3rd Symposium on Operating Systems Design and Implementation

Sponsored by USENIX and Co-sponsored by IEEE TCOS and ACM SIGOPS

Review the Program. See the Quality. Join us at OSDI '99.

You may register online at:
http://www.usenix.org/events/osdi99/

Program Committee

Program Co-Chairs

Margo Seltzer, *Harvard University*
Paul Leach, *Microsoft Corporation*

Program Committee

Tom Anderson, *University of Washington*
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Sean O'Malley, *Network Appliance*
Rob Pike, *Lucent Technologies*

QUESTIONS?

For more information, please contact us at:

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

Office Hours: 8:30AM–5:00PM Pacific Standard Time
Email: conference@usenix.org
Phone: 1.949.588.8649
Fax: 1.949.588.9706
Updates: *www.usenix.org/events/osdi99/*

Important Dates to Remember:

Early Registration Savings Deadline: ***Monday, Feb. 1, 1999***

Hotel Discount Deadline: ***Friday, Jan. 29, 1999***

Program at-a-Glance

Sunday, February 21

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

Monday, February 22

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

Tuesday, February 23

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

Wednesday, February 24

7:30 am – 5:00 pm	On-Site Registration
9:00 am – 5:00 pm	Technical Program
6:00 pm – 11:00 pm	Birds-of-a-Feather Sessions

Thursday, February 25

9:00 am – 12:30 pm	Technical Program

Table of Contents

Dear Colleague:

It is time for our community to define the charter of operating systems research for the coming decade. Are there enough fertile research areas in our core areas, or should we be embracing more divergent areas: the World Wide Web, Distributed Systems, Languages, etc.? Our Keynote, Jim Gettys, will explain why the World Wide Web is an operating systems issue, and our panel on virtual machine-based systems will address the interaction between OS research and language environments.

It is our pleasure to bring you the program for the Third USENIX Symposium on Operating System Design and Implementation. With the help of a fabulous program committee, we have assembled a collection of papers that reflect the identity crisis in which our field finds itself. We received papers from nearly every field of computer systems research: distributed systems, programming tools, language-based systems, databases, I/O systems, file systems, and fault tolerance. However, the resulting program mirrors the core technologies of the operating system business: I/O, file systems, virtual memory, resource management, scheduling, kernels, and distribution.

We look forward to having you join us in New Orleans, February 22–25, to explore these and other important issues for our field.

For the OSDI Program Committee,
Margo Seltzer, *Harvard University, Program Co-Chair*
Paul Leach, *Microsoft Corporation, Program Co-Chair*

PS: Remember to sign up for your tutorial early. See pages 4–5 for more information.

"Overall, great conference. Great talks, papers, invited talks, etc. The WIPS (Works-in-Progress) were excellent…"
—OSDI '96 attendee

Sponsored by 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, innovation, and 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*

Co-Sponsored by ACM SIGOPS and IEEE TCOS

ACM SIGOPS SIGOPS is the ACM Special Interest Group on Operating Systems. SIGOPS addresses a broad spectrum of issues associated with operating systems research and development. For more information see *http://www.acm.org/sigops/*

IEEE TCOS The IEEE Computer Society's Technical Committee on Operating Systems Applications and Environments (TCOS) is involved with theoretical and practical aspects of operating system design, including system organization, resource allocation policies, measurement, performance evaluation, and system reliability. It is also involved with all operating system aspects affecting system interface specifications, the completeness of services, and portability of applications. TCOS publishes a newsletter, the *TCOS Bulletin,* four times a year. For more information, see *http://www.computer.org/*

Master the newest technology

Stay on top of the latest technology. Register now for a tutorial.

Tutorial fees include
- **Admission to the tutorial you select**
- **Printed and bound tutorial materials from your session**
- **Lunch**

Technology is changing more rapidly than ever before. No matter what your special expertise is, you are expected to stay on top of the latest improvements *and* do your job. Sign up for a tutorial and you will get an immediate payoff by gaining command of the newest developments and putting them to work at your site.

