# SIGAda 2005

## Annual International Conference

### 13-17 November 2005

### DoubleTree Hotel – Atlanta/Buckhead

### Atlanta, Georgia USA

Hosted by the

Southern Polytechnic State University,

School of Computing and Software Engineering

and the

TSYS Department of Computer Science, Columbus State University

# FINAL PROGRAM

Sponsored by ACM SIGAda

in cooperation with SIGAPP, SIGCAS, SIGCSE, SIGPLAN, SIGSOFT,

Ada-Europe, and Ada Resource Association

# Welcome to SIGAda 2005 from the SIGAda, Conference, and Program Committee Chairs

Welcome to the 2005 Annual International Conference of ACM's Special Interest Group on Ada (SIGAda), being held for a second year in Atlanta, Georgia, USA. The Buckhead area of Atlanta is also a marvelous place to hold a conference as it has pleasant weather in November facilitating technical discussions in a congenial environment.

We offer you a conference featuring a top-quality technical program focused on important strengths of Ada: distributed, real-time, and embedded systems. The visions of these systems reflected in Ada's original requirements in the 1970s have expanded in almost unimaginable ways with Ada 95 implementations, and continue to be objects of envy by those in the programming language community who understand what the strengths of a language bring to implementers in terms of efficiency, reliability, and effectiveness. Software challenges remain dominant in these domains with rapid hardware advances. Most other languages fail to meet the needs identified as far back as the 1976 Steelman, being able at best to do only ¾ of the needed functions while Ada performs over 95%. Ada's track record of reliability, efficiency, robustness and all-around success is unparalleled at solving real-time and/or distributed system challenges. Ada is used in space/satellite systems, most modern jetliner avionics, high-speed ground transportation systems, and battle automation systems. As such, it is an important part of the world's economies and defenses.

Three days of technical papers, keynotes, and invited presentations will report how these successes are achieved and where remaining issues are leading. We are fortunate to have leaders in the software engineering community to provide keynote addresses to set the tone for our conference.

We are also fortunate to have special presentations which will give you an opportunity to find out how Ada continues to evolve to meet our future requirements, to result in Ada 2005.

Beyond the formal conference of selected papers and presentations, SIGAda 2005 offers workshops and tutorials with the same duality of on-theme and complementary topics. SIGAda's tutorials provide full-day or half-days on selected topics to enhance one's professional development. SIGAda's workshops allow those working the same issues to share with each other and leverage everyone's accomplishments; workshop products are "delivered" to the community.

The broad offerings of career-enhancing tutorials include basic Ada 95 introductions for software engineers new to Ada, intermediate and advanced Ada topics for practitioners striving to expand their Ada expertise, and several language-independent technology topics. These topics are often coupled with Ada technology because only Ada's full and complete definition allows one to indicate what is expected, and to show that it can be achieved. Join us in understanding how these topics mutually support the disciplined development and evolution of serious, high quality software systems.

Finally, we hope SIGAda 2005 provides you an outstanding opportunity for rewarding affiliation with colleagues in industry, academia, and government - discussions "in the hall," informal meal-time meetings, and even during the more relaxed moments we make for socializing in this wonderful southern city. If you don't realize it already, you will learn that these associations can be as valuable as the technical program at professional conferences, and often extend the experience after you return home.

We take this opportunity to thank our Corporate Sponsors as they participate in this year's SIGAda Conference. Our Platinum sponsors are Microsoft and AdaCore. Our Silver sponsors are I-Logix, Verocel, and TNI-Europe. Also exhibiting is LDRA Software Technology, and Integrated Computer Solutions Incorporated.

