



The Ada Connection

16th International Conference on
Reliable Software Technologies -
Ada-Europe 2011

Ada Conference UK
2011

Advance Programme



John McIntyre Conference Centre, Edinburgh, UK

20 – 24 June 2011

<http://www.ada-europe.org/conference2011>



Greetings from the General Chairs

The Ada Connection, which combines the 16th International Conference on Reliable Software Technologies – Ada-Europe 2011 – with Ada Conference UK 2011, sees a union of two Ada events that have both been very successful in their own right. The **Ada-Europe** series of conferences has become established as an international forum for providers, practitioners and researchers in all aspects of reliable software technologies. The **Ada Conference UK** has been running in its current form since 2006 as a series of biennial one-day events, to highlight the increased relevance of Ada in safety- and security-critical systems. By combining these events, the **Ada Connection** will provide a unique opportunity for interaction and collaboration between academics and industrial practitioners.

Included in the programme of tutorials, technical papers, industrial presentations, vendor presentations and a comprehensive vendor exhibition will be three keynote talks provided by eminent speakers: Peter Bernard Ladkin (Causalis Ltd) on the *Functional Safety of Software-Based Critical Systems*, Jeff O’Leary (US FAA) on *Assuring Software Reliability While Using Web Services and Commercial Products* and Pippa Moore (UK CAA) on *Hippocrates and DO-178B*. These will be complemented by two panel discussions, entitled *Programming Languages Meet Multicore* and *DO178C and Object-Orientation for Critical Systems*. We have invited experts in language design and the critical systems domain to put forward their views on these topics, and expect some spirited debate.

Outside the technical programme there will of course be opportunities to interact, both with other delegates and with the vibrant city of Edinburgh. Tuesday night’s reception, held in the conference exhibition area, features a “whisky tasting” to whet your appetite for discussion; that appetite will continue to be fed at the conference banquet on Wednesday, held in the elegant Georgian splendour of the Signet Library in Edinburgh’s old town and featuring a pre-dinner presentation from Les Hatton, Professor of Forensic Software Engineering at Kingston University. Well known for his contributions in software engineering, Les is also a noted raconteur, bluesman and once played drums for Alexis Korner.

By holding the conference in Edinburgh, we achieve not only the benefits of a first-class conference destination, a capital city which needs very little introduction here, but we also have the happy coincidence of marking 25 years since the Ada-Europe conference was last held in that city. We are sure that, as on that occasion, this year’s conference will offer many opportunities and topics to discuss, debate and engage with other professionals in reliable software technologies.

We look forward to seeing you in Edinburgh in June.

Steve Riddle, Rod Chapman
General Co-chairs, The Ada Connection



Palace of Holyroodhouse



Calton Hill

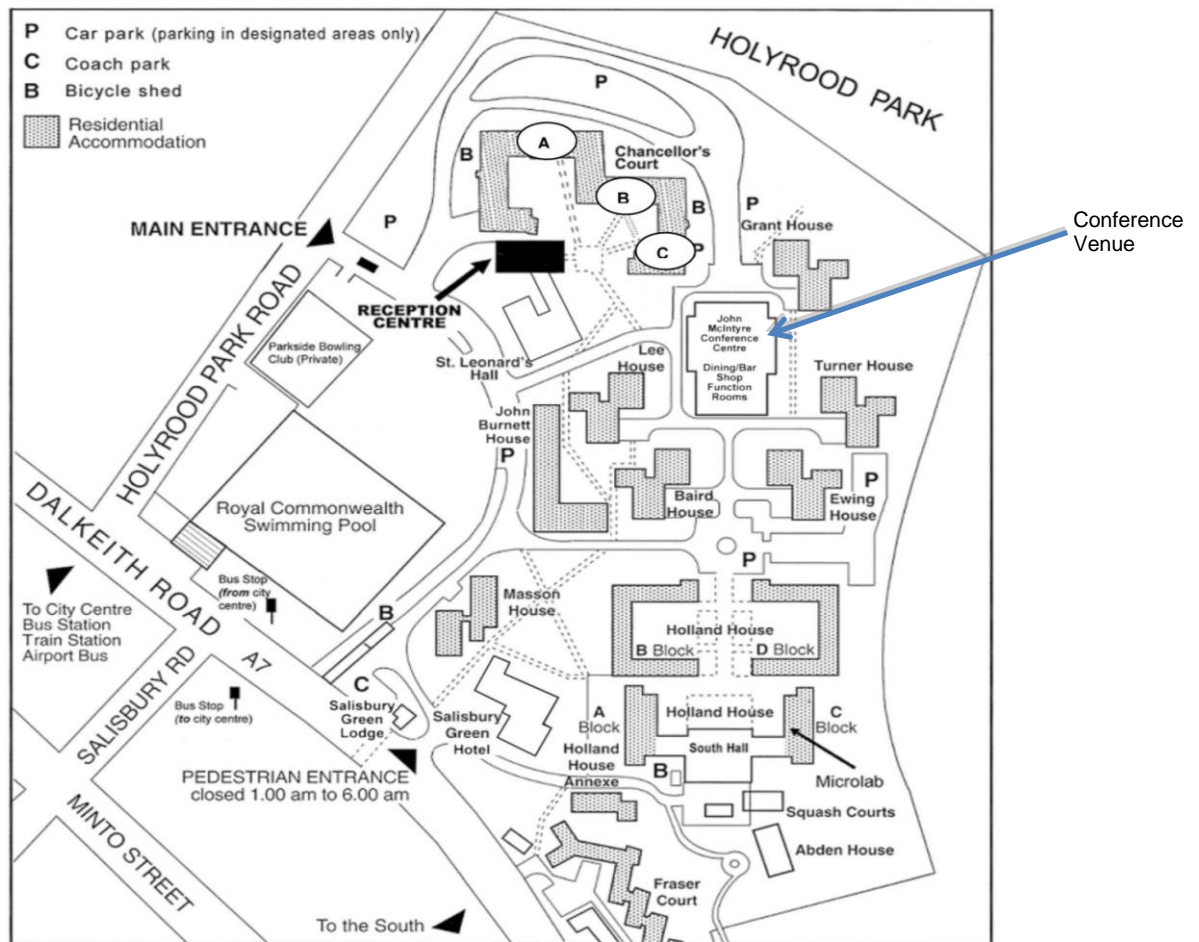
Conference Venue and Location Information

Conference Venue – John McIntyre Conference Centre

The John McIntyre Conference Centre is located within the University of Edinburgh's campus, approximately 1¼ miles (2km) southeast of the centre of Edinburgh. To walk from the city centre to the venue will take approximately 20 minutes.

