presentation session: <i>Real-time systems</i>
16:30 - 17:00	<i>Co-engineering of security and safety life-cycles for engineering security-informed safety-critical automotive systems in compliance with SAE J3061 and ISO 26262</i> B. Gallina, M.A. Javed, H. Martin and R. Bramberger	<i>Period adaptation of real-time control tasks with fixed priority scheduling</i> X. Dai and A. Burns
17:00 - 17:30	<i>Verification & Validation of launcher flight software</i> D. Lesens	<i>On Ada protected objects and multiprocessor spin-locking protocols</i> J. Garrido, J. Zamorano, A. Alonso, J.A. de la Puente
17:30 - 18:00	<i>Guiding assurance of architectural design patterns for critical applications</i> I. Sljivo, G.J. Uriagereka, S. Puri and B. Gallina	<i>A Hierarchical Architecture for Time- and Event-Triggered Real-Time Systems</i> J. Real, S. Sáez., A. Crespo
18:00 - 18:30	The speaker’s corner <i>Experience from 40 years of teaching Ada</i> J.P. Rosen	Best Presentation award Future events Closing
19:15	Buses to conference banquet	



ORGANIZERS

Conference & Program Chair

Tullio Vardanega
University of Padova, Italy

Educational Tutorial & Workshop Chair

Dene Brown
SysAda Ltd, UK

Industrial Chair

Maurizio Martignano
Spazio-IT, Italy

Exhibition & Sponsorship Chair

Ahlan Marriott
White Elephant GmbH, Switzerland

Publicity Chair

Dirk Craeynest
Ada-Belgium & KU Leuven, Belgium

Local Chair

Maciej Sobczak
GE Aviation – EDC Warsaw, Poland

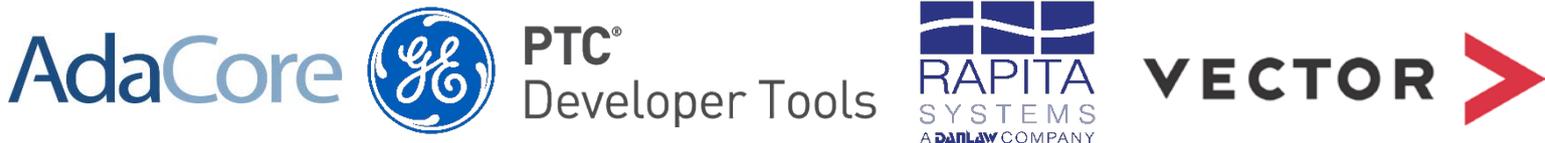
Program Committee

Mario Aldea (Universidad de Cantabria, ES), Johann Blieberger (Vienna University of Technology, AT), Bernd Burgstaller (Yonsei University, KR), António Casimiro (LASIGE/U. Lisboa, PT), Juan A. de la Puente (Universidad Politécnica de Madrid, ES), Michael González Harbour (Universidad de Cantabria, ES), J. Javier Gutiérrez (Universidad de Cantabria, ES), Jérôme Hugues (ISAE, FR), Hubert Keller (Karlsruhe Institute of Technology, DE), Franco Mazzanti (ISTI-CNR, IT), Laurent Pautet (Telecom ParisTech, FR), Luís Miguel Pinho (CISTER/ISEP, PT), Erhard Plödereder (Universität Stuttgart, DE), Jorge Real (Universitat Politècnica de València, ES), Sergio Sáez (Universitat Politècnica de València, ES), Frank Singhoff (Université de Bretagne Occidentale, FR), Tullio Vardanega (Università di Padova, IT).

Industrial Committee

Ian Broster (Rapita Systems), Dirk Craeynest (Ada-Belgium & KU Leuven), Ismael Lafoz Pastor (Airbus Defence and Space), Ahlan Marriott (White Elephant GmbH, CH), Maurizio Martignano (Spazio-IT, IT), Silvia Mazzini (Intecs, IT), Marco Panunzio (Thales Alenia Space, FR), Patricia Lopez Cueva (Thales Alenia Space, FR), Jean-Pierre Rosen (Adalog, FR), Emilio Salazar (GMV, ES).

CONFERENCE SPONSORS



PROCEEDINGS

The proceedings of the peer-reviewed papers presented at the conference will appear in a dedicated, Open Access, Special Issue of Elsevier's Journal of Systems Architecture, due by December 2019-January 2020.



The proceedings of the industrial papers and of the DeCPS co-located workshop will appear in the Ada User Journal.





Join Ada-Europe!

Become a member of Ada-Europe and [support Ada-related activities](#) and the future [evolution of the Ada programming language](#).

<http://www.ada-europe.org/join>