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**SUNDAY, NOVEMBER 13**

9:00am – 5:30pm      Tutorials

**MONDAY, NOVEMBER 14**

8:30am – 5:00pm      Tutorials

7:00pm – 11:00pm    SIGAda Extended Executive Committee Meeting

**TUESDAY, NOVEMBER 15**

9:00am – 6:00pm      Technical Program (see page 3)

10:30am – 4:00pm    Exhibits

7:00pm – 9:00pm      Conference Reception

**WEDNESDAY, NOVEMBER 16**

8:30am – 3:30pm      Technical Program (see page 4)

10:30am – 2:00pm    Exhibits

4:00pm – 11:00pm    Workshops/BoF/Working Groups Meeting Sessions (see page 5)

**THURSDAY, NOVEMBER 17**

8:30am – 1:00pm      Technical Program (see page 4)

## SIGAda 2005 Check-in/Registration in the Conference Center

An hour **before** the opening of Tutorials / Sessions plus other times/places as posted. Most check-in will be at the ballroom foyer (see map on page 8)

# Keynote Speakers

## *Faster Than a Speeding Bullet*

**Jim V. Leonard**
Boeing Corporation

I will review my experiences with computers and software over my lifetime, starting out with some of my memories as a kid before WW II, where the fastest thing I knew was Superman.

During that time, the first computer was being envisioned, using electromechanical relays that filled a several story building. ENIAC, I believe, was the name. My next experience was in college at Akron University, where we had a Bendix G-15 Computer; it was about the size of a refrigerator. In graduate school at Washington University-St. Louis, I was in a class taught by Dr. Jerry Cox. The class designed and had built a digital computer known as the 4W2 (Four Week Wonder). Although housed in a standard 19" rack, this may have been the world's first "personal" computer. It was patterned after the LINC-11 (Laboratory Instruction Computer). I spent that summer of 1965 writing programs in machine language for this computer. Working at McDonnell-Douglas at the same time, I was involved in a spacecraft program in which we used an intervolometer to sequence events. It wasn't until later that I was on another program that used a digital computer.

The remainder of the speech will involve my experiences with an existing program that utilizes Westinghouse assembly language and then Ada as a design language; I will conclude with some thoughts on the future of programming.

## *Ada in the Avionics Industry*

**George Romanski**
President, Verocel Inc.

All systems installed on aircraft are classified based on the effects they may have on safety. As the systems have become more computerized, Ada has a role to play. Ada has been used successfully in the past, continues to be used at present and is expected to be used in the future. The key components of Ada's success in the avionics industry will be examined.

The market is changing and platforms are changing. It is a critical time not to get left behind.

Mr. Romanski has specialized in the production of software development environments for the past 35 years. His work has focused on compilers, cross compilers, run-time systems, and tools for embedded real-time applications. Mr. Romanski was Vice President of Technology at EDS/Scicon (XD-Ada), Vice President of Engineering at Alsys (Alsys-Ada), and Director of Safety Critical Software at Aonix (C-SMART, Raven). Since 1992, he has concentrated on software for safety critical applications. In 1999, he co-founded Verocel, Inc., a company that specializes in safety critical software certification, for systems programmed in Ada and other languages.

# Conference Schedule

## TUTORIAL PROGRAM

**Notes:**
   (1) Sunday tutorials are held in Lenox and Piedmont A.
   (2) Monday tutorials are held in Peachtree A, Peachtree B, and Chastain

### Sunday, November 13

#### Full-Day Tutorials (9:00am – 5:30pm)

**SF1 An Introduction to Ada 95 for Programmers**
[Lenox Room]
*David A. Cook (AEgis Technologies Group, Inc.)*
*Eugene W.P. Bingue (Independent Consultant)*

**SF2 The SAE Architecture Analysis and Design Language**
[Piedmont A Room]
*Joyce Tokar (Pyrrhus Software, Inc.)*

### Monday, November 14

#### Full-Day Tutorials (8:30am – 5:00pm)

**MF1 Real-Time Java for Ada Programmers**
[Chastain Room]
*Ben Brosgol (AdaCore)*

#### Morning Tutorials (8:30am – 12:00 noon)

**MA1 Systems Engineering and the Impact of Computer Language Selection on it**
[Peachtree A Room]
*Richard Conn (Independent Consultant/IEEE-CS CSDP)*

**MA2 Real-time and Parallel Processing in Ada 95**
[Peachtree B Room]
*Eugene W.P. Bingue (Independent Consultant)*
*David A. Cook (AEgis Technologies Group, Inc.)*

