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### Papers Presented at USENIX Conferences are Refereed.

The refereed papers were reviewed by the Program Committee and selected for their quality from a large number of submissions. We thank the Program Committee for their hard work.

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*IBM T.J. Watson Research Center*

### Tutorial Program Chair

Douglas C. Schmidt, *Washington University*

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### Advanced Topics Workshop Chair

Joe Sventek, *Hewlett-Packard Labs*

## QUESTIONS?

**Email:** [conference@usenix.org](mailto:conference@usenix.org)

**Phone:** 1.949.588.8649 **Fax:** 1.949.588.9706

**Updates:** [www.usenix.org/coots99/](http://www.usenix.org/coots99/)

## Important Dates to Remember:

**Hotel and Pre-Registration Discount Deadline:**

*Friday, April 9, 1999*

## Program at-a-Glance

### Sunday, May 2, 1999

|                   |                      |
|-------------------|----------------------|
| 6:00 pm – 9:00 pm | On-Site Registration |
| 6:00 pm – 9:00 pm | Welcome Reception    |

### Monday, May 3, 1999

|                   |                      |
|-------------------|----------------------|
| 7:30 am – 5:00 pm | On-Site Registration |
| 9:00 am – 5:00 pm | Tutorial Program     |

### Tuesday, May 4, 1999

|                    |                             |
|--------------------|-----------------------------|
| 7:30 am – 5:00 pm  | On-Site Registration        |
| 9:00 am – 5:00 pm  | Tutorial Program            |
| 6:00 pm – 10:00 pm | Birds-of-a-Feather Sessions |

### Wednesday, May 5, 1999

|                    |                             |
|--------------------|-----------------------------|
| 7:30 am – 5:00 pm  | On-Site Registration        |
| 9:00 am – 10:30 am | Opening Remarks and Keynote |
| 11:00 am – 5:00 pm | Technical Sessions          |
| 6:00 pm – 8:00 pm  | Conference Reception        |
| 8:00 pm – 10:00 pm | Birds-of-a-Feather Sessions |

### Thursday, May 6, 1999

|                   |                    |
|-------------------|--------------------|
| 9:00 am – 5:00 pm | Technical Sessions |
|-------------------|--------------------|

### Friday, May 7, 1999

|                   |   |
|-------------------|---|
| 9:00 am – 5:00 pm | Advanced Topics Workshop<br>(by invitation only—see page 9) |
|-------------------|---|

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**“Object-oriented programming has become the mainstay of programming, and if there is one conference that will give you an edge in this area, I am sure it is COOTS '99. The program committee has put together an outstanding conference with tutorials, invited talks, refereed papers, and an Advanced Topics Workshop.”**

**Murthy Devarakonda,  
IBM Thomas J. Watson  
Research Center  
Program Chair**

## Dear Colleague:

The ability to keep up with the latest trends is essential for your professional vitality. For researchers and practitioners alike, the Conference on Object-Oriented Technologies and Systems (COOTS) is a proven and invaluable source for the latest paradigms in object-oriented technologies. I invite you to join the COOTS community, and together lead the changing world.

At COOTS '99, you will meet and network with the leading developers and researchers in the object-oriented systems arena:

James Gosling of Sun Microsystems will give the keynote address. Where else but at this intentionally small conference can you hear Gosling talk, standing within 60 feet of you? It is guaranteed to be a thought-provoking discussion of how Java has changed the way we write programs today and what it can do for us in the future.

Professor Barbara Liskov of MIT will offer another enlightening talk on the second day of the technical program. An experienced researcher in the field of programming languages and object databases, she will share with us issues in controlling information flow to protect the privacy of shared information.

The COOTS technical program is the venue for learning about advanced R&D results from the leading universities and industrial labs. This year the technical program is stronger than ever. The high quality of submissions allowed the program committee to select the very best papers representing the latest advances and creative new directions in hot areas such as Java, COM, and CORBA. The two days of reports of research and experience cover a wide range of topics, including:

- Using and enhancing Java in realistic settings;
- Providing essential qualities of service in distributed object-oriented systems;
- Extending CORBA and COM to meet evolving user needs;
- Managing enterprise-scale applications with object-oriented techniques;
- Leveraging re-usable design knowledge to enhance programmer productivity;

- Modifying the object runtime environment to meet evolving user needs;
- What to look for when objects meet database technology;
- How to develop performance-critical distributed OO applications;
- Realistic, thought-provoking treatment of design patterns, meta-object protocols, interception techniques, and virtual machine performance issues;
- How to manage enterprise-scale large object-oriented applications;
- Java, Java, and more Java.

On May 3–4, an excellent set of tutorials is offered. Attendees from previous years tell us that the COOTS tutorials are the best in the business. Led by well-known experts and educators, these tutorials will introduce or update you on topics such as: frameworks, patterns, and components; efficient C++ programming; Java Beans, distributed Java, and the Jini™ platform; CORBA servers; COM and COM+; scalable ODBMS applications; and performance issues in OO applications.

On May 7th, an Advanced Topics Workshop takes place. Joe Sventek, Hewlett-Packard Labs, chairs this year's workshop with the timely theme of “Validating the Composition and/or Execution of Component-Based Systems.” Attendance is limited and based on acceptance of a position paper. (Presenters within the regular conference may also attend.) See page 9 for more information.

Object-oriented programming has become the mainstay of programming, and if there is one conference that will give you an edge in this area, I am sure it is COOTS. I look forward to seeing you in San Diego during May 3–7, 1999.

**On behalf of the Program Committee,  
Murthy Devarakonda  
IBM Thomas J. Watson Research Center**

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**Seating is limited, so register now to guarantee your first choice.**

### Continuing Education Units (CEUs)

USENIX provides CEUs for a small administrative fee. Established by the International Association for Continuing Education and Training, the CEU is a nationally recognized standard unit of measure for continuing education and training, and is used by thousands of organizations across the United States. Completion of one full day of the tutorial program qualifies for 0.6 CEUs. You can request CEU credit by checking the appropriate box on the registration form. USENIX provides a certificate and maintains transcripts for each attendee who chooses CEU credits. CEUs are not the same as college credits. Consult your employer or school to determine their applicability.

