



**11th International Conference on
RELIABLE SOFTWARE TECHNOLOGIES**

ADA-EUROPE 2006



Porto, Portugal, June 5–9, 2006

ADVANCE PROGRAM

<http://www.ada-europe.org/conference2006.html>





PRESENTATION

In 2006, the 11th International Conference on Reliable Software Technologies takes place in Porto, Portugal, from 5 to 9 of June. The conference has a number of highlights including four invited talks, a full three day technical program of referred papers, two sessions on industrial presentations, an industrial exhibition and two days of tutorials. The conference offers an international forum for researchers, developers and users of reliable software technologies. Presentation and discussions cover applied and theoretical work currently conducted to support the development and maintenance of software systems.

Porto (a.k.a. Oporto) is Portugal's second-largest city, in the heart of an area of great vitality, ideal gateway to the undiscovered North of Portugal. The city presents a rich Cultural Heritage. From the remains of Visigothic and Celtic

villages, Roman roads, bridges and Castros to Romanesque and Gothic churches and Cathedrals built during the Medieval Age, centuries of mankind-built heritage are to be discovered in and around Porto. The recognition of Porto by UNESCO (in 1996) as a World Heritage City is undoubtedly a tribute to its wealth of over two thousand years of history.

The city of Porto and its river, Douro, cannot be dissociated. The Douro valley, with its lovely terraces of vineyards clinging to the hillsides, is the kingdom of the famous Port Wine and offers visitors spectacular views.

The friendly welcoming nature of the Portuguese people, highly professional and cost-effective services are a guarantee of a successful event and will give you something to remember in the future.

OVERVIEW OF THE WEEK

	Morning	Late Morning	After Lunch	Afternoon
Monday June 5th Tutorials	William Bail <i>Verification and validation for reliable software systems</i>		Matthew Heaney <i>The Ada 2005 Standard Container Library</i>	
	Jean-Pierre Rosen <i>Developing Web-aware Applications in Ada with AWS</i>			
	Joyce L Tokar <i>SAE Architecture Analysis and Design Language</i>			
Tuesday June 6th Sessions & Exhibition	Keynote Talk: Rod Chapman <i>Correctness by Construction: Putting Engineering into Software</i>	Real-Time Systems	Static Analysis	Verification Invited Presentation: John L. Hill <i>I Have a Dream: ICT Problems We All Face</i>
Wednesday June 7th Sessions & Exhibition	Keynote Talk: Henrique Madeira <i>Empirical Software Risk Assessment Using Fault Injection</i>	Applications	Industrial Presentations	Compilers
		Reliability		
Tuesday June 8th Sessions & Exhibition	Keynote Talk: Miguel Angel de Miguel <i>Model Driven Technologies in Safe-aware Software Applications</i>	Industrial Presentations	Distributed Systems	Closing Session and Awards
Friday June 9th Tutorials	Colin Coates <i>Model Driven Development with the Unified Modeling Language (UML) 2.0™ and Ada</i>		Jérôme Hugues <i>Distribution in Ada 95 with PolyORB, A Schizophrenic Middleware</i>	
	William Bail <i>Requirements management for dependable systems</i>			
	Benjamin M. Brosgol <i>Real-Time Java for Ada Programmers</i>			

INVITED SPEAKERS

One of the conference's highlights is the invited talks from leading experts in the field:

- "Correctness by Construction: Putting Engineering into Software", Rod Chapman (Praxis HIS, UK)
- "Empirical Software Risk Assessment Using Fault Injection", Henrique Madeira (University of Coimbra, Portugal)
- "Model Driven Technologies in Safe-aware Software Applications", Miguel Angel de Miguel (Technical University of Madrid, Spain)
- "I Have a Dream: ICT Problems We All Face ", John L. Hill (Sun Microsystems, USA)

Correctness by Construction: Putting Engineering into Software



Rod Chapman,
Praxis HIS, UK
(Tuesday 6th, 9:00 - 10:00)

This presentation will look at the many problems of designing and building high-integrity software and the processes, languages and tools that are currently used.

The need to "engineer" our software implies that discipline and reasoning are required, yet most processes and languages seem to obstruct rather than assist such attempts. To help understand why, we consider the history of programming language design, and how this has shaped the way we think about software and constrained our ability to engineer it.

In this generally gloomy picture some good news can be found: the emergence of design-by-contract facilities in languages such as Eiffel and SPARK has made a strong impact in some niche areas. In those areas, we have made a rather unusual observation: customers (some having "flirted" with this week's fashionable approach) are "coming back to Ada", recognizing the language's strengths, particularly for high-integrity applications.

The presentation will close by considering why Praxis still uses (and chooses) Ada, and the role that Ada has to play in the future of high-integrity software.

Presenter

Roderick Chapman received MEng and DPhil degrees from the University of York, England in 1991 and 1995 respectively. He is currently products manager at Praxis Critical Systems, leading the design and development of the SPARK language and toolset.