#### Afternoon Tutorials (1:30 – 5:00pm)

**MP1 A#: Programming PDAs and .NET devices with Ada**
[Peachtree A Room]
*Martin C. Carlisle (US Air Force Academy)*

**MP2 PolyORB: A Schizophrenic Middleware**
[Peachtree B Room]
*Thomas Quinot (AdaCore)*

#### Evening Activites (7:00pm – 11:00pm)

**SIGAda Extended Executive Committee (EEC)**
**Meeting in Piedmont A**
**(Open to all)**

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**SIGAda 2005 Exhibitors are in**
**Peachtree Ballroom C**
Tuesday: 10:30am – 4:00pm
Wednesday: 10:30am – 2:00pm

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## CONFERENCE

**Note: All conference sessions will be held in Peachtree Ballroom A and B**

### Tuesday, November 15

**9:00-10:30am**

Greetings from SIGAda and Conference Officers

Welcome

**Keynote Address:**
**Ada in the Avionics Industry**
George Romanski *(Verocel)*

#### (10:30 - 11:00am) Morning Break - Exhibits Open

**11:00am - 12:30pm**

**Scheduling and Memory Requirements Analysis with AADL**
*Frank Singhoff (University of Brest, France),*
*J. Legrand (University of Brest, France),*
*L. Nana (University of Brest, France), and*
*L. Marcé (University of Brest, France)*

**Modeling SPARK Systems with UML**
Xavier Sautejeau

**Optimizing the SPARK Program Slicer**
*Lt Col Ricky E. Sward (US Air Force Academy) and*
*Lt Col Leemon C. Baird III (US Air Force Academy)*

#### (12:30 – 2:00pm) Mid-day Break and Exhibits

**2:00 - 3:30 pm**

**Using ASIS to Generate C++ Bindings**
*Howard Ausden and Karl Nyberg*

**AdaCore Vendor Presentation**
*Edmond Schonberg(AdaCore)*

**Experimental Performance Analysis of Ada Programs in Cluster Systems**
*Imad Salah (University of Jordan, Jordan),*
*Alexandr Korochkin (National Technical University, Ukraine), and Dmitry Korochkin (National Technical University, Ukraine)*

#### (3:30 – 4:00pm) Afternoon Break & Exhibits

**4:00 - 6:00pm**

**Experiences Using SPARK in an Undergraduate CS Course**
*Anthony S. Ruocco*

**The Implementation of Ada 2005: Synchronized Interfaces in the GNAT Compiler**
*Javier Miranda (University of Las Palmas de Gran Canaria), Edmond Schonberg (New York University), and Hristian Kirtchev*

**Temporal Skeletons for Verifying Time**
*Gustaf Naeser, Kristina Lundqvist, and Lars Asplund*

**I-Logix Vendor Presentation:**
**"Model Driven Development for Ada Applications with Rhapsody"**
*Marty Bakal(I-Logix)*

#### (6:00pm) Adjourn

**7:00 – 9:00pm**

**Conference Reception in Savannah Room**

**Join your fellow conferees for some relaxation & stimulating discussion. Featuring an array of Hors d'oeuvres, carving station, cash bar, and more.**

**SIGADA 2005** (vertical text, left margin)

## CONFERENCE
### (continued)
*Note: All conference sessions will be held in Peachtree Ballroom A and B*

### Wednesday, November 16

| 8:30 - 9:00am | **Announcements**<br><br>**SIGAda Awards** |
|---|---|

| 9:00 - 10:30am | **Affordable Applications of Formal Methods to Software Engineering**<br>*James F. Davis (University of Maryland)*<br><br>**SafetyChip: A Time Monitoring and Police Device**<br>*Gustaf Naeser and Lars Asplund*<br><br>***Microsoft Vendor Presentation***<br>*Bindia Hallauer(Microsoft)* |
|---|---|

**(10:30 – 11:00am) Morning Break and Exhibits**

| 11:00am - 12:30pm | **Orchestrating Shots for the National Ignition Facility (NIF)**<br>*David Mathisen, Greg Bowers, Robert Carey, Jerome Krammen, Randy Sanchez, and Eric Stout*<br><br>**AspectAda — Aspect Oriented Programming for Ada95**<br>*Knut Pedersen and Constantinos Constantinides*<br><br>**Verocel Vendor Presentation:**<br>*"Safety Critical Ada in an ARINC 653 Environment"*<br>*George Romanski(Verocel)* |
|---|---|

