

2016 IEEE International Conference on Software Quality, Reliability and Security (QRS 2016)

**Vienna, Austria
1 – 3 August 2016**



**IEEE Catalog Number: CFP16C33-POD
ISBN: 978-1-5090-4128-2**

**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:	CFP16C33-POD
ISBN (Print-On-Demand):	978-1-5090-4128-2
ISBN (Online):	978-1-5090-4127-5

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

CURRAN ASSOCIATES INC.
proceedings
.com

2016 IEEE International Conference on Software Quality, Reliability and Security

QRS 2016

Table of Contents

Message from the QRS 2016 Steering Committee Chairs	xi
Message from the QRS 2016 General Chair.....	xiii
Message from the QRS 2016 Program Chairs.....	xiv
QRS 2016 Steering Committee	xv
QRS 2016 Organizing Committee	xvi
Chairs of Workshops Co-Located with QRS 2016.....	xvii
QRS 2016 Program Committee.....	xviii
QRS 2016 Additional Reviewers.....	xx
Keynote Speeches.....	xxii
Invited Talk by VVASS Workshop.....	xxviii
Invited Talk by SSCPS Workshop.....	xxix
Panel by CRE Workshop	xxx

Session: Cloud-Based and Concurrent Programs

Hunting Killer Tasks for Cloud System through Machine Learning: A Google Cluster Case Study	1
<i>Hongyan Tang, Ying Li, Tong Jia, and Zhonghai Wu</i>	
HistLock: Efficient and Sound Hybrid Detection of Hidden Predictive Data Races with Functional Contexts	13
<i>Jialin Yang, Chunbai Yang, and W.K. Chan</i>	

D-Cube: Tool for Dynamic Design Discovery from Multi-threaded Applications Using PIN	25
<i>Srijoni Majumdar, Nachiketa Chatterjee, Shila Rani Sahoo, and Partha Pratim Das</i>	
Network Performance Bottleneck Detection and Maximum Network Throughput Estimation for Datacenter Applications	33
<i>Patrick Ngai, Sung-Jer Lu, Yu-Sung Wu, Wei-Sheng Lim, and Tung-Yueh Lin</i>	

Session: Combinatorial Testing

How Effective Is Branch-Based Combinatorial Testing? An Exploratory Study	41
<i>Huiyan Wang, Chang Xu, Jun Sui, and Jian Lu</i>	
Applying Combinatorial Testing in Industrial Settings	53
<i>Xuelin Li, Ruizhi Gao, W. Eric Wong, Chunhui Yang, and Dong Li</i>	
Test Effectiveness Evaluation of Prioritized Combinatorial Testing: A Case Study	61
<i>Eun-Hye Choi, Shunya Kawabata, Osamu Mizuno, Cyrille Artho, and Takashi Kitamura</i>	
TLS Cipher Suites Recommendations: A Combinatorial Coverage Measurement Approach	69
<i>Dimitris E. Simos, Kristoffer Kleine, Artemios G. Voyiatzis, Rick Kuhn, and Raghu Kacker</i>	

Session: Empirical Approaches for Software Process Quality

A Faceted Classification Scheme for Change-Based Industrial Code Review Processes	74
<i>Tobias Baum, Olga Liskin, Kai Niklas, and Kurt Schneider</i>	
Grey Relational Analysis Based k Nearest Neighbor Missing Data Imputation for Software Quality Datasets	86
<i>Jianglin Huang and Hongyi Sun</i>	
Model-Driven Evaluation of Software Architecture Quality Using Model Clone Detection	92
<i>Matthew Stepha and James R. Cordy</i>	
User-Perceived Source Code Quality Estimation Based on Static Analysis Metrics	100
<i>Michail Papamichail, Themistoklis Diamantopoulos, and Andreas Symeonidis</i>	

Session: Program Verification - Invariants and Constraints

Automatic Invariant Synthesis for Arrays in Simple Programs	108
<i>Bin Li, Zhenhao Tang, Juan Zhai, and Jianhua Zhao</i>	
Verifying Distributed Controllers with Local Invariants	120
<i>Yiqun Wang, Shengwei An, Xiaoxing Ma, Chun Cao, and Chang Xu</i>	
Precondition Calculation for Loops Iterating over Data Structures	132
<i>Juan Zhai, Bin Li, Zhenhao Tang, Jianhua Zhao, and Xuandong Li</i>	
A Method for Pruning Infeasible Paths via Graph Transformations and Symbolic Execution	144
<i>Romain Aissat, Marie-Claude Gaudel, Frédéric Voisin, and Burkhart Wolff</i>	

Session: Debugging and Fixing

Towards Understanding Interactive Debugging	152
<i>Fabio Petrillo, Zéphyrin Soh, Foutse Khomh, Marcelo Pimenta, Carla Freitas, and Yann-Gaël Guéhéneuc</i>	
What Makes a Satisficing Bug Report?	164
<i>Tommaso Dal Sasso, Andrea Mocchi, and Michele Lanza</i>	
The Bugs Framework (BF): A Structured Approach to Express Bugs	175
<i>Irena Bojanova, Paul E. Black, Yaacov Yesha, and Yan Wu</i>	
Using a Distributed Representation of Words in Localizing Relevant Files for Bug Reports	183
<i>Yukiya Uneno, Osamu Mizuno, and Eun-Hye Choi</i>	