Before joining SPARK team, Rod was involved in the implementation high-integrity real-time and embedded systems, including SHOLIS (the first system implemented to the Def Stan 00-55 SIL4 standard), the Lockheed Martin C130J Mission Computer, and the MULTOS CA. Rod has presented tutorials, papers and panel sessions at many conferences, including SIGAda, Ada Europe, and SSTC.

Empirical Software Risk Assessment Using Fault Injection



Henrique Madeira,
University of Coimbra,
Portugal
(Wednesday 7th, 9:00 - 10:00)

Component-based software development is a well-established practice. Even mission-critical applications, where rigorous verification and

validation is mandatory, are now using off-the-shelf (OTS) components and reusing previously developed code. An important concern in using OTS components is the impact of possible failures in these components, as OTS components are not generally designed for strict timing and/or safety-critical environments. Furthermore, the new operational conditions derived from component reuse may differ substantially from those the components were initially designed for, which may expose software faults that had not been disclosed before. Therefore, the software industry needs practical and effective methods to help estimating (and reducing) the risk of using OTS components or helping in choosing the most reliable option when alternative components are available.

This presentation describes a new methodology for experimental risk assessment based on software fault injection. The usual risk evaluation equation is used to consider specific aspects evaluated by fault injection, such as the probability of fault activation and fault impact, as well as the use software complexity metrics to estimate the probability of residual defects in software components. The injected faults emulate typical programming errors using fault injection operators derived from extensive field data study on software faults. Examples of using the proposed approach in two different systems representing realistic component-based applications developed in Java and C and using OTS components such as RTEMS real time operating system.

Presenter

Henrique Madeira is an associate professor at the University of Coimbra. His main research interests focus on experimental evaluation of dependable computing

systems, fault injection, error detection mechanisms, and transactional systems dependability, subjects on which he has authored or co-authored more than 90 papers in refereed conferences and journals. He has coordinated or participated in tens of projects funded by the Portuguese government and by the European Union. Henrique Madeira was the Vice-Chair of the IFIP Working Group 10.4 Special Interest Group (SIG) in Dependability Benchmarking from the establishment of the SIG in the summer of 1999 until 2002. He has organized several Workshops and scientific events and was the Program Co-Chair of the International Performance and Dependability Symposium track of the IEEE/IFIP International Conference on Dependable Systems and Networks, DSNPDS2004. Henrique Madeira is co-developer of several fault injection too such as RIFLE and Xception, which have been used in several universities worldwide and in space agencies such as INPE, ESA, and NASA. He is a co-founder of the company Critical Software, SA.

Model Driven Technologies in Safe-aware Software Applications



Miguel Angel de Miguel
Technical University of Madrid, Spain
 (Thursday 8th, 9:00 - 10:00)

Safety critical software components require complex development processes, and the early evaluation of software architectures is a basic mean for the reduction of safety critical software costs. In Model Driven Developments (MDD) models are on the critical path of software development. MDD assumes a sequence of development based on different types of models, in general platform independent and platform specific. But safety critical software applies some other types of models that provide support for the verification of safety characteristics. The integration of different modeling approaches reduces problems of inconsistencies and model development costs, but this integration requires the adaptation of traditional MDD model paths, and some tool integration support. MDD infrastructures (e.g. Meta Object Facilities and UML extensions) provide facilities to support the integration of safety critical modeling methods. But some improvements are needed; these improvements include the invocation of services in other tools, and solutions to interchange modeling tools components that adapt model driven facilities to domains and technologies.

Presenter

Miguel A. de Miguel is associate professor at the Technical University of Madrid, in the Telecommunications School.

He got his PhD in this university and he has collaborated as research visitor at the University of Illinois in Urbana-Champaign and INRIA and he has been working several years in Thales Research and Technology. Mr de Miguel has been chairman in some OMG standardization groups. His research interests include the description of modeling notations for the specification and development of high integrity systems, and the integration of these notations in software development cycles.

I Have a Dream: ICT Problems We All Face



John L. Hill
Sun Microsystems, USA
 (Tuesday 6th, 17:30 - 18:00)

This presentation is a call to action addressing five macro problems affecting practically every aspect of the information and communications technology industry. The inertia of the installed base of code, software quality, increasing complexity, intellectual property rights practices, and the methods of teaching software technologies each impede the progress of Mankind throughout the world. Radical improvement is needed. The presentation proceeds by making disturbing recommendations about cooperation in the marketplace, elimination of vulnerabilities in programming languages, application of high-order software development methods, innovation, and education about software.

Presenter

John Hill has spent 30 years in the Information and Communications Technology industry with the past 18 years in industry standards. He is currently employed by Sun Microsystems, where he is responsible for implementing strategies to improve the efficiency and effectiveness of ICT standardization. While with Sun Microsystems, AMP, Compaq, and Unisys, Hill obtained extensive experience in industry standards, software and hardware engineering, data processing operations, strategic marketing, and technical negotiation. He has influenced industry standards for computer programming languages and operating systems. Throughout his career, Hill has participated actively and held numerous elected positions in a wide range of standardization organizations including ECMA, JTC 1/ SC22, INCITS, JTC 1 TAG, IEEE, and VITA. Hill has received numerous awards including the 1998 National Committee for Information Technology Standards Chairman's Award, the IEEE Certificate of Appreciation (1996), and The Wall Street Journal Award in 1971 for a research paper entitled "The Economic Cost of the Oil Import Quota, 1959-1970."