## Tutorial Overview

Each tutorial runs from 9:00 AM to 12:30 PM or from 1:30 PM to 5:00 PM. Please select one morning and one afternoon tutorial each day. Sorry, no partial or split-day registrations are allowed. Lunch is included with your tutorial fees.

### Monday, May 3, 1999

**Full Day Tutorial Session (9:00am-5:00pm):**

**M1** Patterns at Work  
Frank Buschmann, *Siemens AG*

**Morning Tutorial Sessions (9:00am-12:30pm):**

**M2AM** Writing Efficient C++ Programs  
Stan Lippman, *Consultant*

**M3AM** Implementing CORBA Servers Using the Portable Object Adapter  
Steve Vinoski, *IONA Technologies*

**Afternoon Tutorial Sessions (1:30pm-5:00pm):**

**M4PM** Introduction to Java Beans  
Uwe Steinmueller, *Siemens Microelectronics*

**M5PM** The COM(+) Programming Model  
Don Box, *DevelopMentor*

### Tuesday, May 4, 1999

**Morning Tutorial Sessions (9:00am-12:30pm):**

**T1AM** Programming for the Jini™ Platform  
Ken Arnold, *Sun Microsystems, Jini Team*

**T2AM** Patterns and Performance of Real-time Object Request Brokers  
Douglas C. Schmidt, *Washington University, St. Louis*

**T3AM** Distributed Java: Building Collaborative Applications  
Ron I. Resnick, *DiaLogos, Inc.*

**Afternoon Tutorial Sessions (1:30pm-5:00pm):**

**T4PM** Advanced Principles of Object-Oriented Design in UML  
Robert C. Martin, *Object Mentor Inc.*

**T5PM** JavaBean Components: Specification, Design and Test with Catalysis/UML  
Desmond D'Souza, *Platinum Technology*

**T6PM** Building Scalable ODBMS Applications  
Matt BenDaniel, *Object Design, Inc.*

## Monday, May 3, 1999

**Full Day Tutorial Session**  
(9:00 am – 5:00 pm):

### M1 PATTERNS AT WORK

Frank Buschmann, *Siemens AG*

**Who should attend:** People with solid knowledge of OO design and programming, and basic knowledge of patterns and UML notation, who are interested in seeing how patterns and framework components can be applied to develop object-oriented communication software systems.

Developing complex communication software is a challenging task. This tutorial demonstrates how a real-world OO distributed warehouse management system was designed using patterns and framework components. We replay the software construction process step-by-step, outlining the design problems that occurred, presenting patterns that could potentially help solve these problems, discussing design alternatives, and showing how we actually applied the patterns we selected. Through this process we illustrate the evolution of the communication system to its final architecture.

The patterns explained and used in this tutorial include Reactor, Acceptor-Connector, Active Object, Abstract Factory, Facade, Strategy, Broker, Forwarder-Receiver, Layers, Proxy, and Publish/Subscribe, which are available in the book “Pattern-Oriented Software Architecture” (John Wiley & Sons), “Design Patterns: Elements of Reusable Software Architecture” (Addison-Wesley) and in the various volumes of the “Pattern Languages of Programming Design” series (Addison-Wesley).

We will generalize from the specifics of the case study in the tutorial to derive guidelines for applying patterns and discuss how patterns can help in building high-quality software with predictable properties and qualities. The tutorial concludes with a summary of our experiences from several distributed object computing system projects in which we applied patterns, (i.e., what worked, what could be improved, and how to leverage this experience in your projects).

By using real-world examples, we will show how patterns help to guide the process of building high-quality software. Moreover, we show that applying patterns is a task that requires creative and innovative developers, and is not a rote, mechanical task.

**Morning Tutorial Sessions**  
(9:00 am – 12:30 pm):

### M2AM Writing Efficient C++ Programs

Stan Lippman, *Consultant*

**Who should attend:** Programmers either using, or about to use C++ for the delivery of production code in which efficiency is a concern. Attendees are presumed to be familiar with Standard C++; that is, the support C++ provides for object-based, object-oriented, and generic programming. Expertise in the language is not required.

In this tutorial, we present a series of C++ idioms for writing efficient C++ programs. We briefly review the underlying C++ object model, and turn to design alternatives when the idioms themselves become overwhelmed (e.g., with large-scale object creation and copy). We will look at object-based design, use of the STL container classes and generic algorithms, and object-oriented programming.

These are particularly effective areas of program efficiency because (a) the idioms generally make for more readable programs, and (b) once the idioms and implementation (or object) model is internalized, the gains in efficiency come mostly for free. In this course, we'll point out areas where experienced C programmers tend to write correct but frightfully sluggish C++ code.

To make the tutorial interesting, we'll walk through successive iterations in improving the performance of a correctly working program. To make the tutorial quantitative, we'll look at some performance numbers for reference.

### M3AM Implementing CORBA Servers Using the Portable Object Adapter

Steve Vinoski, *IONA Technologies*

**Who should attend:** C++ programmers who want to learn how to use the new standard Portable Object Adapter (POA) in their CORBA applications. A basic understanding of CORBA is a plus, but expertise is not necessary. Experience with the deprecated Basic Object Adapter (BOA) might be helpful but is not necessary. C++ examples are used in this tutorial, so a basic understanding of C++ is helpful. However, Java programmers will also benefit from this tutorial because it focuses on the fundamentals of the POA, which are language-independent.

This tutorial first reviews the basics of CORBA and shows where Object Adapters fit into the overall CORBA architecture. It then explores details of the standard Portable Object Adapter (POA), including:

- POA policies, which control POA features and behavior
- Servant life cycle issues
- CORBA object life cycle issues
- Servant management and activation
- POA activation
- POA management
- Useful POA policy combinations

After completing this tutorial, participants will have a basic understanding of how to use the POA to write CORBA applications.

**Afternoon Tutorial Sessions**  
(1:30 pm – 5:00 pm):

### M4PM Introduction to Java Beans

Uwe Steinmueller, *Siemens Microelectronics*

**Who should attend:** Software developers who have non-trivial experience in programming with Java and want to learn the basic concepts of the Java component model. The goal of this tutorial is to apply these concepts to the attendees' daily programming work.

