# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>viii</td>
</tr>
<tr>
<td>Conference Committee</td>
<td>ix</td>
</tr>
<tr>
<td>Author Index</td>
<td>x</td>
</tr>
</tbody>
</table>

## PLENARY SESSION

**Wednesday (9:00-10:30)**

Chair: Peter Salus

**KEYNOTE ADDRESS:** Security for the 90's  
*William T. O'Shea, Vice President, Product Development, AT&T*

## RPC AND DISTRIBUTED SYSTEMS

**Wednesday (11:00-12:30)**

Chair: Lori Grob

- Experience with PARPC  
  *Bruce Martin, Hewlett-Packard Laboratories; Charles Bergan, Walter Burkhard, University of California, San Diego; Jehan-François Paris, University of Houston*
  
  Page 1

- Dynamically Synchronized Locking — a Lightweight Locking Protocol for Resource Locking in a Stateless Environment  
  *Peter Gloor, Rudolf Marty, University of Zurich*
  
  Page 13

- Integrating UNIX Terminal Services into a Distributed Operating System  
  *Geoffrey M. Lee, Lawrence Livermore National Laboratory*
  
  Page 29

## FILE SYSTEMS

**Wednesday (2:00-3:30)**

Chair: Melinda Shore

- The Automounter  
  *Brent Callaghan, Tom Lyon, Sun Microsystems, Inc.*
  
  Page 43

- Improving the Performance and Correctness of an NFS Server  
  *Chet Juszczak, Digital Equipment Corporation*
  
  Page 52

- MSS-II and RASH A Mainframe UNIX Based Mass Storage System with a Rapid Access Storage Hierarchy File Management System  
  *Robert L. Henderson, NASA Ames Research Center*
  
  Page 65
OPERATING SYSTEMS I

Wednesday (4:00-5:30)  
Chair: Avadis Tevanian

Multiprocessor Aspects of the DG/UX Kernel .................................................. 85  
*Michael H. Kelley, Data General Corporation*

MOSIX: An Integrated Multiprocessor UNIX ..................................................... 101  
*Amnon Barak, Richard Wheeler, The Hebrew University of Jerusalem*

Sema: a Lint-Like Tool for Analyzing Semaphore Usage in a Multithreaded UNIX Kernel .............................................................. 113  
*Joe Korty, MODCOMP*

WINDOW SYSTEMS

Thursday (9:00-10:30)  
Chair: Jeff Schwab

Visualizing X11 Clients ......................................................................................... 125  
*David Lemke, David S.H. Rosenthal, Sun Microsystems*

PEX: A 3D Extension to X Windows ....................................................................... 139  
*Spencer W. Thomas, Martin Friedmann, University of Michigan*

XVT: Virtual Toolkit for Portability Between Window Systems .......................... 151  
*Marc J. Rochkind, Advanced Programming Institute, Ltd.*

SPECIAL INTEREST I

Thursday (11:00-12:30)  
Chair: Andrew Hume

Viral Attacks on UNIX System Security ............................................................... 165  
*Tom Duff, AT&T Bell Laboratories*

A Faster fsck for BSD UNIX .................................................................................. 173  
*Eric J. Bina, Motorola Micro-Computer Division; Perry A. Emrath, University of Illinois at Urbana-Champaign*

Lessons of the New Oxford English Dictionary Project ..................................... 187  
*Tim Bray, University of Waterloo*
INTERNETWORKING

Thursday (2:00-3:30)  Chair: Thomas Narten

Implementation of Dial-Up IP for UNIX Systems .................................................. 201
Leo Lanzillo, Craig Partridge, BBN Systems and Technologies Corporation

Wengyik Yeong, Martin Lee Schoffstall, Mark S. Fedor, NYSERNet, Inc.

Limiting Factors in the Performance of the Slow-Start TCP Algorithms ............... 219
Allison Mankin, Kevin Thompson, The MITRE Corporation

OBJECTS & MEMORY

Thursday (4:00-5:30)  Chair: Jim Lipkis

The Shared Memory Server .................................................................................. 229
Alessandro Forin, Joseph Barrera, Richard Sanzi, Carnegie Mellon University

Minimalist Physical Memory Control in UNIX ...................................................... 245
Mark C. Holderbaugh, Scott E. Preece, Motorola Microcomputer Division

Software Configuration Management with an Object-Oriented Database ............... 257
Eric Black, Atherton Technology

Supporting Objects in a Conventional Operating System ..................................... 273
Prasun Dewan, Eric Vasilik, Purdue University

WORK IN PROGRESS

Thursday (4:00-5:30)  Chair: Keith Bostic

VIRUS, WORM AND OTHER UNIX PESTS

Thursday (8:00-10:00)  Chair: Keith Bostic

A Tour of the Worm ............................................................................................... 287
Donn Seeley, University of Utah

Some Musings on Ethics and Computer Break-Ins ................................................ 305
Eugene H. Spafford, Purdue University
SPECIAL INTEREST II

Friday (9:00-10:30) Chair: Donn Seeley

A Comparison of Compiler Utilization of Instruction Set Architectures ........................................ 313
  Daniel V. Klein, Carnegie Mellon University

Discuss: An Electronic Conferencing System for a Distributed Computing Environment ........................................ 331
  Ken Raeburn, Jon Rochlis, Stan Zanarotti, Massachusetts Institute of Technology;
  William Sommerfeld, Apollo Computer, Inc.

A Partial Tour Through the UNIX Shell ........................................ 343
  Geoff Collyer, University of Toronto

OPERATING SYSTEMS II

Friday (11:00-12:30) Chair: Jon Kepecs

Job and Process Recovery in a UNIX-Based Operating System ........................................ 355
  Brent A. Kingsbury, John T. Kline, Cray Research, Inc.

Session Management in System V Release 4 ........................................ 365
  Tim Williams, AT&T Bell Laboratories

The Modix Kernel ........................................ 377
  Greg Snider, Jim Hays, Hewlett-Packard Company

PROCESSES

Friday (2:00-3:30) Chair: Jim McGinness

Evolving the UNIX System Interface to Support Multithreaded Programs ........................................ 393
  Paul R. McJones, Garret F. Swart, DEC Systems Research Center

Variable Weight Processes with Flexible Shared Resources ........................................ 405
  Ziya Aral, Ilya Gertner, Alan Langerman, Greg Schaffer, Encore Computer Group;
  James Bloom, Thomas Doeppner, Brown University

System V/MLS Labeling and Mandatory Policy Alternatives ........................................ 413
  Charles W. Flink, II, Jonathan D. Weiss, AT&T Bell Laboratories
SECURITY

Friday (4:00-5:30)  Chair: Rick Lindsley

Secure Multi-Level Windowing in a B1 Certifiable Secure UNIX Operating System

Barbara Smith-Thomas, AT&T Bell Laboratories

429

Secure Window Systems for UNIX

Mark E. Carson, Wen-Der Jiang, Jeremy G. Liang, Gary L. Luckenbaugh, Debra H. Yakov, IBM Corp.

441

A Trusted Network Architecture for AIX Systems

Chii-Ren Tsai, Virgil D. Gligor, Wilhelm Burger, Mark E. Carson, Pau-Chen Cheng, Janet A. Cugini, Matthew S. Hecht, Shau-Ping Lo, Sohail Malik, N. Vasudevan, IBM Systems Integration Division

457