TUTORIALS

Verification and Validation for Reliable Software Systems



William Bail,
The MITRE Corporation, USA
 (Monday June 5th, morning)

In the development of software systems, the role of verification and validation is often not formally recognized or applied. In fact, throughout development, the roles of construction and verification are intertwined. In this tutorial we examine the nature of V&V as applied to software systems with high expectations of dependability, and present techniques that have been shown to increase quality and dependability. Rather than being an exclusively “testing” activity, V&V consists of a wide range of practices, each with strengths and weaknesses, that support careful and considered development of software systems.

- Introduction
- Terminology
- Development life cycles
- Overview of practices
- Inspections
- Audits
- Reviews
- Testing
- Types of testing
- Levels of testing
- Special problems
- Planning for verification and validation

Presenter

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. 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, primarily 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’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. At MITRE, Dr. Bail is currently supporting the U.S. Navy, focusing on the practice of software engineering within PEO IWS (Integrated Warfare Systems), particularly as applied to large real-time systems. Prior to 1990, Dr. Bail worked at

Intermetrics Inc. in Bethesda MD. Since 1989 he has served as a part-time Adjunct Associate Professor at the University of Maryland University College where he develops instructional materials and teaches 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, and Requirements Engineering for Dependable Systems at SIGAda, AdaEurope, and other conferences.

Why you should participate in this tutorial?

This tutorial will assist in planning for complex systems development by providing a framework of verification steps that will maximize the opportunity for success with the efficient use of resources.

The Ada 2005 Standard Container Library



Matthew Heaney,
On2 Technologies, USA
 (Monday June 5th, afternoon)

This tutorial provides an overview of the standard container library, describing its design and philosophy and presenting techniques for using the library most effectively.

Containers are divided into two main categories: sequence containers, to insert elements at specified positions, and associative containers, which insert elements in order by key. The library includes vectors and lists (from the former category), and hashed and sorted sets and maps (from the latter). All containers have variants to support elements (or keys) that have an indefinite subtype. Containers have various mechanisms (including both active and passive iterators) for designating and accessing container elements.

Presenter

Matt is the author of Charles, a container library for Ada which was the basis of the proposal selected by the ARG for the Ada 2005 standard container library. He has given many Ada tutorials on topics that include object-oriented programming, design patterns, and software systems and library design. Matt was recently awarded an Outstanding Ada Community Contribution Award by SIGAda, for his work in the development of container libraries for Ada.

Why you should participate in this tutorial?

The standard container library is an important addition to the Ada language, since developers need data structures with semantics more sophisticated than simple arrays or linked lists. An array provides support for mapping an element to a discrete index subtype, but this is not really general enough, since one often needs keys of other types. The developer also needs container abstractions that scale well to large numbers of elements, with operations having predictable execution behavior. The standard container library solves these problems, thus greatly simplifying many programming tasks that would otherwise be very difficult or just plain tedious. You should attend this tutorial to learn about the standard container library, what features it provides, and how it solves typical programming problems.

Developing Web-aware Applications in Ada with AWS



Jean-Pierre Rosen,
Adalog, France
(Monday June 5th, full day)

This tutorial describes AWS, the Ada Web Server, and how to use it for the development of web-aware applications. It describes the principles of AWS, from the most basic functionality to more advanced functions (authentication, SOAP interface, session management, hotplugs, multi-server applications, etc.). The seminar emphasizes practical usage of AWS, and presents design patterns that have proved effective for developing existing applications. It compares the development process with AWS to other techniques. The tutorial provides attendees with the information needed to assess whether AWS is appropriate to their needs, and the necessary knowledge to start writing full-scale Web applications.

Presenter

J.-P. Rosen graduated from ENST in 1975, and obtained his PhD in 1986. He started as a software engineer at the computing centre of ENST. After a Sabbatical at New York University on the Ada/ED Project, he worked as Professor at ENST, where he was responsible for the teaching of Software Engineering and Ada. He has now formed Adalog, a company specialized in high level training, consultancy, and software development in the fields of Ada and OOD. J.-P. Rosen is Chairman of the AFNOR (French standardization body) group for Ada, and the author of “Méthodes de Génie Logiciel avec Ada 95” (Software Engineering Methods with Ada 95) and “HOOD: an industrial approach for software development”.

Why you should participate in this tutorial?

AWS is more than a simple Web server, it allows

incorporation of Web technology into applications where the Web interface is only part of the problem. By attending this tutorial, participants will gain in-depth understanding of the issues of Web interfaces, and will discover new solutions to common problems, like using a browser as a GUI or providing control through Web interfaces to real-time programs.

