



12th Pacific Rim International Symposium on Dependable Computing

18-20 December 2006 • Riverside, California

Editors

Daniel Jeske
Gianfranco Ciardo
Yuan-Shun Dai

Sponsored by

IEEE Computer Society Technical Committee on Fault-Tolerant Computing
University of California, Riverside

In cooperation with

IFIP WG 10.4 on Dependable Computing and Fault Tolerance



Los Alamitos, California

Washington • Tokyo

Copyright © 2006 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, or the Institute of Electrical and Electronics Engineers, Inc.

IEEE Computer Society Order Number P2724
ISBN-13: 978-0-7695-2724-6
ISBN-10: 0-7695-2724-8
Library of Congress Number 2006932188

Additional copies may be ordered from:

IEEE Computer Society
Customer Service Center
10662 Los Vaqueros Circle
P.O. Box 3014
Los Alamitos, CA 90720-1314
Tel: + 1 800 272 6657
Fax: + 1 714 821 4641
<http://computer.org/cspress>
csbooks@computer.org

IEEE Service Center
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
Tel: + 1 732 981 0060
Fax: + 1 732 981 9667
[http://shop.ieee.org/store/
customer-service@ieee.org](http://shop.ieee.org/store/customer-service@ieee.org)

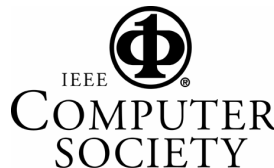
IEEE Computer Society
Asia/Pacific Office
Watanabe Bldg., 1-4-2
Minami-Aoyama
Minato-ku, Tokyo 107-0062
JAPAN
Tel: + 81 3 3408 3118
Fax: + 81 3 3408 3553
tokyo.ofc@computer.org

Individual paper REPRINTS may be ordered at: reprints@computer.org

Editorial production by Stephanie Kawada

Cover art production by Joe Daigle/Studio Productions

Printed in the United States of America by Applied Digital Imaging



IEEE Computer Society
Conference Publishing Services

<http://www.computer.org/proceedings/>



**12th Pacific Rim International Symposium
on Dependable Computing**

Table of Contents

Message from the General and Program Chairsxi
Referees.....xii

Session 1: Reliability Modeling

Two-Dimensional Software Reliability Models and Their Application3
Tomotaka Ishii and Tadashi Dohi

A Strategy for Verification of Decomposable SCR Models..... 11
Dejan Desovski and Bojan Cukic

Detection and Correction Process Modeling Considering the Time Dependency..... 19
Y. P. Wu, Q. P. Hu, M. Xie, and S. H. Ng

Detecting and Exploiting Symmetry in Discrete-State Markov Models.....26
W. Douglas Obal II, Michael G. McQuinn, and William H. Sanders

Session 2: Fault Detection

An Evaluation of Similarity Coefficients for Software Fault Localization39
Rui Abreu, Peter Zoeteweij, and Arjan J. C. van Gemund

SEVA: A Soft-Error- and Variation-Aware Cache Architecture.....	47
<i>Luong D. Hung, Masahiro Goshima, and Shuichi Sakai</i>	
An OS-Level Framework for Providing Application-Aware Reliability.....	55
<i>Long Wang, Zbigniew Kalbarczyk, Weining Gu, and Ravishankar K. Iyer</i>	
Minimal System Conditions to Implement Unreliable Failure Detectors.....	63
<i>Antonio Fernández, Ernesto Jiménez, and Sergio Arévalo</i>	

Session 3: Software Test

A New Approach to Improving the Test Effectiveness in Software Testing Using Fault Collapsing	73
<i>Shiyi Xu</i>	
A Framework for Inheritance Testing from VDM++ Specifications.....	81
<i>Aamer Nadeem and Michael R. Lyu</i>	
Assessment on Undetectable Burst Errors in Tandem CRCs	89
<i>Meng-Lai Yin and Bruce Orenstein</i>	
Efficient Built-In Self-Test Schemes for Video Coding Cores: A Case Study on DCT/IDCT Circuits	97
<i>Shyue-Kung Lu, Ting-Yu Chen, and Wei-Yuan Liu</i>	

