Ada europe

23rd International Conference on
RELIABLE SOFTWARE TECHNOLOGIES

Ada-Europe 2018

18-22 June 2018, Lisbon, Portugal

ADVANCE PROGRAM

http://www.ada-europe.org/conference2018

In cooperation with

acm In-Cooperation   SIGAda   acm SIGBED   acm SIGPLAN

Ada Resource Association

PRESENTATION

In 2018, the 23rd International Conference on Reliable Software Technologies - Ada-Europe 2018 - takes place in Lisbon, Portugal, from 18 to 22 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 academia, research and industry.

The conference offers an international forum for researchers, developers and users of reliable software technologies. Presentations cover applied and theoretical work conducted to support the development and maintenance of reliable software systems.

The conference program includes three days with keynote talks, refereed papers, sessions with industrial presentations, an industrial exhibition and two days of tutorials and co-located workshops. A new workshop on "Runtime Verification and Monitoring Technologies for Embedded Systems" (RUME) will take place on Monday and, on Friday, the program will be complemented with the 5th workshop on "Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering" (DeCPS). There are also social events, including a welcome reception on Tuesday 19th, after the Ada-Europe General Assembly, and a conference banquet on Wednesday 20th.

Lisbon is currently considered one of the best touristic cities in Europe. It is the capital of Portugal and is well known for its medieval castle, for the Belém tower, for the natural light and breath-taking scenery views, and for so many other nice things that you should discover for yourself.

> **Ada-Europe 2018 provides a unique opportunity for dialogue and collaboration between academics and industrial practitioners interested in reliable software.**

OVERVIEW OF THE WEEK

	Morning	Late Morning	After Lunch	Afternoon
Monday June 18th Tutorials & Workshop	**Tutorial:** P. Chapin, *Recent Developments in SPARK 2014*			
	Tutorial: J.P. Rosen, *Access Types and Memory Management in Ada 2012*		**Tutorial:** J.P. Rosen, *Numerics for the Non-Numerical Analyst*	
	Tutorial: W. Bail, *Design and Architecture Guidelines for Trustworthy Systems*		**Tutorial:** W. Bail, *Requirements Development for Safety- and Security-Critical Systems*	
	Workshop: *Runtime Verification and Monitoring Technologies for Embedded Systems*			
Tuesday June 19th Sessions & Exhibition	**Keynote Talk:** Paulo Veríssimo *(Univ. of Luxembourg)*	**Regular Session:** *Safety and Security*	**Industrial Session:** *Ada in Industry*	**Regular Session:** *Ada 202X*
Wednesday June 20th Sessions & Exhibition	**Keynote Talk:** Carl Brandon *(VTC, USA)*	**Regular Session:** *Handling Implicit Overhead*	**Industrial Session:** *Space Systems*	**Regular Session:** *Real-Time Scheduling*
Thursday June 21st Sessions & Exhibition	**Keynote Talk:** Erhard Plödereder *(Univ. of Stuttgart, Germany)*	**Industrial Session:** *V&V of Safety-Critical Software*	**Industrial Session:** *Software Methodologies*	**Regular Session:** *New Application Domains*
Friday June 22nd Tutorials & Workshop	**Tutorial:** F. Singhoff and P. Dissaux, *Scheduling Analysis of AADL Architecture Models*			
	Tutorial: J. Sparre Andersen, *Writing Contracts in Ada*		**Tutorial:** J. Sparre Andersen, *Unit-Testing with Ahven*	
	Tutorial: R. Amiard and P.M. Rodat, *Introduction to Libadalang*		**Tutorial:** J. Signoles, *Frama-C, a Framework for Analysing C Code*	
	Workshop: *Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering*			

The information in this document is still preliminary. Please refer to the conference web site for the latest details.

KEYNOTE SPEAKERS

Security and Dependability Challenges of IT/OT Integration

Paulo Esteves-Veríssimo

University of Luxembourg, Luxembourg

(Tuesday June 19th)

A great deal of society's stakes is today placed on the cyber sphere. The pillars of this new environment are critical information infrastructures (CII), where an accelerated convergence, or integration, of information technology (IT) like the internet-cloud complex, and operational technology (OT) like cyber-physical systems, is becoming the norm e.g., in utilities, like power grid operators, or transportation systems, including autonomous vehicles.

This global convergence leads to extremely large-scale and decentralised computer and network systems, in whose interconnection the natural difference of the threat and risk models of both kinds of realms (IT/OT) is sometimes not taken into account, opening threat surfaces both to occasional accidents and targeted attacks, or advanced persistent threats (APT).

We believe, and discuss in the talk, that paradigms and techniques are required that endow systems with the capacity of defeating incremental adversary power and sustaining perpetual and unattended operation, in a systematic and automatic way.

Short Bio

Paulo Esteves-Veríssimo is a Professor and FNR PEARL Chair at the University of Luxembourg Faculty of Science, Technology and Communication (FSTC), since fall 2014, and head of the CritiX lab (Critical and Extreme Security and Dependability) at SnT, the Interdisciplinary Centre for Security, Reliability and Trust at the same University (https://wwwen.uni.lu/snt). He is adjunct Professor of the ECE Dept., Carnegie Mellon University. Previously, he has been a Professor of the Univ. of Lisbon, member of the Board of the same university and Director of LaSIGE (http://lasige.di.fc.ul.pt). Veríssimo is Fellow of the IEEE and Fellow of the ACM, and he is associate editor of the IEEE Transactions on Computers (TC - 2015---). He is currently Chair of the IFIP WG 10.4 on Dependable Computing and Fault-Tolerance and vice-Chair of the Steering Committee of the IEEE/IFIP DSN conference. He is currently interested in secure and dependable distributed architectures, middleware and algorithms for: resilience of large-scale systems and critical infrastructures, privacy and integrity of highly sensitive data, and adaptability and safety of real-time networked embedded systems. He is author of over 180 peer-refereed publications and co-author of 5 books.