USENIX tutorials aim to provide the critical information you need. Delivered by experts with hands-on experience, tutorials are practical, intensive, and essential to your professional development.

Our guarantee: If you feel a tutorial does not meet the high standards you have come to expect from USENIX, let us know by the first break and we will change you to any available tutorial immediately.

Continuing Education Units

USENIX provides Continuing Education Units (CEUs) for a small additional administrative fee. The CEU is a nationally recognized standard unit of measure for continuing education and training, and is used by thousands of organizations. Each full day USENIX tutorial qualifies for 0.6 CEUs. You can request CEU credit by completing the CEU section on the registration form. USENIX provides a certificate for each attendee taking a tutorial for CEU credit, and maintains transcripts for all CEU students. *CEUs are not the same as college credits. Consult your employer or school to determine their applicability.*

Register now to guarantee your first choice. Seating is limited.

Select From These Quality Tutorials

Each tutorial runs from 9:00 AM to 5:00 PM. Lunch is included with your tutorial fees. Please select only one.

M1 Building Security (for Developers)
Marcus J. Ranum, *Network Flight Recorder*

M2 Windows NT Internals
Jamie Hanrahan, *Kernel Mode Systems*

M3 Deploying and Benchmarking Web Caches
Peter Danzig, *Network Appliance and USC*
Alex Rousskov, *National Laboratory for Applied Network Research (NLANR)*

M1 Building Security (for Developers)

Marcus J. Ranum, *Network Flight Recorder*

Who should attend: Developers or development managers interested in learning about the types of security problems that often crop up in applications and systems. This tutorial will assume some knowledge of networking and C programming under UNIX-like operating systems.

Are you writing security critical software? Increasingly, applications are being fielded over public networks, which are not even close to adequately protected against malicious interference. Simply throwing cryptography into your applications is not enough; if it is going to work, security must be *designed* in. This tutorial provides a technical overview of how applications typically fail in the field, and the basic principles to apply when designing your own security critical application.

Topics covered include:
- Paranoia
  - The communications security environment
  - Designing to the appropriate level
  - How do applications fail?
- Building security
  - Properties of security
  - Basics of security design
- Tricks, techniques (and mistakes)
  - File I/O
  - Calling processes
  - Chroot
  - Setuid
- Tools
  - Crypto basics
  - Why crypto is no panacea
  - Authentication techniques
  - Hash codes
  - State preservation techniques
  - Public key, secret key, and all that
  - Getting random numbers

Marcus J. Ranum is CEO and founder of Network Flight Recorder, Inc. He is the principal author of several major Internet firewall products, including the *DEC SEAL,* the *TIS Gauntlet,* and the *TIS Internet Firewall Toolkit.* Marcus has been managing UNIX systems and network security for over 14 years, including configuring and managing *whitehouse.gov.* Marcus is a frequent lecturer and conference speaker on computer security topics.

M2 Windows NT Internals

Jamie Hanrahan, *Kernel Mode Systems*

Who should attend: This tutorial is aimed at operating system developers, applications programmers, and system administrators who need to understand the internal behavior and architecture of Windows NT. **Note:** the information presented is valid for both NT Version 4 and 5.

Windows NT is built on a new operating system code base, similar in many ways to well-established OS's such as Unix and VMS, and very different from Microsoft's DOS/Win16/Windows 9x platforms. This tutorial will describe the behavior of Windows NT from "system architecture" point of view. Using a variety of tools, we will explore internal interfaces and the behavior of the system, show how NT implements fundamental operating system functions such as scheduling and memory management, and show how NT's architecture affects some of its functionality.

