Dear Colleagues,

It is my pleasure to invite you to attend the Domain-Specific Languages Conference, the second sponsored by USENIX, again in cooperation with the ACM Special Interest Groups on Programming Languages and Software Engineering. I am confident of a repetition of the very high quality of interaction that occurred at the first DSL Conference in 1997. I have no doubt the quality of the presentations will be just as outstanding.

Domain-specific languages have had substantial impact on how software is created, maintained, and modified. Prototypical examples of DSLs are YACC, SQL, spreadsheets, and HTML. These DSLs exemplify many of the unique attributes of the DSL approach:

- DSLs automatically provide programmers with guarantees of correctness, performance, and security that are simply unachievable with general-purpose languages such as C, C++, and Java (think of YACC and SQL).
- DSLs allow non-programmers to program (think of spreadsheets).
- By providing high-level abstractions tailored to the problem domain, DSLs allow programmers with general skills to program in a new domain without having to know platform details (think of HTML and Web services).

DSL'99 advances the practice of DSL design, DSL implementation, and software engineering by:

- providing examples of successful DSLs;
- highlighting the spectrum of benefits DSLs provide (e.g., compile-time guarantees of behavior, improved program performance);
- uncovering design principles and methodologies for creating DSLs;
- explicating design techniques and tools for working with DSLs throughout the software engineering lifecycle;
- providing a framework within which language designers from different domains can easily communicate; and
- facilitating a community that will continue to study and refine the practice of software engineering through DSLs.

DSL'99 features refereed technical papers and invited talks, along with "hot research reviews." The conference offers technical papers on various approaches to DSL construction, on new DSLs for problem domains such as specifying hardware circuits and robot control protocols, and on the creation of data-intensive Web sites and collaborative applications. Brad Myers from the Human-Computer Interaction Institute (CMU) kicks off the program with his keynote address. He describes the results of empirical studies designed to discover the most natural programming paradigms for nonprofessional programmers. Peter Lee, from Carnegie Mellon University and Cedilla Systems Inc., speaks on "Language Technology for Performance and Security," and Philip Wadler, from Bell Labs, provides a tantalizing glimpse of "The Next 700 Markup Languages." Our hot research reviews look at DSLs for programming active networks (Carl Gunter, University of Pennsylvania) and explore how to design and create DSLs using program specialization (Charles Consel, Irisa/University of Rennes).

I look forward to seeing you October 3-5, 1999, in beautiful downtown Austin, Texas.

Sincerely,

Thomas Ball
Bell Laboratories, Lucent Technologies
For the Program Committee

Important Date to Remember

Hotel & Pre-Registration Discount Deadline:

Monday, September 13, 1999

Contents

Program at a Glance

Saturday, October 2

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

Sunday, October 3

7:30 am - 5:00 pm	On-Site Registration
8:30 am - 5:00 pm	Technical Sessions
12:00 pm - 1:30 pm	Conference Luncheon
8:00 pm - 11:00 pm	Birds-of-a-Feather Sessions

Monday, October 4

7:30 am - 5:00 pm	On-Site Registration
8:45 am - 4:30 pm	Technical Sessions
6:00 pm - 7:00 pm	Conference Reception
8:00 pm - 11:00 pm	Birds-of-a-Feather Sessions

Tuesday, October 5

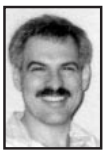
8:45 am - 12:00 pm	Technical Sessions

8:30 am - 8:45 am **Opening Remarks**

Thomas Ball, Program Chair, *Bell Laboratories, Lucent Technologies*

8:45 am - 10:00 am **Keynote Address**

Towards More Natural Domain-Specific Languages



Brad A. Myers, *Human-Computer Interaction Institute, Carnegie Mellon University*

Most textual domain-specific languages were adapted from existing programming languages or were based on the intuition of the designer. The Natural Programming Project is developing general principles, methods, programming language designs, and environments that will provide a more scientific basis on which to base these designs, when the goal is a language that is easy to learn and effective for use by people who are not professional programmers. This talk will provide an overview of the Natural Programming approach and our results so far.