Session 4: Security

Flexible, Cost-Effective Membership Agreement in Synchronous Systems	105
<i>Raul Barbosa and Johan Karlsson</i>	
Towards Adaptive Secure Group Communication: Bridging the Gap between Formal Specification and Network Simulation	113
<i>Sebastian Gutierrez-Nolasco, Nalini Venkatasubramanian, Mark-Oliver Stehr, and Carolyn Talcott</i>	
Quantum Oblivious Transfer and Fair Digital Transactions.....	121
<i>Yao-Hsin Chou, I-Ming Tsai, Chien-Ming Ko, Sy-Yen Kuo, and Ing-Yi Chen</i>	
Storing RSA Private Keys in Your Head.....	129
<i>Taisya Krivoruchko, James Diamond, and Jeff Hooper</i>	

Session 5: Availability

Database Transaction Management for High-Availability Cluster System.....	139
<i>Ken-ichiro Fujiyama, Nobutatsu Nakamura, and Ryuichi Hiraike</i>	
Restoration Strategies in Mesh Optical Networks: Cost vs. Service Availability	147
<i>Daniel R. Jeske and Ashwin Sampath</i>	

Modeling High Availability Systems	154
<i>Kishor S. Trivedi, Ranjith Vasireddy, David Trindade, Swami Nathan, and Rick Castro</i>	

Session 6: Intrusion Detection

Base Address Recognition with Data Flow Tracking for Injection Attack Detection.....	165
<i>Satoshi Katsunuma, Hiroyuki Kurita, Ryota Shioya, Kazuto Shimizu, Hidetsugu Irie, Masahiro Goshima, and Shuichi Sakai</i>	

A Stateful Approach to Spyware Detection and Removal.....	173
<i>Ming-Wei Wu, Yennun Huang, Yi-Min Wang, and Sy-Yen Kuo</i>	

Session 7: Reliability Prediction and Optimization

A Best Practice Guide to Resource Forecasting for the Apache Webserver	183
<i>Günther A. Hoffmann, Kishor S. Trivedi, and Mirosław Malek</i>	

Software Reliability Prediction and Assessment Using Both Finite and Infinite Server Queueing Approaches.....	194
<i>Wei-Chih Huang, Chin-Yu Huang, and Chuan-Ching Sue</i>	

On Statistically Estimated Optimistic Delivery in Wide-Area Total Order Protocols.....	202
<i>José Mocito, Ana Respício, and Luís Rodrigues</i>	

Early Software Reliability Prediction with ANN Models	210
<i>Q. P. Hu, M. Xie, and S. H. Ng</i>	

Session 8: Dependability Applications

A Dependable Outbound Bandwidth Based Approach for Peer to Peer Media Streaming.....	221
<i>Zheng-Yi Huang and Sheng-De Wang</i>	

A Pragmatic Protocol for Database Replication in Interconnected Clusters.....	230
<i>J. Grov, L. Soares, A. Correia Jr., J. Pereira, R. Oliveira, and F. Pedone</i>	

An Efficient Commit Protocol Exploiting Primary-Backup Placement in a Distributed Storage System	238
<i>Xiangyong Ouyang, Tomohiro Yoshihara, and Haruo Yokota</i>	

Reliable Video Transmission Techniques for Wireless MPEG-4 Streaming Systems	248
<i>Sheng-Tzong Cheng and Jian-Liang Lin</i>	

Session 9: Survivability

On the Fly Estimation of the Processes That Are Alive/Crashed in an Asynchronous Message-Passing System	259
<i>Achour Mostefaoui, Michel Raynal, and Gilles Tredan</i>	
Synchronous Set Agreement: A Concise Guided Tour (including a New Algorithm and a List of Open Problems)	267
<i>Michel Raynal and Corentin Travers</i>	
Dependable Multithreaded Processing Using Runtime Validation	275
<i>Kaiyu Chen and Sharad Malik</i>	