The venue is located on the edge of Holyrood Park, at the foot of Arthur's Seat – the highest point in Edinburgh is at the centre of the park, with the cliffs of Salisbury Crags to the west.

Venue Web site: <http://www.edinburghfirst.co.uk/venues/john-mcintyre-conference-centre-internal>



By Bus

From the shop side of Princes Street take a bus to the Royal Commonwealth Pool on Dalkeith Road; the conference centre is a short walk down Holyrood Park Road from the stop.

Lothian buses: 14, 30, 33, 48, X48; £1.20, you need exact change. **First Edinburgh Bus:** 86; £1.30.

By Taxi

A taxi from the city centre to the John McIntyre Conference Centre will cost approximately £7 and take 5-10 minutes.

By Rail

The conference centre is 2 miles from Edinburgh Waverley, the main rail station. A taxi or a bus will take around 10 minutes.

By Air

The conference centre is about 8 miles from Edinburgh International Airport. A taxi will cost around £20, or take the Airlink bus service to Waverley Bridge at a cost of £3.

By Road

The satnav reference is EHI6 5AY.

Overview

The programme encompasses five days of presentations, tutorials, panel sessions, meetings, and a substantial exhibition. In traditional style, Monday and Friday provide a choice of full-day and half-day tutorials surrounding the technical programme.

An overview of the week “at a glance” is shown below. Each of the three days of the technical programme begins with an opening plenary session, followed by a keynote talk. Tuesday provides the official opening of the conference, and Wednesday opens with an overview of the upcoming Ada 2012 standard. Thursday starts with an education theme, with an update on GAP (the GNAT Academic Program), an Educators session and the award of the “Ada Way” Prize. This prize is for the first annual Student Programming Contest, an initiative organised by Ada-Europe which is designed to attract students and educators to Ada.

On the following pages you can read more about the keynote speakers, tutorial programme, panel sessions, exhibition and social programme, and the full details of the presentations in the conference programme.

Exhibition

The conference includes a free-to-attend exhibition which will enable delegates to meet with a range of vendors, who are involved across the software development life-cycle. Note that the welcome reception will be held in the exhibition areas on Tuesday evening.

Exhibition Hours

- June 21: 0900 – 2000
- June 22: 0900 – 1700

Overview of the Week

Some of the information in this document is still preliminary – please refer to the conference website for latest details.

	Monday	Tuesday	Wednesday	Thursday	Friday			
900		Opening/Welcome	Ada 2012 update	GAP update, Educators' session, AdaWay Prize				
930	Tutorials	Keynote - Peter Ladkin	Keynote - Pippa Moore	Keynote - Jeff O'Leary	Tutorials			
1030		1030 Coffee until 1130						
1100	1100 Coffee				1100 Coffee			
1130	Tutorials	Technical Papers: Multicore	Industrial Presentations: Modelling and Complexity	Panel: DO178C and Object-Orientation for Critical Systems	Tutorials			
1300	1300 Lunch until 1430							
1430	Tutorials	Technical Papers: Verification	Sponsor Talks	Industrial Presentations: Real-time and Longevity	Exhibitor Talks	Technical Papers: Architecture and Modelling	Industrial Presentations: Innovation and New Markets	Tutorials
1600	1600-1630 Coffee							
1630	Tutorials	Panel: Programming Languages Meet Multicore	Sponsor & Exhibitor Talks	Industrial Presentations: Transitioning and Debugging	Exhibitor Talks	Technical Papers: Education and Mixed criticality	Tutorials	
1700		Ada-Europe General Assembly plus Reception and Whisky Tasting			1800 Best presentation award and closing			
1800			1930 Pre-dinner drinks					
1930			2000 Conference Dinner					
2000								

Invited Keynote Speakers

Eminent keynote speakers have agreed to open each of the three days of the core conference programme. These three keynote speakers are:

- **Peter Bernard Ladkin** (University of Bielefeld CITEC and Causalis Limited) is a recognised specialist in system safety. Peter will address concerns about the international standard IEC 61508 and its perceived lack of criteria for critical assessment of objective properties of software developed for safety-critical systems. He will also recount progress on guidelines for German applications which go some way towards redressing this perceived lack, in his talk entitled *Functional Safety of Software-Based Critical Systems*.
- **Pippa Moore** (UK Civil Aviation Authority) has been an Avionic Systems Design Surveyor with the CAA for over 14 years, and has worked as a CAA, JAA and EASA systems specialist on civil certification projects such as the A380, A340, Embraer 170/190, Trent 900 and Trent 1000. Pippa's talk will address the issues to be considered when attempting to "do no harm" when developing a software system.
- **Jeff O'Leary** (US Federal Aviation Administration) has more than 18 years of experience in software development, systems acquisition and deployment of large mission critical command and control systems. In his talk *Assuring Software Reliability While Using Web Services and Commercial Products* he will present a government software procurement official's perspective on systems development and quality, and discuss the implications, approach and unique issues of building reliable, trusted web services using commercial products.

Functional Safety of Software-Based Critical Systems

Peter Bernard Ladkin - University of Bielefeld CITEC and Causalis Limited

Tuesday 21st, 0930 to 1030



The international standard IEC 61508 governing functional safety for systems with programmable parts is perceived by many (including the speaker) to lack criteria for the critical assessment of objective properties of software developed for safety-critical systems. The German programmable-system safety standards committee DKE GK 914, which contributes to IEC 61508, has been especially so concerned. The talk recounts progress on guidelines for German applications which go some way towards redressing this perceived lack.

