Your gateway to Ada—
the right choice for reliable software

Tri-Ada’97
CONFERENCE
The annual meeting of the Ada programming world
Adam’s Mark Hotel, St. Louis, Missouri
November 9 - 13, 1997

FINAL PROGRAM
From the Conference Chair

In an annual tradition of some standing, members of the government, industry, and academic communities have come together for a forum of discussions, presentations, workshops, panels, vendor presentations, and informal meetings, of which the principal focus has been Ada. For the past eleven years, these conferences have been known as Tri-Ada, in keeping with their tri-partite constituencies.

The Tri-Ada ’97 conference is set to take place in St. Louis, MO, November 9-13, 1997. Once again, the conference is sponsored by the ACM Special Interest Group for Ada, SIGAda. Also this year, Tri-Ada is being held in cooperation with three other ACM SIGs - SIGPLAN (Programming Languages), SIGSOFT (Software Engineering), and SIGCSE (Computer Science Education) - and Ada Europe.

This has been an eventful year for Ada. The 1996 National Research Council report on Defense Department programming language policy made several significant recommendations, which - upon implementation - have changed the way in which the language is viewed by the DoD, and the world. The replacement of the “mandate” for the use of Ada in DoD programs with Software Engineering Plan Reviews for the determination of the suitability of programming languages, and the elimination of the waiver process have forever altered the playing field. Ada must now stand on its own merits. To elaborate upon the decision he made as Assistant Secretary of Defense, we have arranged to have Lt. Gen. (Retired) Emmett Paige, Jr. as the Principal Keynote Speaker to open the conference.

Without detracting from the larger view of the conference program presented in the following pages, let me say that none of these events could have happened without the support and cooperation of the conference committee, and the advice of past conference chairs and SIGAda officers. Their unstinting efforts have made Tri-Ada ’97 possible. It is entirely fitting, therefore, that I here express my most sincere thanks to each and everyone of them, the program committee, and all who have contributed to the conference.

In closing, I want to welcome each of you to St. Louis, and invite you to explore and enjoy the collaboration of presenters and participants who have gathered here for the Tri-Ada ’97 conference and exposition.

David F. Harrison
Conference Chair, Tri-Ada ’97
Harris Technical Services Corporation
Fairview Heights, IL

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Keynote Speakers

The New Course for Ada in the DOD
Lieutenant General Emmett Paige, Jr., US Army (ret.),
President and Chief Operating Officer, OAO Corporation
Tuesday, November 11, 9:00 AM - 9:45 AM

As most in the Ada community are well aware, the Department of Defense had the National Academy of Sciences, National Research Council Computer Science and Telecommunications Board perform a study of DOD software policies. Emmett Paige, who as Assistant Secretary of Defense was involved with commissioning the study, will explain why he deems the study a good one. He has initiated action to accept and implement all of the study recommendations, with one exception. The DOD will no longer require Ada for any of its systems but will continue to support it as the preferred language, particularly for weapon systems and C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance) systems. By doing this, the DOD has removed a contentious policy from its software process. Furthermore, the Department has set out to achieve desired software results through other recommendations (such as the requirement for a software engineering plan) that do not involve mandating any particular programming language. Those results sought include, but are not limited to: 1. Reliability 2. Maintainability 3. Standardization 4. Reuse

This policy change represents both challenges and opportunities. The NRC Report reaffirmed the advantages Ada offers in high-assurance, high-reliability software. But removing the Ada Mandate challenges program managers to determine the engineering requirements of their programs before making programming-language decisions. As noted in the NRC Report, Ada will be a very competitive choice for many military applications. Opportunities exist for Ada vendors who can make the engineering case for Ada to program managers. The challenge for program managers is, then, not to use Ada to satisfy a policy requirement, but to use Ada where it makes engineering sense.

The Lieutenant General (Retired) Emmett Paige, Jr., has come a long way since enlisting in the US Army in August 1947. At that time, he was 16 and a high-school dropout. By 1993, General Paige was confirmed by Congress and appointed by the President as the Assistant Secretary of Defense for Command, Control, Communications and Intelligence. His is one of the world’s most distinguished careers in defense-related data communications and communications electronics.

Paige had already completed the Signal Corps Officers Candidate School by 1952 and was commissioned a 2nd Lieutenant. During his career, General Paige would go on to command the 361st Signal Battalion in Vietnam and the 11th Signal Group at Ft. Huachuca, AZ. In 1976, he was promoted to Brigadier General and given command of both the US Army Communications-Electronics Engineering and Installation Agency at Ft. Huachuca and the US Army Communications Systems Agency at Ft. Monmouth, NJ. Paige eventually commanded the US Army Communications Research and Development Command, the US Army Electronics Research and Development Command, and the US Army Information Systems Command.

One of Paige’s most challenging military jobs was as Project Manager of the Integrated Wide Band Communications System installed in Southeast Asia. This was the largest communications system ever installed in a combat environment. By the time he was summoned for his current DOD Assistant Secretary position, he was retired from the Army and serving as President and Chief Operating Officer of OAO Corporation, an Aerospace and Information Systems Company in Greenbelt, MD.

Among General Paige’s awards are: Information Week Magazine’s 1987 Chief Information Officer of the Year; the Armed Forces Communications-Electronics Association Distinguished Service Medal; the Data Processing Management Association’s coveted Distinguished Information Sciences Award; and the Black Engineers Lifetime Achievement Award.
Programming Languages Do Make a Difference
Lieutenant Colonel Drew Hamilton, United States Military Academy
Tuesday, November 11, 2:15 PM - 3:00 PM

Programming languages do make a difference in program reliability. The Ada Joint Project Office (AJPO) has good, hard data showing that programs written in Ada 95 have significantly fewer errors than equivalent programs written in lower-level languages.

This is part of the reason educators are turning more attention to Ada. The NRC study reported a 47 percent increase in the number of colleges and universities using Ada in the past three years. Ada strongly supports software engineering; hence, it supports software engineering education.

Furthermore, Ada vs. C is the wrong question. Instead, the DOD will more likely have to consider the relative merits of Ada and something very similar to Ada. But regardless of what the future holds for Ada, the use of C is declining and will continue to decline. Ada was developed as a Mil-Standard to meet military requirements. High reliability and maintainability across a long life-cycle are critical requirements that no other programming language currently can meet as well as Ada 95.

Drew Hamilton has been on special assignment as Chief of the Ada Joint Program Office in the Defense Systems Information Agency. He is also the Research Director for the Department of Electrical Engineering and Computer Science at the US Military Academy.

Previously he served as Chief of the Officer Training Division at the Computer Science School, Fort Gordon. His book, Distributed Simulation, written with Major D. A. Nash and Dr. Udo W. Pooch, was recently published by CRC Press.

Quality for the Millennium
Edward F. Miller, Software Research, Inc.
Wednesday, November 12, 2:00 PM - 2:45 PM

Quality issues are increasingly dominating software purchase decisions. As concern expands about trustworthiness of systems, so does the need to ensure quality. Yet, amid technology advances in the past decade that make automated software quality a highly mechanized process, there appear to be barriers to applying known methods. Process-related approaches fare better, but still experience resistance. Achieving quality for the millennium – more than just overcoming the Y2K problem – will take careful application of proven methods in well-conceived processes.

Edward (Ed) F. Miller, PhD, is Founder, President, and Chief Executive Officer of Software Research, Inc., a San Francisco-based company that specializes in software testing and sponsors Quality Week. He is involved with software test tools development and software engineering quality questions. In fact, Dr. Miller has worked in the software quality management field for 25 years in a variety of capacities, and has helped develop families of automated software and analysis support tools. He is the author of Software Testing and Validation Techniques, an IEEE Computer Society Press tutorial text.

Ada: Roads Taken (and Not Taken)
John B. Goodenough, Ph.D., SEI
Thursday, November 13, 8:45 AM - 9:30 AM

John Goodenough will give a personal retrospective on Ada as an example of what it takes to get new technology widely adopted.

John Goodenough is the Chief Technical Officer of the Software Engineering Institute (SEI), where he is helping the software engineering field accelerate the pace at which it is adopting improved practices. Dr. Goodenough was one of the original developers of Ada and was involved in circulating the Strawman for comment in 1975. After leading one of the initial Ada design teams for this effort, Goodenough went on to serve as a Distinguished Reviewer for the Ada 83 and Ada 95 design efforts. He led the development of the initial ACVC test suite, has served on the Ada Board, and was principal author-editor of the Ada 9X Requirements document.

She Ain’t What She Used To Be - Or Is She?
Charles B. Engle, Jr., Q-Labs.
Thursday, November 13, 3:00 PM - 3:45 PM

Ada has been under the microscope since it was introduced back in 1979. It has been the preferred language of the DOD for most of that time, and even was the required, some would say mandated, language for a portion of that time. Now, the Ada policy as we knew it is gone.

What will eventually replace it? What does the future hold for Ada? What will be the official DOD policy with respect to Ada in the future? How will industry, especially the large DOD contractor community, deal with the change in Ada policy? What is the current trend in this regard? The speaker will address these topics and others in his prognostications about where the Ada industry is going, based on where it has been.