In this tutorial, we present the basics of components and especially of the Java component model: Java Beans. The tutorial outlines the architecture of Java Beans and its basics: properties, events, methods, serialization, and packaging. All material will be presented using simple Beans created by the author. We will also demonstrate the principles of more advanced Beans concepts like “data-aware” Beans. The example Beans will also utilize the new Swing UI components.

A key problem with Java Beans is their integration into the different builder tools. The course will discuss this issue and demonstrate “Java Studio” and “Visual Cafe 3.0” as two quite different examples of such tools. This section will also critically reflect some of the shortcomings with Java Beans.

After completing this tutorial, participants will be able to develop their own beans.

## M5PM The COM(+) Programming Model

Don Box, *DevelopMentor*

**Who should attend:** Developers and architects involved in the design and implementation of component-based applications. An understanding of either Java or C++ is expected in order to grasp the code fragments, but read-only language skills should be adequate. This tutorial is geared at presenting the core semantics of the programming model and providing attendees with a view into the current state of COM(+).

This tutorial focuses on the semantics of COM(+) and covers the core abstractions used to design and implement COM(+) applications. Topics covered include:

- Interface-based programming—COM-style
- COM(+) class loading and component configuration
- Context and Interception
- Remoting architecture
- Transactional Programming
- Asynchronous Programming

Sifting through the mounds of detail involved in actual COM(+) development can be daunting. This tutorial is intended to be a roadmap to help attendees focus on the core abstractions that will most influence their designs.

## Tuesday, May 4, 1999

### Morning Tutorial Sessions (9:00 am – 12:30 pm):

#### T1AM Programming for the Jini™ Platform

Ken Arnold, *Sun Microsystems, Jini Team*

**Who should attend:** Programmers who want to know what Jini technology does, how it does it, and how they can play. Participants should be familiar with Java language programming beyond the beginner level, and with OO in general. Some familiarity with distributed programming is helpful, but not required.

The Jini architecture makes it possible to write and deploy services in a network so that the set of services and their interactions are flexible. This course will teach you the architecture,

its component parts, and how they interact. You will then learn how the architecture is expressed in Java programming, the interfaces and classes involved, and the pieces of the Jini programming model.

You will learn about the responsibilities of services in a Jini system, and how to use the programmer tools available for developing services and clients in a Jini system. Examples of simple services will be discussed, and you will have frameworks for writing your own services and clients.

#### T2AM Patterns and Performance of Real-time Object Request Brokers

Douglas C. Schmidt, *Washington University, St. Louis*

**Who should attend:** The tutorial is intended for software developers who are designing and implementing real-time communication systems such as telecommunication systems, multimedia services, network management applications, personal communication systems, client/server management information systems, WWW servers, avionics systems, and upper-layer communication protocols.

CORBA is an emerging standard that defines a flexible model for distributed object computing. This tutorial describes the design and optimization principles, patterns, and performance of real-time CORBA Object Request Brokers (ORBs). The tutorial material is based on the forthcoming OMG real-time CORBA specification, as well as experience with the ACE ORB (TAO), which is the first real-time ORB endsystem that supports end-to-end QoS guarantees over networks and embedded system interconnects.

This talk focuses on:

- The design and performance of the real-time CORBA QoS programming model
- ORB endsystem architecture (which minimizes priority inversion and non-determinism)
- Portable Object Adapter (POA) optimizations (which associate client requests with servants in constant time)
- Scheduling and Events Services for adaptive QoS and static/dynamic real-time scheduling
- A highly optimized CORBA protocol engine (which implements the standard IIOP protocol using a small memory footprint)
- A/V Streaming Service (which controls and manages audio/video streams)

#### T3AM Distributed Java: Building Collaborative Applications

Ron I. Resnick, *DiaLogos, Inc.*

**Who should attend:** Java developers interested in serious exploration of the options available for building distributed Java programs. Some Java programming experience is required, and familiarity with RMI, CORBA, Voyager or a similar framework would be useful. The tutorial will be of particular interest to developers who are finding limitations in tiered static architectures, and want to explore “collaborative computing” alternatives in Java.

This tutorial explores a number of different mechanisms available to the Java developer for building distributed programs. These include the java.net socket communication primitives, RMI, Java/CORBA, JSDT, ObjectSpace Voyager and SoftWired iBus. These technologies are examined in the context of contrasting two primary styles for building large-scale systems: tiered and collaborative architectures.

Tiered systems are very much in vogue today, and are characterized by three-tier systems with graphical clients, mid-tier transactional application servers and back-end data resources. The object paradigm, and Java in particular, have in recent years been wedded to this model in the form of things like object transaction managers, Java application servers and Enterprise Java Beans. These are themselves typically built upon request/response communication primitives such as CORBA/IIOP, HTTP, RMI and JDBC.

Collaborative architectures, in contrast, do not restrict objects to reside on fixed layers of a system, but rather are composed of ad-hoc groups of distributed objects which compose together at runtime. They frequently build upon message-passing communication primitives, and often upon multicast communications. Java is particularly well suited for collaborative computing due to its native code mobility support. Java frameworks for collaborative computing, such as JSDT, Voyager Spaces and iBus are now commercially available, and offer real alternatives for system designers. The recent introduction of Jini indicates that collaborative Java computing is moving into the mainstream.

The tutorial demonstrates coded examples using each of the technologies, highlighting the features they each offer to support collaborative computing.

## Afternoon Tutorial Sessions (1:30 pm – 5:00 pm):

### T4PM **Advanced Principles of Object-Oriented Design in UML**

Robert C. Martin, *Object Mentor Inc.*

**Who should attend:** Software engineers who are familiar with an OO language and who want to know about OO Design Strategies in UML. This is a highly technical tutorial for engineers in the trenches. It is filled with anecdotes and lessons from the speaker's long experience as a software engineer and consultant.

This tutorial discusses ten advanced principles of OO design in the context of UML. Students will learn the basics of UML notation, and how to apply it in the context of OO design. Principles include:

- Principles of class design
  1. (OCP) The Open Closed Principle
  2. (LSP) The Liskov Substitution Principle
  3. (DIP) The Dependency Inversion Principle
  4. (ISP) The Interface Segregation Principle
- Principles of package cohesion
  5. (REP) The Reuse/Release Equivalency Principle
  6. (CCP) The Common Closure Principle
  7. (CRP) The Common Reuse Principle
- Principles of package coupling
  8. (ADP) The Acyclic Dependencies Principle
  9. (SDP) The Stable Dependencies Principle
  10. (SAP) The Stable Abstractions Principle

Topics range from detailed techniques for designing classes, to principles for partitioning classes into packages, to design metrics for measuring various qualities of an OO design.