Peter Bernard Ladkin has degrees from Oxford and the University of California, Berkeley, in Mathematics, Philosophy and Logic. He worked in California, in Logic, in AI, and in Software Verification, before returning to Europe, where he has specialised in system safety, especially hazard analysis and accident analysis. His method Why-Because Analysis is used by two branches of Siemens involved with rail, and by his tech-transfer company Causalis for clients largely from commercial aviation. He has recently been appointed a member of the German standards committee DKE GK 914.

Hippocrates and DO-178B

Pippa Moore - UK Civil Aviation Authority

Wednesday 22nd, 0930 to 1030



Pippa Moore has been an Avionic Systems Design Surveyor with the CAA for over 14 years.

In that time Pippa has worked as a CAA, JAA & EASA systems specialist on civil certification projects such as the A380, A340, Embraer 170/190, Trent 900, and Trent 1000. She has also worked on numerous aircraft and engine validation projects principally concerned with control software and complex hardware aspects.

When developing any type of software system, especially one that is directly related to safety or which will operate in a safety related environment, one of the primary objectives of any development processes should be to “do no harm”. This talk will address the issues to be considered when attempting to achieve this.

Assuring Software Reliability While Using Web Services and Commercial Products

Jeff O’Leary - US Federal Aviation Administration

Thursday 23rd, 0930 to 1030



Jeffrey O’Leary is a Senior Software Development and Acquisition Lead at FAA. He has more than 18 years of experience in software development, systems acquisition and deployment of large mission critical command and control systems. He spearheaded the software development of several large Ada based complex Air Traffic Control Systems including the Display System (DS), User Requested Evaluation Tool (URET) and the En-Route Automation Modernization (ERAM). In the process he developed a custom quality model to guide software acquisition and development policy. He is now providing leadership in software development for key components of the Next Generation Air Transportation (NextGen) enterprise system. He has a Bachelor of Science from Michigan State University and Masters in Computer Systems Management from the University of Maryland. He regularly advises the US Government Accountability Office GAO and the US Department of Transportation on the state of the Ada programming language. He was the keynote speaker

at 2007 ACM SIGAda International Conference and an invited speaker at the 2003 Conference on the Acquisition of Software-Intensive Systems sponsored by Carnegie Mellon University’s Software Engineering Institute (CMU SEI) and the Office of the Under Secretary of Defense.

Mr O’Leary will present a government software procurement official’s perspective on systems development and quality, with emphasis on high reliability, security and safety. He will share experiences and issues, as well as how FAA is addressing the reliability and assurance (DO-278) of the various “NextGen” projects in the En Route domain. In addition, he will discuss the implications, approach and unique issues of building reliable, trusted web services using several commercial products that have found their way into FAA National Airspace Space (NAS) Architecture, including into safety critical threads.

Tutorials

The conference schedule includes two full days of tutorials running as three parallel tracks on Monday and Friday.

The programme this year features six half day tutorials on Monday and three full day tutorials on Friday.

All of the tutorials are delivered by recognized domain experts, addressing a range of individual topics within the general scope of the conference.

Tutorial Schedule

Morning tutorials sessions will start at 0930 and end at 1300. Afternoon sessions will start at 1430 and end at 1800. Coffee breaks will be from 1100 to 1130 and 1600 to 1630.

Monday 20th June - Half Day Tutorials

TI: Experimenting with ParaSail – Parallel Specification and Implementation Language **S. Tucker Taft, SofCheck, USA**

Monday 20th, 0930 to 1300

This tutorial will provide a chance to experiment with a new language designed to support the safe, secure, and productive development of parallel programs. ParaSail is a new language targeted at safety-critical and high-security systems development in a “multi-core” world, with pervasive parallelism coupled with extensive compile-time checking of annotations in the form of assertions, preconditions, postconditions, etc. ParaSail does all checking at compile time by incorporating an advanced static analysis engine, allowing it to eliminate race conditions, null dereferences, uninitialized data access, numeric overflow, out of bounds indexing, etc. as well as statically checking the truth of all user-written assertions.

The tutorial will begin with a short introduction to the language. After that, the attendees will receive a prototype ParaSail compiler and an accompanying ParaSail Virtual Machine interpreter for writing and testing ParaSail programs. A set of sample programs will be provided as a starting point for experimentation. The tutorial/workshop will finish with a group discussion and feedback on the experience of using this new language, and ideas about next steps.

Level

The tutorial includes an introduction to the language. No specific prerequisites other than an interest and ability in learning a new language, plus a basic understanding of parallelism, assertions, preconditions and postconditions.

Reasons for attending

This is a chance to experiment with a new programming language oriented around parallelism and formal verification. The language is still in development, so it is also an opportunity to help improve and refine the language, and perhaps gain some insights that might contribute to other language design efforts.

Short Biography

The presenter has been involved with language design since 1975, and with Ada since 1980. He was the technical lead for the design of Ada 95, and was heavily involved in the design of Ada 2005 and the ongoing design of Ada 2012. In addition to language design, the presenter has been the technical lead on the development of an Ada 83 and an Ada 95 compiler, as well as of an advanced language-independent static analysis technology.



Edinburgh at dusk

T2: Designing and Checking Coding Standards for Ada **Jean-Pierre Rosen, Adalog, France**

Monday 20th, 0930 to 1300

Most companies have developed coding standards (often because having one is a requirement for certification) but few have conducted a real analysis of the value, consistency and efficiency of the coding standard. This tutorial presents the challenges of establishing a coding standard, not just for the sake of having one, but with the goal of actually improving the quality of software. This implies not only having “good” rules, but also having rules that are understood, accepted and adhered to by the programming team.

The issues of automatically checking the rules is also fundamental: experience shows that no manual checking can cover the programming rules to a satisfactory extent. The tutorial presents the tools available, then goes into deeper details using AdaControl, a free rules checking tool.

Attendees are invited to bring their own code and computers, for a practical experiment of how automatic checking can help discover violations that have escaped the most thorough reviews.

Level

Intermediate.

Expected audience experience: no special requirement.