Brad A. Myers is a Senior Research Scientist in the Human-Computer Interaction Institute in the School of Computer Science at Carnegie Mellon University, where he is the principal investigator for various projects, including User Interface Software, Demonstrational Interfaces, Natural Programming, and the Pebbles PalmPilot Project. He is the author or editor of over 180 publications, including Creating User Interfaces by Demonstration *and* Languages for Developing User Interfaces*, and he is on the editorial board of five journals. His research interests include User Interface Development Systems, user interfaces, Programming by Example, programming languages for kids, Visual Programming, interaction techniques, window management, and programming environments. He belongs to SIGCHI, ACM, IEEE Computer Society, IEEE, and Computer Professionals for Social Responsibility.*

10:00 am - 10:30 am **Break**

10:30 am - 12:00 pm **Testing and Experience Reports**

Session Chair: James R. Larus, *Microsoft Research*

Using Production Grammars in Software Testing
Emin Gun Sirer and Brian N. Bershad, *University of Washington*

Jargons for Domain Engineering
Lloyd H. Nakatani, Mark A. Ardis, Robert G. Olsen, and Paul M. Pontrelli, *Bell Laboratories, Lucent Technologies*

Slicing Spreadsheets: An Integrated Methodology for Spreadsheet Testing and Debugging
James Reichwein, Gregg Rothermel, and Margaret Burnett, *Oregon State University*

12:00 pm - 1:30 pm **Conference Luncheon**

1:30 pm - 3:00 pm **Hot Research Review**

Session Chair: Charles Consel, *Irisa/University of Rennes*

Domain-Specific Languages for Programming and Security in Active Networks

Carl A. Gunter, *University of Pennsylvania*

Active networks allow routing elements to be programmed by the packets passing through them., thereby enabling optimizations and extensions of current protocols as well as the development of fundamentally new protocols. To realize this flexibility, it is essential to provide models for programming and security that are easy to use while providing acceptable performance. In this lecture I will look at how domain-specific languages for programming active networks and describing security policies can be used to control global computation, avoid costly cryptographic operations, and enable formal specification and verification of essential properties.

Carl A. Gunter does research in the areas of programming languages and software engineering. He has contributed to foundations for the semantics of programming languages, type systems, and the design of programming languages. His research has also included contributions on computational logic, the representation of partial information, and mathematical models of software configuration dependencies. His current work focuses on active networks, security infrastructure systems, formal methods in software engineering, and liability analysis of software agreements and accidents.

3:00 pm - 3:30 pm **Break**

3:30 pm - 5:00 pm **Optimization and Extensibility**

Session Chair: Mary Fernandez, *AT&T Labs—Research*

An Annotation Language for Optimizing Software Libraries
Samuel Z. Guyer and Calvin Lin, *University of Texas at Austin*

A Case for Source-Level Transformations in MATLAB
Vijay Menon and Keshav Pingali, *Cornell University*

Using Java Reflection to Automate Extension Language Parsing
Dale E. Parson, *Bell Laboratories, Lucent Technologies*

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

8:45 am - 10:00 am — Invited Talk

Language Technology for Performance and Security, or, Making Life Better, Not Just Easier

Peter Lee, *Carnegie Mellon University* and *Cedilla Systems Incorporated*

Modern languages strive to make programming easier. However, the real importance of modern language technology does not lie merely in ease of use. The same design principles that enable programs to be constructed more easily also lead to improved performance and safety. In order to illustrate this, I will give an introduction to proof-carrying code. PCC allows exceptionally high levels of performance and safety but for practical reasons depends critically on the design principles that underlie better languages for programmers.

Peter Lee is an Associate Professor of Computer Science at Carnegie Mellon University. His approach of applying theoretical ideas in programming language design to practical systems has led to numerous research contributions in the areas of programming language design, compiler technology, networking, and operating systems. Most recently, he has focused his attention on developing Proof-Carrying Code, a technique which uses program verification to enhance the performance and safety of mobile code. He is a principal investigator for the DARPA-sponsored Fox Project and is also the co-founder and president of Cedilla Systems Incorporated.