From Physicist to Rocket Scientist, and how to make a CubeSat that works

Carl Brandon

Vermont Technical College, USA

(Wednesday June 20th)

After getting experience with SPARK/Ada on an Artic Sea Ice Buoy, we used the same CPU and software system on our first CubeSat. Our CubeSat, launched on November 13, 2013, was in orbit for two years and two days, travelling 293 million miles during 11,071 orbits of the Earth. It was operational the entire time, sending us many photos, until burning up over the Pacific during re-entry. It is still the only successful university satellite on the East coast of the US. I will explain how to have a successful CubeSat, where many, many others have failed, in which the reliability of SPARK/Ada software plays a big part. We are now developing a complete spacecraft software system, CubedOS, using SPARK/Ada, and are looking forward to being part of a deep space, self-propelled CubeSat mission with partners at NASA's Jet Propulsion Lab, visiting asteroids controlled by SPARK/Ada software.

Short Bio

I was interested in space from an early age, but my education led to a B.S. in physics from Michigan State. I worked on the cyclotron there, starting out with a vacuum tube computer. Then at IBM, with two colleagues, I designed their first memory chip. I used computer analysis for my M.S. on the aerodynamics of seagull soaring flight and Ph.D. on bat flight aerodynamics and flight mechanics with bats flying in a wind tunnel, at UMass, Amherst. I got involved with Ada at its beginning, teaching the first undergrad course in Ada in the early 1980's. I just finished my 41st year teaching physics at Vermont Technical College. 13 years ago, I got involved with CubeSats (10 cm x 10 cm x 10 cm, 1 kg satellites). Being a physicist (with a good software

background) is a great background for CubeSats. We built the first CubeSat launched by any university in New England or New York. We credit our success with the use of SPARK/Ada for our software. We are now working on a complete spacecraft software package, CubedOS written in SPARK/Ada.

Vulnerabilities in Safety, Security, and Privacy

Prof. Dr. Erhard Plödereder

University of Stuttgart, Germany

(Thursday June 21st)

Prof. Plödereder will discuss the differences and commonalities in threats that affect safety, security or privacy in today's systems. He will argue that vulnerabilities made possible by programming language features form a common base for violating safety, security, or privacy. None of these three concerns can be satisfied without first eliminating these vulnerabilities in the code of today's systems. Regrettably all known languages in actual use contain constructs that give rise to such vulnerabilities. He will describe several useful information sources about vulnerabilities and about rules that are geared to prevent them from arising in real code.

Examples will illustrate the knowledge conveyed by these sources.

Short Bio

Erhard Plödereder holds the Chair for Programming Languages and Compilers at the University of Stuttgart, Germany. His research interests are static program analysis tools to detect vulnerabilities in safety-critical code. He is a member of ISO WG23, which focuses on identifying vulnerabilities in programming languages and on providing advice for their prevention generally and in various programming languages.

In the past Erhard Plödereder was president of Ada-Europe (2001-2008), chairman of IFIP 2.4. (2002-2008), ISO WG9/ARG (1994-2001), ISO WG9/XRG and the Distinguished Reviewers for Ada95 (1989-1994), and maintains an active involvement in today's Ada and ISO groups. He served as vice dean and dean at the Faculty of Computer Science, Electrical Engineering and Information Technology of the University of Stuttgart (1998-2010). He earned M.Sc. and Ph.D. degrees at Harvard University and a Diploma in Computer Science at the TU Munich, Germany.

Tutorials

T1 – Recent Developments in SPARK 2014

Peter Chapin, Vermont Technical College, USA

(Monday June 18th, full day)

This tutorial will quickly cover the basics of SPARK 2014 for the benefit of those attendees who have no SPARK 2014 experience (assumed to be the majority of the attendees). This overview will not cover every detail of SPARK. Instead it will provide the necessary background so that the newer features of SPARK can be understood. The bulk of the time will focus on the newer features that have been added to SPARK in recent years, along with some general comments about where SPARK development may be heading in the future. Sample code will be provided in machine readable form, so attendees can experiment with SPARK first hand during allocated "lab" times during the tutorial. Attendees are encouraged to bring a computer.

Level: *Intermediate*

Attendees should have working familiarity with Ada including exposure to, but not necessarily expertise with, Ada's concurrency and object-oriented features. No prior experience with SPARK is required. Experienced SPARK users who are interested in SPARK's newer features are also welcome.

Reasons for attending

Attendees will leave the tutorial with a general understanding of SPARK's abilities and of the direction SPARK development has been moving. Attendees will be in a good position to explore SPARK further by trying it on their own projects.

Presenter

Dr. Chapin is a professor of software engineering at Vermont Technical College (VTC) in the United States. He has been a faculty member there for 32 years and has taught both Ada and SPARK to undergraduate and graduate students. He is a co-author, along with John McCormick, of "Building High Integrity Applications with SPARK", published by Cambridge University Press in 2015. Dr. Chapin has been the Software Directory at VTC's CubeSat Laboratory since 2009 where he has overseen the development of CubeSat flight software in SPARK done by students.