Topics covered include:

- General System Architecture
- Providing operating system functions in user mode
- Thread Scheduling
- Memory Management Internals
- Using and interpreting performance measurement tools

Jamie Hanrahan provides Windows NT driver development, consulting, and training services to leading companies. He is co-writing a book on Windows NT device drivers, to be published by O'Reilly and Associates. He also has an extensive background in VMS device drivers and internals. He is co-author of *VMS Advanced Driver Techniques* and received the Instructor of the Year award while teaching VMS device drivers and internals courses for Digital Equipment Corporation.

M3 Deploying and Benchmarking Web Caches

Peter Danzig, *Network Appliance and USC*
Alex Rousskov, *National Laboratory for Applied Network Research (NLANR)*

Who should attend: Engineers, managers, developers and system administrators deploying web cache solutions for ISPs, carriers, and large enterprises. Participants should know the basics of web caching, web protocols and be interested in deploying and evaluating web caches for 100Mbps, DS3, and higher bandwidths.

The first half of this tutorial covers the issues of sizing individual cache nodes, and then how to aggregate cache nodes to scale to hundreds of megabits of WAN bandwidth. We will describe L4 switches for partitioning client traffic and clustering individual cache nodes, and also will describe how to build a distributed web server from proximity-detecting load balancers and web caches. We will also review current statistics from operating web caches. We will describe new applications of web caches to network news (NNTP) distribution and streaming media distribution.

The second half of this tutorial complements the first by covering a wide range of benchmarking activities including:

- Identifying and stress-testing weak performance points of a proxy
- Interpreting and verifying the benchmark results

Several state-of-the-art benchmarks will be discussed and compared. Both white box and black box testing techniques will be studied. The presentation is based on numerous real world test cases and sample benchmarking sessions.

After completing this tutorial, participants will understand what is involved in building a robust, high volume web cache, and will be able to benchmark it and be confident that their results are solid and conclusions are valid. The audience will receive essential information about interpreting benchmark results and will leave with a ready-to-use collection of benchmarking tricks, caveats, and pitfalls.

Peter Danzig is the chief architect of internet products at Network Appliance. Peter lead the Harvest web cache project from 1993 to 1995. In 1996, Peter formed Internet Middleware Corporation (IMC), the first commercial company aimed exclusively at building carrier-class web caches. Network Appliance purchased Peter's company in 1997, and today, more than two dozen National Telecoms have standardized their web cache deployments around Peter's products. Peter is an associate professor at the University of Southern California, and has authored many research papers on Internet information systems, traffic modeling, and flow and congestion control.

Alex Rousskov works for the University of California San Diego on the NLANR Caching project. At NLANR, Alex leads the development of Web Polygraph, a public domain state-of-the-art proxy benchmark. He is also working on Squid caching proxy and other performance oriented caching projects.

Tuesday, February 23

9:00am – 10:30am

Opening Remarks and Keynote Address:
The Blind Men and The Elephant

Jim Gettys, *Compaq Computer Corporation*

We are the blind men examining the Web elephant. The interactions between bandwidth, latency, network transport protocols, access protocols, interfaces, and content of the Web are not commonly understood. I will describe my view of the elephant.

> "And so these men of Indostan, disputed loud and long, each in his own opinion, exceeding stiff and strong, Though each was partly in the right, and all were in the wrong! So, oft in theologic wars, the disputants, I ween, tread on in utter ignorance, of what each other mean, and prate about the elephant, not one of them has seen!" —John Godfrey Saxe

Jim Gettys is a Senior Consultant Engineer for Compaq Computer Corporation's Industry Standards and Consortia Group and is a Visiting Scientist at the W3C at M.I.T. Jim is the chair of the HTTP/NG Protocol Design Working Group (PDG) of W3C. Jim is the editor of the IETF "Hypertext Transport Protocol—HTTP/1.1" document.

With Bob Scheifler, Jim is co-designer of the X Window System. Gettys' designed the X Library and contributed to X Window System core protocol. Via the Internet, Gettys coordinated the efforts of contributors both inside and outside Digital to the development of X Windows System, one of the first major software systems to be built in a distributed, collaborative fashion.