SAE Architecture Analysis and Design Language



Joyce L Tokar,
Pyrrhus Software, USA
(Monday June 5th, full day)

The Architecture Analysis and Design Language (AADL) is an architecture description language (ADL) that has been developed under the auspices of the International Society of Automotive Engineers (SAE), Avionics Systems Division (ASD) Embedded Computing Systems Committee (AS-2). The AADL was approved as an SAE standard in November of 2004. In 2005, the SAE AADL standard was extended with the approval of four annexes: Graphical AADL Notation, AADL Meta Model and Interchange Formats, Language Compliance and Application Program Interface, and the Error Model. The AADL language has been defined to provide a consistent and concise notation, both textual and graphical, to be used to develop models of complex, real-time, critical systems such as those used in automotive, avionics, medical, robotic, and space-based systems. The AADL provides the notation to perform various types of analysis of the complex critical systems. In the early stages of design, the AADL enables the definition of the preliminary connectivity between application and execution platform components. As an AADL model is developed, additional components and properties are specified. The properties provide the information needed by analysis tools to determine the behavior and performance of the system being modeled. The AADL has been designed to facilitate the development of tools that provide automatic code generation of the system both in terms of the application software components and the underlying execution environment. The AADL may be used to verify an actual system against the specified model. With automatic code generation, the AADL offers a system model that maintains significant information about a system that is useful throughout the lifetime of the system. Thus, the AADL offers support for all stages of system development.

This tutorial will provide an introduction to the AADL language from a textual and graphical perspective. It will also give some guidelines regarding the relationship between existing systems and the generation of AADL models. The tutorial will present a mapping between programming languages such as C and Ada and the AADL.

Several uses of the AADL in the design and analysis of safety-critical real-time systems will be demonstrated along with the OSATE toolset.

Attendees may learn more about AADL at www.aadl.info

Presenter

Joyce Tokar is the President of Pyrrhus Software – a software consultancy and training company. Over the past 15 years, Dr. Tokar has been working in the area of mission and safety critical, embedded software systems. She has been involved in research and development in the areas of software and systems architectures, high level computing languages such as Ada, Ada 95, C/C++, and real-time embedded technology. During this time she has co-authored the Society of Automotive Engineering (SAE) Architecture Analysis and Description Language (AADL) standard. She has written the Programming Language Annex for the SAE AADL standard. Dr. Tokar has also participated in the evolution of the Ada programming language both as a member of the team defining the Ada 05 update and as a distinguished reviewer for Ada 95. Dr. Tokar is also active in the area of secure software system development tools and environments. She provides expert witness consultation in the area of real-time embedded systems and software systems engineering. Dr. Tokar also offers training courses in AADL, SPARK, Ada, and real-time embedded systems programming.

Dr. Tokar is the Head of the US Technical Advisor Group (TAG) to ISO Working Group 9, the group that is responsible for the definition and evolution of the Ada language. She is a member of the Ada Rapporteur Group (ARG) and has served in various roles within SIGAda and the Ada9X Project. Dr. Tokar has been very active in the Ada Semantic Interface Specification Working Group (ASISWG). She has also been a regular participant in the International Real-Time Ada Working Group (IRTAWG) where she has contributed to the definition and standardization of the Ravenscar Profile; a tasking subset of Ada 95 that is suitable for use in safety critical and high integrity real-time systems. Dr. Tokar has authored a large number of papers and reports, most of which are in the areas of software & system architecture, the Ada programming language and real-time, embedded systems. Dr. Tokar is involved with a number of professional societies and committees associated with real-time, embedded systems. And, she is a mentor for the IEEE Future Cities program. Dr. Tokar has received numerous awards for her contributions including the Who's Who in Executives and Professionals 2005-2006 and the Outstanding Ada Community Contributions Award 2000 from the ACM (Assoc. for Computing Machinery) SIGAda. She has been recognized in Who's Who in Information Technology. Dr. Tokar also received the Duncan Peddie Memorial Award for her lectures at the University of Natal in Durban, South Africa.

Why you should participate in this tutorial?

This tutorial will assist programmers in developing AADL specifications and corresponding source code, and vice

versa. A program manager will learn guidelines to obtain a consistent and uniform mapping between source code and AADL specifications. A systems integrator will find the AADL tutorial useful to enable the development of software components that are acceptable for integration. A tool vendor will find this tutorial helpful when considering how to develop tools to support the development and analysis of source code and AADL models. The attendees should have an understanding of the fundamentals of the development of complex, critical real-time systems.

Model Driven Development with the Unified Modeling Language (UML) 2.0™ and Ada



Colin Coates, I-Logix, UK
(Friday June 9th, morning)

System and software development has become an increasingly complex science. With so many emerging devices, processors, systems specification languages, software implementation languages, and tools for all of these, there needs to be a common denominator in the development process that brings focus back on the application. Model-Driven Development (MDD) based on the UML has emerged as the preferred approach by a growing number of systems engineers and software developers for addressing this growing complexity. The UML has proven to be the standard visual representation language capable of providing both systems and software teams with a coherent set of interchangeable artifacts that fully describe an application with rich enough specification to be able to design and implement it in Ada. This tutorial will, through the use of worked examples, demonstrate the pros and cons of using a Model Based approach with the Ada language. It will examine how UML 2.0 concepts might be mapped into Ada code and how this process might be automated through the use of model transformation.