Charles B. Engle, Jr., PhD, is Vice President, North America, for Q-Labs, Inc., a subsidiary of Ericsson. He is a former Chief of the Ada Joint Program Office. Dr. Engle is a retired Army officer whose tours included an appointment on the faculty at West Point and a position as Deputy Program Manager of the Software Engineering Institute.
Special Technical Papers

Three distinguished speakers will present technical papers of special interest in their own one-hour sessions.

Is the Answer Always Ada?
Patricia K. Lawlis, c.j. kemp systems, inc.
Wednesday, November 12, 8:45 AM - 9:45 AM

Guidelines for Choosing a Computer Language: Support for the Visionary Organization describes the process of selecting a computer language and accompanying tool set for a software project. Critics have objected that the process this document recommends always leads to the conclusion that the project team should select Ada. Lawlis will discuss this and show that, although Ada should be a candidate language most of the time, the criticism is unfounded. She and co-workers have developed a prototype of a tool to automate the process described in the guidelines publication. In her talk, she will use this prototype to demonstrate how the process works.

In 1984, Patricia Lawlis, PhD, was responsible for bringing Ada to the Air Force Institute of Technology (AFIT) as the Institute’s language of choice in its computer curricula. Since then, she has been a member of the Evaluation & Validation (E&V) team and the Ada Software Engineering Education and Training (ASEET) team, both sponsored by the Ada Joint Project Office (AJPO). In 1995, she retired from the Air Force as a Lieutenant Colonel, after 10 years on the AFIT faculty. She is currently President of c.j. kemp systems, inc.

High-Integrity, Object-Oriented Programming with Ada 95
S. Tucker Taft, Intermetrics, Inc.
Thursday, November 13, 9:30 AM - 10:30 AM

Object-oriented programming presents new challenges for building high-integrity systems. Features like dynamic allocation, inheritance, and dynamic binding can simplify the creation of extensible systems, but at the same time can make thorough testing of a system more complex. Ada 95 was expressly designed to support high-integrity, object-oriented programming. It allows the programmer to control where and when dynamic allocation and dynamic binding occur, and it has defaults that make unpredictable or unintended effects due to dynamic allocation, inheritance, or dynamic binding less likely. Taft will present the features of Ada 95 that help in building high-integrity systems, and will provide some comparisons with other object-oriented languages such as C++, Java, Eiffel, and Smalltalk with respect to high-integrity programming.

Tucker Taft is Technical Director in the Intermetrics Products and Technology Group and is currently directing technical development of Intermetrics’ Ada 95 technology, called AdaMagic™. He is also leading development for Intermetrics’ Ada 95-to-Java, byte-code compiler, called AppletMagic™. From 1990 to 1995, Taft led the Ada 9X language design team.

“But I Thought Ada 95 Was 100% Compatible with Ada 83!”
Robert B. K. Dewar, Ada Core Technologies
Thursday, November 13, 2:00 PM - 3:00 PM

One of the fundamental intents of the design of Ada 95 was to maintain a high level of compatibility with Ada 83. Robert Dewar, one of the authors of the Ada 95 Requirements document, will discuss the original requirement, and assess how well it has been met in practice. As one of the leaders of the GNAT project, he gained significant experience assisting in porting millions of lines of code from Ada 83 to Ada 95. This talk will include some details of successes and problems that teams have encountered “in the trenches.”

Robert Dewar is a well-known expert in programming languages and compilers. He helped design Algol-68, Ada 83, and Ada 95. He led teams that developed Ada/Ed the first validated Ada 83 compiler, and more recently GNAT, the widely used GNU Ada 95 implementation. He is President and CEO of ACT (Ada Core Technologies).

Conference at a Glance

• Sunday, November 9
8:30 AM - 5:30 PM Tutorials (see pages 15-16)

• Monday, November 10
8:30 AM - 5:30 PM Tutorials (see pages 15-16)
8:30 AM - 5:30 PM Workshop on Reengineering Legacy Systems into Ada (by invitation - see page 18)
5:30 PM - 7:00 PM Local SIGAda Representatives’ Dinner Meeting
7:00 PM - 9:30 PM SIGAda Extended Executive Committee Meeting (open to all)

• Tuesday, November 11
8:00 AM - 8:30 AM Orientation for first-time Tri-Ada attendees
8:30 AM - 5:30 PM Technical program and exhibition hall (see pages 12-13)
6:30 PM - 9:30 PM Reception and Gala: The operetta “Princess Ada, or The Castle AdaMandate” (see page 18)

• Wednesday, November 12
8:30 AM - 5:30 PM Technical program and exhibition hall (see pages 12-13)
5:45 PM - 7:30 PM Tri-Ada’97 Public Forum (open to all - see page 18)
7:00 PM - Birds-of-a-feather (BOF) sessions and working-group meetings (see page 18)

• Thursday, November 13
8:30 AM - 4:00 PM Technical program and exhibition hall (see pages 12-13)
Tri-Ada ’97 Conference Program

Technical Presentations

In addition to the talks listed below, the conference will offer technical presentations by exhibitors.

See summary on pages 12-13

Education

Tuesday, 11:00 AM - 12:30 PM
Rose Garden Room

Using Ada 95 as a Tool to Teach Problem Solving to Non-CS Majors.
MAJ William Suchan and CPT Todd L. Smith, Department of Engineering and Computer Science, United States Military Academy

The United States Military Academy at West Point requires all first-year students to take CS105, Introduction to Computing, a broad course that emphasizes computers and problem solving, and provides students a firm foundation in the use of an engineering design method. While CS105 is not a programming course, programming is a fundamental part of the course, and the authors have chosen Ada as the programming language. In this presentation, they explain why they chose Ada 95, and how Ada 95 enhances their ability to teach an engineering methodology to first-year students.


All students attending the U.S. Air Force Academy are required to take an introductory course in computer science. Last year, the authors made a transition to Ada in this course. In this paper, they explain their rationale for making this change and discuss some potential (though not significant) concerns for those considering a similar transition.

The Undergraduate Capstone Software Design Experience. Jean R. S. Blair, Eugene K. Ressler, and Thomas D. Wagner, United States Military Academy

The authors present lessons learned in using Ada 95 as the implementation language for a senior-level compiler design course at the U.S. Military Academy. They focus on the use of Ada 95 as a pedagogical tool for conveying sophisticated computer science topics. They have found that Ada 95 is a good vehicle for teaching object-oriented concepts and an effective implementation language for an object-oriented compiler design. Because Ada-95 code is easy to read and understand, the authors spend less class time explaining implementation-language constructs and more on the relevant compiler design concepts.

Distributed Systems

Tuesday, 11:00 AM - 12:30 PM
Promenade A-B

Transparent Filtering of Streams in GLADE. Laurent Pautet, ENST Paris, France; Thomas Wolf, Swiss Federal Institute of Technology in Lausanne, Switzerland

The authors present an extension of GLADE, GNAT’s implementation of the Distributed Systems Annex, to transparently filter (e.g., encrypt or compress) messages sent during remote procedure calls. They discuss the implementation and then present an example application for banking, showing how to use filtering and also demonstrating how to program client/server applications with distributed objects in Ada 95.

Network Application Support in Ada 95. Jörg Kienzle, Swiss Federal Institute of Technology

The talk describes an approach to supporting network applications – that is, client-server applications with a dynamic number of short-lived clients – within the original Ada 95 distributed systems model. The conformance of this concept with the Ada Standard is verified. The authors present an implementation based on GLADE (for the GNAT compiler of Annex E of the Ada Reference Manual), highlighting the necessary modifications to the configuration language and the run-time system.

Pedro de las Heras Quiros, Jesús M. González-Barahona, and José Centeno-González, Group of Systems and Communications (GSyC), Carlos III University of Madrid

Toolkits for programming fault-tolerant distributed systems tend to provide low-level abstractions, which makes them difficult to use. In contrast, Annex E of the Ada language provides a high-level framework for programming distributed systems. This talk proposes an implementation of Annex E that offers the abstraction of replicated partitions, while preserving the semantics of the Annex as much as possible. The authors are now implementing a prototype.

Tasking and Real-Time

Tuesday, 4:00 PM - 5:30 PM
Rose Garden Room

Comparing the Reliability Provided by Tasks or Protected Objects for Implementing a Resource Allocation Service: A Case Study.
C. Kaiser and J. F. Pradat-Peyre, Conservatoire National des Arts et Métiers — Laboratoire CEDRIC

This presentation compares the use of tasks and protected objects for resource allocation in Ada 95 through a case study. It considers two possible implementations of a resource allocation server — one with a task, the other with a protected object. Although both implementations are based on the same allocation policy.
and have the same structure, the authors prove that the one using a protected object is fair and deadlock free, while the one using a task is not.

**Task Dependence Nets for Concurrent Systems with Ada 95 and Its Applications.** Jingde Cheng, Department of Computer Science and Communication Engineering, Kyushu University, Japan
Program dependencies are dependence relationships holding between statements in a program that are implicitly determined by control and data flows in the program. Determining program dependencies in target programs is indispensable and crucial to many software development, maintenance, evolution, and reengineering activities. This paper proposes a dependence-based abstract representation, named Task Dependence Net (TDN), for concurrent systems with Ada 95 and shows its possible applications in software development, maintenance, evolution, and reengineering.

