

**Proceedings**

**The 14th IEEE Pacific Rim  
International Symposium  
on Dependable Computing  
PRDC 2008**

**15-17 December 2008  
Taipei, Taiwan**



**Los Alamitos, California  
Washington • Tokyo**



# **2008 14th IEEE Pacific Rim International Symposium on Dependable Computing**

# **PRDC 2008**

## **Table of Contents**

Message from the General and Program Committee Chairs

Organizing Committee

---

### **Session 1A: Dependable Hardware (I)**

Fetching Primary and Redundant Instructions in Turn for a Fault-Tolerant Embedded Microprocessor .....	1
<i>Shijian Zhang and Weiwu Hu</i>	
Conjoined Pipeline: Enhancing Hardware Reliability and Performance through Organized Pipeline Redundancy .....	9
<i>Viswanathan Subramanian and Arun K. Somani</i>	
Versatile and Efficient Techniques for Speeding-Up Circuit Level Simulated Fault-Injection Campaigns .....	17
<i>Weiguang Sheng, Liyi Xiao, and Zhigang Mao</i>	

### **Session 1B: Dependable Systems (I)**

On-line Monitoring of Real Time Applications for Early Error Detection .....	24
<i>Thomas Robert, Jean-Charles Fabre, and Matthieu Roy</i>	
The Schemes to Develop Dependable System Using COTS .....	32
<i>Koji Tomita, Kazunori Fujiwara, Hiroshi Kawasaki, Naoki Miwa, and Satoru Nagai</i>	
Language and Tool Support for Model Checking of Fault-Tolerant Distributed Algorithms .....	40
<i>Takahiro Minamikawa, Tatsuhiko Tsuchiya, and Tohru Kikuno</i>	

## **Session 2A: Algorithms and Theory (I)**

On the Complexity of a Self-Stabilizing Spanning Tree Algorithm for Large Scale Systems .....	48
<i>Julien Clement, Thomas Herault, Stephane Messika, and Olivier Peres</i>	
VTV - A Voting Strategy for Real-Time Systems .....	56
<i>Hüseyin Aysan, Sasikumar Punnekkat, and Radu Dobrin</i>	
A Peer-to-Peer Filter-Based Algorithm for Internal Clock Synchronization in Presence of Corrupted Processes .....	64
<i>Roberto Baldoni, Marco Platania, Leonardo Querzoni, and Sirio Scipioni</i>	
Constructing Liberation Codes Using Latin Squares .....	73
<i>Wang Gang, Liu Xiaoguang, Lin Sheng, Xie Guangjun, and Liu Jing</i>	

## **Session 2B: Modeling and Analysis (I)**

RAS Modeling of an HPC Switch System .....	81
<i>Dong Tang, William Bryson, and Richard Elling</i>	
On Modeling the Lifetime Reliability of Homogeneous Manycore Systems .....	87
<i>Lin Huang and Qiang Xu</i>	
Modeling Perfect and Minimal Rejuvenation for Client Server Systems with Heterogeneous Load .....	95
<i>V. P. Kourtras and A. N. Platis</i>	
Dependable Overlay Networks .....	104
<i>Hakem Beitollahi and Geert Deconinck</i>	

## **Session 3A: Dependable Systems (II)**

Countering IPC Threats in Multiserver Operating Systems (A Fundamental Requirement for Dependability) .....	112
<i>Jorrit N. Herder, Herbert Bos, Ben Gras, Philip Homburg, and Andrew S. Tanenbaum</i>	
A Process Health Status Service for Safety Related Systems Using TT/ET Communication Scheduling .....	122
<i>Carl Bergenhem and Johan Karlsson</i>	
Application of Flexible and Efficient Campus Curriculum Systems .....	132
<i>Chia-Chen Yen and Jih-Shih Hsu</i>	

## **Session 3B: Dependable Networks**

Detecting Inconsistent Values Caused by Interaction Faults Using Automatically Located Implicit Redundancies .....	138
<i>Bogdan Tomoyuki Nassu, Takashi Nanya, and Hiroshi Nakamura</i>	
Limitations of the Linux Fault Injection Framework to Test Direct Memory Access Address Errors .....	146
<i>Roberto Jung Drebes and Takashi Nanya</i>	
Towards Adaptive Covert Communication System .....	153
<i>Fedor V. Yarochkin, Shih-Yao Dai, Chih-Hung Lin, Yennun Huang, and Sy-Yen Kuo</i>	

## **Session 4A: Dependable Systems (II)**

Orderly Random Testing for Both Hardware and Software .....	160
<i>Shiyi Xu</i>	
A Study of Modified Testing-Based Fault Localization Method .....	168
<i>Yu-Min Chung, Chin-Yu Huang, and Yu-Chi Huang</i>	
Bayesian Inference Approach for Probabilistic Analogy Based Software Maintenance	
Effort Estimation .....	176
<i>Y. F. Li, M. Xie, and T. N. Goh</i>	
Indirect Control Path Analysis and Goal Coverage Strategies for Elaborating System	
Safety Goals in Composite Systems .....	184
<i>Jennifer Black and Philip Koopman</i>	

