

2016 IEEE/ACM 38th International Conference on Software Engineering (ICSE 2016)

**Austin, Texas, USA
14-22 May 2016**

Pages 1-594



**IEEE Catalog Number: CFP16018-POD
ISBN: 978-1-5090-2071-3**

**Copyright © 2016, The Association for Computing Machinery (ACM)
All Rights Reserved**

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

IEEE Catalog Number:	CFP16018-POD
ISBN (Print-On-Demand):	978-1-5090-2071-3
ISBN (Online):	978-1-4503-3900-1
ISSN:	0270-5257

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

IEEE/ACM 38th IEEE International Conference on Software Engineering (ICSE 2016)

Table of Contents

Message from the Chairs	xvii
Committees.....	xxiii
Additional Reviewers.....	xxxv
Sponsors and Supporters.....	xxxvii

Technical Research

Android

PRADA: Prioritizing Android Devices for Apps by Mining Large-Scale Usage Data.....	3
<i>Xuan Lu, Xuanzhe Liu, Huoran Li, Tao Xie, Qiaozhu Mei, Dan Hao, Gang Huang, and Feng Feng</i>	
— <i>Peking University, China; University of Illinois at Urbana-Champaign, USA; University of Michigan, USA; Wandoujia Lab, China</i>	
Release Planning of Mobile Apps Based on User Reviews	14
<i>Lorenzo Villarroel, Gabriele Bavota, Barbara Russo, Rocco Oliveto, and Massimiliano Di Penta</i>	
— <i>Free University of Bozen-Bolzano, Italy; University of Molise, Italy; University of Sannio, Italy</i>	
Toward a Framework for Detecting Privacy Policy Violations in Android Application Code.....	25
<i>Rocky Slavin, Xiaoyin Wang, Mitra Bokaei Hosseini, James Hester, Ram Krishnan, Jaspreet Bhatia, Travis D. Breaux, and Jianwei Niu</i>	
— <i>University of Texas at San Antonio, USA; University of Texas at Dallas, USA; Carnegie Mellon University, USA</i>	
Mining Sandboxes.....	37
<i>Konrad Jamrozik, Philipp von Styp-Rekowsky, and Andreas Zeller</i>	
— <i>Center for IT-Security, Privacy and Accountability (CISPA), Germany</i>	

Performance

Generating Performance Distributions via Probabilistic Symbolic Execution.....	49
<i>Bihuan Chen, Yang Liu, and Wei Le</i>	
— <i>Nanyang Technological University, Singapore; Iowa State University, USA</i>	

Performance Issues and Optimizations in JavaScript: An Empirical Study	61
<i>Marija Selakovic and Michael Pradel</i>	
— TU Darmstadt, Germany	
Reliability of Run-Time Quality-of-Service Evaluation Using Parametric Model Checking	73
<i>Guoxin Su, David S. Rosenblum, and Giordano Tamburrelli</i>	
— National University of Singapore, Singapore; BESTSELLER E-commerce, The Netherlands	
Optimizing Selection of Competing Services with Probabilistic Hierarchical Refinement	85
<i>Tian Huat Tan, Manman Chen, Jun Sun, Yang Liu, Étienne André, Yinxing Xue,</i>	
<i>and Jin Song Dong</i>	
— Singapore University of Technology and Design, Singapore;	
National University of Singapore, Singapore; Université Paris 13, France;	
Nanyang Technological University, Singapore	

Empirical

The Emerging Role of Data Scientists on Software Development Teams	96
<i>Miryung Kim, Thomas Zimmermann, Robert DeLine, and Andrew Begel</i>	
— UCLA, USA; Microsoft Research, USA	
Belief & Evidence in Empirical Software Engineering.....	108
<i>Premkumar Devanbu, Thomas Zimmermann, and Christian Bird</i>	
— University of California, Davis, USA; Microsoft Research, USA	
Grounded Theory in Software Engineering Research: A Critical Review and Guidelines.....	120
<i>Klaas-Jan Stol, Paul Ralph, and Brian Fitzgerald</i>	
— Lero — The Irish Software Research Centre, Ireland; University of Auckland, New Zealand	