T2 – Access Types and Memory Management in Ada 2012

Jean-Pierre Rosen, Adalog, France

(Monday June 18th, morning)

In most languages, pointers are either low-level (pure hardware addresses in C), or implicit (Java, C#). Ada provides explicit pointers, but of a higher level of abstraction (hence the use of the term "access"), disconnected from the hardware level, and as safe as possible. In addition, the language includes sophisticated features for controlling memory allocation and deallocation. While this has great benefits, it may confuse those who are used to pointers in other languages. Proper usage also requires some difficult to grasp notions, like accessibility levels. This tutorial explains all the issues with Ada access types, from basic usage to sophisticated features like remote access types. Many practical examples demonstrate how to use them and how to control memory allocation, and special emphasis is provided for the latest features offered by Ada 2005 and 2012. A must-attend for all those using access types.

Level: *Intermediate*

Expected audience experience: casual knowledge of Ada.

Reasons for attending

- Understand what makes Ada access types different from other languages' pointers.
- Explore rarely taught issues, like accessibility levels, storage pools and subpools, remote access types...
- Learn when and how to use access types – and when not to use them.

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 engineering. He is chairman of AFNOR's (French standardization body) Ada group, AFNOR's spokeperson at WG9, member of the Vulnerabilities group of WG9, and chairman of Ada-France. Adalog offers regularly on-site and off-site training sessions in Ada. This tutorial is based in part on the "advanced Ada' course offered by Adalog.

T3 – Design and Architecture Guidelines for Trustworthy Systems

William Bail, The MITRE Corporation, USA

(Monday June 18th, morning)

Software design and architecture together play a central role in software development. Understanding their concepts and principles is essential to being able to develop a trustworthy and dependable software system. This tutorial examines these concepts, discusses design quality attributes necessary to ensure trustworthy behaviour, and provides an overview of different design approaches. It will differentiate architecture and design, their relationship to coding styles, and describe examples of good and faulty design. It will introduce a variety of design challenges that are commonly encountered and will discuss the impact of complexity in the quality of the software, recognizing that complexity presents significant risk to the dependable design understood by developers. Design features need to be correlated to counteract potential threats to security and safety. All designs have inherent properties, but not all designs have the same properties, resulting in a need to select a design for a system that is coherent with the system's intended role and usage profile.

Level: *Intermediate / Advanced*

Targeted at practitioners who are involved in designing and developing complex systems which have high dependability and trust requirements.

Reasons for attending

The tutorial will provide a perspective on the roles of design and architecture in the development of software intensive systems that have safety and cyber-secure roles, and will provide guidance on how to approach such development. As such, it will directly support process improvement, and provide a basis for achieving trustworthy performance. It emphasizes the role of design features that enhance achieving desirable dependability goals. It recommends practical approaches for soliciting, deriving and documenting design features.

Presenter

Since 1990, Dr. Bail has worked for The MITRE Corporation in McLean VA as a Computer Scientist in the Software Engineering Center (SWEC). MITRE is a not-for-profit corporation chartered to provide systems engineering services to the U.S. Government agencies, including the DoD, the FAA, and the IRS. Within MITRE, the SWEC focuses on supporting various programs with consultation, particularly transitioning emerging technologies into practice. Dr. Bail has been involved with establishing modular open system guidance and policy for multiple customers.

Dr. Bail's technical areas of focus include dependable software design and assessment, error handling policies, techniques for software specification development, design methodologies, metric definition and application, and verification and validation. Prior to 1990, Dr. Bail worked at Intermetrics Inc. in Bethesda MD.

From 1989 to 2011, he served as a part-time Adjunct Professor at the University of Maryland University College where he developed instructional materials and taught courses in software engineering, in topics such as Software Requirements, Verification and Validation, Software Design, Software Engineering, Fault Tolerant Software, and others. Previously, Dr. Bail taught part-time at The University of Maryland from 1983-1986 in the Computer Science Department for undergraduate courses in discrete mathematics, computer architecture, and programming language theory.

Dr. Bail has presented tutorials on Cleanroom Software Engineering, Semi-Formal Development Techniques, Statistical Testing, Verification and Validation, and Requirements Engineering at SIGAda, Ada-Europe, NDIA Systems Engineering Conference, and other conferences. Dr. Bail received a BS in Mathematics from Carnegie Institute of Technology, and an MS and Ph.D. in Computer Science from the University of Maryland.

T4 – Numerics for the Non-Numerical Analyst

Jean-Pierre Rosen, Adalog, France

(Monday June 18th, afternoon)

Numerics are a special area of software development, and numerically intensive programs are best developed by specialists of the domain. On the other hand, many programs have to deal with mathematical computations, without being really numerically intensive.

This tutorial addresses the techniques (and pitfalls) that every application developer needs to know as soon as there are some computations that go beyond simple integer arithmetic, without requiring them to be advanced numerical analysts. The tutorial also addresses the various tools offered by Ada, from numeric types to libraries.

Level: *Intermediate*

Expected audience experience: casual knowledge of Ada.

Reasons for attending

- Learn how to select the most appropriate numeric type for your applications.
- Avoid pitfalls and increase the accuracy and portability of numeric computations.
- Discover the standard libraries provided by Ada.

