

Proceedings

# **IEEE COMPCON 97**

---

San Jose, California

February 23 – 26, 1997

*Sponsored by*  
IEEE Computer Society



IEEE Computer Society Press  
Los Alamitos, California

Washington • Brussels • Tokyo

---



---

IEEE Computer Society Press  
10662 Los Vaqueros Circle  
P.O. Box 3014  
Los Alamitos, CA 90720-1314

---

Copyright © 1997 by The Institute of Electrical and Electronics Engineers, Inc.  
All rights reserved

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries may photocopy beyond the limits of US copyright law, for private use of patrons, those articles in this volume that carry a code at the bottom of the first page, provided that the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

Other copying, reprint, or republication requests should be addressed to: IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, P.O. Box 133, Piscataway, NJ 08855-1331.

*The papers in this book comprise the proceedings of the meeting mentioned on the cover and title page. They reflect the authors' opinions and, in the interests of timely dissemination, are published as presented and without change. Their inclusion in this publication does not necessarily constitute endorsement by the editors, the IEEE Computer Society Press, or the Institute of Electrical and Electronics Engineers, Inc.*

IEEE Computer Society Press Order Number PR07804  
ISBN 0-8186-7804-6  
ISBN 0-8186-7805-4 (case)  
ISBN 0-8186-7806-2 (microfiche)  
IEEE Order Plan Catalog Number 97CB36028  
ISSN 1063-6390

*Additional copies may be ordered from:*

IEEE Computer Society Press  
Customer Service Center  
10662 Los Vaqueros Circle  
P.O. Box 3014  
Los Alamitos, CA 90720-1314  
Tel: + 1-714-821-8380  
Fax: + 1-714-821-4641  
E-mail: cs.books@computer.org

IEEE Service Center  
445 Hoes Lane  
P.O. Box 1331  
Piscataway, NJ 08855-1331  
Tel: + 1-908-981-1393  
Fax: + 1-908-981-9667  
mis.custserv@computer.org

IEEE Computer Society  
13, Avenue de l'Aquilon  
B-1200 Brussels  
BELGIUM  
Tel: + 32-2-770-2198  
Fax: + 32-2-770-8505  
euro.ofc@computer.org

IEEE Computer Society  
Ooshima Building  
2-19-1 Minami-Aoyama  
Minato-ku, Tokyo 107  
JAPAN  
Tel: + 81-3-3408-3118  
Fax: + 81-3-3408-3553  
tokyo.ofc@computer.org

Editorial production by Bob Werner  
Art production by Joe Daigle/Studio Productions  
Printed in the United States of America by Technical Communication Services



The Institute of Electrical and Electronics Engineers, Inc.

# Table of Contents

## Proceedings of COMPCON'97

Message from the Conference Chair .....	xiii
Message from the Program Chair .....	xiv
Organizing Committees .....	xv
Distance Health Track Overview .....	xvi

### Monday Morning Sessions

#### Track 1

##### New Microsoft Server Technologies

**Chair: Jim Gray, Microsoft Research**

Universal Data Access with OLE DB .....	2
<i>J. Blakeley</i>	
Windows NT Clusters for Availability and Scalability .....	8
<i>R. Short, R. Gamache, J. Vert, M. Massa</i>	
Microsoft Transaction Server .....	14
<i>R. Limprecht</i>	

#### Track 2

##### DEC Alphas: Server to Desktops

**Chair: Allen Baum, DEC**

The Alpha 21164PC Microprocessor .....	20
<i>P. Bannon, Y. Saito</i>	
The Alpha 21264: A 500 MHz Out-of-Order Execution Microprocessor .....	28
<i>D. Leibholz, R. Razdan</i>	
DIGITAL FX!32: Running 32-Bit x86 Applications on Alpha NT .....	37
<i>R. Hookway</i>	

#### Track 3

##### Image and Video Quality

**Chair: Ruby Lee, Hewlett-Packard**

Color Image Quality Metric S-CIELAB and its Application on Halftone Texture Visibility .....	44
<i>X. Zhang, D. Silverstein, J. Farrell, B. Wandell</i>	
An Evaluation of Video Fidelity Metrics .....	49
<i>A. Yu, R. Lee, M. Flynn</i>	
Image Quality Metrics Based on Single and Multi-Channel Models of Visual Processing .....	56
<i>J. Farrell, X. Zhang, C. van den Branden Lambrecht, D. Silverstein</i>	

## Monday Early Afternoon Sessions

### Track 1

#### Trees and Tree Transformations in Interactive Environments

**Chair: Michael A. Harrison, University of California at Berkeley**

Efficient Self-Versioning Documents .....	62
<i>T. Wagner, S. Graham</i>	
Presentation by Tree Transformation.....	68
<i>M. Harrison, V. Maverick</i>	
Grendel: A Web Browser with End User Extensibility.....	74
<i>B. Dennis, M. Harrison</i>	

