

2016 46th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2016)

**Toulouse, France
28 June – 1 July 2016**



**IEEE Catalog Number: CFP16048-POD
ISBN: 978-1-4673-8892-4**

**Copyright © 2016 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 are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

******This publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP16048-POD
ISBN (Print-On-Demand):	978-1-4673-8892-4
ISBN (Online):	978-1-4673-8891-7
ISSN:	1530-0889

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

2016 46th Annual IEEE/IFIP International Conference on Dependable Systems and Networks

DSN 2016

Table of Contents

Greetings from the General Chairs.....	xi
Message from the Program Chairs.....	xii
Organizing Committee.....	xiii
Program Committee.....	xv
Steering Committee.....	xvii

Dependability Sessions

Best Paper Candidates

A Quantitative Methodology for Security Monitor Deployment	1
<i>Uttam Thakore, Gabriel A. Weaver, and William H. Sanders</i>	
Dynamic Scalable State Machine Replication	13
<i>Long Hoang Le, Carlos Eduardo Bezerra, and Fernando Pedone</i>	
OSIRIS: Efficient and Consistent Recovery of Compartmentalized Operating Systems	25
<i>Koustubha Bhat, Dirk Vogt, Erik van der Kouwe, Ben Gras, Lionel Sambuc, Andrew S. Tanenbaum, Herbert Bos, and Cristiano Giuffrida</i>	

Storage Systems

Towards a Scalable and Write-Free Multi-version Checkpointing Scheme in Solid State Drives	37
<i>Hoda Aghaei Khouzani and Chengmo Yang</i>	
Elastic Parity Logging for SSD RAID Arrays	49
<i>Yongkun Li, Helen H. W. Chan, Patrick P. C. Lee, and Yinlong Xu</i>	
OI-RAID: A Two-Layer RAID Architecture towards Fast Recovery and High Reliability	61
<i>Neng Wang, Yinlong Xu, Yongkun Li, and Si Wu</i>	

Clouds and Networks

StorM: Enabling Tenant-Defined Cloud Storage Middle-Box Services	73
<i>Hui Lu, Abhinav Srivastava, Brendan Saltaformaggio, and Dongyan Xu</i>	
Process-Oriented Non-intrusive Recovery for Sporadic Operations on Cloud	85
<i>Min Fu, Liming Zhu, Ingo Weber, Len Bass, Anna Liu, and Xiwei Xu</i>	
Network Recovery After Massive Failures	97
<i>Novella Bartolini, Stefano Ciavarella, Thomas F. La Porta, and Simone Silvestri</i>	

Software-Defined Networks

JURY: Validating Controller Actions in Software-Defined Networks	109
<i>Kshiteej Mahajan, Rishabh Poddar, Mohan Dhawan, and Vijay Mann</i>	
SDNShield: Reconciliating Configurable Application Permissions for SDN App Markets	121
<i>Xitao Wen, Bo Yang, Yan Chen, Chengchen Hu, Yi Wang, Bin Liu, and Xiaolin Chen</i>	
Can't Touch This: Consistent Network Updates for Multiple Policies	133
<i>Szymon Dudycz, Arne Ludwig, and Stefan Schmid</i>	

Software Dependability

HSFI: Accurate Fault Injection Scalable to Large Code Bases	144
<i>Erik van der Kouwe and Andrew S. Tanenbaum</i>	
Making Fast Consensus Generally Faster	156
<i>Sebastiano Peluso, Alexandru Turcu, Roberto Palmieri, Giuliano Losa, and Binoy Ravindran</i>	
ePVF: An Enhanced Program Vulnerability Factor Methodology for Cross-Layer Resilience Analysis	168
<i>Bo Fang, Qining Lu, Karthik Pattabiraman, Matei Ripeanu, and Sudhanva Gurumurthi</i>	

Memory and Caches

Methuselah Flash: Rewriting Codes for Extra Long Storage Lifetime	180
<i>Georgios Mappouras, Alireza Vahid, Robert Calderbank, and Daniel J. Sorin</i>	
Enabling Deep Voltage Scaling in Delay Sensitive L1 Caches	192
<i>Chao Yan and Russ Joseph</i>	
ReadDuo: Constructing Reliable MLC Phase Change Memory through Fast and Robust Readout	203
<i>Ruija Wang, Youtao Zhang, and Jun Yang</i>	

