13th International Conference on Computers and Their Applications 1998

Honolulu, Hawaii, USA
25-27 March 1998

Editors:

N.C. Debnath

INTERNATIONAL SOCIETY FOR COMPUTERS
AND THEIR APPLICATIONS

13th International Conference on
Computers and Their Applications

March 25 - 27, 1998
Sheraton Princess Kaiulani Hotel, Honolulu, Hawaii USA

TECHNICAL PAPER INDEX

SOFTWARE ENGINEERING

Constrained Inheritance in Object-Oriented Design
Gongzhu Hu (Central Michigan University) .......................................................... 1

Internet Software Engineering: Design and Implementation of Interactive Web Applications
Karl M. Göschke (Vienna University of Technology) .......................................... 5

Cheating the Software Development Process and Producing High Quality Software
Dale Kerolak (TRW Automotive Electronics) ..................................................... 9

Rapid Prototyping and GUI Building with VisualAge
Roger Y. Lee (Central Michigan University) and Narayan C. Debnath (Winona State University) ................. 13

An Expert System for Object-oriented Program Testing
Wu-Chi Chen, Deng-Jyi Chen (National Chiao-Tung University) and David T. K. Chen
(Fordham University) ...................................................................................... 19

Architecture Support of a Descriptor Computer on Object-Orientation
Richard C. L. Li, Anthony S. Fong and Derek Pao (City University of Hong Kong) ......................... 23

An Automated Software Model Generator
Narayan C. Debnath (Winona State University), Saif Islam (West Group) and
Roger Lee (Central Michigan University) .......................................................... 28

Static Identifying of Synchronization Faults in Dynamic-Multithreaded Applications
Yigang Chen, W. T. Tsai (University of Minnesota), J. Liu (Western Oregon
University) and Weiwen Xie (Deluxe Corporation) ........................................ 34

Applying Program Slicing to Software Architectures
Jianjun Zhao (Fukuoka Institute of Technology) ................................................. 38
Using Z Approach to Object-Oriented Software Testing and Metrics for C++
Inheritance Hierarchies
Chun-Chia Wang, Wen C. Pai and Shou-Wei Chen (Kuang Wu Institute of Technology and
Commerce) ........................................................................................................... 42

A Formal Specification Method for Building Real-Time Distributed Software
Tae-Yeon Kim, Sung-Back Hong and Yong-Kyun Lee (ETRI) ......................................... 46

Automatic Program Debugging System for Programming Language Tutoring System
Namhee Moon and Kiho Lee (EWHA University) .......................................................... 50

Development of Switching Software by Using Object Oriented Techniques
Chang Sup Keum, Joon Kyung Lee, DongGill Lee and Byung Sun Lee (ETRI) ...................... 54

COMPUTER NETWORKING

A Congestion Sense Network Interface
Hasan Çam (King Fahd University of Petroleum and Minerals) ........................................... 58

Adaptive Admission Control for Wireless ATM Networks
Blair R. Collier and Robert J. Szcerba (Lockheed Martin Federal Systems) ......................... 62

CMA: A Cell Management Algorithm for ATM Networks
G. M. Chaudhry, M. Guizani (University of Missouri-Columbia/Kansas City) ..................... 66

An Optimal Physically-Disjoint Path Algorithm for Real-Life Telecommunication Networks
Ramesh Bhandari (AT&T Laboratories) ........................................................................ 70

An Approach for Finding the Efficient Cost Cores on Weighted Split Networks
Shin-Jer Yang (Soochow University) ........................................................................... 76

Transformation of Estelle Specifications to Lotos Specifications
Hazem El-Gendy (Global Advanced Tech. & Innovative Solutions), Hani El-Sayed,
Abdel-Wahab Faye (Cairo University) ......................................................................... 82

DATA COMMUNICATIONS

Conformance Testing Requirements for Formal Development of Testability-Directed PICSP
Hazem El-Gendy (Global Advanced Technologies and Innovative Solutions) and
Robert L. Probert (University of Ottawa) ..................................................................... 85