### T5PM **JavaBean Components: Specification, Design and Test with Catalysis/UML**

Desmond D'Souza, *Platinum Technology*

**Who should attend:** Attendees must be familiar with basics of both Java and Java Beans. Some familiarity with basic modeling (OMT, UML, etc.) would be a plus.

Component standards like Java Beans promise standard re-usable parts which can be easily composed. To be replaceable and scalable, the behavior of a Bean should be described in a way which is abstract (permit many implementations), precise (clear, unambiguous, a basis for qualification and test), and that permits easy composition with other components.

This tutorial will describe an approach to the precise and systematic specification of a Java Bean, extended to its design, implementation, and test, based on the Catalysis approach to applying UML. The focus is on the component mind-set to specifying and assembling components, with specifics of the Java language only as needed.

Topics include:

- From objects to components
- Java interfaces & classes
- Method specification
- Abstract model of state
- Specification attributes and types
- Event specification
- Exception specification
- Designing and implementing a Bean
- Testing against specs

### T6PM **Building Scalable ODBMS Applications**

Matt BenDaniel, *Object Design, Inc.*

**Who should attend:** C++ and Java architects and programmers building or planning applications which need object persistence with large datasets and/or many users. Proficiency with C++ or Java and distributed applications or DBMS is a plus.

Experienced application developers have concluded that an Object Database is an essential building block for production OO systems that support high usage loads and gigabyte-to-terabyte-sized storage. ODBMS's provide tremendous advantages compared with RDBM's, flat files or serialization, but only when the appropriate design and implementation techniques are applied. The nature and importance of these techniques can become painfully apparent during project delays due to the pitfalls that abound.

The tutorial first reviews the main aspects of ODBMS architecture and key scalability concepts. The techniques are explained with diagrams and examples. The tutorial concludes with a close look at a deployed application using these techniques.

The tutorial attendees will learn the principles of scalable ODBMS application design. Developers will better understand how ODBM's work and how to obtain their benefits. This will also enable architects to scope projects better.

A brief course outline is:

- Using the Techniques
- Review of ODBMS
- Key Concepts
- Process Techniques
- Data Techniques
- Transaction Techniques
- Real Example Application

“The tutorials provided me with the answers to immediate programming problems. I was very satisfied with the amount of information I learned at the conference...”

Billy Chambless, *Mississippi State University Center for Air/Sea Technology*

## About the Instructors



**Ken Arnold** is one of the architects of the Jini platform, lead architect of the JavaSpaces™ project, the community source coordinator for the Jini project, and a Senior Staff Engineer at Sun Microsystems, Inc. He is a longtime writer on programming and OO topics, most recently as co-author with James Gosling of *The Java Programming Language*. Prior to working at Sun, Ken was part of the original HP team developing CORBA, and worked at Apollo Computer on UNIX and user interfaces. As part of the original BSD team, Ken created the curses library package and was co-author of the game Rogue.



**Matt BenDaniel** is Principal Consulting Engineer at Object Design, Inc. Since 1990 he has provided ODBMS training, design consulting, and deployment assistance to hundreds of clients. Object Design in Burlington, Massachusetts is the leading ODBMS vendor. BenDaniel has an SB from MIT in Computer Science and an SM in Management from the Sloan School at MIT.



**Don Box** is a cofounder of DevelopMentor, an education firm that focuses on distributed object technology. He is the author of *Essential COM* and a coauthor of *Effective COM*, both from Addison Wesley. He is also a contributing editor to *Microsoft Interactive Developer* as well as *Microsoft Systems Journal*, where he writes the bi-monthly COM column. He has a Master's degree in Computer Science from the University of California at Irvine, where he had the dubious honor of being Douglas C. Schmidt's office mate.



**Frank Buschmann** is software engineer at Siemens Corporate Technology in Munich, Germany. His research interests include Object Technology, Application Frameworks and specifically Patterns. Frank has been involved in several concrete industrial software development projects. Frank is co-author of *Pattern-Oriented Software Architecture—A System of Patterns*.



**Desmond D'Souza** is VP of component-based development at ICON Computing, a Platinum Technology Company. Mr. D'Souza publishes and speaks regularly at various object forums, has used object technology since 1985, and is co-author of *Objects, Components, and Frameworks with UML—the Catalysis Approach* published by Addison Wesley in 1998. He writes the Modeling for Java column in the Journal of Object-Oriented Programming and in Report on Object Analysis and Design.



**Stanley Lippman** provides consultation on C++ and OO software development. Prior to becoming an independent consultant, Stan was principal software engineer at Disney Feature Animation. While at AT&T Bell Laboratories, Stan led the *cfront* Release 3.0 and Release 2.1 compiler development team. Stan was a member of the Bell Laboratories Foundation Project under the leadership of Bjarne Stroustrup and was responsible for the object model component of a research C++ programming environment. Stan is the author of *C++ Primer*, *Inside the C++ Object Model*, and Editor of *C++ Gems*. For more information see [www.objectwrite.com](http://www.objectwrite.com).



**Robert C. Martin** has been a software professional since 1970. He is president of Object Mentor Inc., a firm of highly experienced experts that offers high level OO software design consulting, training, and development services to major corporations around the world. In 1995 he authored the

best-selling book: *Designing Object Oriented C++ Applications Using the Booch Method*, published by Prentice Hall. In 1997 he was chief editor of the book: *Pattern Languages of Program Design 3* published by Addison Wesley. Since 1996, he has been the editor-in-chief of the *C++ Report*. He has published dozens of articles in various trade journals, and is a regular speaker at international conferences and trade shows.



**Ron Resnick** has been developing distributed systems since 1991 at Northern Telecom and IBM. He works at DiaLogos Incorporated where he develops and teaches courses on advanced distributed Java and CORBA topics. Ron has written articles for *Dr. Dobbs Sourcebook* and *CORBA*

*Development*, and founded the *dist-obj* mailing list, a private forum devoted to advanced topics in distributed object research and practice.