**Optimization of Ada-95 Tasking Constructs.** Dong-Ik Oh and T.P. Baker, Florida State University, Department of Computer Science
This presentation reports on experiments with techniques intended to improve the performance of the GNAT Ada-95 multitasking implementation. These include reductions in operating system service calls, single versus fine-grained locking, and an implementation of the Restrictions pragma to eliminate support for task abort and asynchronous transfer of control. The authors provide actual performance data.

**Reuse**
Wednesday, 11:00 AM - 12:30 PM
Promenade C
ReUSE/Ada: A Tool to Promote Code Reuse. David Battaglia, Austin Burke, John Beidler, University of Scranton
ReUSE is an Ada programming tool that facilitates code reuse. It can automatically create function and procedure calls, and it helps the developer instantiate generic packages. ReUSE also provides a package browser, compiler interface, interactive error processing, centralized storage of project files, multiple simultaneous editors, and other features to help the developer write and reuse Ada code efficiently.

**Use Object-Oriented Techniques to Develop Reusable Components.** Huiming Yu, Department of Computer Science, North Carolina A&T State University
This talk describes a group of reusable components and subsystems that have been developed and put in an Ada Reuse Library. The implementation of these components and subsystems demonstrates the use of Ada-95 features for applying object-oriented techniques.

**A Reusability Measurement Framework and Tool for Ada 95.** Margaretha W. Price, MountainNet, Inc.; Steven A. Demurjian, Sr., Computer Science & Engineering Department, University of Connecticut; Donald M. Needham, Computer Science Department, United States Naval Academy
This paper presents a framework for analyzing and measuring the reusability of object-oriented designs. The approach relies on reuse-specific subjective characterizations of packages and hierarchical libraries and on a set of metrics that objectively measures the dependencies among packages based on those characterizations. The authors have developed a prototype tool that can parse Ada 95 applications, measure their reuse potential, and automatically advise software designers/developers on the ways to improve their products' reusability.
and complexity of Ada 95 programs. The GRASP prototype, which is freely available, allows users to generate Control Structure Diagrams to improve the comprehensibility of Ada 95 source code and Complexity Profile Graphs to identify and measure areas of complexity. GRASP is well suited for use in software systems where Ada is used as “glue code” and some modules are written in other languages.

**The Source Code Analysis Tool Construction Project.** Richard Conn, Software Engineering Department, Monmouth University

The Source Code Analysis Tool Construction (SCATC) Project involves the creation of a domain-specific kit to support the development of a product line of tools written in Ada 95 for rapid static analysis of large and small software systems. These systems may be written in Ada 83, Ada 95, C, C++, Java, or any combination thereof. The tools of the product line can be used during design to evaluate incomplete systems as well as during implementation to evaluate complete systems. The SCATC domain-specific kit and the first tools of the product line are to be released to the Public Ada Library in the next few months.

**Targeting GNAT to the Java Virtual Machine.** Cyrille Comar and Gary Dismukes, Ada Core Technologies; Franco Gasperoni, Telecom Paris (ENST)

There is a natural mapping from Ada 95 to the Java Virtual Machine (JVM), making it attractive to target the widely available GNAT compiler to the JVM to gain the benefits of Ada’s maintainability and reliability for the development of fully portable Internet applications. This paper details an approach to targeting the GNAT Ada 95 compilation system to the Java technology. It discusses the translation of Ada 95 features into corresponding Java Virtual Machine representations and shows how Ada can be interfaced to Java and the Java class libraries to enable the mixed-language applications.

**Idioms and Patterns**

*Wednesday, 4:00 PM - 5:30 PM*  
**Promenade A-B**  
**Managing Usage of Dynamic Structures with Ada Controlled Objects.** Vincent Celier, International Airways Management Systems, Hughes Aircraft of Canada

This talk presents a method of managing dynamic structures (allocated on the heap) using Ada controlled objects. The method is efficient, prevents memory leaks and dangling pointers, and explicitly controls the “deep” copies through a notion of “ownership.” This presentation will compare the method to other methods such as automatic deep copy and on-demand deep copy for modification. Examples of usage will be provided.

**Concurrent Design Patterns for Resource Sharing.** Bo Sanden, Colorado Technical University

A concurrent design pattern is a small grouping of tasks and protected units that is useful in many applications. This talk concentrates on two widely used patterns for resource control in concurrent programming: the Assembly Line and the Shared Resource. In the Assembly Line, each resource has a task that handles one request at a time, then sends it to the next resource-task. In the Shared Resource, the resource is represented by a protected unit, which is called by requesters implemented as tasks. Often, either pattern can be used in a given problem.

**The Design of Interfaces and Connectors for the Composition of Abstractions.** Magnus Kempe, Kempe Software Capital Enterprises

Based on a design for the adaptability of components, the author proposes a model for the composition of abstractions in Ada 95 and demonstrates the use of generics for architectural composition of abstractions. The model takes into account information hiding, encapsulation, generalization, specialization, and adaptability. The author shows that the interfaces and connectors necessary for composing software abstractions, and thus for implementing software architecture “styles,” are easily expressed in Ada 95.

**Development Tools II**

*Wednesday, 4:00 PM - 5:30 PM*  
**Rose Garden Room**  
**Debugging Distributed Applications with Replay Capabilities.** Daniel Neri, Royal Institute of Technology, Stockholm, Sweden; Laurent Pautet and Samuel Tardieu, ENST, Paris, France

This talk presents the latest enhancements made by the ENST research team to GLADE, GNAT’s implementation of the Distributed Systems Annex. The authors have extended GLADE’s communication subsystem to allow recording facilities and replay capabilities. This makes debugging distributed applications much easier, because it allows the user to replay each partition separately by simulating external events at consistent dates, without losing the possible determinism of the original program.

**ASIStint: An Interactive ASIS Interpreter.** Vasiliy Fofanov and Sergey Rybin, Moscow State University; Alfred Strohmeier, Swiss Federal Institute of Technology in Lausanne

ASIStint is an interactive ASIS interpreter with scripting facilities. It may be used for learning ASIS, i.e., the user may try out interactively the effects of the various ASIS queries. It might also be used as an assistant (sic!) when experimenting with ASIS queries, e.g., in order to find out a way of implementing a part of an ASIS application, or to correct it. Yet another use is debugging and testing.
an ASIS implementation. Input-output of a session may be recorded, and then be replayed.

**Ada and Java**

Thursday, 11:00 AM - 12:30 PM
Promenade A-B

A Comparison of the Object-Oriented Features of Ada 95 and Java. Benjamin M. Brosgol, Aonix

This paper provides a technical comparison of the object-oriented features in Java and Ada 95. Java and Ada 95 provide roughly the same functionality, but with different approaches that reflect their heritage. Despite its surface syntax’s similarity to C and C++, Java is a “pure” object-oriented language in the style Simula and Smalltalk, with the object/class concepts underlying nearly all of the semantics. Ada 95 treats object orientation as one approach, but not necessarily the only one, that may be applied. Both languages support inheritance, polymorphism, dynamic binding, and encapsulation.

**Ada-Java Communication in ADEPT.** Anthony Gargaro, Computer Sciences Corporation; Gary Smith, Ronald J. Theriault, Richard A. Volz, and Raymond Waldrop, Texas A&M University

The authors have previously described a general strategy for interoperability between Java and Ada. They have demonstrated that interoperability between Java and Ada is not only feasible, but readily accomplished. In this paper, they explore in greater detail the Java Exchange Partition Communication System that forms the basis on which this interoperability is built. They also describe several different paradigms by which Java-Ada interoperability can be achieved.

**Ada 95, Java Byte Code, and the Distributed Systems Annex.** Brad Balfour, Objective Interface Systems

This talk describes the architecture and implementation of a prototype that successfully combined an Ada 95-to-Java-Byte-Code client with an Ada 95 distributed server built using the Distributed Systems Annex. The presentation relates capabilities of the software to the package layout on both the web client and the partitioned server. It also illustrates some sections of the code. The talk relates the benefits of the prototype back to the goals of both Java Byte Code and the Distributed Systems Annex.

**Engineering and Scientific Applications**

Thursday, 11:00 AM - 12:30 PM
Rose Garden Room

An Ada-95 Basis For Propagation Modeling. Donald M. Needham, Computer Science Department, U.S. Naval Academy; Steven A. Demurjian and Thomas J. Peters, Department of Computer Science and Engineering, University of Connecticut

The authors report on their use of object-oriented propagations as part of their software-engineering research environment ADAM (Active Design and Analyses Modeling). They present propagation constructs built upon the object-oriented features of the Ada-95 programming language. Propagation modeling is useful in the industrial domain in iterative design processes in which rapid prototyping is used for experimental verification. Designers use topological tolerances as a tool for retaining desired design invariance when producing successively refined prototypes.

An Instance of the Application Download Pattern: The SPAIDS Software Loader/Verifier Domain Analysis and Implementation. Sanjiv Dungrani, William Pritchett, and John Riley, DCS Corporation

The requirement to obtain application software from an external source and correctly load it on a potentially embedded target arises in many domains, including Java applets as well as avionic and vehicular control software. Common problems include accessing an appropriate communications medium, authenticating that the application software is virus- and tamper-free, and verifying that the load has occurred without error. The authors identify this as the Application Download Pattern. The vehicular electronics (vectronics) field refers to this problem as the software loader/verifier problem. This talk describes the SPAIDS Software Loader/Verifier project. The domain analysis is expressed using the Unified Modeling Language Version 1.0 (UML). The implementation makes substantial use of the object-oriented features of Ada 95.