Reasons for attending

- Understand the value of coding standards;
- Learn how to choose you own coding rules, in a way that's both useful and efficient;
- Discover how to check your own rules;
- Consider the difficulties and pitfalls of introducing coding standard to the development teams, and how to overcome them.

Short Biography

JP 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 spokesperson at WG9, member of the Vulnerabilities group of WG9, and chairman of Ada-France.

T3: Programming Distributed Systems with YAMI4 **Maciej Sobczak, Inspirel, Poland**

Monday 20th, 0930 to 1300

YAMI4 is a messaging solution for distributed systems, designed with particular attention to distributed real-time control systems. The tutorial will introduce the messaging paradigm as provided by YAMI4 libraries, with specific focus on differences with regard to established approaches like RPC. The realities of mission critical systems will be addressed by presenting related features such as working with fixed memory partitions, as well as compliance with the Ravenscar profile.

The tutorial will include code examples as well as on-the-fly demonstration of several simple systems like client-server, publish-subscribe, broker and load-balancing queues.

Level

The tutorial is intended to be an introduction to YAMI4 as a messaging platform, but some language and domain background is required in order to fully benefit from the tutorial content:-

- Intermediate knowledge of Ada with focus on tasking and interfaces;
- Beginner/Intermediate understanding of networking and distributed systems.

Reasons for attending

YAMI4 is one of the very few communication systems where Ada is inherently integrated in the whole software stack. Thanks to this focus, mission-critical features and lightweight implementation, YAMI4 can be an interesting candidate for use in distributed systems constructed in Ada. The audience will benefit from the first-hand insight and experience of the author and will gain the knowledge sufficient to use the messaging paradigm as an attractive alternative to more established communication solutions based on the RPC approach.

Short Biography

Maciej Sobczak is a founder and CEO of Inspirel, a software engineering and consulting company that focuses on high-quality infrastructure components for distributed and database systems. Maciej's recent working experience includes several years as a senior engineer in the distributed control system at the European Laboratory for Nuclear Research (CERN, Geneva). Maciej has lecturing experience from his independent consulting work and gave an industrial presentation at the Ada-Europe'10 conference in Valencia. He is also recognized for his open-source contributions as well as publications in international journals devoted to software engineering, including the Ada User Journal.

T4: Why and How to Measure Non-functional Properties On-target

Ian Broster, Rapita Systems Ltd, UK

Monday 20th, 1430 to 1800

This tutorial explores some of the challenges of developing reliable embedded systems, focusing on non-functional properties that are particularly important to test “on-target”. These include software performance/timing, worst case execution time (WCET), code coverage and memory use.

The tutorial explains and compares different techniques for measurement and analysis of software on embedded targets including tracing methods, in-memory analysis and using hardware support. It shows how those techniques can be used for verification of non-functional properties on-target, including in the context of DO178B/C and the new ISO26262, standard to meet the requirements for safety. The tutorial also explains how to benefit from measurement and analysis techniques in other ways such as focused optimization, faster debugging and supporting software management processes. There will be an opportunity for hands-on work, with a competition and a prize!

Level

Intermediate.

Audience experience required: desire to develop reliable, efficient embedded software.

Reasons for attending

This tutorial will benefit embedded software developers and managers who need to engineer reliable, embedded software. Today, on-target measurements and analysis do not have to be guesswork. The material covers key aspects of embedded systems:

- how to gain a clear, detailed, and accurate understanding of the behaviour of embedded software;
- how to use this information to ensure that non-function requirements are met;
- how to improve the system based on analysis and measurements.

Short Biography

Dr Ian Broster is a founder and Director of Rapita Systems Ltd, a company specializing in on-target software verification. He is an experienced, lively lecturer who has given numerous training courses, lectures and presentations on this and other topics, with excellent feedback from previous Ada-Europe tutorials. He has been involved with Ada since 1995 and earned his PhD at the Real-Time Systems Research Group of the University of York.

T5: Hard Real-Time and Embedded Systems Programming with Ada

Pat Rogers, AdaCore, France

Monday 20th, 1430 to 1800

Please note: this replaces the previously scheduled tutorial (Revamping the Software Technical Review Process, William Bail). We are grateful to Pat Rogers for stepping in to provide this alternative.

Although the terms are often used interchangeably, real-time systems need not be embedded, and embedded systems need not have deadlines. However, applications in both domains are expensive and labour-intensive, especially because developers typically have only low-level tools available and must use techniques that are more ad hoc than analytical. Ada 2005 represents the state-of-the-art in real-time programming languages and offers a high-level model for low-level programming that is unsurpassed in expressive power. This intensive course covers the modern analytical techniques for determining whether deadlines will be met, the Ada language facilities required to support those analyses, and the high-level facilities Ada provides for real-time and embedded systems development. In particular, the Ravenscar Profile is given detailed coverage.

In the tutorial we focus on the facilities provided to developers for use at the application level. Hence there are two major sections, one covering the details of the packages and pragmas defined in the Real-Time Annex, and one covering the details of the Ravenscar Profile. The focus is on the rationale and expected usage of the facilities, with extensive examples.

Level

Intermediate to advanced. Prior experience in the real-time and embedded programming domains is not required but is helpful.

Reasons for attending

Developers will understand the fundamentals of schedulability analysis and the unmatched real-time programming facilities provided by Ada. In addition, the low-level programming facilities, so often misunderstood, are covered in detail.

Short Biography

Patrick Rogers is a senior Member of the Technical Staff with Ada Core Technologies, specializing in high-integrity and real-time application support. A computing professional since 1975 and an Ada developer since 1980, he has extensive experience in real-time applications in both embedded bare-board and POSIX-based environments. An experienced lecturer and trainer since 1981, he has provided numerous tutorials and courses in software fault tolerance, hard real-time schedulability analysis, object-oriented programming, and the Ada programming language. He holds B.S. and M.S. degrees in computer science from the University of Houston and a Ph.D. in computer science from the University of York, England, in the Real-Time Systems Research Group.

T6: Use of Object-Oriented Technologies in High-Reliability Systems

Jean-Pierre Rosen, Adalog, France

Monday 20th, 1430 to 1800

This tutorial presents the new challenges brought by the advent of object-oriented technologies (OOT) into the realm of high reliability systems.