**Douglas C. Schmidt** is an Associate Professor in the Department of Computer Science and the Department of Radiology at Washington University in St. Louis, Missouri. His research focuses on design patterns, implementation, and experimental analysis of OO frameworks, which facilitate the

development of high-performance, real-time distributed object computing systems on parallel processing platforms running over high-speed networks and embedded system interconnects.



**Uwe Steinmueller** is Technical Director of the PSE Technology Lab at Siemens Microelectronics, Inc. At PSE Technology Lab he is focused on Java and Smartcard applications. Before coming to the PSE Technology Lab he was at Siemens Research in Munich and worked there as Java evangelist. He

has utilized OO programming and component technology for more than 8 years and has been a member of the ANSI C++ committee for about four years.



**Steve Vinoski** is Chief Architect for IONA Technologies. A frequent speaker at technical conferences, he has been giving CORBA tutorials around the globe since 1993. Steve has also helped put together several important OMG specifications, including CORBA 1.2, 2.0, 2.2, and 2.3, the OMG IDL

C++ Language Mapping, the ORB Portability Specification, and the Objects By Value Specification. In 1996 he served on the OMG Architecture Board. He is currently the chair of the OMG IDL C++ Mapping Revision Task Force. He and Michi Henning are co-authors of *Advanced CORBA Programming with C++* published in January 1999 by Addison Wesley Longman. Steve also writes the "Object Interconnections" column for the *SIGS C++ Report Magazine* with Dr. Douglas C. Schmidt.

# Validating the Composition/Execution of Component-Based Systems

**CHAIR: Joe Sventek, Hewlett-Packard Labs**

**Position Papers due: March 1, 1999 Acceptance Notices Issued: March 20, 1999**

This one-day, post-conference workshop will focus on issues surrounding the validation of component-based systems, in terms of their composition as well as their execution behavior. Composition validation implies comparison of the component structure of the deployed/installed/executing system with a composition model; execution validation implies comparison of the component structure and behavior of the executing system with an execution model.

The workshop topics include, but are not limited to, approaches/techniques for the following:

- Specification of correct composition of systems in terms of components and relationships
- Validation of the composition at different epochs: compile/assembly, deployment, instantiation, execution
- Changing the composition during runtime without bringing down the system
- Testing of component-based systems during development

Attendance is limited and based on acceptance of a position paper and attendance at the conference technical program. Potential workshop attendees are invited to submit a position paper of at most three (3) pages via electronic mail to Joe Sventek <joe\_sventek@hp.com> no later than March 1st, 1999. Acceptance notices to all participants will be issued by March 20th, 1999. Position papers should briefly describe experiences, work in progress, and/or ongoing research and development in the topic area. A representative subset of authors of position papers may be invited to make informal presentations at the workshop. The workshop submissions will also be circulated in advance to permit the majority of the workshop time to be spent on discussion of relevant issues.

If you have any questions regarding the topic, especially if you are concerned whether your focus is relevant to the chosen topic, do not hesitate to send electronic mail to Joe Sventek <joe\_sventek@hp.com>.

## QUESTIONS?

**Email:** [conference@usenix.org](mailto:conference@usenix.org)

**Phone:** 1.949.588.8649 **Fax:** 1.949.588.9706

**Updates:** [www.usenix.org/coots99/](http://www.usenix.org/coots99/)

**9:00am – 10:30am****Opening Session****Opening Remarks & Awards**Murthy Devarakonda, *IBM T.J. Watson Research Center***Keynote Address**

James Arthur Gosling, Ph.D.

*Chief Scientist, Java Software; VP and Fellow, Sun Microsystems, Inc.*

James Gosling is currently a VP & Fellow at Sun Microsystems. He has built satellite data acquisition systems, a multiprocessor version of Unix, several compilers, mail systems and window managers. He has also built a WYSIWYG text editor, a constraint based drawing editor and a text editor called 'Emacs' for Unix systems. At Sun his early activity was as lead engineer of the NeWS window system. He did the original design of the Java programming language and implemented its original compiler and virtual machine. He received a BS in Computer Science from the University of Calgary, Canada in 1977. He received a PhD in Computer Science from Carnegie-Mellon University in 1983. His thesis was entitled "The Algebraic Manipulation of Constraints".

**10:30am – 11:00am****Break****11:00am – 12:30pm****Design Patterns**Chair: Steve Vinoski, *IONA Technologies, Inc.***Filters as a Language Support for Design Patterns in Object-Oriented Scripting Languages**Gustaf Neumann and Uwe Zdun, *University of Essen, Germany***Performance Patterns: Automated Scenario Based ORB Performance Evaluation**Sridhar Nimmagadda, Chanaka Liyanaarachchi, Douglas Niehaus, Anil Gopinath and Arvind Kaushal  
*University of Kansas***Object-Oriented Pattern-Based Parallel Programming with Automatically Generated Frameworks**Steve MacDonald, Duane Szafron, and Jonathan Schaeffer, *University of Alberta, Canada***12:30pm – 2:00pm****Lunch (on your own)****2:00pm – 3:30pm****Runtime Issues**Chair: Yi-Min Wang, *Microsoft Research***Intercepting and Instrumenting COM Applications**Galen C. Hunt, *Microsoft Research* and Michael L. Scott, *University of Rochester***Implementing Causal Logging Using OrbixWeb Interception**Chanathip Namprempre, Jeremy Sussman, and Keith Marzullo, *University of California, San Diego***Quality of Service Aware Distributed Object Systems**Svend Frolund and Jari Koistinen, *Hewlett-Packard Laboratories***3:30pm – 4:00pm****Break****4:00pm – 5:00pm****Objects and Databases**Chair: Rajendra Raj, *Morgan Stanley & Company***Resource Control for Java Database Extensions**Grzegorz Czajkowski, Tobias Mayr, Praveen Seshadri, Thorsten von Eicken, *Cornell University***Address Translation Strategies in the Texas Persistent Store**Sheetal V. Kakkad and Paul R. Wilson, *University of Texas, Austin*

**9:00am – 10:00am**



**Invited Talk: Supporting Privacy in a Distributed Environment**

Barbara Liskov

*Ford Professor of Engineering, Massachusetts Institute of Technology*

When servlets and applets are used today, it is impossible to protect the privacy of information that must be shared with the mobile code for it to do its job. This talk will describe new ways of providing control over information flow that protects the privacy of shared information. The talk will also discuss JFlow, an extension to Java that supports information flow control and allows most run-time information flow checks to be avoided by static checking.