10:00 am - 10:30 am — Break

10:30 am - 11:45 am — DSLs and Monads

Session Chair: Paul Hudak, *Yale University*

DSL Implementation Using Staging and Monads
Tim Sheard, Zine-el-abidine Benaissa, and Emir Pasalic, *Oregon Graduate University*

Monadic Robotics
John Peterson and Greg Hager, *Yale University*

11:45 am - 1:30 pm — Lunch (on your own)

1:30 pm - 3:00 pm — Hot Research Review

Session Chair: Todd Proebsting, *Microsoft Research*

A Methodology for Designing Domain-Specific Languages Using Program Specialization

Charles Consel, *Irisa/University of Rennes*

Domain-specific languages are mainly being developed in isolation. Furthermore, the difficult task of designing, structuring, and implementing a DSL requires expertise in multiple areas. DSLs can succeed only if development methodologies and tools are made available.

In this talk I give an overview of a methodology for developing DSLs. I also demonstrate how program specialization can map DSL interpreters into efficient (possibly just-in-time) compilers. The presentation is illustrated by concrete examples.

Charles Consel is a professor of computer science at the University of Rennes Irisa/Inria. He leads the Compose group at Inria. His group studies partial evaluation, a program transformation approach aimed at specializing programs with respect to given execution contexts. The work has been carried out with a program specializer for C called Tempo. This system has been successfully used in various applications such as operating systems and scientific code. A complementary research project is domain-specific languages: a software development approach that provides high productivity, easy maintenance, and improved safety (without giving up performance, thanks to partial evaluation). His work on programming languages, software engineering, and operating systems has led to many publications in major conferences and journals (POPL, PLDI, OOPSLA, ASE, SOSP, TOPLAS, ACM Surveys).

3:00 pm - 3:30 pm — Break

3:30 pm - 4:30 pm — Embedded Languages

Session Chair: Michael Schwartzbach, *University of Aarhus*

Domain-Specific Embedded Compilers
Daan Leijen and Erik Meijer, *Utrecht University*

Verischemelog: Verilog Embedded in Scheme
James Jennings and Eric Beuscher, *Tulane University*

6:00 pm - 7:00 pm — Conference Reception

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

8:45 am - 10:00 am **Invited Talk**

The Next 700 Markup Languages

Philip Wadler, *Bell Laboratories, Lucent Technologies*

XML (eXtensible Markup Language) is a magnet for hype: the successor to HTML for Web publishing, electronic data interchange, and e-commerce. In fact, XML is little more than a notation for trees and for tree grammars, a verbose variant of Lisp S-expressions coupled with a poor man's BNF (Backus-Naur form). Yet this simple basis has spawned scores of specialized sublanguages: for airlines, banks, and cell phones; for astronomy, biology, and chemistry; for the DOD and the IRS. Domain-specific languages indeed! There is much for the language designer to contribute here. Not least, as all this is based on a sort of S-expression, is there a role for a sort of Lisp.

Philip Wadler is a researcher at Bell Labs, Lucent Technologies. He is co-designer of the languages Haskell, Pizza, and GJ. He likes to spend his time on the border between theory and practice, looking for ways to use one to inform the other. He helped turn monads from a concept in algebraic topology into a way to structure programs in Haskell, and his work on GJ may help turn quantifiers in second-order logic into a feature of the Java programming language. He edits the Journal of Functional Programming *for Cambridge University Press and writes a column for* SIGPLAN Notices. *He was an ACM distinguished lecturer 1989–1993 and has been an invited speaker at conferences in Boulder, Brest, Gdansk, London, Montreal, New Haven, Portland, Santa Fe, Sydney, and Victoria.*

10:00 am - 10:30 am **Break**

10:30 am - 12:00 pm **The Web, Data, and Collaboration**

Session Chair: Jay Lepreau, *University of Utah*

Declarative Specification of Data-Intensive Web Sites
Mary Fernandez and Dan Suciu, *AT&T Labs—Research;* Igor Tatarinov, *North Dakota State University*

A Collaboration Specification Language
Du Li and Richard R. Muntz, *University of California, Los Angeles*

Hancock: A Language for Processing Very Large-Scale Data
Dan Bonachea, *University of California, Berkeley;* Kathleen Fisher and Anne Rogers, *AT&T Labs—Research*

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 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

SAGE, the System Administrators Guild, is a special technical group within USENIX that is dedicated to the advancement and recognition of system administration as a profession.