For a long time, OOP was deemed too dynamic a model for highly reliable systems, especially levels A/B of the DO178B, although the standard in itself does not preclude the use of any technology. However, interest for introducing OO techniques is growing in the community; the FAA sponsored OOTiA (Object-Oriented Technology in Aviation), a handbook intended to identify and address these issues. Although not an official policy of the FAA, this handbook is a major input for the upcoming revision of DO178B (DO178C).

The tutorial provides an overview of software safety related standards (DO178B in airborne systems, EN5018 for railway systems). Based on the extensive work of the OOTiA, it explains the issues of object oriented technologies in high reliability systems, and how such technologies can be used while ensuring the high degree of control, review and testing mandated by these systems. Finally, it shows how Adas object oriented model differs from the traditional model, and brings better solutions for introducing OOP to high reliability systems.

Level

Intermediate.

Reasons for attending

- Understand what software safety standards are about;
- Discover the issues of object oriented technologies in high reliability systems.;
- Get an up to date view of current trends with regard to OOT and DO178B/C;
- Learn how Ada's model of object-oriented programming is especially appropriate for secure systems.

Short Biography

JP 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 spokesperson at WG9, member of the Vulnerabilities group of WG9, and chairman of Ada-France.

Friday 24th June - Full Day Tutorials

T7: MAST: Predicting Response Times in Event-Driven Real-Time Systems

Michael G. Harbour, Universidad de Cantabria, Spain

Friday 24th, 0930 to 1800

This tutorial is focused on modelling the timing behaviour of event-driven real-time systems and on the methods used to guarantee the predictability of their response times. We will start by looking at simple single processor systems scheduled with fixed priorities, and we will then progress through dynamic scheduling and distributed systems. The tutorial will give a practical introduction to the use of the MAST modelling and analysis tools for schedulability analysis. We will also review new features that are being added to MAST such as hierarchical partitioned scheduling and advanced flexible scheduling techniques that allow protection among different components of a complex application. The tutorial will help real-time system designers in learning about advanced modelling methods and tools, and will provide practical experience with using the MAST toolset.

This tutorial is addressed to practitioners of real-time systems interested in learning about advanced modelling and analysis techniques for these systems. Some basic knowledge on developing software systems is recommended for attending this tutorial.

Level

Intermediate.

Target audience: practitioners of real-time systems interested in learning about advanced modelling and analysis techniques for these systems.

Reasons for attending

MAST is an advanced set of tools for modelling real-time systems. It uses state-of-the-art modelling elements and analysis tools. This tutorial will help real-time system designers in learning about these advanced modelling methods and tools, and will provide practical experience with using the MAST toolset.

Short Biography

Michael González Harbour is a Professor in the Department of Mathematics, Statistics and Computer Science at the University of Cantabria. He works in software engineering for real-time systems, and particularly in modelling and schedulability analysis of distributed real-time systems, real-time operating systems, and real-time languages. He is a co-author of "A Practitioner's Handbook on Real-Time Analysis". He has been involved in several industrial projects using Ada to build real-time controllers for robots. Michael has participated in the real-time working group of the POSIX standard for portable operating system interfaces. He is one of the principal authors of the MAST suite for modelling and analysing real-time systems.

T8: SPARK: The Libre Language and Toolset for High-Assurance Software

Roderick Chapman, Altran Praxis, UK

Friday 24th, 0930 to 1800

SPARK is a contractualized sub-language of Ada which is unambiguous and suitable for rigorous static analysis. It has been extensively used in industrial applications where safety and security are paramount. The tutorial, which is extracted from the four-day "Software Engineering with SPARK" course will cover: the rationale and design goals of SPARK, the core SPARK language, and SPARK analyses including information flow, exception freedom and formal verification. The tutorial will also cover the latest GPL release of the SPARK technology and the research topics that this opens, such as more advanced forms of analysis and proof, model-checking and language extensions.

Level

Intermediate. The recommended experience and background of the audience are practising software engineers, programme managers, and those involved with procurement of high-integrity software systems might attend this tutorial. Some background in the development of safety- or security-critical software might be useful, but not essential.

Reasons for attending

- To learn about the trade-offs in the design of programming languages and static analysis tools;
- To learn about what such tools can and can't offer in terms of soundness, depth, efficiency and completeness of analysis;
- To appreciate the SPARK language, and the capabilities of the SPARK toolset, and how these "fit" into a larger high-assurance software process;
- To propose, discuss and learn about research themes offered by the Libre release of the SPARK technology.

Short Biography

Dr Roderick Chapman is a well-known conference speaker. He has presented papers, tutorials and workshops at many international events including STC, NSA HCSS, and ACM SIGAda. He was the opening key-note speaker at Ada-Europe 2006.

Rod has been involved with the design of both safety-and security-critical software with Praxis for many years, including significant contributions to many of Praxis key-note projects such as SHOLIS, MULTOS CA, Tokeneer, and the development of the SPARK language and verification tools. He is a Chartered Engineer, a Fellow of the BCS, and an SEI-certified PSP Instructor.

T9: Distributed Programming Techniques in Ada

Thomas Quinot, AdaCore, France

Friday 24th, 0930 to 1800

This tutorial provides an extensive presentation of distribution and inter-partition communication facilities in Ada. The morning is dedicated to low level network support, and in particular TCP/IP programming interfaces. These facilities are of use to developers who need to implement specific, externally mandated protocols. Interoperability across machine architectures is also discussed (in particular, endianness issues), as well as the elegant solutions to these issues available in Ada (representation clauses and stream attributes). The second part focuses on middleware technology. The general notion of a distribution model, providing high level abstractions for interactions between application components executing on different partitions, is introduced. We discuss how component interactions are formally described, and how middleware runtime libraries implement and support these interactions.

We provide an in-depth discussion of specific middleware-based distribution architectures: CORBA (an industry standard for language-independent distributed objects systems), the Ada Distributed Systems Annex (an optional annex to standard Ada incorporating transparent distribution support at the very heart of the language), and AWS/SOAP (a middleware system specifically targeted at implementing web services). We conclude with a discussion of specific issues arising with the implementation of distributed architectures, including case studies of interoperability and fault tolerance issues.