**10:00am – 10:30am**

**Break**

**10:30am – 12:00pm**

**Optimization**

Chair: Werner Vogels, *Cornell University*

**JMAS: A Java-Based Mobile Actor System for Distributed Parallel Computing**

Legand L. Burge III and K. M. George, *Oklahoma State University*

**Adaptation and Specialization for High Performance Mobile Agents**

Dong Zhou and Karsten Schwan, *Georgia Institute of Technology*

**Design Considerations and Performance Optimizations for Real-time ORBs**

Aniruddha Gokhale, *Lucent Bell Labs*; Irfan Pyarali, Carlos O’Ryan, Douglas Schmidt, Vishal Kachroo, Alexander Arulanthu, and Nanbor Wang, *Washington University, St. Louis*

**12:00pm – 1:30pm**

**Lunch (on your own)**

**1:30pm – 3:00pm**

**Programming in the Large**

Chair: Joe Sventek, *Hewlett-Packard Labs*

**The Application of Object-Oriented Design Techniques to the Evolution of the Architecture of a Large Legacy Software System**

Jeff Mason and Emil Ochotta, *Xilinx Inc.*

**Supporting Automatic Configuration of Component-Based Distributed Systems**

Fabio Kon and Roy H. Campbell, *University of Illinois at Urbana-Champaign*

**Automating Three Modes of Evolution for Object-Oriented Software Architectures**

Lance Tokuda and Don Batory, *University of Texas at Austin*

**3:00pm – 3:30pm**

**Break**

**3:30pm – 5:00pm**

**Java**

Chair: Ken Arnold, *Sun Microsystems, Inc.*

**The Design and Implementation of Guaran**

Alexandre Oliva and Luiz Eduardo Buzato, *Universidade Estadual de Campinas, Brazil*

**Tuning Branch Predictors to Support Java Method Invocation**

N. Vijaykrishnan, *Pennsylvania State University* and N. Ranganathan, *University of Texas at El Paso*

**Comprehensive Profiling Support in the Java Virtual Machine**

Sheng Liang and Deepa Viswanathan, *Sun Microsystems Inc.*

“I learned more in four days than three months of reading newsgroups, books, and journals. Excellent source of information and a chance to mingle with the big names in the field.”

Bob Laferriere, GE Medical Systems, Inc.

# USENIX & SAGE Membership Information and Events

## About USENIX

Since 1975, the USENIX Association has brought together the community of engineers, system administrators, scientists, and technicians working on the cutting edge of computing. USENIX and its members are engaged in problem-solving, in innovation, and in research that works.

USENIX conferences are the essential meeting grounds for the presentation and discussion of the newest information on the technical developments in computing.

USENIX and its members are dedicated to:

- Problem-solving with a practical bias
- Fostering innovation that works
- Communicating rapidly the results of both research and innovation
- Providing a neutral forum for the exercise of critical thought and the airing of technical issues

USENIX Website: [www.usenix.org](http://www.usenix.org)

## About SAGE

SAGE, the System Administrators Guild, is the largest membership society for system managers and is dedicated to the advancement and recognition of system administration as a profession. SAGE is a special technical group within USENIX. To join SAGE, you must be a member of USENIX.

SAGE Website: [www.usenix.org/sage/](http://www.usenix.org/sage/)

### The USENIX Association

2560 Ninth Street, Suite 215

Berkeley, CA 94710

Phone: 1.510.528.8649

Fax: 1.510.548.5738

Email: [office@usenix.org](mailto:office@usenix.org)

Web: <http://www.usenix.org/>

## Upcoming USENIX Events

### Conference on Network Administration

April 7-9, 1999, Santa Clara, CA

<http://www.usenix.org/events/neta99/>

### Workshop on Intrusion Detection and Network Monitoring

April 11-12, 1999, Santa Clara, CA

<http://www.usenix.org/events/detection99/>

### Workshop on Embedded Systems

March 29-31, 1999, Cambridge, MA, USA

<http://www.usenix.org/events/es99/>

### USENIX Workshop on SmartCard Technology

May 10-11, 1999, Chicago, IL

<http://www.usenix.org/events/smartcard99/>

### SANS99

Co-Sponsored by SAGE, The System

Administrators Guild

May 9-15, 1999, Baltimore, MD

### USENIX Annual Technical Conference

June 6-11, 1999, Monterey, CA

<http://www.usenix.org/events/usenix99/>

### 3rd USENIX Windows NT Symposium

July 12-14, 1999, Seattle, WA

Paper submissions due: February 23, 1999

<http://www.usenix.org/events/usenix-nt99/>

### 2nd Large Installation System Administration of Windows NT Conference (LISA-NT)

Sponsored by USENIX, Co-sponsored by SAGE

July 14-16, 1999, Seattle, WA

Paper submissions due: February 23, 1999

<http://www.usenix.org/events/lisa-nt99/>

### 8th USENIX Security Symposium

Sponsored by USENIX in cooperation with

The CERT Coordination Center

August 23-26, 1999, Washington, D.C.