10:30am – 11:00am **Break**

11:00am – 12:30pm

I/O
Session Chair: Sean O'Malley, *Network Appliance*

Automatic I/O Hint Generation through Speculative Execution
Fay Chang, Garth A. Gibson, *Carnegie Mellon University*

IO-Lite: A Unified I/O Buffering and Caching System
Vivek S. Pai, Peter Druschel, Willy Zwaenepoel, *Rice University*

Virtual Log Based File Systems for a Programmable Disk
Randolph Y. Wang, *University of California, Berkeley;* Thomas E. Anderson, *University of Washington;* David A. Patterson, *University of California, Berkeley*

12:30pm – 2:00pm **Lunch (on your own)**

2:00pm – 3:30pm

Resource Management
Session Chair: Greg Minshall, *Siara Systems*

Resource Containers: A New Facility for Resource Management in Server Systems
Gaurav Banga, Peter Druschel, *Rice University;* Jeffrey C. Mogul, *Western Research Laboratory, Compaq Computer Corp.*

Defending Against Denial of Service Attacks in Scout
Oliver Spatscheck, *University of Arizona;* Larry L. Peterson, *Princeton University*

Self-Paging in the Nemesis Operating System
Steven Hand, *University of Cambridge Computer Laboratory*

3:30pm – 4:00pm **Break**

4:00pm – 5:30pm

Panel Discussion:
VM-based Operating Systems

Moderator: Paul Leach, *Microsoft Corporation*
Participants: TBD

Wednesday, February 24

9:00am – 10:30am

Kernels
Session Chair: Rob Pike, *Lucent Technologies*

Tornado: Maximizing Locality and Concurrency in a Shared Memory Multiprocessor Operating System
Michael Stumm, Ben Gamsa, Jonathan Appavoo, *University of Toronto;* Orran Krieger, *IBM TJ Watson Research Center*

Interface and Execution Models in the Fluke Kernel
Bryan Ford, Mike Hibler, Jay Lepreau, Roland McGrath, Patrick Tullmann, *University of Utah*

Fine-Grained Dynamic Instrumentation of Commodity Operating System Kernels
Barton P. Miller, Ariel Tamches, *University of Wisconsin*

10:30am – 11:00am **Break**

11:00am – 12:30pm

Real-Time
Session Chair: Mike Jones, *Microsoft Corporation*

ETI Resource Distributor: Guaranteed Resource Allocation and Scheduling in Multimedia Systems
Miche Baker-Harvey, *Equator Technologies, Inc.*

A Feedback-Driven Proportion Allocator for Real-Rate Scheduling
David C. Steere, Ashvin Goel, Joshua Gruenberg, Dylan McNamee, Calton Pu, and Jonathan Walpole, *Oregon Graduate Institute*

A Comparison of Windows Driver Model Latency Performance on Windows NT 4.0 and Windows 98
Erik Cota-Robles, James P. Held, *Intel Corporation*

12:30pm – 1:30pm **Lunch (on your own)**

2:00pm – 3:00pm

Distributed Systems
Session Chair: Tom Anderson, *University of Washington*

Practical Byzantine Fault Tolerance
Miguel Castro, Barbara Liskov, *MIT Laboratory for Computer Science*

The Coign Automatic Distributed Partitioning System
Galen C. Hunt, *Microsoft Research;* Michael L. Scott, *University of Rochester and Microsoft Research*

3:00pm – 3:30pm **Break**

3:30pm – 5:00pm

Works-in-Progress
Moderator: John Hartman, *University of Arizona*

Thursday, February 25

9:00am – 10:30am

Virtual Memory
Session Chair: Kai Li, *Princeton University*

Tapeworm: High-Level Abstractions of Shared Accesses
Peter Keleher, *University of Maryland*

MultiView and Millipage—Fine-Grain Sharing in Page-Based DSMs
Ayal Itzkovitz, Assaf Schuster, *Technion—Israel Institute of Technology*