- Introduction to UML 2.0
- Translating UML 2.0 concepts into Ada
- UML Model-Driven Development, with special consideration of:
 - Customizable reverse engineering of legacy Ada code into a UML 2.0 model;
 - Customizable forward generation of Ada code from a UML 2.0 model.

Presenter

Colin Coates has more than twelve years experience in the discipline and craft of software engineering. He began his career cutting Ada code on military R&D projects, and continued it with working in the fields of telecommunications, air-traffic control and Internet-enabled applications. Conversant in multiple programming languages and paradigms of analysis and design, he now

applies his accumulated knowledge by working for I-Logix as a Senior Applications Engineer.

Why you should participate in this tutorial?

The tutorial will focus on areas which are of critical importance to the contemporary Ada software engineering professional. These areas are:

1. The latest standard for the Unified Modelling Language (UML), which has become the dominant software modeling notation for object oriented programming languages.
2. How to apply a UML Model-Driven Development approach, whilst preserving the unique benefits of implementing software in the Ada programming language. The tutorial will give special consideration to the twin imperatives of supporting legacy code (through reverse engineering Ada a UML model), and also controlling the automatic generation of robust, maintainable and evolving Ada code.

Distribution in Ada 95 with PolyORB, a Schizophrenic Middleware



Jérôme Hugues,
ENST, France
(Friday June 9th, afternoon)

PolyORB is the reference implementation of the "schizophrenic" middleware architecture. This innovative architecture resolves middleware-to-middleware interoperability issues: it allows seamless integration of partitions in heterogeneous distribution environments (CORBA, DSA, web services) through the collaboration of multiple colocated personalities. We first present the motivations and approaches for developing distributed applications in Ada 95.

We then focus on two application fields for PolyORB:

1. as a CORBA implementation, using the idlac IDL-to-Ada compiler, allowing integration in multi-language distributed applications;
2. as a supporting partition communication subsystem for the Ada Distributed Systems Annex (annex E), using the gnatdist partitioning tool.

We finally present the general principles of schizophrenic middleware, and show how this architecture can be leveraged to take advantage of both the CORBA and Ada DSA distribution models. We also show how it can be adapted to meet stringent application requirements, particularly in the context of embedded, real-time systems. PolyORB is developed by ENST, LIP6 and AdaCore, and supported by AdaCore. The PolyORB project is a member of the ObjectWeb consortium.

Presenter

Jérôme Hugues graduated from ENST in 2002, and got his PhD in 2005. He is now associate professor at the C/S

department of the ENST. His research domain covers distributed systems, real-time systems and the use of modeling and formal methods applied to the engineering of complex systems. As part of his research activities, he was involved in the PolyORB project since its early stage in 2002, and since he became one of its lead architects. He uses PolyORB as a proof of concept of emerging techniques in distributed systems, and contributed many enhancements to its architecture and its internals: better performance, determinism and compliance to standards, including CORBA and RT-CORBA. He also contributed to the formal verification of the inner core of PolyORB using Petri Nets. He also participates in the support and development of PolyORB in the context of an industrial partnership between AdaCore and the ENST.

Why you should participate in this tutorial?

Understanding how to build distributed applications requires a deep understanding of the involved technologies. This tutorial will describe how to write distributed applications in Ada, and how to efficiently tune it according to your application needs, understanding the link between design decisions and the underlying technology.

Requirements Management for Dependable Systems



William Bail,
The MITRE Corporation
(Friday June 9th, full day)

The demands of systems on which high expectations of dependability are placed stress the normal techniques applied to requirements engineering. These demands are exacerbated when the systems are embedded and real-time. Considerations of fault tolerance, graceful degradation, degraded performance modes, and temporal challenges (latency and synchronization) fail to be fully satisfied by normal practice. This tutorial examines these challenges and provides a set of techniques and practices that address these issues. It specifically addresses the issue of stakeholder acceptability, allowing trade-offs of various system qualities to determine overall system acceptance. The tutorial does not describe in detail any specific techniques. Rather, it describes the ways that requirements need to be handled to ensure dependability. This tutorial has been updated significantly from the version that was presented at Ada Europe 2005 by focusing on models of dependability and presenting a new model of stakeholder acceptance.

- Introduction
- Terminology
- Dependability
- Acceptability
- Source, levels, nature and types of requirements

- Requirements qualities
- Management of requirements and verification
- Special problems

Presenter (see first Tutorial)

Why you should participate in this tutorial?

If you are responsible for the development of a critical software intensive system, this tutorial will help you plan for and implement effective requirements processes, helping you to manage your requirements from inception through deployment, and assist in avoiding many of the common pitfalls that many projects have encountered.