Presenter

Please see Tutorial T2.

T5 - Requirements Development for Safety- and Security-Critical Systems

William Bail, The MITRE Corporation, USA

(Monday June 18th, afternoon)

The requirements defined for a system form the foundation for the development of the system, and as such, are fundamentally core to the successful realization and delivery of the system to the eventual users. Cost and schedule increases in the development of systems, and shortcomings in deployed systems are closely correlated to weaknesses in the system's requirements. Some historic data suggests that requirements are responsible for nearly half of all system development failures. For dependable systems, shortcomings in requirements development have an especially dramatic impact. For example, systems requiring a high level of security are often not addressed until later in the development process. This tutorial discusses shortcomings in current practices, and provides guidance for enhanced practices that address historic shortcomings. It also provides an approach to weighing trade-offs associated with ambitious goals and realistic limits, and recognizes the complex and multiple interplays between different requirements. It specifically addresses the issue of stakeholder acceptability, allowing trade-offs of various system qualities to determine overall system acceptance. It also emphasizes the tight relationship between design and requirements development, showing how good practice can directly improve the quality of the resulting system. The tutorial describes the ways that requirements need to be handled to maximize the likelihood of success. This tutorial has been updated significantly from versions presented at previous Ada-Europe conferences.

Level: *Intermediate / Advanced*

Targeted at practitioners who are involved in developing complex systems which have high dependability and trust requirements.

Reasons for attending

The tutorial will provide a framework for development of requirements for cyber and safety critical systems and provide advice on how to approach such development. As such, it will directly support process improvement, and provide a basis for a predictable and reliable requirements development activity. It justifies the level of attention that needs to be placed on the development and maturation of system and software requirements. It supports obtaining a perspective against which requirements can be viewed and suggests practical approaches for soliciting and documenting requirements. It will explain the underlying basis for how requirements need to be handled and will provide solutions for some commonly-encountered challenges when developing requirements for large, software-intensive systems.

Presenter

Please see Tutorial T3.

T6 – Scheduling Analysis of AADL Architecture Models

Frank Singhoff, Lab-STICC/UBO, France
Pierre Dissaux, Ellidiss Technologies, France

(Friday June 22nd, full day)

In this tutorial, we will provide an overview of scheduling analysis capabilities that are proposed by the real-time scheduling theory, AADL and tools implementing it. The objective of this tutorial is to show to the attendees the benefits that can be expected by performing early scheduling/timing analysis for real-time software.

The Architecture Analysis and Design Language (AADL) is an SAE International Standard dedicated to precise modeling of complex embedded systems, covering both hardware and software concerns. Its definition relies on a precise set of concepts inherited from industry and academics best practice: clear separation of concerns among layers, rich set of properties to document system metrics and support for many kind of analysis: scheduling, safety and reliability, performance, but also code generation.

14 years after the first release of the AADL standard, the AADL community has implemented many AADL tools that are mature enough to be handled by embedded critical real-time systems designers. Then, we propose in this tutorial to show how to apply AADL scheduling analysis

tools. The tutorial will be illustrated by AADL models and labs with the tools AADLInspector and Cheddar.

Cheddar is a GPL open-source scheduling analysis tool (http://beru.univ-brest.fr/~singhoff/cheddar). It has been designed and distributed to allow users to understand the main concepts of the real-time scheduling theory. The tool is built around a simplified Architecture Description Language devoted to support real-time constructs. Users can directly build their real-time systems models with this ADL and its associated editor, however, it is expected that other more general modeling front-ends have to be used while integrating scheduling analysis into an engineering process.

AADLInspector (http://www.ellidiss.fr) is a model processing framework that embeds a set of generic features to load real-time models and let them be properly processed by various analysis or production tools. AADLInspector uses AADL V2 standard as a base reference for its input models and embeds a commercial version of Cheddar as well as the interactive Marzhin simulator that emulates the AADL run-time.