USENIX Website: *http://www.usenix.org/*

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*

Conference Organizers

Program Chair

Thomas Ball, *Bell Laboratories, Lucent Technologies*

Program Committee

Tim Bray, *Textuality*
Charles Consel, *Irisa/University of Rennes*
Mary Fernandez, *AT&T Labs—Research*
Paul Hudak, *Yale University*
James R. Larus, *Microsoft Research*
Doug Lea, *State University of New York at Oswego*
Jay Lepreau, *University of Utah*
Brad A. Myers, *Human-Computer Interaction Institute, Carnegie Mellon University*
Todd Proebsting, *Microsoft Research*
David S. Rosenblum, *University of California, Irvine*
Michael Schwartzbach, *University of Aarhus*

Invited Talks Coordinator

Carlos Puchol, *Bell Laboratories, Lucent Technologies*

Hotel and Travel Information

Hotel Discount Reservation Deadline: Monday, September 13, 1999

After the reservation deadline, hotel rates will be much higher!

USENIX has negotiated special rates for conference attendees at Omni Austin Hotel — Downtown. Contact the hotel directly to make your reservation.

You *must* mention USENIX to get the special rate. The hotel requires that all reservations be guaranteed with a credit card *at least* 10 business days prior to your arrival. All reservations not guaranteed within 10 business days are subject to cancellation without notice. To cancel your reservation, you must notify the hotel at least 24 hours prior to the day of your arrival.

Omni Austin Hotel—Downtown
700 San Jacinto at 8th Street
Austin, Texas 78701
Toll-free: 1.800.843.6664
Local telephone: 1.512.476.3700
Reservation fax: 1.512.397.4888 — Attn.: Reservations

Single/Double Occupancy $125.00
(plus state and local taxes, currently 15%)

Note: All requests for hotel reservations made after the September 13 deadline will be handled on a space-available basis at the hotel's standard rate.

Discount Airfares

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

JNR, Inc.
Toll-free in U.S. and Canada: 1.800.343.4546
Telephone: 1.949.476.2788

Austin-Bergstrom International Airport

The newly opened Austin-Bergstrom International Airport is approximately 10 miles from the downtown hotels. Super Shuttle offers continuous transportation to all downtown hotels at a current cost of $8 one way. Taxi service is available at an approximate cost of $25 one way.

Points of Interest in Austin

Austin Zoo: Located in the Hill Country, the Zoo provides sanctuary for both exotic and domestic animals.

Lady Bird Johnson Wildflower Center: This 42-acre botanical garden features plants native to Central Texas Hill Country.

Texas Governor's Mansion: Since 1856, every Texas governor has called this antebellum dwelling home.

Texas State Capitol: Gardens, statues, and memorials surround this 26-acre complex. Tours every 15 minutes.

Treaty Oak: The last of the Council Oaks, where, according to legend, treaties with Indians were signed. Although this 600-year-old tree was poisoned in 1989, one massive branch of greenery still survives.

Texas Memorial Museum: Displays of Texas and natural history include gems and minerals, paleontology, wildlife dioramas, Indian artifacts, and the original Goddess of Liberty statue.

Umlauf Sculpture Gardens & Museum: Over 130 sculptures by internationally known artist Charles Umlauf are displayed throughout the xeriscaped garden and museum.

REFUND/CANCELLATION POLICY: If you must cancel, all refund requests must be in writing with your signature, and postmarked no later than September 24, 1999. Telephone and email cancellations cannot be accepted. You may fax your cancellation or substitute another in your place. Call the Conference Office for details: 1.949.588.8649.