### Track 2

#### New PA-RISC Processors and Systems

**Chair: Ruby Lee, Hewlett-Packard**

PA-8500: The Continuing Evolution of the PA-8000 Family	
<i>B. Smith</i>	
The Evolution of the HP/Convex Exemplar .....	81
<i>T. Brewer, G. Astfalk</i>	
Computer Optimizations for the PA-8000 .....	87
<i>A. Holler</i>	

### Track 3

#### Web on Your TV

**Chair: Robin Williams, IBM Almaden**

Web Browser Intelligence: Opening up the Web.....	122
<i>R. Barrett, P. Maglio, D. Kelle</i>	
Acorn's Technology for Network Computing.....	124
<i>J. Redford, M. Taunton</i>	
The Information Appliance Revolution	
<i>J. Busch</i>	

## Monday Mid-Afternoon Sessions

### Track 1

#### Internet Security

**Chair: Robert Hagmann, Vitria Technology, Inc.**

New Security Architectural Directions for Java.....97  
*L. Gong*

Privacy-Enhancing Technologies for the Internet.....103  
*I. Goldberg, D. Wagner, E. Brewer*

### Track 2

#### Functional Verification of Microprocessor Architecture and Design

**Chair: Sunil Kakkar, Integrated Device Technology**

A Comprehensive Diagnostics Software Strategy for IDT's Microprocessors .....111  
*S. Kakkar*

Functional Verification of the Superscalar SH-4 Microprocessor .....115  
*P. Biswas, A. Freeman, K. Yamada, N. Nakagawa, K. Uchiyama*

### Track 3

#### Thin Web Clients

**Chair: Robin Williams, IBM Almaden**

Screen Phones  
*M. Jennings*

Odin, A Low Cost Device to Work with TV  
*J. Salvadore*

A Low Cost, High Speed Portable Communications Device: A Case Study using  
IDT RV4640 Microprocessor and IDT77903 ATM Card .....172  
*S. Kakkar, A. Hussain*

## Tuesday Morning Sessions

### Track 1

#### Object-Relational Database Systems

**Chair: Robert Hagmann, Vitria Technology**

Evolution of Object-Relational Database Technology in DB2 .....131  
*D. Chamberlin*

Bringing Objects to the Mainstream .....136  
*A. Nori, S. Kumar*

DataBlade Extensions for INFORMIX-Universal Server .....	143
<i>M. Olson</i>	

## Track 2

### The Origin System

#### Chair: Forrest Baskett, Silicon Graphics

System Overview of the SGI Origin 200/2000 Product Line .....	150
<i>J. Laudon, D. Lenoski</i>	
Origin System Design Methodology and Experience: 1M-gate ASICs and Beyond .....	157
<i>A. Eiríksson, J. Keen, A. Silbey, S. Venkataraman, M. Woodacre</i>	
The SGI Origin Software Environment and Application Performance .....	165
<i>S. Whitney, J. McCalpin, N. Bitar, J. Richardson, L. Stevens</i>	

## Track 3

### Digital Photography

#### Chair: John Meyer, Hewlett-Packard Labs

Visual Realism and Interactivity for the Internet .....	269
<i>R. Blumberg, P. Hughes</i>	
Output Technologies for Digital Photography .....	274
<i>L. Hanlon</i>	
Image Processing Considerations for Digital Photography .....	280
<i>P. Wong, D. Tretter, C. Herley, N. Moayeri, R. Lee</i>	

## Tuesday Early Afternoon Sessions

### Track 1

### Java Enabling Compilers and Translators

#### Chair: Tariq Afzal, Samsung Semiconductor

A Gcc-based Java Implementation .....	174
<i>P. Bothner</i>	
Briki: An Optimizing Java Compiler .....	179
<i>M. Cierniak, W. Li</i>	
Making Java™ Math Libraries by Translating Fortran .....	185
<i>M. Myszewski</i>	

## Track 2

### 3D Graphics Accelerators

**Chair: Dileep Bhandarkar, Intel**

GLINT 500TX: Second Generation Silicon for Personal Workstation Graphics

*N. Trevett*

PERMEDIA: Low Cost Entry-Level Professional 3D Graphics

*N. Trevett*

RealiZm Graphics ..... 192  
*M. Buckelew*

## Track 3

### Panel on Taxation of the Internet

**Chair: Ted Laliotis, Laliotis and Associates**

## Tuesday Mid-Afternoon Sessions

### Track 1

#### Optimizations and Benchmarking for Java

**Chair: Tariq Afzal, Samsung Semiconductor**

NetRexx — An Alternative for Writing Java Classes ..... 200  
*M. Cowlshaw*

Java Bytecode Optimizations ..... 206  
*H. Lambright*

A Study of the Cache and Branch Performance Issues with Running Java on  
Current Hardware Platforms ..... 211  
*C. Hsieh, M. Conte, T. Johnson, J. Gyllenhaal, W. Hwu*