**Performance Issues of Scientific Programming in Ada 95.** James B. White III, Ohio Supercomputer Center

The author discusses the applicability of Ada 95 to scientific programming, by comparing its trade-offs in features and performance with those of Fortran and C++. By considering the improvements made to and planned for Fortran, along with recent developments in the use of C++, this talk outlines current scientific computing. It then discusses how Ada 95 compares and, in particular, how it may provide improvements.
Message from the Program Chair

In 1997, the United States Department of Defense dropped its two-decades-old strategy to control its software costs through the use of a single programming language. From now on, Ada will be used in a Defense Department program not because it has been mandated, but because a program manager has determined that Ada is the right choice. The new policy is at once a vote of confidence in Ada and a challenge to its survival.

Our conference theme “Ada: the right choice for reliable software” reflects the determination of the Ada community to face this challenge and to prevail. With the ever-growing number of applications, not only in the defense sector, but in our everyday lives, in which high reliability is essential, the stakes are too high to surrender to the quick and dirty development practices that have become the norm in many parts of the software industry.

While the use of Ada has spread far beyond the United States Department of Defense, the Defense Department is still Ada’s largest customer, and its programming-language policies affect the entire Ada industry. Therefore, our program focuses attention on the profound changes in those policies in 1997. Lt. Gen. Emmett Paige, Jr., Ret., will open the conference with a keynote address discussing the decision he made as Assistant Secretary of Defense to discontinue the single-language strategy. Lt. Col. Drew Hamilton, director of the Ada Joint Program Office, will follow up with a keynote address explaining why the Defense Department continues to care deeply about the choice of programming languages. An invited technical presentation by Patricia K. Lawlis will address the criteria for selecting a programming language. A panel discussion will consider whether Software Engineering Plan Reviews “instituted to replace the mandatory use of Ada” will be effective in leading program managers to make the right choice of programming language. Charles B. Engle, Jr., will close the conference with a keynote address offering his predictions about how the new Defense Department policies will affect Ada.

The 1996 National Research Council report on Defense Department programming language policy recognized the superiority of Ada for the Department’s unique applications, but suggested that Ada be considered on an equal footing with other programming languages for standard commercial and scientific applications. The Tri-Ada ‘97 program spotlights the major role that Ada is positioned to play in mainstream commercial and scientific software (and consequently, in the commercial and scientific applications of the Defense Department). A keynote address by Edward F. Miller will present a view from the commercial software industry on the importance of high-quality software. A keynote address by John B. Goodenough will review the lessons that Ada’s history teaches us about getting a new technology widely adopted. An invited technical presentation by S. Tucker Taft will elucidate the unique benefits Ada offers for the development of high-quality object-based software. A paper session will showcase the use of Ada for engineering and scientific applications. Both a paper session and a panel on the use of Ada in computer science education will examine the central role that Ada continues to play in that arena and the reasons that industry can count on a steady stream of talented Ada-literate graduates. A considerable portion of the program is devoted to the ability of Ada software to interoperate in large and complex environments, including the World Wide Web, with software written in other languages: There will be a panel on Ada and Databases, as well as paper sessions on Distributed Systems, on Bindings and Libraries, and on Ada and Java.

Even in the midst of policy upheavals, this year’s program attends to Tri-Ada’s traditional role of reporting on technical advances in the Ada world. Ada 95 is still a new and exciting language. A day-long workshop and a panel session are devoted to the reengineering of legacy software into Ada 95, and an invited technical presentation by Robert B.K. Dewar addresses the migration of legacy Ada-83 code into Ada 95. A panel session on the Ada Semantic Interface Specification, which facilitates the rapid construction of Ada development tools, is accompanied by two paper sessions on Development Tools. A paper session on Idioms and Patterns presents new ideas for the Ada designer and programmer. Paper sessions on Reuse and on Tasking and Real-Time address both tools and development techniques, offering practical advice for the successful use of Ada.

Tri-Ada ‘97 was blessed with many high-quality submissions this year, more than could be accommodated in our program. This led to some difficult and painful decisions to omit papers that are deserving of presentation and have an important contribution to make to the Ada community. I wish to thank the members of the program committee for the hard work they put into reviewing the submissions, providing constructive feedback to the authors, and helping to select 30 outstanding papers and to weave them into a cohesive program.

Norman H. Cohen,
Program Chairman
Tri-Ada ‘97 Program Committee

CHAIR

Norman H. Cohen,
IBM Thomas J. Watson Research Center

VICE-CHAIRS

Christine Ausnit-Hood,
BDM International, Inc.

Michael Feldman,
The George Washington University

Lt. Col. Drew Hamilton,
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Computer Science Department,
California State University, Northridge

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Lockheed Martin Missiles & Space

Charles B. Engle, Jr.,
Q-Labs, Inc.

Ed Falis,
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Ernesto Guerrieri,
Inso Corporation

Maretta Holden,
Boeing Defense and Space Group

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Computing Devices International

Judy Kerner,
The Aerospace Corporation

Yvon Kermarrec,
ENST de Bretagne, France

Stefan F. Landoir,
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Rudolf Landwehr,
Competence Center Informatik GmbH, Germany

Catharine Murphy,
Rockwell International,
Communication Systems Division

Laurent Pautet,
Telecom Paris University

Bo Sand, n,
Colorado Technical University

Jag Sodhi,
U.S. Army CECOM SEC FSSE

Alfred W. Strohmeier,
Swiss Federal Institute of Technology in Lausanne

S. Tucker Taft,
Intermetrics, Inc.

Joyce Tokar,
DDC-I, Inc.

David P. Wood,
Aonix

TUTORIALS (Details on pages 15-16)

Sunday, November 9

Morning
S1 Cleanroom Techniques.
Charles Engle, Q-Labs
St. Louis A
S2 Introduction to Ada 95 for Beginners.
David Cook & Leslie Dupaix, ASEET Team
Director’s Room 41

Afternoon
S3 Real-Time Programming.
Joyce Tokar, DDC-I
St. Louis A
S4 Protected Types in Ada 95.
Richard Riehle, independent Ada consultant
Director’s Room 41
S5 Developing Solutions in Windows 95/NT with Ada.
Eugene Bingue, University of Phoenix and ASEET Team
Director’s Room 46

Full Day
S6 UML and Ada 95 Combined: Process & Products.
Rose Garden Room
S7 Programming Distributed Applications with Ada 95, and an Inside Look at the GNAT Implementation.
Yvon Kermarrec, Telecom Bretagne University; Laurent Pautet and Samuel Tardieu, Telecom Paris University
Director’s Room 43
S8 Concurrency for Ada Programmers.
Bryce Bardin, independent Ada consultant
St. Louis C
S9 How to Develop High-Assurance Ada 95 or Java Programs in Collaborative WWW Environments.
George Cherry, Thought**Tools
St. Louis B

Monday, November 10

Morning
M1 CORBA and Ada 95 for High-Performance Distributed Software Components.
Bill Backes, Objective Interface Systems
St. Louis C
M2 Building Development Tools for Use with GNAT.
Cyrille Curmar, Ada CoreTechnologies; Sergey I. Rybin, Moscow State University
Director’s Room 41
M3 Systems Programming in Ada.
Bryce Bardin, independent Ada Consultant
St. Louis A

Afternoon
M4 High-Integrity Ada Using SPARK 95.
John Barnes, John Barnes Informatics
St. Louis C
M5 Booch Components.
Dave Wilder, RIVA Technologies, Inc.
St. Louis A
M6 Ada-based Systems Engineering with O4S.
Ingmar Oegern, Romet AB
Director’s Room 41
M7 Ada 95 Object-Oriented Programming Guidelines.
Susan Fike Dorchak, Long Island University
Director’s Room 43

Full Day
M8 The Fusion Method, with Implementation in Ada.
Alfred Strohmeier & Stephane Barbey, Swiss Federal Institute of Technology at Lausanne
St. Louis B
M9 Rate Monotonic Analysis.
Ben Watson, Tri-Pacific Consulting
Director’s Room 29
M10 Java for Ada Programmers.
Ben Brosgol, Aonix
Promenade A

M11 Ada 95 for Ada-83 Programmers.
Norman H. Cohen, IBM Thomas J. Watson Research Center
Promenade B

Local SIGAda Reps Dinner
The traditional SIGAda Local Reps Pizza Dinner and meeting will take place on Monday evening, November 10, 5:30 PM to 6:45 PM in the Directors Row Room #23 (2nd floor).
## Summary Conference Schedule

### Tuesday, November 11

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30am - 8:45am</td>
<td>Welcome and overview</td>
</tr>
<tr>
<td>8:45am - 9:00am</td>
<td>Introduction of new SIGAda leaders</td>
</tr>
<tr>
<td>9:00am - 9:45am</td>
<td>Keynote speech by Lieutenant General Emmett Paige, Jr., U.S. Army (ret.)</td>
</tr>
<tr>
<td>9:45am - 11:00am</td>
<td>Break. Exhibition hall opens.</td>
</tr>
</tbody>
</table>