**(12:30 – 2:00pm) Mid-day Break and Exhibits**

| 2:00 - 3:30pm | **Data Sharing Between Ada and C/C++**<br>*Matt Mark*<br><br>**A Comparison of CORBA and Ada's Distributed Systems Annex**<br>*Andrew Berns*<br><br>**TNI Europe Vendor Presentation:**<br>*"STOOD - AADL 1 and UML 2"*<br>*Tony Elliston (TNI Europe)* |
|---|---|

**(3:30 – 4:00pm) Afternoon Break**

| 4:00 - 6:00pm | **APIWG plenary, Birds of a Feather**<br>*Geoff T. Smith (AdaCore)(see page 5)*<br><br>**AdaCore's GNAT Academic Package**<br>*Edmond Schonberg (AdaCore)(see page 5)* |
|---|---|

**(6:00 – 7:30pm) Evening Break**

| 7:30 - 11:00pm | **Visual Studio 2005**<br>*Bindia Hallauer (Microsoft)(see page 5)*<br><br>***Agile and CMMI methodologies revolving around Microsoft Solutions Framework Version 4***<br>*Bindia Hallauer (Microsoft)(see page 5)*<br><br>**Commercializing Ada**<br>*Robert C. Leif (Newport Instruments)(see page 5)*<br><br>***Birds of a Feather(BoF) Sessions****(see page 5)* |
|---|---|

### Thursday, November 17

| 8:30 – 9:15am | **Keynote Address:**<br>**Faster Than a Speeding Bullet**<br>*James Leonard (Boeing)* |
|---|---|

**(9:15 – 9:30am) Morning Break**

| 9:30 -11:00am | **Ada 2005 Session**<br>*Pascal Leroy (IBM Rational (France); Chair of the WG9 Ada Rapporteur Group)* |
|---|---|

**(11:00 – 11:30am) Morning Break**

| 11:30am - 1:00pm | **Ada 2005 Session (continued)**<br>*Pascal Leroy (IBM Rational (France); Chair of the WG9 Ada Rapporteur Group)* |
|---|---|

**(1:00pm) Closing Comments & Conference Adjournment**

## Ada 2005 Session

The Ada language standard is being revised, under the auspices of the International Organization for Standardization (ISO), in order to support the evolving needs of the Ada community and to incorporate relevant advances in programming language technology since the introduction of Ada 95 over ten years ago. Known as Ada 2005, the revised language is expected to be approved by ISO some time next year, and many of its features are already implemented, or may soon be available, from Ada vendors.

Ada 2005 offers improvements in many areas:

Comprehensive support for real-time and high-reliability applications (such as the Ravenscar Profile, new task dispatching policies, and execution-time clocks)

Enhanced Object-Oriented Programming features (such as Java-like interfaces and traditional object.operation notation) and an abstraction mechanism that combines OOP and concurrency (synchronized interfaces)

Generalized program structure and visibility control (such as "mutually dependent" package specifications and more usable limited types)

Better access type facilities (such as access-to-constant parameters and allowance of nested subprograms as run-time parameters)

Standardization of some vendor-supplied pragmas that came into common use for Ada 95 (such as Unchecked_Union and Assert)

Extensions to the predefined environment (such as the container library, time/date manipulation, and directory operations)

Other enhancements (such as 32-bit characters).

Participants will include key contributors to the Ada revision: Pascal Leroy (IBM Rational), Tucker Taft (SofCheck), and John Barnes(independent consultant). They are members of WG9, the ISO Working Group responsible for Ada language maintenance. This session will provide a technical overview of the new Ada 2005 facilities.

# Workshops/Birds of a Feather/ Working Group Meetings

Focused workshops are important in evolving Ada technology to better meet the needs of the Ada community. While there is no charge to attend **Workshops**, all participants must be registered for at least one full day of the conference. Listed below are workshops already organized at SIGAda 2005.

Conference attendees interested in forming a **Birds of a Feather** (BOF) get-together with colleagues or who would like to organize a **Working Group** meeting with those who share an interest, should post BOF proposals on the main conference bulletin board, stating topic, objective or issues, and organizer's name. Schedule and time/room assignments will be finalized Wednesday afternoon.