Paper submissions due: March 9, 1999

<http://www.usenix.org/events/sec99/>

### 2nd Conference on Domain-Specific Languages

Sponsored by USENIX in cooperation with

ACM SIGPLAN and SIGSOFT

October 3-6, 1999, Austin, TX

Paper submissions due: March 22, 1999

<http://www.usenix.org/events/dsl99/>

### 2nd USENIX Symposium on Internet Technologies and Systems (USITS)

Sponsored by USENIX, Co-Sponsored by IEEE

Computer Society Task Force on Internetworking

October 11-14, 1999, Boulder, CO

Extended abstracts due: March 25, 1999

<http://www.usenix.org/events/usits99/>

### 13th Systems Administration Conference (LISA '99)

Sponsored by USENIX and SAGE

November 7-12, 1999, Seattle, WA

Paper submissions due: May 25, 1999

<http://www.usenix.org/events/lisa99/>

### 7th Tcl/Tk Conference

February 14-18, 2000, Austin, TX

<http://www.usenix.org/events/tcl2k/>

### 4th Symposium on Operating Systems Design & Implementation

November 2000, San Diego, CA

## USENIX AND SAGE THANK THEIR SUPPORTING MEMBERS

**USENIX Supporting Members:** APUNIX COMPUTER SERVICES \* CIRRUS TECHNOLOGIES \*  
CISCO SYSTEMS, INC. \* CYBERSOURCE CORPORATION \* DEER RUN ASSOCIATES \*  
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# Conference Activities and Services

## QUESTIONS?

**USENIX  
Conference Office**  
22672 Lambert Street,  
Suite 613  
Lake Forest, CA 92630

**Phone:**  
1.949.588.8649

**Fax:**  
1.949.588.9706

**Email:**  
[conference@usenix.org](mailto:conference@usenix.org)

**URL:**  
<http://www.usenix.org>

**Office hours:**  
8:30 am – 5:00 pm  
Pacific Time

## Conference Proceedings

One copy of the proceedings is included with your Technical Sessions registration fee. To order additional copies, contact the USENIX Association at 1.510.528.8649, or send your email to: [office@usenix.org](mailto:office@usenix.org)

## Tutorial Notes

Some tutorial notes may be available for sale after 3:00 pm on-site Tuesday, May 4. Check with the registration desk staff.

## Birds-of-a-Feather Sessions (BoFs)

### Tuesday and Wednesday evenings

Do you have a topic that you'd like to discuss with others? Our Birds-of-a-Feather Sessions may be perfect for you. BoFs are very interactive and informal gatherings for attendees interested in a particular topic. Schedule your BoF in advance by telephoning the USENIX Conference Office at 1.949.588.8649, or email to: [conference@usenix.org](mailto:conference@usenix.org)

## Social Activities

**Meet the conference speakers and connect with your peers in the community.**

### Sunday, May 2

6:00 pm – 9:00 pm Welcome Reception

### Wednesday, May 5

6:00 pm – 8:00 pm Conference Reception

8:00 pm – 11:00 pm Birds-of-a-Feather Sessions

## Student Stipends and Discounts

### Technical Sessions:

USENIX offers a special discount rate of \$75 for its technical sessions for full-time students. You must include a copy of your current student I.D. card with your registration. This special fee is not transferable.

### Student Stipends:

A limited number of student stipends are available to pay for travel, living expenses, and registration fees to enable full-time students to attend the conference. To apply for a stipend, read *comp.org.usenix* 6 to 8 weeks before the conference, visit our Web site, [www.usenix.org/students/](http://www.usenix.org/students/) or email [students@usenix.org](mailto:students@usenix.org) for more information.

**“A really great place to see all the latest techniques and technologies.”**

**Dan Moulder, University of Waterloo**

**Hotel and  
Pre-Registration  
Discount  
Deadline:**

**Friday,  
April 9, 1999**

**For more  
information,  
please  
contact us:**

**USENIX**

**Conference Office**

22672 Lambert Street,  
Suite 613  
Lake Forest CA 92630

**Phone:**

1.949.588.8649

**Fax:** 1.949.588.9706

**Email:**

[conference@usenix.org](mailto:conference@usenix.org)

**URL:**

<http://www.usenix.org>

**Office hours:**

8:30 am – 5:00 pm  
Pacific Time

## Hotel and Travel Information

The Conference headquarters will be:

**The Town & Country Resort**

500 Hotel Circle North  
San Diego, CA 92186-5098  
**Toll Free:** 1.800.772.8527 (USA)  
**Local Phone:** 1.619.291.7131  
**Reservation Fax:** 1.619.291.3584

### ROOM RATES

|                         |                            |
|-------------------------|----------------------------|
| <b>Garden Rooms</b>     | \$78 single, \$88 double   |
| <b>East Tower Rooms</b> | \$93 single, \$103 double  |
| <b>West Tower Rooms</b> | \$104 single, \$114 double |

(Plus local tax, currently 9.5%)

### To Make Your Reservation

Call the hotel directly and ask for the Reservations Desk. You must mention USENIX to get this special group rate. A one night's deposit is required to guarantee your first night's stay. To cancel your reservation, you must notify the hotel at least 24 hours before your planned arrival date.

**IMPORTANT:** The room reservation deadline is Friday, April 9, 1999. Requests for reservations received after the deadline will be handled on a space and rate available basis.

**PARKING:** Hotel parking is available at a rate of \$4 per day.

### Airport-to-Hotel Transportation

Lindbergh Field, San Diego's International Airport, is located only 15 minutes from the Town & Country Resort. Cloud Nine Shuttle offers continuous 24 hr van service every 20–30 minutes at a current cost of \$8.00 one way. Catch the shuttle outside the baggage claim area at the shuttle loading island. Taxi service is available at an approximate cost of \$15 one way.

### Discount Airfares

Special airline discounts will be available for USENIX attendees. Please call for details:

**JNR, Inc.**

**Toll Free:** 1.800.343.4546 (USA and Canada)  
**Telephone:** 1.949.476.2788

## Registration Information and Fees

### Tutorial Fees (May 3–4, 1999)

*Tutorial registration fees include:*

- Admission to the tutorials you select
- Printed and bound tutorial materials for selected classes
- Lunch

### Early registration fee (until April 9, 1999)

Select a full-day tutorial or one AM and one PM tutorial per day. Sorry, no partial or split-day registration allowed.

|                               |       |
|-------------------------------|-------|
| Tutorial Program for two days | \$690 |
| CEU credit for two full days  | \$ 30 |
| Tutorial Program for one day  | \$395 |
| CEU credit for one full day   | \$ 15 |

**After April 9, add \$50 to the tutorial fee.**

### Technical Sessions Fees (May 5–6, 1999)

*Technical Sessions registration fees include:*

- Admission to all Technical Sessions
- Copy of Conference Proceedings
- Admission to the Conference Reception

### Early registration fee (until April 9, 1999)

|                                    |       |
|------------------------------------|-------|
| Member*                            | \$360 |
| Non-member or<br>Renewing Member** | \$440 |
| Full-time student                  | \$ 75 |

(Must provide copy of current student I.D. Card)

**After April 9, add \$50 to the Technical Sessions fee.**

*\* The member fee applies to current members of USENIX, EurOpen national groups, JUS or AUUG.*

*\*\* Join USENIX or renew your membership at no additional charge. Pay the non-member technical sessions fee and check the USENIX membership box on the registration form and your existing membership will be renewed or you will receive a new one-year individual association membership.*

### Payment

Payment by check or credit card MUST accompany the registration form. Purchase orders, vouchers and telephone reservations cannot be accepted.