## **Session 4B: Algorithms and Theory (II)**

SOQ: A Service-Oriented Quorum-Based Protocol for Resilient Real-Time	
Communication in Partitionable Networks .....	192
<i>Bo Zhang and Binoy Ravindran</i>	
Flexible Heterogeneous Strict Quorum-Based Dynamic Data Replication Schemes .....	200
<i>Christian Storm, Timo Warns, and Oliver Theel</i>	
Eventual Leader Election in the Crash-Recovery Failure Model .....	208
<i>Cristian Martín and Mikel Larrea</i>	
A Greedy Technique for Finding the Most Reliable Edge-Disjoint-Path-Set in	
a Network .....	216
<i>Ruen Chze Loh, Sieteng Soh, Mihai Lazarescu, and Suresh Rai</i>	

## **Session 5A: Dependable Software**

A New Paradigm for Software Reliability Modeling – From NHPP to NHGP .....	224
<i>Tomotaka Ishii and Tadashi Dohi</i>	
Hyper-Erlang Software Reliability Model .....	232
<i>Hiroyuki Okamura and Tadashi Dohi</i>	
PRASE: An Approach for Program Reliability Analysis with Soft Errors .....	240
<i>Jianjun Xu, Rui Shen, and Qingping Tan</i>	
Componentization of Fault Tolerance Software for Fine-Grain Adaptation .....	248
<i>Thomas Pareaud, Jean-Charles Fabre, and Marc-Olivier Killijian</i>	

## **Session 5B: Dependable Hardware (II)**

An Online Control Flow Check for VLIW Processor .....	256
<i>Hung-Chuan Lai, Shi-Jinn Horng, and Yung-Yuan Chen</i>	
Generic Design and Automatic Deployment of NMR Strategies on HW Cores .....	265
<i>Juan-Carlos Ruiz, David de Andrés, Sara Blanc, and Pedro Gil</i>	
Transient Fault Tolerance on Chip Multiprocessor Based on Dual and Triple Core	
Redundancy .....	273
<i>Rui Gong, Kui Dai, and Zhiying Wang</i>	

Three-Level Error Control Coding for Dependable Solid-State Drives .....	281
<i>Haruhiko Kaneko, Takuya Matsuzaka, and Eiji Fujiwara</i>	

## **Session 6A: Security Issues**

Effect of Intrusion Detection on Failure Time of Mission-Oriented Mobile Group Systems in Mobile Ad Hoc Networks .....	289
<i>Jin-Hee Cho, Ing-Ray Chen, and Phu-Gui Feng</i>	
Training Security Assurance Teams Using Vulnerability Injection .....	297
<i>José Fonseca, Marco Vieira, and Henrique Madeira</i>	
Runtime Security Adaptation Using Adaptive SSL .....	305
<i>Christiaan J. Lamprecht and Aad P. A. van Moorsel</i>	
Assessing and Comparing Security of Web Servers .....	313
<i>Naaliel Mendes, Afonso Araújo Neto, João Durães, Marco Vieira, and Henrique Madeira</i>	

## **Session 6B: Modeling and Analysis (II)**

Availability Modeling of SIP Protocol on IBM© WebSphere© .....	323
<i>K. Trivedi, D. Wang, D. J. Hunt, A. Rindos, W. E. Smith, and B. Vashaw</i>	
Availability Analysis of Robotic Swarm Systems .....	331
<i>Yansheng Zhang, Farokh Bastani, I-Ling Yen, Jicheng Fu, and Ingr-Ray Chen</i>	
Error Behavior Comparison of Multiple Computing Systems: A Case Study Using Linux on Pentium, Solaris on SPARC, and AIX on POWER .....	339
<i>Daniel Chen, Gabriela Jacques-Silva, Zbigniew Kalbarczyk, Ravishankar K. Iyer, and Bruce Mealey</i>	

## **Poster Papers**

Path Delay Fault Test Set for Two-Rail Logic Circuits .....	347
<i>Kazuteru Namba and Hideo Ito</i>	
Finding the Optimal Configuration of a Cascading TMR System .....	349
<i>Masashi Hamamatsu, Tatsuhiko Tsuchiya, and Tohru Kikuno</i>	
Reliability Quantification of the Tree Structure Based Distributed System .....	351
<i>Dianfu Ma, Min Liu, Yongwang Zhao, and Dou Sun</i>	
A Functional Unit with Small Variety of Highly Reliable Cells .....	353
<i>Kazunori Suzuki, Takashi Nakada, Masaki Nakanishi, Shigeru Yamashita, and Yasuhiko Nakashima</i>	
Considering Fault Correction Lag in Software Reliability Modeling .....	355
<i>Yanjun Shu, Zhibo Wu, Hongwei Liu, and Xiaozong Yang</i>	
Efficient Dynamic Indexing Methods for Communication-Induced Checkpointing Protocols .....	357
<i>Jichiang Tsai, Wu-Hong Chen, and Che-Cheng Chang</i>	

Author Index