

Proceedings

**2nd IEEE International Symposium  
on Dependable, Autonomic  
and Secure Computing  
(DASC 2006)**

**September 29–October 1, 2006**

**Indiana University-Purdue University**

**Indianapolis, USA**

**Sponsored by**

IEEE Computer Society, Task Force on Autonomous and Autonomic Systems  
Indiana University-Purdue University, Indianapolis



Los Alamitos, California  
Washington • Tokyo

---

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

IEEE Computer Society Order Number P2539  
ISBN-13: 978-0-7695-2539-6  
ISBN-10: 0-7695-2539-3  
Library of Congress Control Number 2005938612

*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](mailto: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](mailto:tokyo.ofc@computer.org)

*Individual paper REPRINTS may be ordered at:* [reprints@computer.org](mailto:reprints@computer.org)

Editorial production by Randall S. Bilof

Cover art production by Joe Daigle/Studio Productions

Printed in the United States of America by The Printing House

  
IEEE  
COMPUTER  
SOCIETY

 **IEEE**

IEEE Computer Society  
**Conference Publishing Services**  
<http://www.computer.org/proceedings/>

# Contents

## Proceedings of the 2nd IEEE International Symposium on Dependable, Autonomic and Secure Computing

**DASC 2006**

Message from the General Co-Chairs .....	ix
Organizing Committees .....	x
Referees .....	xiii

### Session 1: Autonomic Computing and Selfware

A Prototype Model for Self-Healing and Self-Reproduction in Swarm Robotics System.....	3
<i>Yuan-Shun Dai, Michael Hinchey, Manish Madhusoodan, James L. Rash, and Xukai Zou</i>	
Adaptable and Autonomic Mission Manager for Dependable Aerospace Computing .....	11
<i>Ian A. Troxel and Alan D. George</i>	
A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems.....	19
<i>Joaquín Peña, Michael G. Hinchey, Roy Sterritt, Antonio Ruiz-Cortés, and Manuel Resinas</i>	

### Session 2: Cryptography

A Reliable ( $k, n$ ) Image Secret Sharing Scheme .....	31
<i>Li Bai</i>	
Tamper-Evident Digital Signatures: Protecting Certification Authorities against Malware .....	37
<i>Jong Youl Choi, Philippe Golle, and Markus Jakobsson</i>	
A Parallel GNFS Integrated with the Block Wiedemann's Algorithm for Integer Factorization .....	45
<i>Na Guo, Laurence T. Yang, Man Lin, and John P. Quinn</i>	
A CRT-RSA Algorithm Secure against Hardware Fault Attacks .....	51
<i>Sining Liu, Brian King, and Wei Wang</i>	

### Session 3: Autonomic Computing and Monitoring

A Game-Theoretic Approach to Stochastic Security and Dependability Evaluation.....	61
<i>Karin Sallhammar, Bjarne E. Helvik, and Sven J. Knapskog</i>	
Autonomous Decentralized Load Tracking Techniques and Evaluation .....	69
<i>Tetsuya Masuishi, Koichi Shibata, Yasuyuki Oki, and Kinji Mori</i>	
Optimal Checkpoint Placement with Equality Constraints .....	77
<i>Tadashi Dohi, Tatsuya Ozaki, and Naoto Kaio</i>	
Fault-Intrusion Tolerant Techniques in Wireless Sensor Networks.....	85
<i>Ruiping Ma, Liudong Xing, and Howard E. Michel</i>	

## Session 4: Reliability and Security Modeling

Modeling Security Vulnerabilities: A Constraints and Assumptions Perspective .....	95
<i>Anil Bazaz, James D. Arthur, and Joseph G. Tront</i>	
Assessing Vulnerabilities in Apache and IIS HTTP Servers .....	103
<i>Sung-Whan Woo, Omar H. Alhazmi, and Yashwant K. Malaiya</i>	
Estimating Markov Modulated Software Reliability Models via EM Algorithm .....	111
<i>Takao Ando, Hiroyuki Okamura, and Tadashi Dohi</i>	
Measuring Quantitative Dependability Attributes in Digital Publishing Using Petri Net Workflow Modeling.....	119
<i>Gustavo A. Chaparro-Baquero, Nayda G. Santiago, Wilson Rivera, and J. Fernando Vega-Riveros</i>	

## Session 5: Autonomy Supported by Grid and Pervasive Computing

Towards Reliable Rating Filtering in Grid Reputation Systems: A Pre-Evaluating Set Based Bias-Tuned Approach.....	129
<i>Xuejun Yang, Xiangli Qu, and Chunmei Gui</i>	
A Security-Supportive Middleware Architecture for Pervasive Computing.....	137
<i>Zhaoyu Liu and Dichao Peng</i>	
Self-Adaptive Pervasive Computing Application Based on Code Mobility .....	145
<i>Songqiao Han, Shensheng Zhang, and Yong Zhang</i>	