### Parallel tracks:

<table>
<thead>
<tr>
<th>Track</th>
<th>Panel: Software Engineering Plan Reviews — Better or Worse for Ada Than the Mandate?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promenade A-B</td>
<td>Chaired by Mike Kamrud</td>
</tr>
<tr>
<td>Transparent Filtering of Streams in GLADE.</td>
<td>Laurent Pautet, Thomas Wolf</td>
</tr>
<tr>
<td>Network Application Support in Ada 95.</td>
<td>Jirí Kientzle</td>
</tr>
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<tr>
<th>Track</th>
<th>Panel: Ada Semantic Interface Specification (ASIS): Roll Your Own Analysis Tools</th>
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<tr>
<td>Promenade C</td>
<td>Chaired by Curtie Collot, chair of SIGAda ASIS Working Group and ISO ASIS Rapporteur Group</td>
</tr>
<tr>
<td>Tasking Constructs</td>
<td>Dong-Ik Oh, T.P. Balzer</td>
</tr>
</tbody>
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<tr>
<th>Track</th>
<th>Rose Garden Room: Education.</th>
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<tbody>
<tr>
<td>Promenade C</td>
<td>Chaired by Charles B. Engle, Jr.</td>
</tr>
<tr>
<td>Using Ada 95 as a Tool to Teach Problem Solving to Non-CS Majors.</td>
<td>William Suchan and CPT Todd L. Smith</td>
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<tr>
<td>The Undergraduate</td>
<td>Joan R. S. Blair, Eugene K. Reiss, Thomas D. Wagner</td>
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<td>Rational Software</td>
<td>Vector Software</td>
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<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30am - 8:45am</td>
<td>Announcements</td>
</tr>
<tr>
<td>8:45am - 9:00am</td>
<td>Is the Answer Always Ada? Patricia K. Lavlin</td>
</tr>
<tr>
<td>9:45am - 11:00am</td>
<td>Exhibition/Break</td>
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<tr>
<td>Promenade A-B</td>
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<tr>
<td>ReUSE/Ada: A Tool to Promote Code Reuse.</td>
<td>David Battaglia, Austin, Burke, John Beidler</td>
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<td>Haining Yu</td>
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<tr>
<td>Techniques to Develop Reusable Components.</td>
<td>A Reusability Measurement Framework and Tool for Ada 95. Margarettha W. Price, Steven A. Demuprjan, Sr., Donald M. Needham</td>
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<tr>
<td>The Source Code Tool Construction.</td>
<td>Richard Conn</td>
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<td>Targeting GNAT Java Virtual M.</td>
<td>Cyrille Omor, G. Franco Casper</td>
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<tr>
<td>Promenade C</td>
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<tr>
<td>Teaching Network Programming with Ada</td>
<td>Randall Brakard, Tom Moran</td>
</tr>
<tr>
<td>and Lower Layer.</td>
<td>Francisco J. Ballesteros-Cuérra, Luiz Lopez-Fernández</td>
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### Thursday, November 13

**8:30AM - 8:45AM**  
Announcement

**8:45AM - 9:30AM**  
**Keynote speech by John Goodenough**

**9:30AM - 10:30AM**  
High-Integrity Object-Oriented Programming with Ada 95. S.Tucker Taft

**10:30AM - 11:00AM**  
Exhibition/Break

### Parallel tracks:

**Promenade A-B**

<table>
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<tr>
<th>Time</th>
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| 11:00AM - 12:30PM | Promenade A-B  
Ada and Java: A Comparison of the Object-Oriented Features of Ada 95 and Java.  
Benjamin M. Brogoll  
Ada-Java Communication in ADEPT.  
Anthony Cargaro, Gary Smith, Ronald J. Theriault, Richard A. Valz, Raymond Waldrop  
Brad Balfour (details on page 9) |

**Promenade C**

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| 11:00AM - 12:30PM | Promenade C  
Panel: Reengineering Legacy Systems into Ada 95  
Moderator: Shan Baekatoki, California State University at Northridge (details on page 14) |

**Rose Garden Room**

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### Director’s Row 23 Exhibitor talks:

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| 8:30AM - 8:45AM | Director’s Row 23  
Exhibitor talks:  
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<th>Event</th>
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</table>
| 12:30PM - 2:00PM | Director’s Row 23  
Exhibitor talks:  
Boeing  
Objective Interface Systems  
Strictly Business Computer Systems |

**Lunch**

**2:00PM - 3:00PM**  
“But I Thought Ada 95 Was 100% Compatible with Ada 83!” Robert B.K. Dewar

**3:00PM - 3:45PM**  
Keynote speech by Charles B. Engle, Jr.

---

**Panel: Success in Education with Ada**  
Moderator: Michael Feldman, The George Washington University (details on page 14)

**Panel: Ada and Databases**  
Moderator: Bill Beckwith, Objective Interface Systems (details on page 14)

**Panel: Ada and Java**  
Chaired by Alfred W. Strohmeier  
A Comparison of the Object-Oriented Features of Ada 95 and Java.  
Benjamin M. Brogoll  
Ada-Java Communication in ADEPT.  
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Gather under the arch to stay ahead of the curve.
The panel discussion will focus on how a typical Ada developer can use the Ada Semantic Interface Specification (ASIS) to rapidly build “roll-your-own” tools for special analysis of compilable Ada source code for a variety of purposes (such as call tree analysis, object/type usage analysis, browsing, etc.). This panel session will address the ASIS 95 specification focusing on its use for ASIS-based tools to evaluate quality in general, and more specifically, for its analysis of mission-critical/safety-critical systems.

ASIS is an interface between an Ada environment, as defined by the Ada-95 Reference Manual, and any tool requiring information from this environment. An Ada environment includes valuable semantic and syntactic information useful for assessing software quality. ASIS has been designed to be independent of underlying Ada environment implementations, thus supporting the portability of ASIS-based software engineering tools across proprietary Ada compilation environments. Simple ASIS-based tools have already been demonstrated to be portable across vendor Ada compilation environments.

In April 1997, Emmett Paige reaffirmed his belief that Ada is ready to compete on its own merits and issued a memo abolishing the DOD’s Ada requirement and substituting a requirement for “Software Engineering Plan Reviews” (SEPRs) for all major system acquisitions. A SEPR seeks to achieve best-practices decision making by simultaneously reviewing related software engineering life-cycle and cost factors that have a greater overall influence on software capability than does choice of a particular programming language alone. Some commercial firms already conduct similar comprehensive reviews (sometimes called “architecture reviews”) that are models to predict the effectiveness of SEPRs and their possible effects on Ada usage. Will Ada fare better or worse under the requirement for SEPRs? Could SEPRs become widespread commercial practice, and might this help Ada?

Wednesday, 11:00 AM - 12:30 PM
Promenade C
Reengineering Legacy Software into Ada 95
Moderator: Shan Barkataki, California State University at Northridge
Panelists: Kathleen Gilroy; Software Compositions, Joseph M. Scandura, Merge Research Institute & University of Pennsylvania; Mike Olsem, SAIC and STSC; Chad Bremmon, Rational Corporation
This session will engage the panelists and attendees in discussions of reengineering experiences, in order to find creative solutions and sound strategies for future reengineering projects. The panel will focus on real problems and working solutions, particularly those related to legacy systems. Results and lessons learned from the preceding Monday’s workshop on reengineering (see page 15) will also be presented. Technical topics will include discovering legacy functionality, establishing new requirements, migrating to object-oriented techniques, maximizing reuse, and collecting relevant metrics. Management topics will include cost benefits, productivity, and business advantages of reengineering.
**Tri-Ada ’97 Conference Program**

**Tutorials**

Make the absolute most out of your time for professional development: Sign up for one or more Tri-Ada ’97 tutorials! Let Tri-Ada’s accomplished instructors get you up to speed quickly with the topic of your choice.

- Half-day morning tutorials are from 8:30 AM to 12:30 PM.
- Half-day afternoon tutorials are from 1:30 PM to 5:30 PM.
- Full day tutorials are from 8:30 AM to 5:30 PM.
- Tutorials with an AM time will include coffee from 8:00 AM to 8:30 AM, and a break from 10:15 AM to 10:45 AM.
- Tutorials with a PM time will include a break from 3:15 PM to 3:45 PM.

See summary on page 12

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**Sunday Morning**

**S1 Cleanroom Techniques.**

Charles Engle, Q-Labs

*St. Louis A*

This tutorial will introduce the cleanroom technique of software development. No knowledge of Ada is required, but attendees should have experience in some phase of the analysis, design or implementation of software development.

**S2 Introduction to Ada 95 for Beginners.**

David Cook & Leslie Dupaix, ASEET Team

*Director’s Row 41*

Attendees will receive an introduction to Ada and Ada 95. This tutorial assumes that participants have no knowledge of Ada, but attendees should have some programming knowledge or background.

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**Sunday Afternoon**

**S3 Real-Time Programming.**

Joyce Tokar, DDC-I

*St. Louis A*

This tutorial covers the features of real-time programming in Ada 95. This session is designed for experienced Ada 83 users, and covers the features of Ada 95 found in the Systems Programming and Real-Time Systems annexes.

**S4 Protected Types in Ada 95.**

Richard Riehle, independent Ada consultant

*Director’s Row 41*

One of the new features of Ada 95 is the protected type. Protected types directly support concurrency, and allow the user to encapsulate data structures and operations into a type that is safe for multiple access. Participants will learn how to declare and use protected types. This session is designed for novice to experienced Ada programmers.