Symbolic Execution

On the Techniques We Create, the Tools We Build, and Their Misalignments: A Study of KLEE.....	132
<i>Eric F. Rizzi, Sebastian Elbaum, and Matthew B. Dwyer</i>	
— Grammatech Inc., USA; University of Nebraska - Lincoln, USA	
Guiding Dynamic Symbolic Execution toward Unverified Program Executions	144
<i>Maria Christakis, Peter Müller, and Valentin Wüstholtz</i>	
— ETH Zurich, Switzerland	
Synthesizing Framework Models for Symbolic Execution	156
<i>Jinseong Jeon, Xiaokang Qiu, Jonathan Fetter-Degges, Jeffrey S. Foster,</i>	
<i>and Armando Solar-Lezama</i>	
— University of Maryland, USA; Massachusetts Institute of Technology, USA	
Type-Aware Concolic Testing of JavaScript Programs	168
<i>Monika Dhok, Murali Krishna Ramanathan, and Nishant Sinha</i>	
— Indian Institute of Science, India; IBM Research, India	

Compilers and Emerging Trends

- An Empirical Comparison of Compiler Testing Techniques 180
Junjie Chen, Wenxiang Hu, Dan Hao, Yingfei Xiong, Hongyu Zhang, Lu Zhang, and Bing Xie
— *Peking University, China; Microsoft Research, China*
- Termination-Checking for LLVM Peephole Optimizations 191
David Menendez and Santosh Nagarakatte
— *Rutgers University, USA*
- Finding and Analyzing Compiler Warning Defects 203
Chengnian Sun, Vu Le, and Zhendong Su
— *University of California, Davis, USA*
- iDice: Problem Identification for Emerging Issues 214
Qingwei Lin, Jian-Guang Lou, Hongyu Zhang, and Dongmei Zhang
— *Microsoft Research, China*

Energy and Videos

- Energy Profiles of Java Collections Classes 225
Samir Hasan, Zachary King, Munawar Hafiz, Mohammed Sayagh, Bram Adams, and Abram Hindle
— *Auburn University, USA; Polytechnique Montreal, Canada; University of Alberta, Canada*
- An Empirical Study of Practitioners' Perspectives on Green Software Engineering 237
Irene Manotas, Christian Bird, Rui Zhang, David Shepherd, Ciera Jaspan, Caitlin Sadowski, Lori Pollock, and James Clause
— *University of Delaware, USA; Microsoft Research, USA; IBM Research - Almaden, USA; ABB Corporate Research, USA; Google, Inc., USA*
- Automated Energy Optimization of HTTP Requests for Mobile Applications 249
Ding Li, Yingjun Lyu, Jiaping Gui, and William G. J. Halfond
— *University of Southern California, USA*
- Too Long; Didn't Watch! Extracting Relevant Fragments from Software Development Video Tutorials 261
Luca Ponzanelli, Gabriele Bavota, Andrea Mocci, Massimiliano Di Penta, Rocco Oliveto, Mir Hasan, Barbara Russo, Sonia Haiduc, and Michele Lanza
— *Università della Svizzera Italiana, Switzerland; Free University of Bozen-Bolzano, Italy; University of Sannio, Italy; University of Molise, Italy; Florida State University, USA*

Open Source

- Overcoming Open Source Project Entry Barriers with a Portal for Newcomers 273
Igor Steinmacher, Tayana Uchoa Conte, Christoph Treude, and Marco Aurélio Gerosa
— *Federal University of Technology – Paraná, Brazil; Federal University of Amazonas, Brazil; Institute of Mathematics and Statistics University of Sao Paulo, Brazil*

Work Practices and Challenges in Pull-Based Development: The Contributor's Perspective.....	285
<i>Georgios Gousios, Margaret-Anne Storey, and Alberto Bacchelli</i>	
— <i>Radboud University Nijmegen, The Netherlands; University of Victoria, Canada;</i>	
<i>Delft University of Technology, The Netherlands</i>	