## Session 6: Network Security

Towards Understanding the (In)security of Networked Systems under Topology-Directed Stealthy Attacks .....	155
<i>Paul Parker and Shouhuai Xu</i>	
A Dynamic Countermeasure Method for Large-Scale Network Attacks.....	163
<i>Zhaoyu Liu and Roopesh Uppala</i>	
A Solution to Single Point of Failure Using Voter Replication and Disagreement Detection .....	171
<i>A. Patooghy, S. Gh. Miremadi, A. Javadtalab, M. Fazeli, and N. Farazmand</i>	
Runtime Security Verification for Itinerary-Driven Mobile Agents .....	177
<i>Zijiang Yang, Shiyong Lu, and Ping Yang</i>	

## Session 7: Self-Adaptation and Scheduling

A Satisficing MOMIP Framework for Reliable Real-Time Application Scheduling .....	187
<i>Thanikesavan Sivanthi and Ulrich Killat</i>	
Thermal-Aware Task Scheduling to Minimize Energy Usage of Blade Server Based Datacenters .....	195
<i>Qinghui Tang, Sandeep K. S. Gupta, Daniel Stanzione, and Phil Cayton</i>	
SmartC: A Component-Based Hierarchical Modeling Language for Automotive Electronics.....	203
<i>Guoqing Yang, Hong Li, and Zhaohui Wu</i>	

## Session 8: Autonomous Intrusion Detection

On Recognizing Virtual Honeypots and Countermeasures.....	211
<i>Xinwen Fu, Wei Yu, Dan Cheng, Xuejun Tan, Kevin Streff, and Steve Graham</i>	
A Self-Tuning Multicast Flow Control Scheme Based on Autonomic Technology.....	219
<i>N. Xiong, Yanxiang He, Yan Yang, Laurence T. Yang, and Chao Peng</i>	
Autonomic Security and Self-Protection Based on Feature-Recognition with Virtual Neurons.....	227
<i>Yuan-Shun Dai, Michael Hinchey, Mingrui Qi, and Xukai Zou</i>	
Intelligent Autonomic Strategy to Attacks in Network Infrastructure Protection: Feedback Methods to IDS, Using Policies, Alert Filters and Firewall Packet Filters for Various Protocols.....	235
<i>Emmanuel Hooper</i>	

## Session 9: Autonomy in Sensor Networks

Performance Evaluation of Adjusted Probabilistic Broadcasting in MANETs.....	245
<i>M. Masadeh Bani Yassein, M. Ould Khaoua, L. M. Mackenzie, and S. Papanastasiou</i>	
Infrastructure Communication Reliability of Wireless Sensor Networks.....	250
<i>Akhilesh Shrestha, Liudong Xing, and Hong Liu</i>	
Autonomic Sensor Networks: A New Paradigm for Collaborative Information Processing.....	258
<i>Hui Kang, Xiaolin Li, and Patrick J. Moran</i>	

## Session 10: Automated Trust Management

Architecture of Trustworthy Networks.....	269
<i>Xue-hai Peng and Chuang Lin</i>	
DRBTS: Distributed Reputation-Based Beacon Trust System.....	277
<i>Avinash Srinivasan, Joshua Teitelbaum, and Jie Wu</i>	
Trusted Mobile Interaction via Extended Digital Certificates.....	284
<i>Will Tao and Robert Steele</i>	

## Session 11: Access Control

Aclamate: An AOSD Security Framework for Access Control.....	293
<i>Andrew Prunicki and Tzilla Elrad</i>	
Composing Access Control Policies of Distributed Systems.....	301
<i>Omkar J. Tilak, Rajeev R. Raje, and Xukai Zou</i>	
PIFF: An Intelligent File Filtering Mechanism for Peer-to-Peer Network.....	308
<i>Junda Liu, Lin Ning, Yibo Xue, and Dongsheng Wang</i>	
An Algorithm for Privacy-Preserving Quantitative Association Rules Mining.....	315
<i>Weiwei Jing, Liusheng Huang, Yonglong Luo, Weijiang Xu, and Yifei Yao</i>	

## Session 12: Autonomic Computing and Context Awareness

Analysing Stream Authentication Protocols in Autonomous Agent-Based Systems.....	325
<i>Mehmet A. Orgun, Ji Ma, Chuchang Liu, and Guido Governatori</i>	

Automated Caching of Behavioral Patterns for Efficient Run-Time Monitoring .....	333
<i>Natalia Stakhanova, Samik Basu, Robyn R. Lutz, and Johnny Wong</i>	
Service Clouds: A Distributed Infrastructure for Constructing Autonomic Communication Services.....	341
<i>Philip K. McKinley, Farshad A. Samimi, Jonathan K. Shapiro, and Chiping Tang</i>	
<b>Author Index</b> .....	349