TELELAB: A Virtual Laboratory for Scientific Data Distribution on the Internet
Rex E. Gantenbein, Thomas L. James, John R. Cowles (University of Wyoming) and
William H. Paloski (NASA Johnson Space Center) .................................................. 89
Performance Analysis of Queueing Strategies with Multiple Priorities in Multimedia PCS
DongChun Lee (Chonbuk Sanup University) SeungJoan Park and JooSeock Song
(Yonsei University) ........................................................................................................... 93

Proxy-based Reliable Multicast Protocol
YooJae Won, KyungShik Lim, Seung-Ku Hwang (ETRI) and Kwan-Jong Yoo
(Chungnam National University) .......................................................................................... 98

ALGORITHMS

Block Classification for Reducing Artefacts in Video Images Using Statistical Correlation
Morshed U. Chowdhury, Syed M. Rahman and Baikunth Nath (Monash University) .................. 102

Reducing the Rollback on Mobile Computing Environments
Kwang-Sik Chung, Chong-Sun Hwang (Korea University) and Heon-Chang Yu (Seo Kyeong University) ........................................................................................................ 106

An Improved Data Parallel Algorithm for the LSS Problem
W. Dosch (Medizinische Universität zu Lübeck) .................................................................... 111

A New Class of Depth-Size Optimal Parallel Prefix Circuits
Yen-Chun Lin and Chao-Cheng Shih (National Taiwan University of Science and Technology) ........ 117

An Effective Heuristic Algorithm for finding a Steiner Tree in Graphs
Lung-Yung Chu and Dong-Guk Shin (University of Connecticut) ........................................... 121

The Appeal of Evolution: The Case of the RGA-Based Portfolios
Shu-Heng Chen (National Chengchi University) and Wei-Yuan Lin (Soochow University) ......... 125

OPERATING AND DISTRIBUTED SYSTEMS

A Formal Description Technique and an Environment for Protocol Engineering
Anthony Chung (DePaul University) and Deepinder Sidhu (University of Maryland, Baltimore County) ..... 131

A Comparative Study of Adaptive and Hierarchical Load Sharing Policies for Distributed Systems
Sivarama P. Dandamudi (Carleton University) and Michael Kwok Cheong Lo (Nortel Technologies) .... 136

Blueprint for Comprehensive Distributed Computing Applications at Large Organizations
Isaac Ghansah (California State University, Sacramento) and Bryan Boatright (NASA Kennedy Space Center) .............................................................................................................. 142

A Quantitative Definition of Locality of Reference
Saied Hosseini-Khayat (GlobeSpan Semiconductor Inc.) ....................................................... 146
QVI: Query-based Virtual Index for Distributed Information Retrieval
Dong-gyu Kim and Sang-goo Lee (Seoul National University) .............................................. 152

A Lightweight Computational Model for Achieving Location Transparency in
Distributed Environments
Richard T. Landers and Dong-Guk Shin (University of Connecticut) ...................................... 156

Adaptive Coscheduling for Concurrent Systems: Model and Performance
Sanglu Lu and Li Xie (Nanjing University) ........................................................................... 160

Pattern-guided Performance Measurements of OO Multi-Threaded Servers
Gurudas Somaddar, Dorina Petriu (Carleton University) ...................................................... 164

DATABASES

An Object-Oriented Database Framework for Supporting Product Evolution
M. Jin (Kyungnam University) and T. C. Ting (University of Connecticut) ................................. 169

A Relational Database Design Tool Modeling both Structural and Behavioral Aspects of
Database Applications
Ching-Ming Chao (Soochow University) ............................................................................... 173

Supporting End-User’s Non-Consistent Database Views
David Chao, Robert C. Nickerson (San Francisco State University) ......................................... 178

A Simple Model Capable of Expressing Meta-Data for Database Interoperability
Kei-Hoi Cheung (Yale University School of Medicine) and Dong-Guk Shin (University of Connecticut) .......................... 182