*Please check bulletin boards and registration materials at the conference for late additions/changes to this list, including possible BOFs*

| Time | Workshop/Birds of a Feather | Orgainizer | Room |
|---|---|---|---|
| 4:00 – 5:00pm | Ada Application Programming Interfaces (API) Management | Geoff T. Smith | |
| 5:00 – 6:00pm | AdaCore's GNAT Academic Package | Edmond Schonberg | |
| 7:30 – 10:00pm | *(Light snacks provided at this 2-part BOF, courtesy of Microsoft)* Visual Studio 2005 Agile and CMMI methodologies revolving around Microsoft Solutions Framework Version 4 | Bindia Hallauer | Piedmont A |
| 10:00 – 11:00pm | Commercializing Ada | Robert C. Leif | |

**Ada Application Programming Interfaces (API) Management**
*Geoff T. Smith*


**AdaCore's GNAT Academic Package**
*Edmond Schonberg*

This session will provide an update on the implementation of the new language standard in GNAT, as well as a summary of AdaCore's GNAT Academic Program ("GAP").

AdaCore has been actively involved in the implementation of Ada 2005, and most of the features of the upcoming standard are now available in GNAT releases. We will provide a survey of these features and describe the roadmap for the full implementation of Ada 2005 in the GNAT technology.

GAP is an AdaCore initiative to promote Ada in academia by making the GNAT development environment available to professors and their students. The GAP program now has more than 80 colleges and universities worldwide enrolled as participants. Thanks to the implementation of Ada 2005 features in the GAP release, educators can present Ada at its best, in the context of contemporary language design.


**Visual Studio 2005**
*Bindia Hallauer*


**Agile and CMMI methodologies revolving around Microsoft Solutions Framework Version 4**
*Bindia Hallauer*

This BOF will compare and contrast different approaches to improving the reliability of software-intensive products. The approaches that will be covered are:

1. the Microsoft Solutions Framework and Trustworthy Computing
2. the SEI's CMM, the Team Software Process, and the Personal Software Process
3. Extreme Programming

Representatives from both Microsoft and SEI are expected to attend. In addition, various materials will be handed out.


**Commercializing Ada**
*Robert C. Leif*

This workshop will cover the current status of various markets (military, medical, etc.), copyrights and their suitability for Ada (e.g., GPL), and the combined usage of Ada and XML. In addition, a presentation on the