Level

Intermediate. Technical presentation targeted to developers with working knowledge of Ada, not requiring a specific background in distributed systems.

Reasons for attending

The key benefits of this tutorial include:

- available distribution techniques in Ada; applicability context, pros and cons of each approach;
- specific Ada features supporting distribution (Distributed Systems Annex);
- interoperability considerations.

Short Biography

Thomas Quinot holds an engineering degree from Télécom Paris and a PhD from Université Paris VI. The main contribution of his research work is the definition of a flexible middleware architecture aiming at interoperability across distribution models. He joined AdaCore as a Senior Software Engineer in 2003, and is responsible for distribution technologies. He also participates in the development, maintenance and support of the GNAT compiler technology.

Panel Sessions

Tuesday 1630 to 1800 – *Programming Languages Meet Multicore*

Moderator: Erhard Plödereder (University of Stuttgart)

Panellists: Alan Burns (University of York), Tucker Taft (Sofcheck, Inc), Kevin Hammond (University of St Andrews)

The advent of multicore is shaking the very foundations of programming languages for concurrency, resource sharing, synchronisation, etc. The panel will discuss topics that need to be addressed by language designers as they strive to support the move towards multicore applications and much higher degrees of concurrency in the execution of programs.

Thursday 1130 to 1300 - *DO178C and Object-Orientation for Critical Systems*

Moderator: Tim Kelly (University of York)

Panellists: Cyrille Comar (AdaCore), Jean-Pierre Rosen (Adalog), Dewi Daniels (Verocel), Trevor Jennings (Altran Praxis)

The high-integrity systems industry faces the challenge of reaping the benefit of object-orientation in their rigid and demanding development process. Domain experts will debate pros and cons, risks and opportunities, and ways to introduce elements of object-orientation into safety-critical system development.

Vendor Exhibition

The exhibition will open on Tuesday morning and run until the last session on Wednesday. It will take place at the conference venue; coffee breaks and lunch on Wednesday will be served in the exhibition space.

Companies who have already booked their exhibition space at the conference include, in alphabetical order: **AdaCore, Altran Praxis, Causalis Limited, Ellidiss Software, Green Hills Software, IPL, LDRA, Objektum Solutions, Rapita Systems, Resource Engineering, TTE Systems, Vector Software, Verocel and Wind River.**

Exhibitors will also deliver a technical presentation in one of the tracks on Tuesday and Wednesday afternoon.

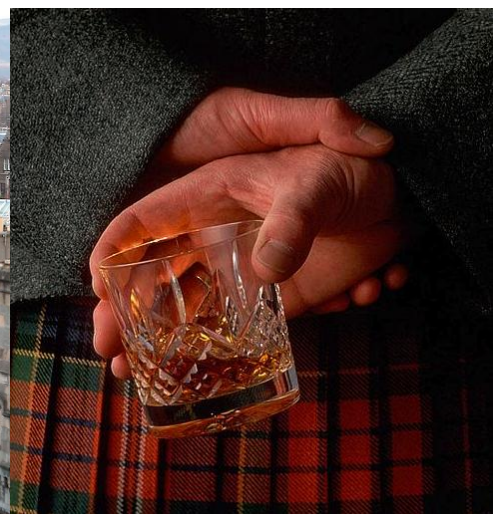
Note that the whisky tasting welcome reception will be held in the exhibition areas on Tuesday evening



Scottish Piper



Edinburgh Rooftops



A Wee Dram

Social Programme

Welcome Reception – Tuesday 21st June

After the first day of the main conference, take full advantage of this opportunity to unwind, socialise with friends and colleagues old and new – and enjoy Scotland’s most famous product. The Ada Connection offers a Welcome Reception with a difference, combining an informal opportunity to meet our exhibitors with an educational tasting experience. Each exhibition stand will have a different bottle of single malt Scotch whisky available, specially chosen to span the aroma and flavour spectrum; you are invited to visit and sample an appropriate number of these fine and rare “malts”. The original Gaelic word for this warming and uplifting spirit was *usquebaugh* (literally “water of life”), which has transformed into *whisky* in modern English.

To provide an introduction, and some further guidance, we will include a very short presentation (timed at 1845, immediately after the Ada-Europe General Assembly), plus tasting notes on the whiskies available.

Canapés will be served and you will also be able to enjoy Scottish shortbread and tablet. Wine and soft drinks (Irish Bru) will, of course, also be available.

(The reception is included in the three-day conference package, and also for conference day delegates.)

Conference Banquet Dinner – Wednesday 22nd June

The Ada Connection Gala Dinner will be held in true Celtic style at The Signet Library situated on the Royal Mile, just below Edinburgh Castle, in the centre of Edinburgh’s Old Town and considered to be one of the finest examples of Georgian architecture in the country. The Library is the property of the Society of Writers to Her Majesty’s Signet since 1822.

Drinks will be served in the Lower Library, which is a working law library by day, with historical and contemporary legal and Scottish collections, enjoying an outlook onto Parliament Square and the Royal Mile. Once settled in, we will enjoy a pre-dinner presentation by **Professor Les Hatton** – a noted contributor to safer software engineering. Dinner will then be served in the Upper Library, with magnificent architectural features, including a cupola painting depicting Apollo and the Muses plus a magnificent stained glass window celebrating Queen Victoria’s Jubilee.

Transport (if required) will be organised to return to the John McIntyre Conference Centre.

(The banquet dinner is included in the conference package.)

Additional tickets

Extra tickets for the Conference Dinner on Wednesday 22nd can be purchased when registering for the conference. These tickets may also be available on-site, at the registration desk.



John McIntyre Conference Centre



Signet Library

Tutorial Programme

Monday 20th June

Coffee breaks will be at 1100 to 1130 and 1600 to 1630

Lunch breaks will be from 1230 to 1330 – lunch on Monday is only provided if you are attending two half day tutorials.