Real-Time Java for Ada Programmers



Benjamin M. Brosgol
AdaCore, USA
 (Friday June 9th, full day)

Although the term "real-time Java" may sound self-contradictory, serious technical activity has been underway since early 1999 on extending the Java platform to satisfy the requirements for real-time systems, and several implementations exist. This work is relevant to the Ada community as both a challenge and an opportunity: on the one hand, it may compete with Ada in the real-time marketplace, but on the other hand some of its ideas may be worthy of consideration in a future version of the Ada language or as implementation-provided libraries at present. This tutorial will focus on the Real-Time Specification for Java ("RTSJ"), which was developed by the Real-Time for Java Expert Group under the auspices of Sun Microsystems' Java Community Process. The tutorial will analyze/critique the Java platform with respect to real-time support, summarize/illustrate the main elements of the RTSJ, and compare/contrast the design with Ada's real-time features (both in Ada 95 and Ada 2005). The tutorial will also describe the ongoing work in developing high-integrity profile for the RTSJ, and will provide a status update on the real-time Java work and its usage and prospects.

The proposed tutorial will be an updated version of the "Real-Time Java for Ada Programmers" tutorial that was delivered at Ada Europe 2005 and SIGAda 2005, taken into account recent developments in both real-time Java and Ada 2005.

- Introduction
 - Requirements for real-time programming
 - Background and goals of real-time Java activities
 - Summary of Java thread model
 - Critique of Java platform for real-time support
- Pervasive technical issues
 - Priority inversion management
 - Garbage collection
 - Object Oriented Programming and real-time systems

- The Real-Time Specification for Java
 - Summary
 - Concurrency, scheduling and synchronization
 - Memory management
 - Asynchrony
 - Other features
 - Comparison with "Core Extensions" from the J-Consortium
 - Comparison with Ada
 - High-integrity profile
- Conclusions
 - Status of the definition and implementation of Real-Time Java
 - Assessment of Real-Time Java
 - What Ada can learn from Real-Time Java

Presenter

Dr. Brosgol has over 25 years of experience in the computer software industry, with a focus on programming languages, software development methods, and real-time systems. He was a primary member of the Real-Time for Java Expert Group and a coauthor of the Real-Time Specification for Java. He is currently a member of the Technical Interpretations Committee for the RTSJ and has delivered Java tutorials and courses since 1997. The proposed tutorial will be an updated version of the "Real-Time Java for Ada Programmers" tutorial that he delivered at Ada Europe 2005 and SIGAda 2005, taken into account recent developments in both real-time Java and Ada 2005. Dr. Brosgol is an internationally-recognized expert on Ada. He participated in both the initial language design and the Ada 95 revision, and he is a past chairman of the ACM's Special Interest Group on Ada (SIGAda). He has published numerous papers on Ada, has delivered presentations and tutorials at many Ada Europe and SIGAda conferences, and has been conducting courses on real-time programming in Ada since the late 1980s. He was an invited keynote speaker at the 2003 SIGAda conference, where his topic was "Ada and Real-Time Java: Cooperation, Competition, or Cohabitation?" He is a senior member of AdaCore's technical staff in the US, in the Boston area.

Why you should participate in this tutorial?

- You will learn the pros and cons of the Java thread model, both in general and for real-time applications
- You will see how real-time Java addresses the apparent "show stopper" problem of garbage collection
- You will be able to judge whether real-time requirements can be met by a "pure" Object-Oriented Language
- You will understand the effect of a dynamic and flexible scheduling approach, in terms of expressibility, predictability, and performance
- You will discover who is using real-time Java, and for what sorts of applications

CONFERENCE SCHEDULE

(Preliminary)



	Tuesday 6th	Wednesday 7th		Thursday 8th
9:00 - 10:00	Keynote Talk: Correctness by Construction: Putting Engineering into Software <i>Rod Chapman, Praxis HIS, UK</i>	Keynote Talk: Empirical Software Risk Assessment Using Fault Injection <i>Henrique Madeira, University of Coimbra, Portugal</i>		Keynote Talk: Model Driven Technologies in Safe-aware Software Applications <i>Miguel Angel de Miguel,</i> <i>Technical University of Madrid, Spain</i>
10:00 - 11:00	Coffee & Exhibition	Coffee & Exhibition		Coffee & Exhibition
	Real-Time Systems	Applications	Reliability	Industrial Presentations #2
11:00 - 11:30	Hierarchical Scheduling with Ada 2005 <i>J. Pulido, S. Urueña, J. Zamorano, T. Vardanega,</i> <i>J. A. de la Puente</i>	Secure Execution of Computations in Untrusted Hosts <i>S. Narayanan, M. Kandemir,</i> <i>R. Brooks, I. Kolcu</i>	A Software Reliability Model Based on a Geometric Sequence of Failure Rates <i>S. Wagner, H. Fischer</i>	A Metamodel-based Approach to Reverse Engineer Ada Source Code into UML <i>T. Capelle, X. Sautejeau</i>
11:30 - 12:00	A Comparison of Ada and Real-Time Java for Safety-Critical Applications <i>B. M. Brosgol, A. Wellings</i>	A Systematic Approach to Developing Safe Tele-operated Robots <i>D. Alonso, P. Sanchez,</i> <i>B. Alvarez, J. A. Pastor</i>	Adaptive Random Testing Through Iterative Partitioning <i>T. Y. Chen, D. H. Huang,</i> <i>Z. Q. Zhou</i>	The Development and Deployment of a Workflow System partially written in Ada95 <i>F. Piron</i>
12:00 - 12:30	POSIX Trace Based Behavioural Reflection <i>F. Valpereiro, L. Pinho</i>	Towards developing multi- agent systems in Ada <i>G. Aranda, J. Palanca,</i> <i>A. Espinosa, A. Terrasa,</i> <i>A. García-Fornes</i>	Run-Time Detection of Tasking Deadlocks in Real-Time Systems with the Ada 95 Annex of Real-Time Systems <i>J. Cheng</i>	Parallel Graphical Processing in Ada <i>M. Ward, S. Palin, N. Audsley</i>
12:30 - 14:00	Lunch & Exhibition	Lunch & Exhibition		Lunch & Exhibition