The tutorial will illustrate how to model typical real-time architectures with AADL V2 and how to analyse them with AADLInspector/Cheddar (both the GPL version and the commercial version embedded into AADLInspector).
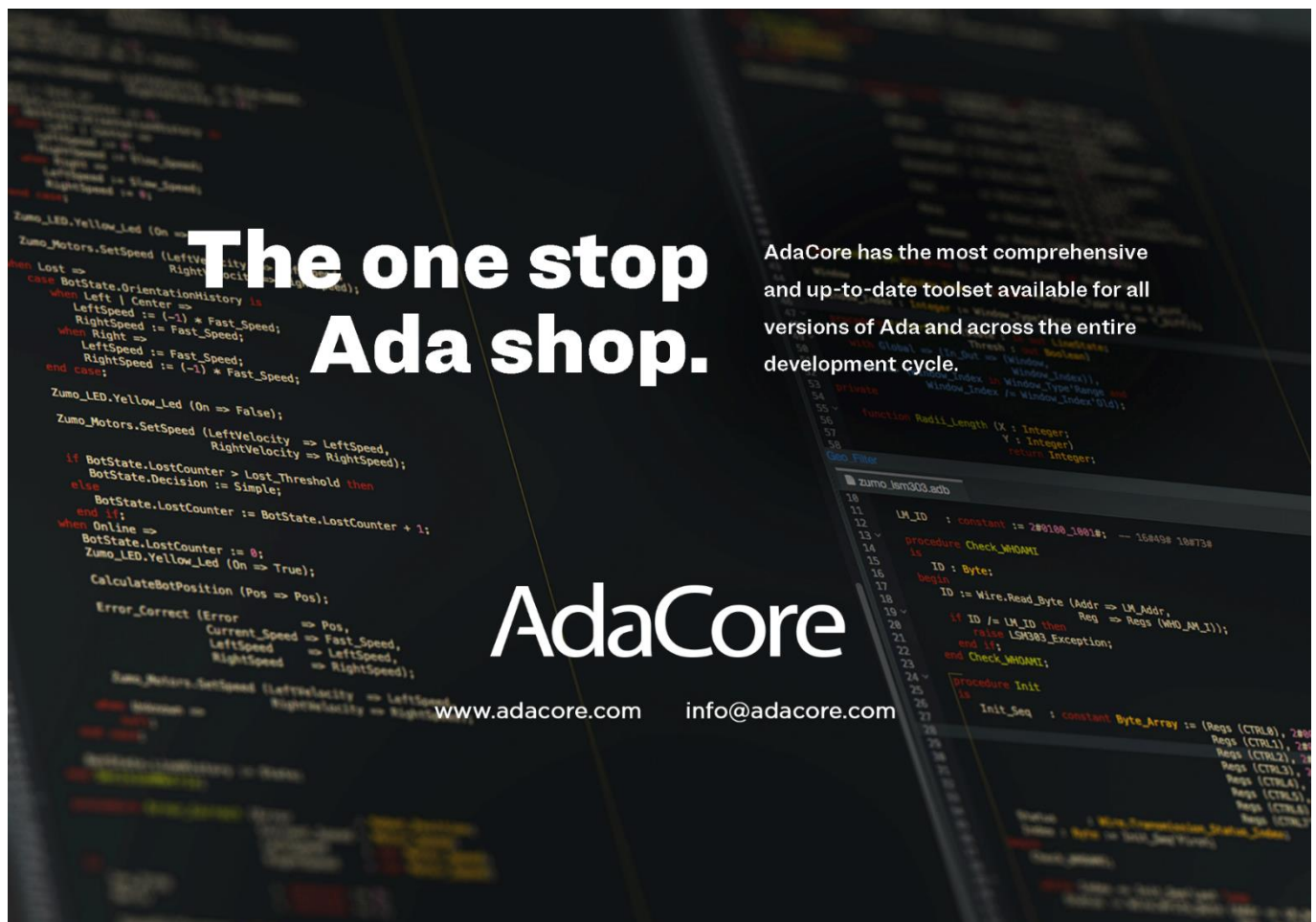
Level: *Intermediate*

The tutorial is designed for attendees who have no background on AADL nor scheduling analysis. Modelling and verification background may help.

Reasons for attending

AADL is notation which is part of the model-based families, along with OMG SysML, MARTE or EASTADL. It has been defined with a strong focus on analysis capabilities from its inception, while being versatile enough to be applied to a wide set of embedded systems. European projects (FP5-ASSERT, TASTE, Flex-eWare), but also US projects (SAVI, Meta) demonstrated that AADL could help engineers in their design effort in the space, avionics and embedded domains. In the meantime, the academic community adopted AADL as a conveyor to bind numerous tools, covering model checking, scheduling, power evaluation or simulation capabilities to name a few.

Furthermore, scheduling analysis is not used as much as it could be, because many practitioners may find it

difficult to apply. The motivation of the tutorial is to highlight the level of maturity of the real-time modelling and analysis solutions around AADL, which is an outcome of the past ten years of academic and industrial research work in this area.

Presenters

Frank Singhoff (UBO/Lab-STICC, Brest, France) is Professor of Computer Science in the Lab-STICC laboratory, UMR CNRS 6285 and in the Computer Science Department at the Université de Bretagne Occidentale, France. He received his engineering degree in Computer Science from the CNAM/Paris in 1996 and his PhD from Télécom-Paris-Tech in 1999. His current research focuses on real-time scheduling analysis and architecture description languages on multi- and many-cores. In 2002, he started Cheddar, a toolset designed to perform analysis with the real-time scheduling theory. Frank Singhoff is also a member of the SAE AS-2C committee working on AADL. He received an ACM SIGAda "Outstanding Ada Community Contributions Award" in 2010. Frank Singhoff gave several tutorials at ESWeek in 2013, MODELS in 2014, HILT in 2014, SIGAda in 2011 and 2007, Ada-Europe in 2008, ETR in 2017, 2015 and 2009.

Pierre Dissaux has an engineering degree in electronics and is the owner and managing director of Ellidiss Technologies. Before founding the company in 2004, he held various job positions in a large telecommunication company (1983-1985), in a research center of the French Ministry of Defense (1985-1991) and in an innovating software house (1991-2003). He is also a member of the SAE AS-2C standardisation committee (AADL) and the main architect of the AADL Inspector tool.

T7 – Writing Contracts in Ada

Jacob Sparre Andersen, JSA Research & Innovation, Denmark

(Friday June 22nd, morning)

One of the important new features in Ada 2012 was an extended support for contract-based programming with "contract aspects". They allow you to specify even more details about types and subprograms in a formal and testable form. If used carefully, they can make package specifications easier to read, and help identifying use and implementation errors faster.