### Track 2

#### Network Hardware

**Chair: Edward Frank, Epigram, Inc.**

FX-1000: A High Performance Single Chip Gigabit Ethernet NIC ..... 218  
*M. Ross, A. Bechtolsheim, M. Le, J. O'Sullivan*

The Reality of ATM Networks ..... 224  
*R. Sansom*

## Track 3

### Information Technology and People with Disabilities

**Chair: T.V. Raman, Adobe Systems**

Emacspeak — An Audio Desktop .....	229
<i>T. Raman</i>	
Structure and Representation of Documents and Data.....	232
<i>M. Krishnamoorthy</i>	
Access to Electronic Information by People with Disabilities .....	235
<i>M. Paciello, Y. Rubinsky</i>	

## Wednesday Morning Sessions

### Track 1

#### The Inferno Operating System

**Chair: Darrell Long, UCSC**

Inferno .....	241
<i>S. Dorward, R. Pike, D. Presotto,</i> <i>D. Ritchie, H. Trickey, P. Winterbottom</i>	
Programming in Limbo .....	245
<i>S. Dorward, R. Pike, P. Winterbottom</i>	
Inferno Security .....	251
<i>D. Presotto</i>	

### Track 2

#### New Intel Microprocessor Technology

**Chair: Dileep Bhandarkar, Intel**

Intel's MMX™ Technology — A New Instruction Set Extension .....	255
<i>O. Lempel, A. Peleg, U. Weiser</i>	
The Pentium® Processor with MMX™ Technology .....	260
<i>M. Eden, M. Kagan</i>	
Pentium® Processor with MMX™ Technology Performance.....	263
<i>M. Greene</i>	

### Track 3

#### Distance Health for the General Population

**Chair: Leslie Sandburg, CyperOptions**

Introduction to Domains, Terms and Players
<i>L. Sandburg</i>



Telemedicine becomes Distance Health  
*L. Lorton*

A Guide to the Literature, with Emphasis on the WWW  
*F. Strange*

## **Wednesday Early Afternoon Sessions**

### **Track 1**

**New Optical Disc Technology: DVD**  
**Chair: Akito Iwamoto, Toshiba**

DVD Overview .....287  
*H. Yamada*

DVD-Video Format .....291  
*H. Mimura*

DVD-RAM  
*M. Takenaga*

DVD-R  
*A. Inoue*

### **Track 2**

**Silicon Entertainment**  
**Chair: Allen Baum, Digital Equipment Corporation**

The Silicon Gaming Odyssey Slot Machine.....296  
*A. Levinthal, M. Barnett*

Designing Virtual Reality Systems:  
A Case Study of a System with Human/Robotic Interaction.....302  
*R. Latham*

Pippin: Adapting PC Technology for the Technophobe .....308  
*E. Sirkin, V. Mehra, E. Keshishoglou,  
L. Madar, A. Carter, W. Knott*

### **Track 3**

**Distance Health for Special Populations**  
**Chair: Bijoy Khandheria, MD, Mayo Clinic**

Distance Health for the Underserved  
*A. Liebgott, P. Hansen, T. Lightner*

Home Health Monitoring:  
Cost Effective Approaches to Quality Care in Non-Trauma Settings  
*V. Dragon, F. Russell, R. Byrd, J. Fitch*

Early Experiences in ATM-Based Telemedicine and a 10 Gigabit/sec Testbed to  
Support Additional Distance Health Trials  
*J. Terdiman; B. Lennon*

## Wednesday Mid-Afternoon Sessions

### Track 1

#### **Data Bases, OLAP**

**Chair: Larry Stevens, Oracle**

*Panelists: J. Kraft, M. Adrian*

### Track 2

#### **The Next-Generation PowerPC™ Microprocessor**

**Chairs: Nasr Ullah, Motorola and Marianne Hsiung, Apple**

A G3 PowerPC™ Superscalar Low-Power Microprocessor.....	315
<i>R. Kennedy, M. Alexander, E. Fiene, J. Lyon,</i>	
<i>B. Kuttanna, R. Patel, M. Pham, M. Putrino,</i>	
<i>C. Croxton, S. Litch, B. Burgess</i>	
Thermal Management System for High Performance PowerPC™ Microprocessors.....	325
<i>H. Sanchez, B. Kuttanna, T. Olson, M. Alexander</i>	
<i>G. Gerosa, R. Philip, J. Alvarez</i>	
Performance Implications of Next Generation PowerPC™ Microprocessor Cache Architectures.....	331
<i>J. Reinold</i>	

### Track 3

#### **Distance Health Futures: How To Proceed**

**Chair: Paul B. Lee, Pantheon Corp.**

Implications of the Kennedy-Kassebaum Bill  
*J. Scanlon*

Mainstreaming Telemedicine into the Healthcare Delivery System  
*D. Puskin*

The California Telehealth Initiative  
*M. Thompson*

Distance Health Technologies to Augment the Capacity of the Military Healthcare System  
*A. Ckacko*

Index of Authors .....	341
------------------------	-----