CONFERENCE SCHEDULE

(Preliminary)



	Tuesday 6th		Wednesday 7th	Thursday 8th
14:00 - 14:30	Static Analysis Static Detection of Access Anomalies in Ada95 <i>B. Burgstaller, J. Blieberger, R. Mittermayr</i>	Vendor Session I	Industrial Presentations #1 Developing Reliable Software Rapidly <i>D. N. Kleidermacher</i>	Distributed Systems Replication-Aware Transactions: How to roll a transaction over failures <i>M. Sharifi, H. Salimi</i>
14:30 - 15:00	One Million (LOC) and Counting: Static Analysis for Errors and Vulnerabilities in the Linux Kernel Source Code <i>P. T. Breuer, S. Pickin</i>	TBD	Publisher Framework (PFW) <i>J. Klein, D. Sotirovski</i>	The Arbitrated Real-Time Protocol (AR-TP): A Ravenscar Compliant Communication Protocol for High-Integrity Distributed Systems <i>S. Urueña, J. Zamorano, D. Berjón, J. Pulido, J. A. de la Puente</i>
15:00 - 15:30	Bauhaus - a tool suite for program analysis and reverse engineering <i>A. Raza, G. Vogel, E. Plödereder</i>		Assessment of Lane Recognition Systems <i>D. Dickmanns, H. Graef, M. Anderschitz</i>	Interchangeable scheduling policies in real-time middleware for distribution <i>J. L. Campos, J. J. Gutierrez, M. G. Harbour</i>
15:30 - 16:00	Coffee & Exhibition		Using CORBA to Bring New Life to Legacy Ada Software <i>J.-C. Mahieux</i>	Coffee & Exhibition
16:00 - 16:30				Closing Session & Awards
16:30 - 17:00	Verification SPARK Annotations within Executable UML <i>D. Curtis</i>	Vendor Session II	Coffee & Exhibition	
17:00 - 17:30	Runtime Verification of Java Programs for Scenario-Based Specifications <i>L. Xuandong, W. Linzhang, Q. Xiaokang, L. Bin, Y. Jiesong, Z. Jianhua, Z. Guoliang</i>	TBD	Compilers Abstract Interface Types in GNAT: Conversions, Discriminants, and C++ <i>J. Miranda, E. Schonberg</i>	
17:30 - 18:00	Invited Presentation: I Have a Dream: ICT Problems We All Face <i>John L. Hill, Sun Microsystems</i>		Using Mathematics to Improve Ada Compiled Code <i>W. D. Maurer</i>	
18:00 - 18:30	Ada-Europe General Assembly			
Port Wine Cellar Visit & Reception			Banquet	

TUTORIAL SCHEDULE

Monday June 5th	T1	Morning	William Bail <i>Verification and validation for reliable software systems</i>
	T2	Afternoon	Matthew Heaney <i>The Ada 2005 Standard Container Library</i>
	T3	Full day	Jean-Pierre Rosen <i>Developing Web-aware Applications in Ada with AWS</i>
	T4	Full day	Joyce L Tokar <i>SAE Architecture Analysis and Design Language</i>
Friday June 9th	T5	Morning	Colin Coates <i>Model Driven Development with the Unified Modeling Language (UML) 2.0™ and Ada</i>
	T6	Afternoon	Jérôme Hugues <i>Distribution in Ada 95 with PolyORB, A Schizophrenic Middleware</i>
	T7	Full day	William Bail <i>Requirements management for dependable systems</i>
	T8	Full day	Benjamin M. Brosgol <i>Real-Time Java for Ada Programmers</i>

Morning tutorial sessions will start at 9:30 and end at 13:00. Afternoon sessions will start at 14:00 and end at 17:30. There will be coffee breaks at 11:00 - 11:30 and at 15:30 - 16:00.

EXHIBITION

The exhibition will open in the mid-morning break on Tuesday and run continuously until the end of the afternoon break on Thursday. It takes place in a room next to the conference rooms. The coffee breaks are held in the

same exhibition area. Breaks Tuesday–Thursday are one hour to allow the attendees a comfortable visit to the exhibition.

GUIDE TO THE SOCIAL PROGRAM

Reception

Tuesday we will be happy to welcome you to one of the most historical and famous places in Porto – Caves Calém Port Wine Cellars. There you will be able to discover Port wine and all its history. You will be given the opportunity to know its evolution through out the years as well as the region where it is produced and the way it is obtained.