Defect Prediction

Automatically Learning Semantic Features for Defect Prediction.....	297
<i>Song Wang, Taiyue Liu, and Lin Tan</i>	
— <i>University of Waterloo, Canada</i>	
Cross-Project Defect Prediction Using a Connectivity-Based Unsupervised Classifier	309
<i>Feng Zhang, Quan Zheng, Ying Zou, and Ahmed E. Hassan</i>	
— <i>Queen's University, Canada</i>	
Automated Parameter Optimization of Classification Techniques for Defect Prediction Models	321
<i>Chakkrit Tantithamthavorn, Shane McIntosh, Ahmed E. Hassan, and Kenichi Matsumoto</i>	
— <i>Nara Institute of Science and Technology, Japan; McGill University, Canada;</i>	
<i>Queen's University, Canada</i>	
AntMiner: Mining More Bugs by Reducing Noise Interference.....	333
<i>Bin Liang, Pan Bian, Yan Zhang, Wenchang Shi, Wei You, and Yan Cai</i>	
— <i>Renmin University, China; Chinese Academy of Sciences, China</i>	

Synthesis

Program Synthesis Using Natural Language.....	345
<i>Aditya Desai, Sumit Gulwani, Vineet Hingorani, Nidhi Jain, Amey Karkare, Mark Marron,</i>	
<i>Sailesh R, and Subhajit Roy</i>	
— <i>IIT Kanpur, India; MSR Redmond, USA</i>	
SWIM: Synthesizing What I Mean - Code Search and Idiomatic Snippet Synthesis.....	357
<i>Mukund Raghothaman, Yi Wei, and Youssef Hamadi</i>	
— <i>University of Pennsylvania, USA; Microsoft Research, United Kingdom;</i>	
<i>École Polytechnique, Palaiseau, France</i>	
Cross-Supervised Synthesis of Web-Crawlers.....	368
<i>Adi Omari, Sharon Shoham, and Eran Yahav</i>	
— <i>Technion - Israel Institute of Technology, Israel; Academic College of Tel Aviv Yaffo, Israel</i>	
Automatic Model Generation from Documentation for Java API Functions	380
<i>Juan Zhai, Jianjun Huang, Shiqing Ma, Xiangyu Zhang, Lin Tan, Jianhua Zhao,</i>	
<i>and Feng Qin</i>	
— <i>Nanjing University, China; Ohio State University, USA</i>	

API

Augmenting API Documentation with Insights from Stack Overflow	392
<i>Christoph Treude and Martin P. Robillard</i>	
— <i>University of Adelaide, Australia; McGill University, Canada</i>	

From Word Embeddings to Document Similarities for Improved Information Retrieval in Software Engineering	404
<i>Xin Ye, Hui Shen, Xiao Ma, Razvan Bunescu, and Chang Liu</i>	
— <i>Ohio University, USA</i>	

Learning API Usages from Bytecode: A Statistical Approach	416
<i>Tam The Nguyen, Hung Viet Pham, Phong Minh Vu, and Tung Thanh Nguyen</i>	
— <i>Utah State University, USA</i>	

Code Smells

On the "Naturalness" of Buggy Code.....	428
<i>Baishakhi Ray, Vincent Hellendoorn, Saheel Godhane, Zhaopeng Tu, Alberto Bacchelli, and Premkumar Devanbu</i>	
— <i>University of Virginia, USA; University of California, Davis, USA; Huawei Technologies Co. Ltd., China; Delft University of Technology, The Netherlands</i>	

Code Anomalies Flock Together: Exploring Code Anomaly Agglomerations for Locating Design Problems	440
<i>William Oizumi, Alessandro Garcia, Leonardo da Silva Sousa, Bruno Cafeo, and Yixue Zhao</i>	
— <i>Pontifical Catholic University of Rio de Janeiro, Brazil; University of Southern California, USA</i>	

Using (Bio)Metrics to Predict Code Quality Online	452
<i>Sebastian C. Müller and Thomas Fritz</i>	
— <i>University of Zurich, Switzerland</i>	