0900 – 0930 Tutorial Registration

0930 – 1300 Tutorial 1: **Experimenting with ParaSail – Parallel Specification and Implementation Language**
S. Tucker Taft, SofCheck, Inc (USA)

Tutorial 2: **Designing and Checking Coding Standards for Ada**
Jean-Pierre Rosen, Adalog (France)

Tutorial 3: **Programming Distributed Systems with YAMI4**
Maciej Sobczak, Inspirel (Poland)

1230 - 1330 Lunch break

1430 - 1800 Tutorial 4: **Why and How to Measure Non-functional Properties On-target**
Ian Broster, Rapita Systems Ltd (UK)

Tutorial 5: **Hard Real-Time and Embedded Systems Programming with Ada**
Pat Rogers, AdaCore (France)

Tutorial 6: **Use of Object-Oriented Technologies in High-Reliability Systems**
Jean-Pierre Rosen, Adalog (France)

Friday 24th June

Coffee breaks will be at 1100 to 1130 and 1600 to 1630.

Lunch break will be from 1300 to 1430.

0900 – 0930 Tutorial Registration

0930 – 1800 Tutorial 7: **MAST: Predicting Response Times**
Michael G. Harbour, Universidad de Cantabria (Spain)

Tutorial 8: **SPARK: The Libre Language and Toolset for High-Assurance Software**
Roderick Chapman, Altran Praxis (UK)

Tutorial 9: **Distributed Programming Techniques in Ada**
Thomas Quinot, AdaCore (France)

Conference Programme

Tuesday 21st June

0800 – 0900 Registration and Coffee

0900 – 0930 Opening Ceremony

0930 – 1030 Keynote Address

Keynote Speaker: **Peter Bernard Ladkin** - University of Bielefeld CITEC and Causalis Limited
Functional Safety of Software-Based Critical Systems

1030 – 1130 Coffee and Exhibition

1130 – 1300 Technical Papers: Multicore

1130 to 1200 Syed Aoun Raza, Stefan Franke and Erhard Plödereder
Detecting High-Level Synchronization Errors in Parallel Programs

1200 to 1230 Fabien Chouteau and Jose Ruiz
Design and Implementation of a Ravenscar Extension for Multiprocessors

1230 to 1300 Sergio Sáez, Silvia Terrasa and Alfons Crespo
A Real-Time Framework for Multiprocessor Platforms Using Ada 2012

1300 – 1430 Lunch and Exhibition

1430 – 1600 Technical Papers: Verification

Sponsor Talks

1430 to 1500 Thierry Coq and Jean-Pierre Rosen
The SQALE Quality and Analysis Models for Assessing the Quality of Ada Source Code

AdaCore Technology Update – GNAT Pro and beyond
Michael Friess, Adacore

1500 to 1530 Dan Eilers and Tero Koskinen
Adapting ACATS to the Ahven Testing Framework

On Target Verification with Rapita Verification Suite
Andrew Coombes, Rapita Systems Ltd

1530 to 1600 Julio Medina and Alvaro Garcia Cuesta
Model-Based Analysis and Design of Real-Time Distributed Systems with Ada and the UML Profile for MARTE

SPARK Update 2011
Rod Chapman, Altran Praxis Ltd

1600 – 1630 Coffee and Exhibition

1630 – 1800 Panel Session

Sponsor & Exhibitor Talks

Programming Languages Meet Multicore

Moderator: Erhard Plödereder (University of Stuttgart)

Panellists: Alan Burns (University of York), Tucker Taft (Sofcheck, Inc), Kevin Hammond (University of St Andrews)

The advent of multicore is shaking the very foundations of programming languages for concurrency, resource sharing, synchronisation, etc. The panel will discuss topics that need to be addressed by language designers as they strive to support the move towards multicore applications and much higher degrees of concurrency in the execution of programs.

Time and Space Partitioning vs. System Complexity
Julian Day, Green Hills Software

Industrial Solutions for Developing Critical Systems and Software
Tony Elliston, Ellidiss

Verocel – The Software Verification Company
Rainer Koellner, Verocel

1800 – 1845 Ada-Europe General Assembly

1815 – 2000 Reception, Exhibition, Whisky Tasting

Wednesday 22nd June

0800 – 0900 Registration and Coffee

0900 – 0930 Ada 2012 Update

0930 – 1030 Keynote Address

Keynote Speaker: **Pippa Moore** - UK Civil Aviation Authority
Hippocrates and DO-178B

1030 – 1130 Coffee and Exhibition

1130 – 1300 Industrial Presentations: Modelling and Complexity

1130 to 1200 Sam Moody (AWE)
Executable UML Models for High Integrity Development

1200 to 1230 Jean-Charles Dalbin (Airbus)
Automatic Code Generation Tools Developed in the Ada Language in a Safety-critical Context

1230 to 1300 Frank Dordowsky (ESG Elektroniksystem- und Logistik-GmbH)
Implementing a Software Product Line for a Complex Avionics System in Ada83

1300 – 1430 Lunch and Exhibition

1430 – 1600 Industrial Presentations: Real-time and Longevity Exhibitor Talks

1430 to 1500	Santiago Urueña Pascal (GMV Aerospace) <i>Monitorisation of Real-time Properties of Certified Distributed Systems</i>	Managing Legacy Ada Software with the LDRA Tool Suite Mark James, LDRA
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1500 to 1530	Jozef Cvirik (Ipesoft) <i>Real-Time Management and Production Systems for Manufacturing and Energy Facilities</i>	Can you Afford to Build your Next High-integrity Embedded System Using a COTS Processor? Michael Pont, TTE Systems
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1530 to 1600	Frederic Pinot (Ansaldo STS) <i>Ada experience : ANSALDO Railways 'Available Safety Computer' CSD</i>	Making Life Test Better: Ada Testing with UML Derek Russell, Objektum Solutions Ltd.
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1600 – 1630 Coffee and Exhibition

1630 – 1800 Industrial Presentations: Transitioning and Debugging Exhibitor Talks