Optimizing the Idle Task and Other MMU Tricks
Cort Dougan, Victor Yodaiken, *New Mexico Institute of Technology;* Paul Mackerras, *Australian National University*

10:30am – 11:00am **Break**

11:00am – 12:30pm

Filesystems
Session Chair: Bruce Lindsay, *IBM Almaden Research Center*

Logical vs. Physical File System Backup
Norman C. Hutchinson, Stephen Manley, Michael Federwisch, Guy Harris, Dave Hitz, Steven Kleiman, and Sean O'Malley, *Network Appliance*

The Design of a Multicast-Based Distributed File System
Björn Grönvall, Assar Westerlund, and Stephen Pink, *Swedish Institute of Computer Science*

Integrating Content-Based Access Mechanisms with Hierarchical File Systems
Udi Manber, *University of Arizona;* Burra Gopal, *Microsoft Corporation*

2nd IEEE Workshop on Mobile Computing Systems and Applications (WMCSA '99)

http://www.research.att.com/conf/wmcsa99/

February 25–26, 1999

Sponsored by the IEEE Computer Society's Task Force on Internetworking (TFIW) and Technical Committee on Operating Systems (TCOS)
In cooperation with the USENIX Association

This past decade has seen the widespread adoption of both portable computing devices and wireless communication networks. However, the integration of these two technologies has yet to occur on a large scale. Achieving pervasive mobile computing will require advances in many areas such as

- Network and operating system support for mobility
- Application adaptation to changing conditions
- Portable computing hardware with networking capability
- Digital audio and video in mobile environments
- Performance evaluation of wireless data networks
- Mobile Internet and Web access
- Security and privacy
- Power management

Following the example of the first WMCSA, the goal of this workshop is to foster the exchange of ideas in mobile computing among workers in the field. Attendance will be limited to about 60 participants, based on the position papers submitted. We seek papers that describe ongoing or completed research and development efforts. We are particularly interested in papers that propose new directions, advocate non-traditional approaches, or generate controversy and discussion. Submissions must not exceed 10 pages in length. We will publish a printed proceedings.

A small number of graduate students will be granted a waiver of the registration fee. In return, these students will be asked to take notes at the workshop. Students who wish to be considered for the waiver must send in a brief description of their current research, and an explanation of how participation in the workshop is likely to help them.

To Register: Please see http://www.research.att.com/conf/wmcsa99/

ORGANIZERS

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Publications Chair: Joe Duran, *Motorola*
Publicity Chair: Jin Jing, *GTE Labs*

Local Arrangements Chair: Golden G. Richard, III, *University of New Orleans*

Program Chair: Ramon Caceres, *AT&T Labs*

Program Committee: Mary Baker, *Stanford University;* B. Badrinath, *Rutgers University;* Nigel Davies, *University of Lancaster;* Dave Johnson, *Carnegie Mellon;* Anthony Joseph, *U.C. Berkeley;* Jay Kistler, *FORE Systems;* Karin Petersen, *Xerox PARC;* Steve Pink, *Lulea University;* Srini Seshan, *IBM Research;* Cormac Sreenan, *AT&T Labs*

Steering Committee: Ramon Caceres, *AT&T Labs;* Fred Douglis (Chair), *AT&T Labs;* Sumi Helal, *University of Florida;* David Kotz, *Dartmouth College;* Darrell Long, *U.C. Santa Cruz*

Symposium Activities and Services

Symposium Proceedings

One copy of the proceedings is included with your Technical Program registration fee. To order additional copies, contact the USENIX Association at 510.528.8649, or send email to: *office@usenix.org*

Birds-of-a-Feather Sessions (BoFs)

Tuesday and Wednesday evenings
February 24 and 25

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. BoFs may be scheduled in advance or on-site at the symposium. Schedule your BoF in advance by telephoning the USENIX Conference Office at 949.588.8649, or sending email to: *conference@usenix.org*

Works-in-Progress Reports

Wednesday, February 24

Do you have interesting work you would like to share, or a cool idea that is not yet ready to be published? The USENIX audience provides valuable discussion and feedback. Short, pithy, and fun, Works-in-Progress Reports (WIPs) introduce interesting new or ongoing work. We are particularly interested in presentation of student work. Prospective speakers should send a short one or two paragraph report, to *osdiwips@usenix.org*. A schedule of presentations will be posted at the symposium and the speakers will be notified in advance. Works-in-Progress Reports are five-minute presentations; the time limit will be strictly enforced.