CUSTODES: Automatic Spreadsheet Cell Clustering and Smell Detection Using Strong and Weak Features.....	464
<i>Shing-Chi Cheung, Wanjun Chen, Yepang Liu, and Chang Xu</i>	
— <i>The Hong Kong University of Science and Technology, China; Nanjing University, China</i>	

Architecture

Disseminating Architectural Knowledge on Open-Source Projects: A Case Study of the Book "Architecture of Open-Source Applications"	476
<i>Martin P. Robillard and Nenad Medvidovic</i>	
— <i>McGill University, Canada; University of Southern California, USA</i>	

Identifying and Quantifying Architectural Debt.....	488
<i>Lu Xiao, Yuanfang Cai, Rick Kazman, Ran Mo, and Qiong Feng</i>	
— <i>Drexel University, USA; University of Hawaii & SEI/CMU, USA</i>	

Decoupling Level: A New Metric for Architectural Maintenance Complexity	499
<i>Ran Mo, Yuanfang Cai, Rick Kazman, Lu Xiao, and Qiong Feng</i>	
— <i>Drexel University, USA; University of Hawaii & SEI/CMU, USA</i>	

Testing 1

- On The Limits of Mutation Reduction Strategies 511
Rahul Gopinath, Mohammad Amin Alipour, Iftekhar Ahmed, Carlos Jensen, and Alex Groce
— *Oregon State University, USA*
- Comparing White-Box and Black-Box Test Prioritization..... 523
Christopher Henard, Mike Papadakis, Mark Harman, Yue Jia, and Yves Le Traon
— *University of Luxembourg, Luxembourg; University College London, United Kingdom*
- How Does Regression Test Prioritization Perform in Real-World Software Evolution? 535
Yafeng Lu, Yiling Lou, Shiyang Cheng, Lingming Zhang, Dan Hao, Yangfan Zhou, and Lu Zhang
— *University of Texas at Dallas, USA; Peking University, China*
- The Impact of Test Case Summaries on Bug Fixing Performance: An Empirical Investigation..... 547
Sebastiano Panichella, Annibale Panichella, Moritz Beller, Andy Zaidman, and Harald C. Gall
— *University of Zurich, Switzerland; Delft University of Technology, The Netherlands*

Testing 2

- Reducing Combinatorics in GUI Testing of Android Applications..... 559
Nariman Mirzaei, Joshua Garcia, Hamid Bagheri, Alireza Sadeghi, and Sam Malek
— *George Mason University, USA; University of California, Irvine, USA*
- MobiPlay: A Remote Execution Based Record-and-Replay Tool for Mobile Applications 571
Zhengrui Qin, Yutao Tang, Ed Novak, and Qun Li
— *The College of William and Mary, USA*
- VDTest: An Automated Framework to Support Testing for Virtual Devices 583
Tingting Yu, Xiao Qu, and Myra B. Cohen
— *University of Kentucky, USA; ABB Corporate Research, USA; University of Nebraska - Lincoln, USA*
- Automated Test Suite Generation for Time-Continuous Simulink Models 595
Reza Matinnejad, Shiva Nejati, Lionel C. Briand, and Thomas Bruckmann
— *University of Luxembourg, Luxembourg; Delphi Automotive Systems, Luxembourg*

Effort Estimation and Search

- Missing Data Imputation Based on Low-Rank Recovery and Semi-Supervised Regression for Software Effort Estimation 607
Xiao-Yuan Jing, Fumin Qi, Fei Wu, and Baowen Xu
— *Wuhan University, China; Nanjing University of Posts and Telecommunications, China; Nanjing University, China*
- Multi-objective Software Effort Estimation 619
Federica Sarro, Alessio Petrozziello, and Mark Harman
— *University College London, United Kingdom; University of Portsmouth, United Kingdom*

A Practical Guide to Select Quality Indicators for Assessing Pareto-Based Search Algorithms in Search-Based Software Engineering	631
<i>Shuai Wang, Shaukat Ali, Tao Yue, Yan Li, and Marius Liaaen</i>	
— <i>Simula Research Laboratory, Norway; University of Oslo, Norway; Beihang University, China; Cisco Systems, Norway</i>	