To really make sense, the contracts should be consistent across your whole library or application. This tutorial will introduce you to writing contracts in Ada and give you guidance on writing consistent contracts. It is organised in three sections: an introduction to writing contracts in Ada using features all the way from Ada 83 to Ada 2012/TC1. Guidelines for writing contracts. And, finally, a guided, practical exercise in writing contracts in Ada.

Level: *Intermediate*

The intended audience is software engineers, who already know an earlier version of Ada, but have not yet used the "programming by contract" aspects added in Ada 2012.

Reasons for attending

After having completed the tutorial, the participants will be ready to apply contract aspects on a project in a consistent and effective manner.

The tutorial is intended to prepare existing Ada programmers to use Ada 2012 contract aspects, both in future projects and on existing Ada projects.

Presenter

Jacob Sparre Andersen has previously given talks and tutorials on the use of Ada 2012 for contract-based programming at Ada-Europe conferences, as well as at DANSAS, FOSDEM and LinuxDay/Cagliari. He also has a long experience as a teacher of physics, mathematics, statistics, software engineering, and financial instruments.

Jacob Sparre Andersen runs his own consulting company in Hørsholm, Denmark and is an associate at the Niels Bohr Institute at University of Copenhagen. He is specialised in mathematical modelling and (of course) Ada. See http://www.jacob-sparre.dk/cv/ for a full curriculum vitae.

T8 – Introduction to Libadalang

Raphaël Amiard, AdaCore, France
Pierre-Marie de Rodat, AdaCore, France

(Friday June 22nd, morning)

This tutorial will introduce the Libadalang Ada source code analysis library, and the way it can be used to create source aware custom tools.

It will cover: 1) How to use Libadalang for simple metrics using syntax; 2) How to use Libadalang for simple metrics using semantic analysis; 3) How to use Libadalang to perform automatic refactorings on your code-base based on a set of rules; 4) How to use Libadalang to implement checkers for custom coding rules.

Attendees should bring a computer with GNAT GPL 2017 installed. These are available for download from https://adacore.com/download.

Level: *Intermediate*

No prior experience with Libadalang is expected, but attendees should be familiar with Ada. A modicum of familiarity with Python or another scripting language is a plus, but definitely not a requirement.

Reasons for attending

- Learn about creating custom Ada tooling easily.
- Learn about the main differences between Libadalang and ASIS.
- See real world uses of custom made source analysis technology.

Presenters

Raphaël Amiard is a software engineer at AdaCore working on tooling and compiler technologies. He joined AdaCore in 2013, after an internship on AdaCore's IDEs. His main interests are compiler technologies, language design, and sound/music making.

Pierre-Marie joined AdaCore in 2013, after he got an engineering degree at EPITA (IT engineering school in Paris). He mainly works on GNATcoverage, GCC, GDB and Libadalang.

T9 – Unit-Testing with Ahven

Jacob Sparre Andersen, JSA Research & Innovation, denmark

(Friday June 22nd, afternoon)

Testing is a useful activity, even when you don't have authorities breathing down your neck to document that you know what your software is doing.

Ahven is an Open Source framework for writing unit tests. It is intended to work with any Ada 95 compiler and is regularly tested with several different compilers.

This tutorial will introduce you to writing unit tests with Ahven as the testing framework. You will learn how to write simple tests, how to structure larger test suites, and how you can measure statement coverage of your unit tests with GNAT and Gcov.

Level: *Intermediate*

The intended audience is software engineers, who already know Ada, and are interested in a lightweight alternative to the unit testing tools used for certification purposes.

Reasons for attending

The tutorial will give you a good start writing unit tests, without tying you to a specific Ada compiler, or requiring you to pay license fees for one of the more advanced closed source Ada unit testing tools.

Presenter

Please see Tutorial T7.

T10 – Frama-C, a Framework for Analysing C Code

Julien Signoles, CEA LIST

(Friday June 22nd, afternoon)

Frama-C is an extensible source code analysis platform that aims at conducting verification of industrial-size C programs. It provides its users with a collection of plug-ins that perform static and dynamic analysis for safety-

and security-critical software. Collaborative verification across cooperating plug-ins is enabled by their integration on top of a shared kernel, and their compliance with a common formal specification language named ACSL. Frama-C is currently used in several industrial settings, notably (but not limited to) avionic, nuclear and defense industries.

This tutorial on Frama-C takes participants on a journey into the Frama-C world along its main plug-ins: the deductive verification tool WP, the abstract-interpretation based plug-in Eva, and the run-time verification tool E-ACSL. It also includes a presentation of the formal specification language ACSL and emphasizes possible collaborations between these plug-ins and a few others. The presentation is illustrated with concrete examples of C programs.

Level: *Introductory / Intermediate*

Attendees should know the C programming language but no former experience with formal methods is required.

Reasons for attending

- If you don't know formal methods: learn what they are (not) good for and how to use them concretely.
- If you already know formal methods and a verification tool for another programming language (e.g. SPARK 2014), learn a state-of-the-art tool currently used for analysing critical C software.

Presenter

Dr Julien Signoles is a researcher-engineer at CEA LIST's Software Security and Reliability Lab (LSL) in France and one of the main developers of Frama-C. His research focuses on runtime assertion checking, software security, and applications of program analysis techniques. He has already delivered many lectures and tutorials and provides professional training on Frama-C and its plug-ins.

Morning tutorial sessions run from 09:30 to 13:00, with a break 11:00-11:30. Afternoon tutorial sessions run from 14:00 to 17:30 with a break 15:30-16:00.