Register by February 1 and save $100

USENIX Student Programs

See our Website for the latest information: *www.usenix.org/students/*

USENIX values students and the research in the advanced computing systems arena that is generated in colleges and universities. Recognizing the importance of that work, USENIX has developed the following programs:

Undergraduate Software Projects fund students to perform the software engineering necessary to take course-project software to a completed software package.

Research Grants and Scholarships fund students and student research projects.

Best Student Paper Awards are cash prizes awarded to best papers by students at USENIX conferences.

Student Fees provide very low registration fees for full-time students to attend USENIX technical sessions and tutorials.

Student Stipends provide funding for students to attend USENIX events.

Student Memberships at reduced membership fees allow students to join the advanced computing community and receive USENIX member benefits.

University Outreach designates a campus representative who provides information to students about USENIX and maintains a library of Conference Proceedings and other materials.

USENIX seeks suggestions** for special programs to sponsor, such as programming contests or workshops. If you have a good idea and are interested in organizing such an event, please contact us. Send email with your idea to Linda Barnett: **barnett@usenix.org

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.

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- 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*

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*

The USENIX Association
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Berkeley, CA 94710
Phone: 1.510.528.8649
Fax: 1.510.548.5738
Email: *office@usenix.org*
Web: *http://www.usenix.org/*

Upcoming Events

Conference on Network Administration
April 7–9, 1999, Santa Clara, CA
http://www.usenix.org/events/neta99/

1st USENIX Workshop on Intrusion Detection and Network Monitoring
April 11–12, 1999, Santa Clara, CA
http://www.usenix.org/events/detection99/

5th Conference on Object-Oriented Technologies and Systems (COOTS)
May 3–7, 1999, San Diego, CA
http://www.usenix.org/events/coots99/

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
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
October 11–14, 1999, Boulder, CO
Extended abstracts due: April 15, 1999;
http://www.usenix.org/events/usits99/

13th Systems Administration Conference (LISA '99)
November 7–12, 1999, Seattle, WA
Paper submissions due: TBA;
http://www.usenix.org/events/lisa99/

7th Tcl/TK Conference
February 14–18, 2000, Austin, TX
http://www.usenix.org/events/tcl00/

USENIX Annual Technical Conference
June 19–23, 2000, San Diego, CA
http://www.usenix.org/events/usenix00/

9th USENIX Security Symposium
August 14–17, 2000, Denver, CO
http://www.usenix.org/events/sec00/

4th Symposium on Operating Systems Design & Implementation
November 2000, San Diego, CA
http://www.usenix.org/events/osdi00/

USENIX AND SAGE THANK THEIR SUPPORTING MEMBERS

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Thank you

Hotel Discount Reservation Deadline:

Friday, January 29, 1999

Early Registration Discount Deadline:

Monday, February 1, 1999

REFUND / CANCELLATION POLICY

If you must cancel, all refund requests must be in writing and postmarked no later than February 12, 1999. Telephone cancellations cannot be accepted. You may substitute another in your place. Contact the Conference Office for details.

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

URL:
http://www.usenix.org

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

Hotel and Travel Information

USENIX has negotiated special rates for symposium attendees at the New Orleans Marriott Hotel. Contact the hotel directly to make your reservation. You must mention USENIX to get the special rate. A one-night room deposit must be guaranteed to a major credit card. To cancel your reservation, you must notify the hotel at least 72 hours before your planned arrival date.