Hardware Errors Resiliency

Leveraging ECC to Mitigate Read Disturbance, False Reads and Write Faults in STT-RAM	215
<i>Seyed Mohammad Seyedzadeh, Rakan Maddah, Alex Jones, and Rami Melhem</i>	
SuperGlue: IDL-Based, System-Level Fault Tolerance for Embedded Systems	227
<i>Jiguo Song, Gedare Bloom, and Gabriel Palmer</i>	
PARBOR: An Efficient System-Level Technique to Detect Data-Dependent Failures in DRAM	239
<i>Samira Khan, Donghyuk Lee, and Onur Mutlu</i>	

Dependability Applications

Efficient Algorithm-Based Fault Tolerance for Sparse Matrix Operations	251
<i>Alexander Schöll, Claus Braun, Michael A. Kochte, and Hans-Joachim Wunderlich</i>	
Formal Analysis for Dependable Supervisory Control and Data Acquisition in Smart Grids	263
<i>Mohammad Ashiqur Rahman, A. H. M. Jakaria, and Ehab Al-Shaer</i>	
A Model-Based Approach to Support Safety-Related Decisions in the Petroleum Domain	275
<i>Leonardo Montecchi, Atle Refsdal, Paolo Lollini, and Andrea Bondavalli</i>	

Models

Mean Field Approximation of Uncertain Stochastic Models	287
<i>Luca Bortolussi and Nicolas Gast</i>	
Uncovering Dynamic Fault Trees	299
<i>Sebastian Junges, Dennis Guck, Joost-Pieter Katoen, and Mariëlle Stoelinga</i>	

Data Centers Dependability

Power-Capping Aware Checkpointing: On the Interplay Among Power-Capping, Temperature, Reliability, Performance, and Energy	311
<i>Kun Tang, Devesh Tiwari, Saurabh Gupta, Ping Huang, Qiqi Lu, Christian Engelmann, and Xubin He</i>	
Reconsidering Single Failure Recovery in Clustered File Systems	323
<i>Zhirong Shen, Jiwu Shu, and Patrick P. C. Lee</i>	
Managing Data Center Tickets: Prediction and Active Sizing	335
<i>Ji Xue, Robert Birke, Lydia Y. Chen, and Evgenia Smirni</i>	

Security Sessions

Privacy

A Privacy Analysis of Google and Yandex Safe Browsing	347
<i>Thomas Gerbet, Amrit Kumar, and Cédric Lauradoux</i>	
PUPPIES: Transformation-Supported Personalized Privacy Preserving Partial Image Sharing	359
<i>Jianping He, Bin Liu, Deguang Kong, Xuan Bao, Na Wang, Hongxia Jin, and George Kesidis</i>	
Modeling Privacy and Tradeoffs in Multichannel Secret Sharing Protocols	371
<i>Devin J. Pohly and Patrick McDaniel</i>	

Cyber-physical Systems Security

On False Data Injection Attacks Against Railway Traction Power Systems	383
<i>Subhash Lakshminarayana, Zhan-Teng Teo, Rui Tan, David K. Y. Yau, and Pablo Arboleya</i>	
Targeted Attacks on Teleoperated Surgical Robots: Dynamic Model-Based Detection and Mitigation	395
<i>Homa Alemzadeh, Daniel Chen, Xiao Li, Thenkurussi Kesavadas, Zbigniew T. Kalbarczyk, and Ravishankar K. Iyer</i>	
F-DETA: A Framework for Detecting Electricity Theft Attacks in Smart Grids	407
<i>Varun Badrinath Krishna, Kiryung Lee, Gabriel A. Weaver, Ravishankar K. Iyer, and William H. Sanders</i>	

Operating Systems Security and Privacy

Secure Identification of Actively Executed Code on a Generic Trusted Component	419
<i>Bruno Vavala, Nuno Neves, and Peter Steenkiste</i>	
Secure and Efficient Multi-Variant Execution Using Hardware-Assisted Process Virtualization	431
<i>Koen Koning, Herbert Bos, and Cristiano Giuffrida</i>	
Overhaul: Input-Driven Access Control for Better Privacy on Traditional Operating Systems	443
<i>Kaan Onarlioglu, William Robertson, and Engin Kirda</i>	