Integrating and Managing Temporal Data in a Data Warehouse
Young-Ok Shin (Hanyang Women’s Junior College), Doo-Kwon Baik (Korea University),
Keun-Ho Ryu, Jong-Yeon Lee (Chung-Buk National University) ........................................... 186

A Benchmark for Parallel Object-Oriented Database Systems
David Taniar (Monash University) ......................................................................................... 190

Complex Object-Oriented Queries: A Graph-Based Approach
David Taniar (Monash University) and J. Wenny Rahayu (La Trobe University) ........................... 194

Design and Performance Evaluation of the System Architecture in a Parallel Database
System: SPAX
Yong-Keol Kim (Taejon Medical Junior College), Seong-II Jin (Chungnam National University),
Yoo-Mi Park, Jinwon Park (ETRI) ......................................................................................... 198
INFORMATION SYSTEMS

Toward a Mobile Agent-Based Stock Market
Hsueh-Chi Joshua Shih (National Yunlin University of Science and Technology) ........................................... 202

SMILEY: A Web-Based Remote Sensed Imagery Data Mining System
William Perrizo, Longjun Chen and Dennis Amundson (North Dakota State University) .................................... 206

Experimental and Computational Data Analysis in CHARLES and DARWIN
David J. Korsmeyer, Joan D. Walton, Cecilia Aragon, Alex Shaykevich, Louise Chan (NASA Ames Research Center) ............................................................... 210

A Quasi-VR Interface for a Virtual Campus Navigation System
John Hewson, Syed Rahman and Andrew Lade (Monash University) ................................................................. 214

An Efficient Approach for Multimedia Presentation
Yung-Chen Hung (Soochow University) ................................................................. 218

MULTIMEDIA APPLICATIONS

Web-based 3D Visualization of Multimedia Data
Thomas J. Alexandre (Swedish Institute for Systems Development) ................................................................. 222

Empirical Studies of Multimedia Semantic Models for Multimedia Presentations
Shu-Ching Chen and R. L. Kashyap (Purdue University) ................................................................. 226

An Internal Representation Model for Efficient Presentation in Various Multimedia Environments
Hae-gill Choi, Kwan-jong Yoc (Chungnam National University) and Sook-young Choi (Woosuk University) ............................................................. 230

A Loss Model for Supporting Disparate QOS in Multimedia Applications
Rajeev Koodli (Nokia Research Center) and C. M. Krishna (University of Massachusetts) ............................................................. 234

Adding Asynchronous Recording Module Running on Distance Video Conference Followed by an External Classroom Monitoring System
Hee Choon Kwon, Jin Ho Jeon, Dae Joon Hwang (Sung Kyun Kwan University), Dongil Shin, Youngho Seo (Reality Recognition Laboratory) ............................................................. 238

Hierarchical Structure-based Metadata Model for Video Database Applications
Yoo-mi Park (ETRI), Yong-keol Kim (Teajon Medical Junior College), Soong-il Jin (Chungnam National University), and Wan Choi (ETRI) ............................................................. 242

A Unified Model for Multimedia Retrieval by Content
Punpiti Plaamsa-nga, Nikitas A. Alexandriuś, George Blankenship (George Washington University), G. Papakonstantinouc, P. Tsanakas, S. Tzafestas (National Tech. University of Athens) ............................................................. 246
Using Temporal Reasoning Approach to Solve the Resource Schedule Conflicts of Multimedia Presentation
Timothy K. Shih, Ying-Hong Wang and Steven K. C. Lo (Tamkang University) .................................................. 250

An Integrated Framework to Support Dynamic Adaptation for Multimedia Applications
Chi-Cheng Lin (Winona State University), Shi-Kuo Chang and Taieb Znati (University of Pittsburgh) .......... 254

An Object-Oriented Application Framework for Distributed Multimedia
Ying-Hong Wang, C. M. Chung, T. K. Shih, H. C. Keh and Hung-Zu Lin (Tamkang University) ............... 258

Best-Effort Delivery of Live Video across a Local Area ATM Network
Sherali Zeadally (University of Southern California) ................................................................. 262