New Orleans Marriott Hotel
555 Canal Street
New Orleans, LA 70140
Toll Free: 1.800.228.9290
Direct Phone: 1.504.581.1000
Reservation Fax: 1.504.553.5625

Single/Double Occupancy $130.00
(*Plus state and local taxes, currently 11% sales tax and $3 per room, per night city ordinance tax)*

NOTE: Requests for hotel reservations made after the deadline will be handled on a space and rate available basis.

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

Airport To Hotel Transportation

The New Orleans Marriott Hotel is approximately 30 minutes from the airport. The Airport Shuttle offers continuous 24 hour van service every 15 minutes. Current cost is $10 one way. Shuttle service information is located in the baggage claim area at the airport. Taxi cost is approximately $21 one way.

What to See and Do in New Orleans

New Orleans is perhaps the most atmospheric city in the U.S. With its emphasis on Cajun-Creole food and intense music scene, there's always something to do. Restaurants, both plain and fancy, traditional and cutting edge, abound. You can dance until dawn. The City.Net web site is a good starting point to plan your free time; *http://city.net/countries/united_states/louisiana/new_orleans/*

Registration Information and Fees

Tutorial Fees
(February 22, 1999)

Tutorial registration fees include:

- Admission to the tutorial you select
- Printed and bound tutorial materials for your selected class
- Lunch

Early registration fee (until February 1)

Tutorial Program for one day	$395
CEU credit	$ 15

After February 1, add $50 to the tutorial fee.

Technical Sessions Fees
(February 23-25, 1999)

Technical Sessions registration fees include:

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

Early registration fee (until February 1)

Member*	$400
Non-member or Renewing Member**	$480
Full-time student	$ 75

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

After February 1, add $50 to the Technical Sessions fee.

** The member fee applies to current members of USENIX, ACM, IEEE, 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.

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*** or email ***students@usenix.org*** for more information.

Copy this form as needed. Type or print clearly.

Registration Form OSDI '99 Symposium *February 22–25, 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 Country

( ) ( )
Telephone No. Fax

Email Address (1 only please) **WWW**

Attendee Profile

Please help us serve you better. By answering the following questions, you help us plan our activities to meet members' needs. 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/mailing list **3.** ❑ *;login:*
4. ❑ Web **5.** ❑ from a colleague **6.** ❑ magazine

What publications or newsgroups do you read related to the OSDI Symposium issues? _____

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

Tutorial Program **Select only one full-day tutorial (9AM–5PM)**

Monday, February 22

❑ M1 Building Security (for Developers)
INSTRUCTOR: Marcus J. Ranum, *Network Flight Recorder*

❑ M2 Windows NT Internals
INSTRUCTOR: Jamie Hanrahan, *Kernel Mode Systems*

❑ M3 Deploying and Benchmarking Web Caches
INSTRUCTORS: Peter Danzig, *Network Appliance and USC*
Alex Rousskov, *National Laboratory for Applied Network Research (NLANR)*

Second choice: _____

REFUND/CANCELLATION POLICY **If you must cancel, all refund requests must be in writing with your signature, and postmarked no later than February 12, 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 (Monday, February 22)

Tutorial program for one day ..... $395.00 $_____
CEU credit (optional), see pg. 4 ..... $15.00 $_____
Late fee applies if postmarked after Monday, February 1, 1999..... Add $50.00 $_____

Technical Session Fees (Tuesday–Thursday, February 23–25)

Current member fee ..... $400.00 $_____
(Applies to individual members of USENIX, ACM, IEEE, EurOpen National Groups, JUS or AUUG)

Non-member or Renewing Member fee*.. $480.00 $_____

***Join or renew your USENIX membership, AND attend the symposium for the same low price.** **Check here:** ❑

Late fee applies if postmarked after Monday, February 1, 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 ID*

TOTAL DUE $_____

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.