Anomaly Detection and Exploits

Kizzle: A Signature Compiler for Detecting Exploit Kits	455
<i>Ben Stock, Benjamin Livshits, and Benjamin Zorn</i>	
A Sharper Sense of Self: Probabilistic Reasoning of Program Behaviors for Anomaly Detection with Context Sensitivity	467
<i>Kui Xu, Ke Tian, Danfeng (Daphne) Yao, and Barbara G. Ryder</i>	

BAYWATCH: Robust Beaconing Detection to Identify Infected Hosts in Large-Scale Enterprise Networks	479
--	-----

*Xin Hu, Jiyong Jang, Marc Ph. Stoecklin, Ting Wang, Douglas L. Schales,
Dhilung Kirat, and Josyula R. Rao*

Network Security

DomainProfiler: Discovering Domain Names Abused in Future	491
---	-----

*Daiki Chiba, Takeshi Yagi, Mitsuaki Akiyama, Toshiki Shibahara, Takeshi Yada,
Tatsuya Mori, and Shigeki Goto*

FTP: The Forgotten Cloud	503
--------------------------------	-----

Drew Springall, Zakir Durumeric, and J. Alex Halderman

Android Security

Practical, Formal Synthesis and Automatic Enforcement of Security Policies for Android	514
---	-----

Hamid Bagheri, Alireza Sadeghi, Reyhaneh Jabbarvand, and Sam Malek

Don't Just BYOD, Bring-Your-Own-App Too! Protection via Virtual Micro Security Perimeters	526
--	-----

Gabriel Salles-Loustau, Luis Garcia, Kaustubh Joshi, and Saman Zonouz

Can We Trust the Privacy Policies of Android Apps?	538
--	-----

Le Yu, Xiapu Luo, Xule Liu, and Tao Zhang

Malware

Repackage-Proofing Android Apps	550
---------------------------------------	-----

Lannan Luo, Yu Fu, Dinghao Wu, Sencun Zhu, and Peng Liu

Measuring the Role of Greylisting and Nolisting in Fighting Spam	562
--	-----

Fabio Pagani, Matteo De Astis, Mariano Graziano, Andrea Lanzi, and Davide Balzarotti

Malware Slums: Measurement and Analysis of Malware on Traffic Exchanges	572
---	-----

*Salman Yousaf, Umar Iqbal, Shehroze Farooqi, Raza Ahmad, Zubair Shafiq,
and Fareed Zaffar*

Passwords

Secure Point-of-Care Medical Diagnostics via Trusted Sensing and Cyto-Coded Passwords	583
--	-----

*Tuan Le, Gabriel Salles-Loustau, Laleh Najafizadeh, Mehdi Javanmard,
and Saman Zonouz*

fuzzyPSM: A New Password Strength Meter Using Fuzzy Probabilistic Context-Free Grammars	595
--	-----

Ding Wang, Debiao He, Haibo Cheng, and Ping Wang

Encryption and Security vs. Performance

Balancing Security and Performance for Agility in Dynamic Threat Environments	607
<i>Michael L. Winterrose, Kevin M. Carter, Neal Wagner, and William W. Strelein</i>	
Rekeying for Encrypted Deduplication Storage	618
<i>Jingwei Li, Chuan Qin, Patrick P. C. Lee, and Jin Li</i>	

PER Sessions

Practical Experience Reports I

Equipping WAP with WEAPONS to Detect Vulnerabilities: Practical Experience Report	630
<i>Ibéria Medeiros, Nuno Neves, and Miguel Correia</i>	
Characterizing the Consistency of Online Services (Practical Experience Report)	638
<i>Filipe Freitas, João Leitao, Nuno Preguiça, and Rodrigo Rodrigues</i>	

Practical Experience Reports II

ELZAR: Triple Modular Redundancy Using Intel AVX (Practical Experience Report)	646
<i>Dmitrii Kuvaiskii, Oleskii Oleksenko, Pramod Bhatotia, Pascal Felber, and Christof Fetzer</i>	
An Evaluation Study on Log Parsing and Its Use in Log Mining	654
<i>Pinjia He, Jieming Zhu, Shilin He, Jian Li, and Michael R. Lyu</i>	
Reliability-Centered Maintenance of the Electrically Insulated Railway Joint via Fault Tree Analysis: A Practical Experience Report	662
<i>Enno Ruijters, Dennis Guck, Martijn van Noort, and Mariëlle Stoelinga</i>	
Author Index	670