1630 to 1700	Wiljan Derks (NXP) <i>Debugging Mechatronic Applications Written in Ada</i>	Using Ada with Test Driven Development Niroshan Rajadurai, Vector Software
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1700 to 1730	Alex Deas (DeepLife) <i>The Transition from MISRA C to SPARK Ada in Active Life Support</i>	The Embedded Software Lifecycle Alex Wilson, Windriver
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1730 to 1800	Dewi Daniels (Verocel) <i>An Overview of DO-178C</i>	The Role of Human-Machine Interaction in Aviation Accidents Bernd Sieker, Causalis Limited
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1930 Pre-dinner drinks at the Signet Library, followed by the Conference Dinner

Pre-dinner Speaker: **Les Hatton** – Kingston University
On the Evolution of Unnatural Language

Thursday 23rd June

0800 – 0900 Registration and Coffee

0900 – 0930 GAP update, Educators' Session and AdaWay Prize

0930 – 1030 Keynote Address

Keynote Speaker: **Jeff O'Leary** - US Federal Aviation Administration
*Assuring Software Reliability While Using Web Services
and Commercial Products*

1030 – 1130 Coffee

1130 – 1300 Panel Session

DOI78C and Object-Orientation for Critical Systems

Moderator: Tim Kelly (University of York)

Panellists confirmed: Cyrille Comar (AdaCore), Jean-Pierre Rosen (Adalog), Dewi Daniels (Verocel), Trevor Jennings (Altran Praxis)

The high-integrity systems industry faces the challenge of reaping the benefit of object-orientation in their rigid and demanding development process. Domain experts will debate pros and cons, risks and opportunities and ways to introduce elements of object-orientation into safety-critical system development.

1300 – 1430 Lunch

1430 – 1600 Technical Papers: Architecture and Modelling Industrial Presentations: Innovation and New Markets

1430 to 1500 Andreas Johnsen and Kristina Lundqvist
*Developing Dependable Software-intensive
Systems: AADL vs. EAST-ADL2*

Phil Thornley (SPARKsure)
The Implementation of High Integrity Data Structures

1500 to 1530 Laura Carnevali, Giuseppe Lipari,
Alessandro Pinzuti and Enrico Vicario
*A Formal Approach to Design and Verification of two-
level Hierarchical Scheduling Systems*

Andrew Coombes (Rapita)
Building Software Tools in Ada: the Rapita Experience

1530 to 1600 Iago Rodríguez-López and Marisol García-Valls
*Architecting a Common Bridge Abstraction Over
Different Middleware Paradigms*

Jacob Sparre (J S Andersen)
Crimeville - Using Ada Inside an On-line Multi-user Game

1600 – 1630 Coffee

1630 – 1800 Technical Papers: Education and Mixed Criticality

1630 to 1700 Rigoberto Chil, Diego Alonso, Francisco Ortiz and Juan Ángel Pastor
Using Robotics as a Motivational Tool. An Ada Interface to a Pioneer Robot

1700 to 1730 Angel Esquinas, Juan Zamorano, Juan Antonio de la Puente, Miguel Masmano, Ismael Ripoll and Alfons Crespo
ORK+/Xtratrum: An Open Partitioning Platform for Ada

1730 to 1800 Sanjoy Baruah and Alan Burns
Implementing Mixed Criticality Systems in Ada

1800 Best presentation award and closing

Registration and Accommodation

Registration

The registration fee for the three days of the technical programme (21st to 23rd June) includes one copy of the proceedings, coffee breaks, lunches, welcome reception on the evening of Tuesday 21st June and conference dinner on Wednesday 22nd June. Registration for a single day of the technical programme includes one copy of the proceedings, two coffee breaks and lunch that day, plus attendance at the welcome reception.

	Member of Ada-Europe or ACM SIGAda or Safety-Critical Systems Club		Non-member		Student*
	Academia	Non academia	Academia	Non academia	
Early registration (payment by 23 rd May 2011)	£460	£510	£510	£570	£380
Late/on-site registration (payment after 23 rd May 2011)	£570		£630		£420
Day registration (single day)	£190		£210		£140

* Student rate

Please check the registration page at <http://www.ada-europe.org/conference2011> for the eligibility condition for student rates.

Tutorial Registration

The fee is per tutorial, including tutorial notes and coffee breaks. Lunches are only included when registered for a full day tutorial or two half day tutorials on the same day.

	Half Day	Full day or two half days
Early registration (payment by 23 rd May 2011)	£110	£220
Late/on-site registration (payment after 23 rd May 2011)	£125	£250

Registration Form

Online registration is available by following the link provided in the registration page at <http://www.ada-europe.org/conference2011>

If you prefer to register via fax or email, please download a copy of the registration form which can be found at <http://www.ada-europe.org/conference2011> and send it by: email to joan.atkinson@ncl.ac.uk; by fax to +44 (0) 191 222 7995.

No registration request will be confirmed until the payment has been processed. Substitutions will be accepted. To save on administration costs and postage, receipts will be handed out at the conference. Cancellation must always be confirmed in writing; don't forget to include all of your banking information. Refund of fees, with a deduction of £25.00 for administrative processing, will be made for cancellations received before 1st June 2011. After that date, no refunds will be possible. Refunds will be processed and paid after the Conference.

For any additional registration-related queries, please contact the registration team via joan.atkinson@ncl.ac.uk or telephone +44 (0) 192 221 2222.

Accommodation

There are a number of small hotels near the conference venue. We have an arrangement with Edinburgh Convention Bureau, who are holding rooms at a number of hotels specifically for this event. Please find details on the Accommodation page of the website at <http://www.ada-europe.org/conference2011> **Please make sure you book accommodation as soon as possible as hotels in this area tend to be extremely busy.**

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Further Information

The conference website at <http://www.ada-europe.org/conference2011> gives full and up to date details of the programme. The website also provides details of the venue, including travel advice, accommodation instructions, links to maps and Edinburgh tourism sites.

For exhibiting and sponsoring opportunities, please contact the Exhibition Chair, Joan Atkinson (email: joan.atkinson@ncl.ac.uk). A sliding scale of sponsorship provides a range of benefits. All levels include display of your company logo on the conference website and printed programme. The lowest level of sponsor support is very affordable.

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