After this visit we will enjoy a cocktail reception in a renewed Caves Calém cellar. These cellars are located in one of the most beautiful areas of Vila Nova de Gaia, right by the Douro River side overlooking the world known Ribeira. We hope you will enjoy your visit!

Conference Banquet

The Wednesday banquet will take place in the "Salão Nobre" (noble room) of the "Alfândega" building, Porto's former Customs House. Beautifully located near the Douro river mouth, its construction remotes to the second half of the 19th century (1860). Its architecture includes stone arches and columns, iron columns, brick vaults and heavy wooden structures. The building was restored by a famous Portuguese architect - Souto Moura - in 1998.

Its location in the historical centre of Porto, the proximity to Douro River, its dimension and singular architecture, are some of the attributes that make this a unique place.

Additional tickets for the reception and for the banquet can be purchased at registration.



REGISTRATION AND ACCOMMODATION

Conference Registration

The registration fee for the three days of the technical program (June 6th - June 8th) includes one copy of the proceedings, coffee breaks, lunches, reception on Tuesday June 6th evening and banquet on Wednesday 7th evening. The registration fee for a single day of the technical program includes one copy of the proceedings, coffee breaks, and lunch for the day of the registration.

	Member of Ada-Europe or ACM SIGAda		Non-member	
	Non academia	Academia	Non academia	Academia
Early registration (by May 12th)	530 €	470 €	590 €	530 €
Late/on-site registration (after May 12th)	590 €	590 €	650 €	650 €
Individual registration (per day)	270 €	270 €	300 €	300 €

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 on the same day
Early registration (by May 12th)	120 €	230 €
Late/on-site registration (after May 12th)	150 €	290 €

No registration request will be confirmed until the payment has been processed. Cancellations must be given in writing. A cancellation fee of 120 € will be applied to all cancellations. No refunds will be given for cancellations received after the 22nd of May. Substitutions will be accepted. To save on administrative costs and postage, receipts will be given out at the conference.

For latest information see the web page at <http://www.ada-europe.org/conference2006.html>. For additional information, please contact the Ada-Europe 2006 Local Chair: **Sandra Almeida**, Tel: +351 22 8340502, Fax: +351 22 8340509, E-mail: salmeida@dei.isep.ipp.pt.

Accommodation

We have negotiated specially reduced rates at hotels in nearby the conference. Please consult the conference website for information. Please book accommodation as soon as possible. Porto will be very busy in that week.

Please return this form by fax to
+351-228340509 or by mail to the Ada-
Europe 2006 Local Chair:
Sandra Almeida,
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4200-072 Porto
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Participant Registration Form

11th International Conference on Reliable Software Technologies –
Ada-Europe 2006

5-9 June 2006, Porto, Portugal

<http://www.ada-europe.org/conference2006.html>

Please use block capitals

Participant Ms Mr Title: _____

First name: _____ Last name: _____

Affiliation/Organization: _____

Address: _____

City: _____ State: _____

Country: _____ Zip/Postal code: _____

Phone: _____ Fax: _____ Email: _____

Special requirements (e.g. diet): _____

Reduced registration fee

Member Ada-Europe; national organization _____ Academia

Member ACM; membership number _____

Additional Comments: _____

Registration time: Early registration (by May 12th) Late or on site (after May 12th)

Registration Fees (see table on Ada-Europe 2006 webpage <http://www.ada-europe.org/conference2006.html>)

Conference registration fee

Three days registration: _____ EUR

Individual days (Tue Wed Thu): _____ EUR

Tutorial registration (please indicate the tutorials for which you want to register):

Monday, June 5th T1 T2 T3 T4

Friday, June 9th T5 T6 T7 T8

Tutorial registration fee: _____ EUR

Extra banquet tickets (@ 65 EUR each): _____ EUR

Extra proceedings (@ 30 EUR each): _____ EUR

Total Payment Due: _____ EUR

Payment method

By credit card Visa Mastercard American Express

Card Number: _____ Expiration date: _____

Cardholder Name: _____ CVC (1): _____

Signature: _____ Date: _____

By bank transfer (2), to account number (IBAN) PT50003501030001570683012 of *Instituto Superior de Engenharia do Porto*. The account is from the bank *Caixa Geral de Depositos*, with bank identifier CGDIPTPL (Please attach a copy of the bank draft to this form).

By check (2), for _____ EUR, made payable to *Instituto Superior de Engenharia do Porto*.

(1) Card Validation Code: With American Express the CVC appears as a separate 4-digit code printed on the front of your card. For all other cards (Visa, MasterCard), the CVC-code is the final 3 digits of the number printed in the signature strip on the reverse of your card.

(2) Please make checks or bank transfers in Euro. Payments in other currencies will not be accepted.



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The organizers thank the exhibitors and supporters of the conference (preliminary list):



Springer Verlag will publish the proceedings of the conference, as vol. 4006 of Lecture Notes in Computer Science