**S5 Developing Solutions in Windows 95/NT with Ada.**

Eugene Bingue, University of Phoenix and ASEET Team

*Director’s Row 46*

This panel-style tutorial is designed for intermediate to experienced Ada programmers, who will learn how to develop and implement Ada programs on a Windows 95 or Windows NT platform. The tutorial will provide technical solutions to areas of concern, such as GUI, ODBC, and OLE. An overview of the Windows API will be the starting point.

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**Sunday Full Day**

**S6 UML and Ada 95 Combined: Process & Products.**

Putnam Texel, p.p. Texel and Co

*Rose Garden Room*

The tutorial introduces participants to an Object-Oriented Software development process that encapsulates UML (or Booch or OMT) and provides a complete managerial and technical infra-structure for a project. Participants will learn 1.) to structure a

“floundering” or new OO project moving towards an Ada implementation, 2.) to migrate an OO Model to an Ada implementation, and 3.) to understand the significance of Use Cases for a project. This session will use a single Case Study to illustrate the entire process, starting from a requirements document through to the actual code.

**S7 Programming Distributed Applications with Ada 95, and an Inside Look at the GNAT Implementation.**

Yvon Kermarrec, Télécom Bretagne University; Laurent Pautet and Samuel Tardieu, Télécom Paris University

*Director’s Row 43*

This tutorial is intended for designers and programmers of Ada applications that will be executed on a distributed system. Although Ada 95 presents an approach for programming distributed systems that is quite complete, the potentials of the language are not immediately understandable and the reader of the reference manual might become puzzled with the restrictions. This tutorial will present a programmer’s view of distributed applications and the language, and compares the Ada 95 approach with CORBA, OSF DCE, and OS network programming.

**S8 Concurrency for Ada Programmers.**

Bryce Bardin, independent Ada consultant

*St. Louis C*

In this comprehensive tutorial on the elements of Ada 95 concurrent programs, attendees will learn how the Ada tasking model applies to various target architectures; about tasks and protected objects and how they interact; and about how tasks are scheduled. Designed for intermediate Ada programmers.

**S9 How to Develop High-Assurance Ada 95 or Java Programs in Collaborative WWW Environments.**

George Cherry, Thought**Tools

*St. Louis B*

The tutorial introduces SDML (Situation-Driven Modeling Language), which is a mathematically-based formal specification language that is easy
to learn. Background and case studies are included. Participants must be interested in developing formally specified programs in WWW intranet environments.

Monday Morning

M1 CORBA and Ada 95 for High-Performance Distributed Software Components. Bill Beckwith, Objective Interface Systems
St. Louis C
The OMG Common Object Request Broker Architecture (CORBA) is a flexible environment for creating potentially distributed software components. The marriage of CORBA with Ada 95 results in uniquely powerful capabilities for creating high-performance, reliable, distributed software components. This tutorial will introduce the principle of CORBA-based architecture, and cover the development process of a distributed-object architecture based on CORBA and Ada 95.

M2 Building Development Tools for Use with GNAT. Cyrille Comar, Ada CoreTechnologies; Sergey I. Rybin, Moscow State University
Director's Row 41
This tutorial will explain how you can build your development and analysis tools when working with GNAT. It will present some sample tools to demonstrate different approaches to tool development. Participants should have a good understanding of Ada semantics. Basic experience in programming with GNAT is helpful but not required.

M3 Systems Programming in Ada. Bryce Bardin, independent Ada Consultant
St. Louis A
Participants receive a comprehensive overview of the elements of real-time systems programming in Ada. They will learn how to write low-level, hardware-dependent programs in Ada 95. This tutorial is designed for experienced Ada 83 programmers.

Monday Afternoon

M4 High-Integrity Ada Using SPARK 95. John Barnes, John Barnes Informatics
St. Louis C
SPARK can be understood as a subset of Ada 95 with embedded annotations (as comments) giving additional information about the program. SPARK was designed for use in applications where the risk of an incorrect program causing damage to life and property (so-called safety-critical areas) must be minimized. This tutorial covers SPARK and the various tools associated with its use.

Monday Full Day

M8 The Fusion Method, with Implementation in Ada. Alfred Strohmeier & Stephane Barbey, Swiss Federal Institute of Technology at Lausanne
St. Louis B
Fusion is an object-oriented software development method. It is a full-coverage method, providing for analysis, design, and implementation. By integrating and extending existing approaches, Fusion provides a direct route from a requirements definition through to an implementation. The advantage of the Fusion method is that it offers not only notations for describing models, but a process for development. No specific knowledge in object-oriented methodology is required for this tutorial.
All Aboard!

For centuries America’s gateway to the west, St. Louis has stood as an invitation to tomorrow, to new frontiers, and to unexplored domains. This year, it will serve as your portal to reliable software. But there’s more! Enjoy the spirit of St. Louis both within and beyond your conference. Down-to-business by day, colorful and boisterous in the evening, this grand city on the Mississippi offers something for everyone. Culture, sightseeing, sports, and nightlife abound. See and experience the grand archway to the prairie states, the riverboats, Union Station, and ample theaters, museums, garden and amusement parks, and restaurants. All await you, your companion, and your Tri-Ada associates.
Workshop on Reengineering Legacy Systems into Ada

Monday, 8:30 AM - 5:30 PM - Director’s Row 25
A one-day workshop on reengineering legacy systems into Ada will take place on Monday, November 10. (This is the second day of tutorials and the day before the full conference convenes). Results of the workshop will be presented in a panel discussion on the morning of Thursday, November 13.

Tri-Ada'97 Public Forum Sponsored by Aonix

Wednesday, 5:45 PM - 7:30 PM - St. Louis D
The Tri-Ada Public Forum was instituted at Tri-Ada '96 as an opportunity for members of the Ada community to interact with leaders of SIGAda, the Ada vendors’ Ada Resources Association, and the Ada Joint Program Office. The Tri-Ada '97 Public Forum is your chance to meet and converse with this year's all-new leaders.

Come with your questions, concerns, and ideas. Tell us what you think we should be doing with your membership fees and tax dollars. Your leaders are listening!

Birds of a Feather/Working Groups

Wednesday, 7:00 PM
The following Working Groups (WG) and Birds-Of A Feather (BOF) were scheduled at press time:

<table>
<thead>
<tr>
<th>Session</th>
<th>Type</th>
<th>Date</th>
<th>Time</th>
<th>Location</th>
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<tbody>
<tr>
<td>SIGAda Executive Committee Meeting</td>
<td>OPEN</td>
<td>Mon., 11/10</td>
<td>7:00PM-9:30PM</td>
<td>Director’s Row 23</td>
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<tr>
<td>ASIS</td>
<td>WG</td>
<td>Wed., 11/12</td>
<td>7:30PM-9:30PM</td>
<td>Director’s Row 29</td>
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<tr>
<td>AdaSAGE ST</td>
<td>BOF</td>
<td>Wed., 11/12</td>
<td>7:30PM-9:30PM</td>
<td>Director’s Row 43</td>
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<tr>
<td>ORBexpress Users Group</td>
<td>BOF</td>
<td>Wed., 11/12</td>
<td>7:30PM-9:30PM</td>
<td>Director’s Row 28</td>
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<tr>
<td>Public Ada Library (PAL)</td>
<td>Demo/Discussion</td>
<td>Wed., 11/12</td>
<td>7:30PM-9:30PM</td>
<td>Promenade A-B</td>
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<tr>
<td>Patterns</td>
<td>WG</td>
<td>Wed., 11/12</td>
<td>9:00PM-11:PM</td>
<td>Director’s Row 27</td>
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<tr>
<td>Reuse</td>
<td>WG</td>
<td>Wed., 11/12</td>
<td>9:00PM-11:PM</td>
<td>Director’s Row 27</td>
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Please consult your Final Program Addendum for possible additional sessions. Check bulletin boards for meetings that have been scheduled since the FP went to press.

Reception & Gala Sponsored by Ada Core Technologies

Tuesday evening, November 11, 6:30 PM - St. Louis E-H
Last year's Gilbert & Sullivan parody (“The Maiden and the Mandate”) was one of the most memorable events of Tri-Ada '96. This year, we present an all-new musical show, with words by Robert Dewar and Ed Schonberg (with apologies, not very sincere, to Gilbert and Sullivan), again sponsored by Ada Core Technologies.

All is not well in the house of Byron. Sir Byron's daughter, the Princess Ada, has fled with the other women of the house to Castle AdaMandate, where she and her disciples worship the gods of Quality, Reliability and Maintainability. None of the noble knights of the mighty order of C/C++ are permitted within the walls. Prince Hacker, betrothed from birth to Princess Ada, demands his birthright, and imprisons Sir Byron. He and his followers then set off to storm castle AdaMandate.
*ObjectAda is the most widely-distributed Ada compiler ever sold. Guess exactly how many copies are in circulation and WIN a Jaz Drive with your own pre-installed copy of ObjectAda! Stop by our booth #500 for details.

For a more in-depth look at how Aonix can help you lay the groundwork for a more creative development environment, call 1-800-97-AONIX, or better yet, visit our website at www.aonix.com.
See the latest advancements, take in the latest demo's, and hear the newest announcements. It's your chance to talk with the creators of the software tools you use daily and get your software advise face to face with the developers. These vendors constantly canvas the field for its needs, issues, and opportunities. Find out from them about the products and services that can help you.