Session: Defect Prediction Models

Thresholds for Size and Complexity Metrics: A Case Study from the Perspective of Defect Density	191
<i>Kazuhiro Yamashita, Changyun Huang, Meiyappan Nagappan, Yasutaka Kamei, Audris Mockus, Ahmed E. Hassan, and Naoyasu Ubayashi</i>	
Correlation between the Distribution of Software Bugs and Network Motifs	202
<i>Shaoxiong Zhang, Jun Ai, and Xuelin Li</i>	
Empirical Evaluation of Cross-Release Effort-Aware Defect Prediction Models	214
<i>Kwabena Ebo Bennin, Koji Toda, Yasutaka Kamei, Jacky Keung, Akito Monden, and Naoyasu Ubayashi</i>	
Profiling Android Vulnerabilities	222
<i>Matthieu Jimenez, Mike Papadakis, Tegawendé F. Bissyandé, and Jacques Klein</i>	

Session: Security

Protecting Legacy Code against Control Hijacking via Execution Location Equivalence Checking	230
<i>Tobias F. Pfeffer, Stefan Sydow, Joachim Fellmuth, and Paula Herber</i>	
Firewalls for the Web 2.0	242
<i>René Rietz, Hartmut König, Steffen Ullrich, and Benjamin Stritter</i>	
Testing Security Requirements with Non-experts: Approaches and Empirical Investigations	254
<i>Bernhard Peischl, Michael Felderer, and Armin Beer</i>	

Session: Databases

Detecting and Preventing Program Inconsistencies under Database Schema Evolution	262
<i>Loup Meurice, Csaba Nagy, and Anthony Cleve</i>	
Quantitative Analysis of Variation-Aware Internet of Things Designs Using Statistical Model Checking	274
<i>Siyuan Xu, Weikai Miao, Thomas Kunz, Tongquan Wei, and Mingsong Chen</i>	
Quantifying the Impact of Replication on the Quality-of-Service in Cloud Databases	286
<i>Rasha Osman, Juan F. Pérez, and Giuliano Casale</i>	

Session: Mobile Apps Testing and Verification

Facilitating Monkey Test by Detecting Operable Regions in Rendered GUI of Mobile Game Apps	298
<i>Chenglong Sun, Zhenyu Zhang, Bo Jiang, and W.K. Chan</i>	
MedicationChecker: Development of a Formally Verified Android Application with EventB2SQL	307
<i>Tim Wahls</i>	
Improving Protocol Passive Testing through "Gedanken" Experiments with Finite State Machines	315
<i>Natalia Kushik, Jorge López, Ana Cavalli, and Nina Yevtushenko</i>	

Session: Memory and Non-functional Errors

Leveraging Static Analysis Tools for Improving Usability of Memory Error Sanitization Compilers	323
<i>Rigel Gjomemo, Phu H. Phung, Edmund Ballou, Kedar S. Namjoshi, V.N. Venkatakrishnan, and Lenore Zuck</i>	

NOTICE: A Framework for Non-Functional Testing of Compilers	335
<i>Mohamed Boussaa, Olivier Barais, Benoit Baudry, and Gerson Sunyé</i>	
A Specification-Based Approach to the Testing of Java Memory Bloat	347
<i>Ju Qian, Xiaoyu Zhou, Wanchun Dang, and Ziyuan Wang</i>	

Session: Mutation and Prioritization

Mutation Integration Testing	353
<i>Mark Grechanik and Gurudev Devanla</i>	
A Model to Estimate First-Order Mutation Coverage from Higher-Order Mutation Coverage	365
<i>Ali Parsai, Alessandro Murgia, and Serge Demeyer</i>	
Test Case Prioritization Using Adaptive Random Sequence with Category-Partition-Based Distance	374
<i>Xiaofang Zhang, Xiaoyuan Xie, and Tsong Yueh Chen</i>	

Session: Project and Process Prediction Models

Software Reliability Analysis of NASA Space Flight Software: A Practical Experience	386
<i>Harish Sukhwani, Javier Alonso, Kishor S. Trivedi, and Issac Mcginnis</i>	
How Does the Dependence between Inspectors Impact Capture-Recapture Estimation? An Empirical Study	398
<i>Ou Wu</i>	
Which Change Sets in Git Repositories Are Related?	406
<i>Jasmin Ramadani and Stefan Wagner</i>	

Session: Fault Localization

DFL: Dual-Service Fault Localization	412
<i>C.M. Tang, Jacky Keung, Y.T. Yu, and W.K. Chan</i>	
Automatic Localization of Bugs to Faulty Components in Large Scale Software Systems Using Bayesian Classification	423
<i>Leif Jonsson, David Broman, Måns Magnusson, Kristian Sandahl, Mattias Villani, and Sigrid Eldh</i>	
Towards More Accurate Fault Localization: An Approach Based on Feature Selection Using Branching Execution Probability	431
<i>Ang Li, Yan Lei, and Xiaoguang Mao</i>	

Session: Testing and Processes

Testing and Debugging in Continuous Integration with Budget Quotas on Test Executions	439
<i>Bo Jiang and W.K. Chan</i>	
A Tool Supported Testing Method for Reducing Cost and Improving Quality	448
<i>Shaoying Liu</i>	
Resource/Schedule/Content Test Planning Model	456
<i>Pete Rotella</i>	
Author Index	464