CO-LOCATED WORKSHOPS

The conference week features two workshops, which will run in parallel with the tutorials. On Monday, June 18th, takes place the workshop on Runtime Verification and Monitoring Technologies for Embedded Systems (RUME), while the 5th edition of the International Workshop on Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering (DeCPS) is on Friday, June 22nd.

VENDOR PRESENTATIONS AND EXHIBITION

The conference will feature an exhibition in a dedicated space close to the auditorium where the sessions will take place, right in front of the hall where the coffee breaks will be served. Exhibitors and vendors will also deliver technical presentations, scattered along the regular sessions.

CONFERENCE VENUE

Lisbon is currently considered one of the best touristic cities in Europe. It is the capital of Portugal and is well known for its medieval castle, for the Belém tower, for its charming old neighbourhoods of Alfama and Bairro Alto, for the natural light and breath-taking scenery views, for the Fado music, for the sweet pastéis de Belém, and for so many other nice things that you should discover by yourself.

June is full of events in Lisbon, including the festivities in honour of St. António, with music, grilled sardines and popular parties in the old neighbourhoods. This year there is also the Rock in Rio Music Festival, starting on the weekend right after the conference. For all these reasons, you should book your hotel in advance! We arranged a block of rooms at the conference hotel with a special price for Ada-Europe (90€ for single rooms and 100€ for double rooms, including breakfast), which can be reserved when registering for the conference through the provided forms. Room availability cannot be ensured after April 20.

The conference will take place at the VIP Executive Art's Hotel, in the modern Parque das Nações area. There you will find a large shopping mall, plenty of restaurants and bars, museums and the Lisbon oceanarium. More information on the venue and getting around in Lisbon is available at the conference web site.

SOCIAL EVENTS

The program includes 1-hour long coffee breaks, providing the opportunity for participants to discuss their work, to visit the exhibition and to socialise. Lunches will be served at the hotel restaurant, from Monday to Friday, providing further interaction opportunities. On Tuesday, participants are invited for a welcome reception after the Ada-Europe General Assembly, whose details are still being arranged. We hope to make everyone feel really welcome to Lisbon. And on Wednesday, the day will end with the conference banquet, at the "Casa do Bacalhau" restaurant. The restaurant is located in the old stables of the Duke of Lafões palace. The room where dinner will be served has a wonderful ceiling, which is original from the eighteenth century. But most of all, we believe that you will fully enjoy the food and the wine!

VIP Executive Art's Hotel address:
Av. Dom João II 47
1998-028 Lisboa, Portugal

REGISTRATION

Conference Registration

The registration fee for the three days of the technical program (June 19th – June 21st) includes lunch and coffee-breaks for every day of the conference, banquet, reception and a copy of the proceedings. The registration fee for a single day of the technical program includes one copy of the proceedings, coffee breaks and lunch on that day.

	Member		Non-member		Student
	Non-academic	Academic	Non-academic	Academic	
Early registration (by May 14th)	660 €	600 €	720 €	660 €	480 €
Late/on-site registration (after May 14th)	720 €		780 €		520 €
Single day registration	300 €				

Members discount: Reserved to members of Ada-Europe and members of an "in cooperation with" SIG of ACM (SIGAda, SIGBED, SIGPLAN), and Ada-Europe sponsors. SIGAda, SIGBED and SIGPLAN members must provide their membership number during the registration process. Ada-Europe members must provide the name of their national body or the keyword "Direct" if they are direct members.

Academic discount: Reserved to full-time faculty members of a university or equivalent educational institution. The name of the institution must be provided in the registration.

Student discount: The conference offers reduced registration rates for students, provided that a copy of a valid student ID is uploaded in during the registration process. The reduced registration fee nevertheless provides full access to all the conference program, including lunches, banquet, reception and complimentary proceedings. Access to the tutorials may also be requested by sending an application e-mail to the program chair, after the registration has been completed (only valid for early registrations). Students that are co-authors of papers accepted for the conference program are eligible for this discount scheme only if at least one other co-author has registered in full.

Tutorial Registration

The fee is per tutorial and includes one coffee-break for half day tutorials and includes two coffee-breaks and lunch for full day tutorials or two half day tutorials on the same day. The tutorial fee is reduced when also registering for the full conference. Students may request free access to tutorials only if registering early for the conference.

	With conference		Without conference	
	Full day	Half day	Full day	Half day
Early registration (by May 14th)	190 €	95 €	270 €	135 €
Late registration (after May 14th)	220 €	110 €	300 €	150 €

Workshop Registration

The early registration fee for workshops is 90€. The fee for late registrations (after May 14th) is 120€. The registration fee includes coffee-breaks and lunch on the workshop day.

Payment Rules and Cancellation Policies

The conference registration fee must be paid before the conference date. Payments can be made by bank transfer or by credit card. Currency exchange charges and bank collection fees are the responsibility of the sender. All accepted papers must have one author registering for the conference (full registration) for the paper to be included in the proceedings. The registration fee will be refunded with a cancellation fee of 30€ if a request is received in writing (e-mail) by June 1st. After this date, no refund will be made.

For latest information see the web page at http://www.ada-europe.org/conference2018. For additional information, please contact the Ada-Europe 2018 Chair: António Casimiro, E-mail: casim@ciencias.ulisboa.pt.