IMAGE PROCESSING

Parallel Algorithms for Deblurring of MR Images
Padmanabhan Menon, Vipin Chaudhary and James G. Pipe (Wayne State University) ......................... 266

Design of Adaptive-Length Median Filter for Removing Impulse Noise
Byeong-Moon Jeon and Chang-Sung Jeong (Korea University) ...................................................... 270

Automatic Target Recognition using DSLHT in the Aerial City Image
Jin-Yong Kim (Taehon Junior College), Jeong-Soo Seo and Chi-Jung Hwang (Chungnam National University) ................................................................. 274

An Efficient On-line Coding Scheme for Similar Images
Tsong-Wuu Lin (Soochow University) ......................................................................................... 278

PMD-Tree: A Balanced Hierarchical Data Structure for Spatio-Temporal Objects
Yasuaki Nakamura (Hiroshima City University) .............................................................................. 282

Pseudorandom Encoding for Structured Light Applications
E. M. Petru, S. R. Das, N. Trif (University of Ottawa) and S. K. Yeung (Chinese University of Hong Kong) ... 287

Self-Organising Map for Shape Based Image Classification
Syed M. Rahman, Gour C. Karmakar and Bob Bignall (Monash University) ........................................ 291

Coarse Matching Method on Aerial City Image Using Distance Weighted Intensity Transformation
Chae Gon Yoo, Sung Y. Shin (South Dakota State University) and Chi Jung Hwang (Chungnam National University) ................................................................. 295

Wavelet Based Antialiasing of Computer Images
Zafer Kadi and Alyn Rockwood (Arizona State University) ............................................................. 299
COMPUTER SIMULATION

Performance Simulation for Faulty Hypercube and Torus Architectures Using Optimal Routing
Hamid Abach (Monash University), M. Abdollahian (RMIT), M. Reid and
Al-Junaid Walker (Monash University) ................................................................. 303

Predicting the Performance of Parallel Programs Using PVM
C. N. Vora, Reda A. Ammar, Howard Sholl, and Jon Ritkin (University of Connecticut) ................. 307

Simulation and Modeling of Battery Chargers/Maintainers
Andrew Rusek (Oakland University) and Henry Catharino (US Army Tank Automotive
and Armaments Command) .................................................................................. 311

Asynchronous Multimedia Processing Using Timed Petri Nets
Timothy K. Shih, D. R. Jiang, Jason C. Hung (Tamkang University), Wen C. Pai and
Chun-Chia Wang (Kuang Wu Institute of Technology & Commerce) ......................... 314

ROBOTICS AND COMPUTER VISION

A Fuzzy Reasoning-Based Canny Edge Detection Algorithm
Joe R. Wang and Gordon K. Lee (North Carolina State University) .................................. 318

Symbolic Dialytic Elimination for Parameter Identification of Platform Manipulators
Zhenqun Li and Zhiming Ji (New Jersey Institute of Technology) ................................... 322

Path Planning Using an Adaptive-Network-Based Fuzzy Classifier Algorithm
Ying-Gu Yang and Gordon K. Lee (North Carolina State University) ............................... 326

EXPERT SYSTEMS, NEURAL NETWORKS AND ARTIFICIAL INTELLIGENCE

Improved Variable-Step Backpropagation Training Method for Feedforward Neural Networks
Richard Cogswell (Monmouth College) ....................................................................... 330

Comparison of the Hypernet Learning Algorithm with other Neural Network Approaches
Maurice E. Cohen (University of California, San Francisco, California State University, Fresno)
and Donna L. Hudson (University of California, San Francisco) .................................... 336

The Expert System Applied to the Discrete Events Simulation
Elena Durán and Rosanna Costaguta (Universidad Nacional de Santiago del Estero and
Universidad Católica de Santiago del Estero) .................................................................. 340

Learning Method of Gesture Templates for Sign Language Recognition Based on
Gesture Components
H. Sagawa, M. Takeuchi (Multi-modal Function Hitachi Laboratory, RWCP) ....................... 344
COMPUTER ARCHITECTURE AND VLSI