## REFUND/CANCELLATION POLICY

If you must cancel, all refund requests must be in writing and postmarked no later than April 23, 1999. Telephone/email cancellations cannot be accepted. You may substitute another in your place. Contact the Conference Office for details.

Copy this form as needed. Type or print clearly.

# Registration Form 5th Conference on Object-Oriented Technologies & Systems (COOTS), May 3–May 6, 1999

The address you provide will be used for all future USENIX mailings unless you notify us in writing.

|                               |              |               |
|-------------------------------|--------------|---------------|
| Name                          | First        | Last          |
| First Name for Badge          |              | Member Number |
| Company / Institution         |              |               |
| Mail Stop                     | Mail Address |               |
| City                          | State        | Zip           |
| ( )                           | ( )          | ( )           |
| Telephone No.                 | Fax          |               |
| Email Address (1 only please) | WWW          |               |

## Attendee Profile

Please help us meet your needs by answering the following questions. All information is confidential.

- I do not want to be on the Attendee list.
- I do not want my address made available except for USENIX mailings.
- I do not want USENIX to email me notices of Association activities.

### What is your affiliation (check one):

- academic  commercial  gov't  R&D

### What is your role in the purchase decision (check one):

- 1.  final 2.  specify 3.  recommend 4.  influence 5.  no role

### What is your primary job function (check one):

- 1.  system/network administrator 2.  consultant 3.  academic/researcher
- 4.  developer/programmer/architect 5.  system engineer
- 6.  technical manager 7.  student 8.  security 9.  webmaster

### How did you first hear about this meeting (check one):

- 1.  USENIX brochure 2.  newsgroup/bulletin board 3.  ;login:
- 4.  WWW 5.  from a colleague 6.  magazine

What publications or newsgroups do you read related to Object-Oriented Technologies? \_\_\_\_\_

## Payment Must Accompany This Form

Payment (U.S. dollars only) must accompany this form. **Purchase orders, vouchers, email, and telephone registrations cannot be accepted.**

- Payment enclosed. Make check payable to **USENIX Conference.**

Charge to my:  VISA  MasterCard  American Express  Discover

Account No. \_\_\_\_\_ / Exp. Date \_\_\_\_\_

Print Cardholder's Name \_\_\_\_\_

Cardholder's Signature \_\_\_\_\_

Please complete this registration form and return it along with full payment to:  
**USENIX Conference Office, 22672 Lambert St., Suite 613,  
Lake Forest, CA USA 92630 Phone: 1.949.588.8649 Fax: 1.949.588.9706**

You may FAX your registration form to 1.949.588.9706 if paying by credit card. To avoid duplicate billing, please DO NOT mail an additional copy.

## Tutorial Program

Select a full-day tutorial or one AM and one PM tutorial per day.

Sorry, no partial or split-day registration allowed.

### Monday, May 3, 1999

Full Day Session (9:00 am – 5:00 pm)

- M1 Patterns at Work

Select one AM and one PM tutorial

Morning Session (9:00 am – 12:30 pm)

- M2AM Writing Efficient C++ Programs
- M3AM Implementing CORBA Servers Using the Portable Object Adapter

Afternoon Session (1:30 pm – 5:00 pm)

- M4PM Introduction to Java Beans
- M5PM The COM(+) Programming Model

### Tuesday, May 4, 1999

Select one AM and one PM tutorial

Morning Session (9:00 am – 12:30 pm)

- T1AM Programming for the Jini™ Platform
- T2AM Patterns and Performance of Real-time Object Request Brokers
- T3AM Distributed Java: Building Collaborative Applications

Afternoon Session (1:30 pm – 5:00 pm)

- T4PM Advanced Principles of Object-Oriented Design in UML
- T5PM JavaBean Components: Specification, Design and Test with Catalysis/UML
- T6PM Building Scalable ODBMS Applications

**REFUND/CANCELLATION POLICY** If you must cancel, all refund requests must be in writing with your signature, and postmarked no later than April 23, 1999. Telephone cancellations cannot be accepted. You may substitute another in your place. Call the conference office for details: 1.949.588.8649.

## Tutorial Program Fees (May 3–4, 1999)

|   |             |          |
|---|-------------|----------|
| Tutorial Program for two days .....                         | \$690.00    | \$ _____ |
| CEU credit for two full days .....                          | \$ 30.00    | \$ _____ |
| Tutorial Program for one day .....                          | \$395.00    | \$ _____ |
| CEU credit for one full day .....                           | \$ 15.00    | \$ _____ |
| Late fee applies if postmarked after<br>April 9, 1999 ..... | Add \$50.00 | \$ _____ |

## Technical Session Fees (May 5–6, 1999)

|  |             |          |
|--|-------------|----------|
| Current member fee .....   | \$360.00    | \$ _____ |
| <i>(Applies to individual members of USENIX, EurOpen national groups, JUS, and AUUG.)</i>  |             |          |
| Non-member or renewing member fee* .....   | \$440.00    | \$ _____ |
| <b>*Join or renew your USENIX membership, for no additional fee, AND attend the conference. Check here:</b> <input type="checkbox"/> |             |          |
| Late fee applies if postmarked after<br>April 9, 1999 .....  | Add \$50.00 | \$ _____ |
| Full-time student** fee, pre-registered<br>or on-site .....  | \$75.00     | \$ _____ |
| Full-time student** fee including USENIX<br>membership fee .....   | \$100.00    | \$ _____ |
| <small>**Students: attach a photocopy of current student I.D.</small>  |             |          |
| <b>TOTAL DUE</b> .....   |             | \$ _____ |