**Exhibitor Booth Numbers**

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth</th>
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<td>AAI Software Systems</td>
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<td>Accel Software Engineering</td>
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<td>ACM SIGAda</td>
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<td>Ada Core Technologies, Inc.</td>
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<td>Advanced Technology Center</td>
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<td>Boeing</td>
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<td>Center for Computer Systems Eng. Information</td>
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<td>Grammatech</td>
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<td>Green Hills Software</td>
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<td>Idaho National Engineering &amp; Env. Lab</td>
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<td>Irvine Compiler Corporation</td>
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<td>McCabe &amp; Associates, Inc.</td>
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<td>Objective Interface Systems, Inc.</td>
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<td>OC Systems, Inc.</td>
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<td>Paul Morris Personnel</td>
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<td>Quality Checked Software</td>
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<td>Rational Software</td>
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<td>RR Software</td>
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<td>SAC/ASSET</td>
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<td>Scientific Toolworks, Inc.</td>
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<td>Software Compositions</td>
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<td>Strictly Business Computer Systems</td>
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<td>TLD Systems, Ltd.</td>
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<td>Top Graph’X</td>
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<td>Vector Software</td>
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**AAI Software Systems**
P.O. Box 126
Hunt Valley, MD 410-628-8545

**Booth #A**

- AAI Software Systems provides software engineering solutions that include: mission planning and control, sensor and environment modeling, EW and radar modeling, simulation and test, and advanced test measurement.
- Our competencies are with multiple platforms, languages, and domains in design, development, integration and support.
- We specialize in scientific and engineering applications using real-time embedded control across multiple processor architectures.

**Accel Software Engineering**

9 Mellon Road, Export, PA 15632
412-733-8800

**Booth #440** - MTV Builder is a PC-based tool that simplifies message specification and automatically generates Ada95 message translation and validation (MTV) software. MTV software is a vital component in the integration of a diverse community of disparate systems and devices. Accel's MTV Builder provides System Integration professionals with an engineered solution for constructing MTV software quickly, inexpensively, and reliably.

**ACM SIGAda**

1515 Broadway, New York, NY 10036
212-869-7440

**Booth #450** - As sponsor of Tri-Ada '97, ACM SIGAda is proud to show off some of the other activities we're involved in. Our booth is a centerpiece of SIGAda's "Ada Advocacy" initiative. Drop by to see demonstrations of Ada resources for educators & practitioners, dozens of Ada Success Stories, Ada vendor catalogs, etc, that we take to other conferences and shows to spread the word about Ada. Also check out the benefits of SIGAda and ACM memberships for all serious software professionals.

**Ada Core Technologies**

73 Fifth Avenue, Ste. 11B, New York, NY 10003
212-620-7300

**Booth #740-750** - Ada Core Technologies will...
be displaying the latest releases of the GNAT compilation system and its tools suite including distributed applications using GLADE, Ada-aware debugging tools, CASE tools, and the compiler with the widest set of targets in the industry. A preliminary version of the forthcoming GNAT to Java system will also be demonstrated.

**ADVANCED TECHNOLOGY CENTER**

22982 Mill Creek Drive, Laguna Hills, CA 92653  
(714) 563-9119

**Booth #3C -** ATC offers AXI: Ada 95 and Ada 83 bindings to X/Motif. AXI modules include:  
- UI/Ada Code Conversion - for translating Motif/User Interface Language (UIL) code to Ada.  
- AdaXPM - for Ada bindings to the X PixMap library for loading and saving multicolor pixmaps in AXI applications.  
- Xarage Support - for emulation of X and Motif subprograms with variable-length argument lists to simplify the creation of complex widgets in Ada.

**AONIX**  
595 Market Street, 10th Floor  
San Francisco, CA 94105  
415-543-0900

**Booth #505-510 -** Aonix, formerly Alysa-Thomson Software/IDE, is a leading supplier of full life-cycle solutions for mission-critical applications. Aonix makes the most advanced Ada 95 development tools available on the market today. We will demonstrate our new release of ObjectAda™ for Windows 95/NT, UNIX, and Java platforms. Also discover our new ObjectAda Real-Time products (Intel, PowerPC, Win32, Solaris) and our new Safety-Critical solutions. ObjectAda is integrated with the powerful graphical application builder, TeleUSE, and with Software through Pictures (OMT/Booch/UNIX) the leading Ada tool for mission-critical applications. Stop by our booth for a demo!

**BOEING**  
P.O. Box 516, St. Louis, MO 63166  
314-324-0103

**Booth #430-430** - Affordable Software Through Integrated Processes, Tools, and Technology  
Conference attendees have the opportunity to learn more about the role software plays in Boeing products. There is an emphasis on the missiles and aircraft developed in St. Louis. The booth has a number of demonstrations and presentations, including: a demonstration of the system used to develop cockpit displays; a demonstration of the system used to perform unit, integration, and system testing; presentations that describe our many successes in the areas of reuse and open architecture. Products videos are playing in the booth that show Boeing products in action.

**CENTER FOR COMPUTER SYSTEMS ENGINEERING**  
Information Clearinghouse  
DISA/JIEO/CP/CSE/EE/HS  
5600 Columbia Pike, Falls Church, VA 22041  
800-738-7379

**Booth #540 -** The CCFSE-IC will provide demonstrations and information about the following DOD programs: Ada, Data Engineering, Defense Information Infrastructure (CDO), Common Operating Environment (COE), Enterprise Library, Information Security and Asset Management.

**DAUGHERTY SYSTEMS**  
One City Place Drive, Suite 240  
St. Louis, MO 63141  
314-432-8200

**Booth # E -** Daugherity Systems is a special kind of consultant company. Through our focus on using client/server and other distributed technologies to improve business processes, Daugherity provides system integration and software application solutions to many major corporations. Daugherity Systems has a strong record of growth since it was founded in 1985 with offices in St. Louis, Chicago, Atlanta and Dallas employing 300 consultants.

**DCC-I**  
400 N. 5TH Street, Phoenix, AZ 85004  
602-2-75-7172

**Booth # 400-410 -** As an established supplier of Ada compilers and development tools for real-time embedded applications, DCC-I will showcase a variety of solutions for software developers including “Debugging of Highly Optimized Ada with Code Motion (DHACM),” “multi-language debugging,” and the ever popular, very powerful “DCC-1 Ada Compiler System - DACS™” PC for Windows NT. Additionally, DCC-I brings many exciting new announcements to TRA-Ada. Stop by for the latest breaking news or for a one on one demonstration.

**GRAMMA TECH, INC.**  
One Hopkins Place, Ithaca, NY 14850  
607-273-7340

**Booth #520 -** GrammaTech offers two products that help to produce Ada code that is consistently easier to read, understand, modify, and reuse. Ada-ASSURED is a language-sensitive editor enabling both novice and advanced Ada programmers to write and maintain properly formatted code faster and with fewer errors. Ada-ASSURED monitors and automates compliance with the SPC AO&ES coding standards, but it may be modifed for customer or project requirements. GrammaTech Ada-Utilities is a set of language-sensitive batch tools for analyzing and transforming multiple Ada source code files. Useful for quality assurance, code reviews, and for constructing additional language-sensitive batch tools. Integrated automatic program verifcation utility for monitoring and reporting compliance with coding standards; a high-quality pretty printer; an Ada-specific find utility similar to UNIX grep, and, a scripting language that works like a language-sensitive version of awk or sed to precisely locate and modify any fragment of code.

**GREEN HILLS SOFTWARE**  
30 West Sola Street, Santa Barbara, CA 93101  
805-965-6044

**Booth #700-710** - Green Hills Software will showcase AdaMULTI™, the most comprehensive Ada 95 software development environment available for embedded applications. The fully validated AdaMULTI automates the edit-build-debug cycle by integrating advanced facilities such as a source-level debugger, editor, program database, source code control system, profiler, browser and more. AdaMULTI supports Green Hills’ Ada 95, C, C++ and FORTRAN compilers, enabling seamless development of application programs in any combination of these languages. AdaMULTI is available for real-time VxWorks/Tornado and native UNIX and Win32 application developers. Supports PowerPC, Pentium/x86, SPARC, MIPS R3000/R4000 680x0/683x, and RAD6000 architectures and is available for SPARC/Solaris, Windows NT/95 and HP-UX hosts.

**IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY**  
25 N. Fremont, Idaho Falls, ID 83415-3779  
(208) 526-0763

**Booth # 640 -** Stop by our booth to learn about Sage-ST. Sage-ST’s sequence object technology can improve your software development efficiency by allowing you to create and reuse objects at multiple levels of abstraction. SASEA Decision Tool. This tool is designed to help the decision-maker walk through the Selecting Appropriate Software Engineering Assets (SASEA) process. Merlin: This is a middleware product that provides seamless integration of information contained in multiple data sources located across many computers.

**IRVINE COMPILER CORPORATION**  
34 Executive Park, #270, Irvine, CA 92614  
714-250-1366

**Booth #G -** ICC will be demonstrating ICC Ada 95 products for 1990, PowerPC, SHARC, Pentium and HP-RT. ICC Ada for 1960 MX is currently being used by the F-22. ICC Ada 95 is hosted on VAX, VAX Sun, HP and Alpha/OSF, Pentium/Linux platforms.