Activities and Services

Student Discounts and Stipends

Technical Sessions Student Rate

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

Student Stipends for Conference Attendance

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 at *http://www.usenix.org/students/*, or email *students@usenix.org* for more information.

Birds-of-a-Feather Sessions (BoFs)

Sunday and Monday evenings, October 3 and 4

Do you have a topic 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 calling the USENIX Conference Office at 1.949.588.8649 or emailing *conference@usenix.org*.

Conference Proceedings

One copy of the Proceedings is included with your Technical Sessions registration fee. To order additional copies, call the USENIX Association at 1.510.528.8649 or send email to *office@usenix.org*.

Social Activities

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

There will be a Welcome Reception on Saturday evening, a Conference Luncheon on Sunday, and a Conference Reception on Monday evening.

Registration Information

Technical Sessions Fees (October 3-5, 1999)

Technical Session registration fees include:

- Admission to all technical sessions
- Copy of Conference Proceedings
- Admission to Conference Luncheon and Reception

Early registration fee (until September 13, 1999)

Member*	$400
Non-member**	$480
Full-time student	$ 75
(copy of current student ID required)	

Members and Non-members: After September 13, add $50 to the registration fee.

** The member fee applies to current members of USENIX, EurOpen national groups, JUS, AUUG, and ACM SIGPLAN & SIGSOFT.*

***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 to renew your existing membership or receive a new one-year individual Association membership.*

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

Questions?

USENIX Conference Office: 22672 Lambert Street, Suite 613, Lake Forest, CA 92630
Email: *conference@usenix.org*
Phone: 1.949.588.8649 **Fax:** 1.949.588.9706
URL: *http://www.usenix.org/*
Office hours: 8:30 am – 5:00 pm P.D.T.

Registration Form

2nd Conference on Domain-Specific Languages
(DSL '99) October 3-5, 1999

Copy this form as needed. Type or print clearly.

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 Country

( ) ( )
Telephone No. Fax

Email Address (1 only please)

IMPORTANT: If there is a mailing label (see other side), please tell us the single letter in the upper right corner (2nd line): _____

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 DSL?

REFUND/CANCELLATION POLICY: If you must cancel, all refund requests must be in writing with your signature, and postmarked no later than September 24, 1999. Telephone and email cancellations cannot be accepted. You may fax your cancellation or substitute another in your place. Call the Conference Office for details: 1.949.588.8649.

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

Technical Program Fees *(Sunday–Tuesday, Oct. 3-5)*

Current member fee..... $400.00 $_____
(Applies to individual members of USENIX, EurOpen national groups, JUS, AUUG, and ACM SIGPLAN & SIGSOFT)

Non-member or renewing member fee*..... $480.00 $_____

***Join or renew your USENIX membership, for no additional fee, AND attend the conference.** **Check here:** ❑

***Late fee** applies if postmarked after*
Monday, September 13, 1999..... Add $50.00 $_____

Full-time student** fee, pre-registered or on-site ..... $75.00 $_____

Full-time student** fee including USENIX membership fee ..... $100.00 $_____

***Students: Attach a photocopy of current student I.D.*

TOTAL DUE $_____

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

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.

Upcoming USENIX Events

8th USENIX Security Symposium
In cooperation with
The CERT Coordination Center
August 23-26, 1999
JW Marriott Hotel, Washington, D.C., USA
http://www.usenix.org/events/sec99/

3rd Annual Atlanta Linux Showcase
Co-sponsored by USENIX, Atlanta Linux Enthusiasts, and Linux International
October 12-16, 1999
Cobb Galleria, Atlanta, Georgia, USA
http://www.linuxshowcase.org/

2nd USENIX Symposium on Internet Technologies and Systems (USITS '99)
Co-sponsored by the IEEE Computer Society Technical Committee on the Internet
October 11-14, 1999
Regal Harvest House Hotel
Boulder, Colorado, USA
http://www.usenix.org/events/usits99/

13th Systems Administration Conference (LISA '99)
Sponsored by SAGE, The System Administrators Guild
November 7-12, 1999
Seattle, Washington, USA
http://www.usenix.org/events/lisa99/