Registration

The registration system is available at the conference web page: http://www.ada-europe.org/conference2018.

CONFERENCE SCHEDULE

	Tuesday 19th	Wednesday 20th	Thursday 21st
8:45 - 9:00	Welcome & Opening		
9:00 - 10:00	**Keynote Talk:** *Security and Dependability Challenges of IT/OT Integration* Paulo Esteves-Veríssimo, University of Luxembourg, Luxembourg	**Keynote Talk:** *From Physicist to Rocket Scientist, and How to Make a CubeSat that Works* Carl Brandon, Vermont Technical College, USA	**Keynote Talk:** *Vulnerabilities in Safety, Security, and Privacy* Prof. Dr. Erhard Plödereder, University of Stuttgart, Germany
10:00 - 11:00	**Coffee & Exhibition**	**Coffee & Exhibition**	**Coffee & Exhibition**
	Regular Session: *Safety and Security*	**Regular Session**: *Handling Implicit Overhead*	**Industrial Session**: *V&V of Safety-Critical Software*
11:00 - 11:30	*Using Safety Contracts to Verify Design Assumptions During Runtime* O. Jaradat and S. Punnekkat	*On the Effect of Protected Entry Servicing Policies on the Response Time of Ada Tasks* J. Garrido, J. Zamorano, A. Alonso and J. A. de La Puente	*Applying Formal Timing Analysis to Satellite Software* A. Wortmann
11:30 - 12:00	*Tool-Supported Safety-Relevant Component Reuse: From Specification to Argumentation* I. Sljivo, B. Gallina, J. Carlson, H. Hansson and S. Puri	*Improved Cache-Related Preemption Delay Estimation for Fixed Preemption Point Scheduling* F. Markovic, J. Carlson and R. Dobrin	*Multicore Timing Analysis for Safety-Critical Software* I. Broster, G. Bernat, F. Cazorla, C. Evripidou and S. Milutinovic
12:00 - 12:20	**Presentation** *The IRONSIDES Project: Final Report* B. Fagin and M. Carlisle	**Vendor presentation** AdaCore	*KhronoSim: Simulation and Testing of Real-Time Critical Cyber-Physical Systems* G. Gouveia, J. Esteves, C. Maia and L. M. Pinho
12:20 - 12:40	**Presentation** *Concurrent Reactive Objects in Rust - Secure by Construction* M. Lindner, J. Aparicio and P. Lindgren	**Vendor presentation** PTC	
12:40 - 14:00	**Lunch & Exhibition**	**Lunch & Exhibition**	**Lunch & Exhibition**

	Tuesday 19th	Wednesday 20th	Thursday 21st
	Industrial Session: *Ada in Industry*	**Industrial Session**: *Space Systems*	**Industrial Session**: *Software Methodologies*
14:00 - 14:30	*Managing the Endianness of Software Building Blocks with GNAT Ada Pragmas: a Case Study* P. L. Cueva and M. Panunzio	*Ariane 6 Flight Software Designed for a Simpler Validation* P. Gast and C. Pierre	*C Guidelines Compliance and Deviations (the MISRA and CERT Cases)* Maurizio Martignano
14:30 - 15:00	*Using Ada in Non-Ada Systems* A. Marriott	*I3DS – A Modular Sensor Suite for Space Robotics* K. N. Gregertsen	*Agile in Safety Critical Projects* Pawel Zakrzewski
15:00 - 15:30	*Easy Ada Tooling with Libadalang* P.-M. de Rodat and R. Amiard	*Multi-Concern Dependability-Centered Assurance for Space Systems via ConcertoFLA* B. Gallina, Z. Haider, A. Carlsson, S. Mazzini and S. Puri	*AGILE-R: Agile Software Development for Railways* S. Mazzini, J. Favaro, G. Ioele, P. Panaroni, G. Gennaro and U. Paone
15:30 - 16:30	**Coffee & Exhibition**	**Coffee & Exhibition**	**Coffee & Exhibition**
	Regular Session: *Ada 202X*	**Regular Session:** *Real-Time Scheduling*	**Regular Session:** *New Application Domains*
16:30 – 17:00	*Safe Dynamic Memory Management in Ada and SPARK* M. Maalej, Y. Moy and T. Taft	*Combined Scheduling of Time-Triggered and Priority-Based Task Sets in Ravenscar* J. Real, S. Sáez and A. Crespo	*Safe Parallelism: Compiler Analysis Techniques for Ada and OpenMP* S. Royuela, X. Martorell, E. Quiñones and L. M. Pinho
17:00 – 17:30	*Safe Non-Blocking Synchronization in Ada2x* J. Blieberger and B. Burgstaller	*Theory and Practice of EDF Scheduling in Distributed Real-Time Systems* J. Javier Gutiérrez and H. Perez	*Microservice-based Agile Architectures: an Opportunity for Specialized Niche Technologies* S. Munari, S. Valle and T. Vardanega
17:30 – 17:50	**Presentation** *Alire: a Library Repository Manager for the Open Source Ada Ecosystem* Alejandro R. Mosteo	**Vendor presentation** RAPITA	**Presentation** *Real-Time Ada Applications on Android* A. P. Ruiz, M. A. Rivas and M. G. Harbour
18:00 – 19:00	**Ada-Europe General Assembly**		**Best Presentation Award** **Presentation of future related events** **Closing**

19:30	**Welcome Reception**	**Conference Banquet and Best Paper Award**	

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