Gallium Arsenide Based Floating Point Adder/Subtractor
Ashok K. Goel, Frederick Damasra and Brent Jesiek (Michigan Technological University) ........................................ 348

Cost-Efficient Branch Prediction Hardwares
Wei-Ming Lin and Ding Wei (The University of Texas at San Antonio) ......................................................... 352

A Fast Multiplier and Divider with Parallel Array Architecture
Wu Woan Kim (Kyungnam University) ..................................................................................................................... 356

The Effect of an Intercepting Cache on Performance of Fast Page and Cache DRAM
Nagi N. Mekhiei (Ryerson Polytechnic University) .................................................................................................. 360

A New Index Structure for Flash Memory Resident Data
Ah-Young You and Sang-goo Lee (Seoul National University) ........................................................................... 364

Modular Model Checking of VLSI Designs Described in VHDL
Fahim Rahim-Sarwary, Emmanuelle Encrenaz, Michel Minoux and Rajesh K. Bawa
(Université Pierre et Marie Curie) ....................................................................................................................... 368

PARALLEL PROCESSING

Efficient Balancing Approach on a Parallel Cube-connected System
Hwakyung Rim and SungChun Kim (Sogang University) ....................................................................................... 372

The Optimal Data Interval for Message Passing to Update Checkpointed States in a Fault-Tolerant Distributed Systems
Sung Y. Shin, Charlie Yong-Sang Shim (South Dakota State University) and Rex E. Gantenbein
(University of Wyoming) ........................................................................................................................................ 376

Parallel Computation of Autocorrelation Matrices on a Limited Number of Processors
S. R. Subramanya and Abdou Youssef (The George Washington University) .................................................. 380

Approaches for Determining Dynamic Synchronization Resource Requirements
Douglas H. Summerville (University of Hawai‘i at Manoa) and José G. Delgado-Frias
(University of New York) ........................................................................................................................................ 385

Reliability Analysis of Tree, D-Tree, X-Tree and DX-Tree Message Passing Architectures
Hamid Abachi (Monash University), M. Abdollahian (RMIT), M. Reid and Al-Junaid Walker
(Monash University) .............................................................................................................................................. 389

Memory Latency Evaluation in Cluster-Based Cache Coherent Multiprocessor with Different Network Topologies
Abu Sadath Asaduzzaman (University of Florida), Imad Mahgoub (Florida Atlantic University)
and Mazin Yousif (IBM Corporation) .................................................................................................................. 393
Improvements on Bus Technology Will Affect the Benefits of Remote Caches in CC-NUMA Architectures
Edward D. Moreno and Sergio T. Kočiji (Universidade de Sao Paulo) .................................................. 397

The Effects of Pipelined Communication in Message-Passing
Csaba Andras Montz (Royal Institute of Technology) ................................................................. 401

COMPUTING PRACTICES AND APPLICATIONS

Designing Tuned Mass Dampers Via Static Output Feedback
W. E. Schmitendorf (University of California, Irvine) ...................................................................... 407

Control System Design for LTI Systems Using Interval Analysis
M. Sami Faradoli and George Bebis (University of Nevada, Reno) .............................................. 413

Fault Diagnosis in Redundant Path Multistage Interconnection Networks
Po-Jen Chuang and Huey-Ming Hsu (Tamkang University) ......................................................... 417

A Mathematical Software System: Theory and Application for Evaluating Associated Transforms
Joyati Debnath (Winona State University) ..................................................................................... 422

Using Aspect Angle for Real-Time Route Planning
Robert J. Szczesna (Lockheed Martin Federal Systems) ............................................................. 426

Using Keywords Separation to Improve Searching on the Web
Chao Zeng (Fukuoka Junior College of Technology) ..................................................................... 430

Leaving the Sandbox: Third Party Validation for Java Applications
I. Jermyn, F. Monrose, P. Wyckoff (New York University) ............................................................. 436

An Object-Oriented Hardware/Software Co-Design Paradigm
Obaidur M. Rashid, Nelson L. Passos, Ranette H. Halverson (Midwestern State University) ........ 440