Session 10: Optimization

Improving Fast Paxos: Being Optimistic with No Overhead	287
<i>Bernadette Charron-Bost and André Schiper</i>	
Fault-Tolerant Partitioning Scheduling Algorithms in Real-Time Multiprocessor Systems.....	296
<i>Hakem Beitollahi and Geert Deconinck</i>	
Resource Availability Optimization for Priority Classes in a Website.....	305
<i>V. P. Koutras and A. N. Platis</i>	

Session 11: Maintenance and Recovery

Design Trade-Offs and Deadlock Prevention in Transient Fault-Tolerant SMT Processors	315
<i>Xiaobin Li and Jean-Luc Gaudiot</i>	
Incorporating Network Connectivity Analysis in Maintenance Planning	323
<i>Meng-Lai Yin and Rafael R. Arellano</i>	
Low-Overhead Run-Time Memory Leak Detection and Recovery.....	329
<i>Timothy Tsai, Kalyan Vaidyanathan, and Kenny Gross</i>	

Session 12: Performance and Reliability

End-to-End Consensus Using End-to-End Channels.....	341
<i>Matthias Wiesmann and Xavier Défago</i>	
Performance and Reliability Analysis of Web Server Software Architectures.....	351
<i>Swapna S. Gokhale, Paul J. Vandal, and Jijun Lu</i>	
A Single-Chip Fail-Safe Microprocessor with Memory Data Comparison Feature	359
<i>Kotaro Shimamura, Takeshi Takehara, Yosuke Shima, and Kunihiko Tsunedomi</i>	

Short Paper Track 1

Evaluating the Impact of Fault Recovery on Superscalar Processor Performance	369
<i>Toshinori Sato and Akihiro Chiyonobu</i>	
A Scenario of Tolerating Interaction Faults between Otherwise Correct Systems	371
<i>Bogdan Tomoyuki Nassu and Takashi Nanya</i>	
Detection and Recovery for Disconnection Failures in a Web-Based Medical Teleconsultation System.....	373
<i>Kuo-Feng Ssu, Chih-Hsun Chou, Wei-Te Shih, Pau-Choo Chung, and Hewijin C. Jiau</i>	
Leader Election in the Timed Finite Average Response Time Model.....	375
<i>Christof Fetzer and Martin Süßkraut</i>	
A Replication Model for Trading Data Integrity against Availability	377
<i>Johannes Osrael, Lorenz Frohofer, and Karl M. Goeschka</i>	
Improving Data Transmission with Helping Nodes for Geographical Ad Hoc Routing	379
<i>Shin-Hung Chung, Kuo-Feng Ssu, Chih-Hsun Chou, and Hewijin Christine Jiau</i>	
Towards Timely ACID Transactions in DBMS	381
<i>Marco Vieira, António Casimiro Costa, and Henrique Madeira</i>	
Monitoring Database Application Behavior for Intrusion Detection.....	383
<i>José Fonseca, Marco Vieira, and Henrique Madeira</i>	

Short Paper Track 2

Implementation Results of a Configurable Membership Protocol for Active Safety Systems.....	387
<i>Carl Bergenheim, Johan Karlsson, Christian Archer, and Andreas Sjöblom</i>	
Ontology Based IT-Security Planning.....	389
<i>Stefan Fenz and Edgar Weippl</i>	
The Hierarchy of BGP Convergence on the Self-Organized Internet.....	391
<i>Jinjing Zhao, Peidong Zhu, Xicheng Lu, and Feng Zhao</i>	
Dynamic Reconfiguration Policies for Reconfigurable Coded-WDM PONs.....	393
<i>Chuan-Ching Sue</i>	
Fault-Tolerant Rate-Monotonic Scheduling Algorithm in Uniprocessor Embedded Systems.....	395
<i>Hakem Beitollahi and Geert Deconinck</i>	
The Survivability of the Augmented Logical Ring Topology in WDM Networks.....	397
<i>Yung-Chiao Chen, Chuan-Ching Sue, and Sy-Yen Kuo</i>	

A Hybrid Multipath Routing in Mobile Ad Hoc Networks	399
<i>Chuan-Ching Sue and Ren-Jie Chiou</i>	
A Generic Trust Overlay Simulator for P2P Networks	401
<i>Wei Wang and Guosun Zeng</i>	
Author Index	403