**MARK V SYSTEMS LIMITED**  
16400 Venturn Blvd., Suite 300, Encino, CA 91436  
818-995-7671

**Booth #430-430** - ASIS-based Ada reverse engineering produces diagrams from Ada code. ObjectMaker® now accesses Ada semantics via ASIS interfaces. Customizable and tailored diagram notation can be specified by the end user; Additionally UML, Open OML, and another 25 diagram notations have been implemented with the ObiectMaker® tool development kit.

**McCABE & ASSOCIATES**  
Twin Knolls Professional Park  
5501 Twin Knolls Road Suite 111  
Columbia, MD 21045  
301-596-3080 Washington  
410-995-1075 Baltimore  
800-638-3636

**Booth #650 -** The McCabe Visual ToolSet™ for Ada is for rigorous software testing and is characterized as highly interactive and visually guided. Statistically the tool generates complexity metrics and test cases for coded modules. Dynamically, the tools report the degree of test- edness after test execution. The McCabe VTT™ for Ada offers outstanding visualization and metrics analysis.

**OBJECTIVE INTERFACE SYSTEMS, INC.**  
1892 Preston White Drive, Reston, VA 20191-5448  
800-800-0197 (6477)

**Booth #600-610 -** Objective Interface provides high-quality, cost-effective development tools to the Ada programming community. Our products feature integration with open systems standards such as CORBA 2.0 and Open Database Connectivity (ODBC), as well as support for real-time configurations and pluggable components. The current product suite includes:  
- O'Rexpress™ for Ada 95, an enhanced CORBA/Ada 95 solution offering high performance with IIOIP support  
- Ada SQL Connect™—the ONLY approach for connecting Ada 95 applications to multiple relational databases via ODBC  
- ScreenMachine™, a GUI builder for Ada 95  
- Consulting/Training/Mentoring
OC SYSTEMS, INC
9990 Lee Hwy., Suite 270, Fairfax, VA 22030
703-359-8160

Booth #220 - OC Systems proudly demonstrates PowerAda 3, a major release of the PowerAda development tools. PowerAda is a complete solution for Ada software development, integration and maintenance on PowerPC computer platforms running AIX, LynxOS or Torando. A major component of the OC Systems Power Solution, PowerAda is a complete, out-of-the-box, easy-to-use solution for projects of all sizes and complexities.

PAUL MORRIS PERSONNEL
3155 NE 31st Ave, Lighthouse Point, FL 33064
954-788-9686

Booth #40 - Paul Morris Personnel is dedicated to serving the Ada Software Engineering community providing staffing services. Our expertise is recognized as the leading Ada staffing resource NATIOWIDE! Our FREE publication Ada Career News informs the Ada community about developments effecting Ada and Object Oriented Software staffing and careers. For a FREE copy of Ada Career News or the latest information effecting your Ada career needs contact: paul@morrissgroup.com” If you have any questions please feel free to give me a call at (919) 419-8242 or e-mail at 74117.35@compuserve.com.

QUALITY CHECKED SOFTWARE
P.O. Box 6656, Beaverton, OR 97007-0656
503-654-5610

Booth #550 - Quality Checked Software distributes the AdaTEST and AdaTEST95 software testing tools from IPL (Information Processing Limited). Both AdaTEST and AdaTEST95 provide integrated solutions for metrics measurement, coverage analysis, and dynamic control or testing. Each tool provides over 80 metrics, including numerous academic and language metrics. Coverage analysis is provided from statement coverage to complete MCDC coverage, with occurrence counts. AdaTEST and AdaTEST95 provide dynamic test harness capabilities that allow automated testing in both host and embedded environments.

RATIONAL SOFTWARE CORPORATION
Corporate Headquarters
18880 Homestead Road, Cupertino, CA 95014
408-863-9900

Booth #200-210 - Rational Software Corporation develops, markets and supports a comprehensive software solution that helps customers automate the development of component-based applications. Rational offers a best-of-breed product family that includes visual modeling, requirements management, software configuration management, process automation and automated software quality (ASQ) products. Rational’s integration of Rose, RequisitePro and SQA Suite supports developers throughout each phase of the development lifecycle, and helps organizations dramatically improve the quality and their software applications.

RR SOFTWARE, INC.
P.O. Box 1512, Madison, WI 53701-1512
608-245-0375

Booth #8 - RR Software will showcase Claw, an object-oriented Ada 95 binding to Microsoft Windows. Claw allows programmers to create Ada GUI applications easily, and is portable from one Ada compiler to another. Demonstations of Claw will be performed regularly. As the innovation leader for PC-based Ada, we provide a variety of solutions, all backed by top-notch technical support, including:
• Validated Ada 95 compilers and tools.
• Customization and consulting.
• Pascal to Ada translation.

SAIC/ASSET
P.O. Box 3305, 1350 Earl L Core Rd., 2nd Floor
Morgantown, WV 26505
304-284-9000

Booth #620 - SAIC/ASSET offers consulting, products, services, and training in the areas of Software Reuse and Reengineering, Web Business Services including Web Site design and Banner Advertising, Electronic Commerce, and Commercial Products Brokering on the Web. SAIC/ASSET provides a comprehensive Electronic Commerce facility on the World Wide Web, featuring on-line brokerage for software and high technology products, low-cost on-line product advertising, marketing, and complete processing of most types of on-line sales transactions.

SCIENTIFIC TOOLSWORKS, INC.
115 Elna Road, Suite 18A, Lebanon, NH 03766
603-488-6960

Booth # 460 - Understand for Ada analyzers, reverse engineers, and cross references Ada 83 and Ada 95 source code. Key features include: Declaration (Booch) Diagrams, With, Withby Hierarchies, Call, Called By Hierarchies and “Push” of information with synchronized views. Also generates shareable in-depth reports in ASCII and HTML formats. Supports millions of lines of code with incremental parser technology automatically deducing and parsing code that has changed. Supports Windows 95, NT, various UNIX, and VMS workstations.

SOFTWARE COMPOSITIONS
321 Ocean Ave., Suite 6
Melbourne Beach, FL 32951
407-952-0430

Booth #800 - Software Compositions provides tools and services for Ada software quality improvement, reusable component extraction, and transition to Ada 95. The Re-engineering Mentor toolset automates Ada code assessment and conversion. Many other tools for Ada development and maintenance are included. Services include contact software services, consulting, custom tools, and training.

TLD SYSTEMS LTD.
3625 Del Amo Blvd., Ste. 100
Torrance, CA 90503
310-542-5433

Booth #730 - TLD provides Ada and JOVIAL Compiler Systems that address the key requirements expressed by users to support software development for real-time systems. TLD’s products support both 16- and 32-bit microprocessors and execute on a variety of hosts. We will be demonstration Ada83 and Ada95 products hosted on the SPARC and Pentium processors and targeting the MIL-STD-1750A, Pentium, MIPS, PowerPC micro-processors. Of particular interest to users are the Symbolic Debugger and Automatic Document Generation capability components of our products.

Top Software
3625 Del Amo Blvd., Ste. 100
Torrance, CA 90503
310-542-5433

Booth #730 - TLD provides Ada and JOVIAL Compiler Systems that address the key requirements expressed by users to support software development for real-time systems. TLD’s products support both 16- and 32-bit microprocessors and execute on a variety of hosts. We will be demonstration Ada83 and Ada95 products hosted on the SPARC and Pentium processors and targeting the MIL-STD-1750A, Pentium, MIPS, PowerPC micro-processors. Of particular interest to users are the Symbolic Debugger and Automatic Document Generation capability components of our products.

Tofs
Fridhem 2, S-76040, Vaddo, Sweden
46-176-5480

Booth #730 - Tofs is a toolkit for engineering of dependable complex systems. Tofs supports analysis, design, consistency check and documentation of complex systems where operators cooperate with software and hardware to complete missions. Tofs combines Ada-based formality with fault-tolerance analysis for system dependability. Tofs runs under MS Windows NT integrated with MS Office 97.

Victor Software, Inc.
1130 Tenrod Road, North Kingstown, RI 02852
401-295-5855

Booth #260 - The VectorCAST products scan your Ada, JOVIAL, and C/C++ source code and automatically generate the test code necessary to construct executable test simulation environments. With the VectorCAST test system your component simulation model is always up-to-date. It only takes minutes to construct the test environments that are required to isolate individual software components. Utilities are also provided to construct and execute test cases and generate the reports necessary to provide an audit trail of expected and actual results.

EXHIBIT HOURS

TUESDAY, 11/11
7:30AM-8:30AM
9:45AM-2:00PM
3:00PM-6:00PM

WEDNESDAY, 11/12
7:30AM-8:30AM
9:45AM-2:00PM
3:00PM-6:00PM

THURSDAY 11/13
7:30AM-8:30AM
10:30AM-2:00PM

▲
2nd Floor
- Exhibits
- Coffee Breaks
- Registration & Information
- Tutorials
  (consult pages 15-16 for specifics)
- SIGAda Local Reps
- BOFs & Working Groups

4th Floor
- Tutorials
  (consult pages 15-16 for specifics)
- BOFs & Working Groups
- Public Forum
- Conference Sessions
- Tutorials
  (consult pages 15-16 for specifics)
- Tuesday evening Social
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