# Acknowledgments

## A Deep Appreciation to the
## 2005 Program Committee

## A Hearty "Thank You" to the
## 2005 Conference Committee

SIGADA 2005

# Conference Center and Meeting Rooms Map

**DOUBLETREE HOTEL ATLANTA-BUCKHEAD - MAIN LEVEL**

PEACHTREE BALLROOM

C    B    A

DAVIDSON BOARDROOM

prefunction space

PIEDMONT ROOM

B    A

LENOX ROOM

**DOUBLETREE HOTEL ATLANTA-BUCKHEAD - TERRACE LEVEL**

CHASTAIN ROOM

BROOKHAVEN ROOM
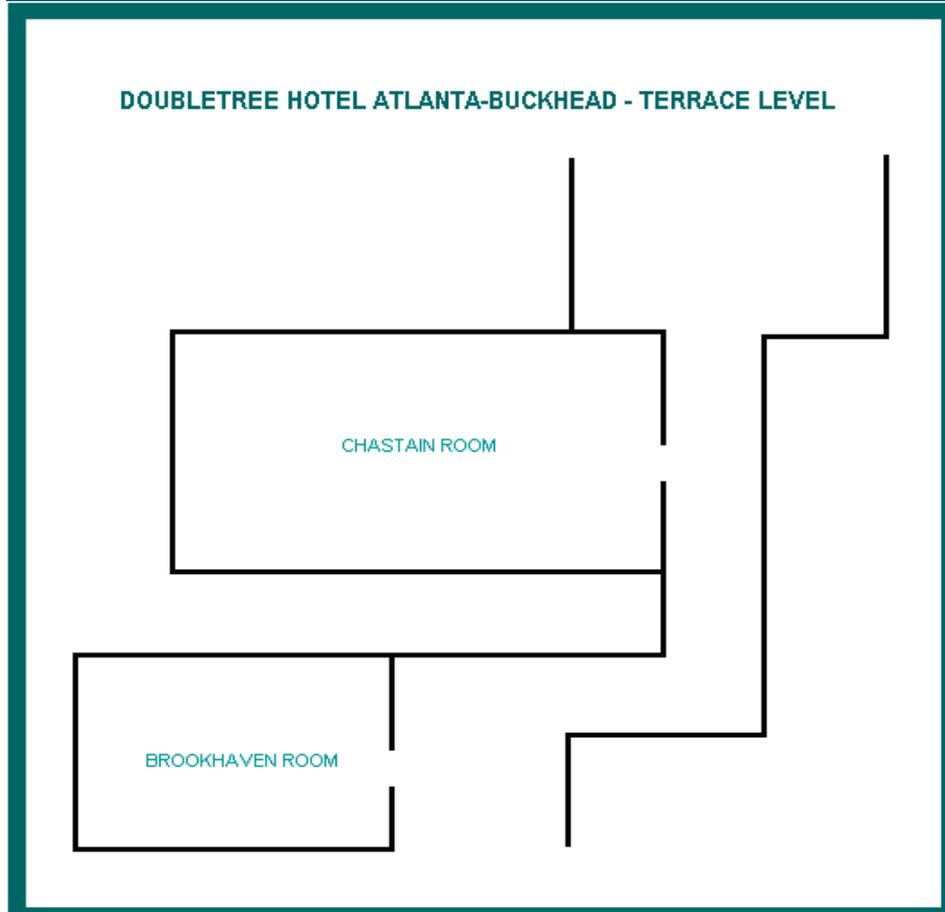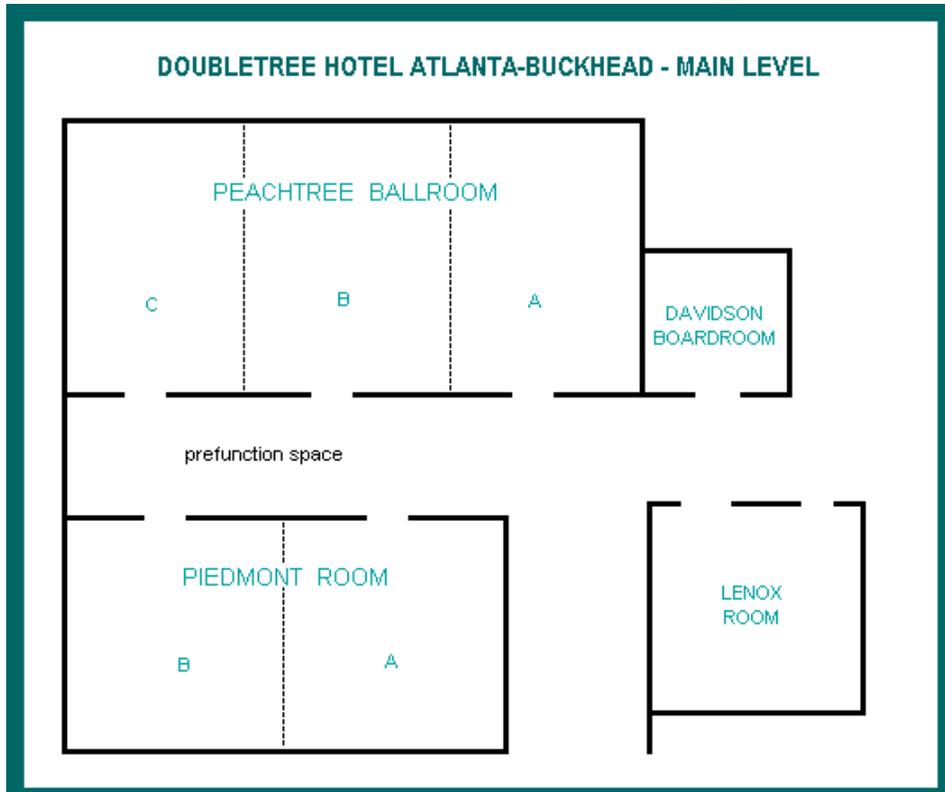
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