Product Lines

A Comparison of 10 Sampling Algorithms for Configurable Systems.....	643
<i>Flávio Medeiros, Christian Kästner, Márcio Ribeiro, Rohit Gheyi, and Sven Apel</i>	
— <i>Federal University of Campina Grande, Brazil; Carnegie Mellon University, USA; Federal University of Alagoas, Brazil; Universität Passau, Germany</i>	
Featured Model-Based Mutation Analysis	655
<i>Xavier Devroey, Gilles Perrouin, Mike Papadakis, Axel Legay, Pierre-Yves Schobbens, and Patrick Heymans</i>	
— <i>University of Namur, Belgium; University of Luxembourg, Luxembourg; INRIA Rennes, France</i>	
Feature-Model Interfaces: The Highway to Compositional Analyses of Highly-Configurable Systems.....	667
<i>Reimar Schröter, Sebastian Krieter, Thomas Thüm, Fabian Benduhn, and Gunter Saake</i>	
— <i>University of Magdeburg, Germany; TU Braunschweig, Germany</i>	
How Does the Degree of Variability Affect Bug Finding?	679
<i>Jean Melo, Claus Brabrand, and Andrzej Wasowski</i>	
— <i>IT University of Copenhagen, Denmark</i>	

Repair and Model Synthesis

Angelix: Scalable Multiline Program Patch Synthesis via Symbolic Analysis.....	691
<i>Sergey Mechtaev, Jooyong Yi, and Abhik Roychoudhury</i>	
— <i>National University of Singapore, Singapore</i>	
An Analysis of the Search Spaces for Generate and Validate Patch Generation Systems	702
<i>Fan Long and Martin Rinard</i>	
— <i>MIT EECS & CSAIL, USA</i>	
PAC Learning-Based Verification and Model Synthesis.....	714
<i>Yu-Fang Chen, Chiao Hsieh, Ondrej Lengál, Tsung-Ju Lii, Ming-Hsien Tsai, Bow-Yaw Wang, and Farn Wang</i>	
— <i>Academia Sinica, Taiwan; National Taiwan University, Taiwan; Brno University of Technology, Czech Republic</i>	
StubDroid: Automatic Inference of Precise Data-Flow Summaries for the Android Framework	725
<i>Steven Arzt and Eric Bodden</i>	
— <i>Technische Universität Darmstadt, Germany; Paderborn University & Fraunhofer IEM, Germany</i>	

Languages

- Exploring Language Support for Immutability 736
Michael Coblenz, Joshua Sunshine, Jonathan Aldrich, Brad Myers, Sam Weber, and Forrest Shull
— *Carnegie Mellon University, USA; Software Engineering Institute, USA*
- The Evolution of C Programming Practices: A Study of the Unix Operating System 1973-2015..... 748
Diomidis Spinellis, Panos Louridas, and Maria Kechagia
— *Athens University of Economics and Business, Greece*
- An Empirical Study on the Impact of C++ Lambdas and Programmer Experience 760
Phillip Merlin Uesbeck, Andreas Stefik, Stefan Hanenberg, Jan Pedersen, and Patrick Daleiden
— *University of Nevada, Las Vegas, USA; University of Duisburg-Essen, Germany*
- Understanding and Fixing Multiple Language Interoperability Issues: The C/Fortran Case 772
Nawrin Sultana, Justin Middleton, Jeffrey Overbey, and Munawar Hafiz
— *Auburn University, USA*

Debugging

- BigDebug: Debugging Primitives for Interactive Big Data Processing in Spark 784
Muhammad Ali Gulzar, Matteo Interlandi, Seunghyun Yoo, Sai Deep Tetali, Tyson Condie, Todd Millstein, and Miryung Kim
— *UCLA, USA*
- Debugging for Reactive Programming 796
Guido Salvaneschi and Mira Mezini
— *Technical University of Darmstadt, Germany*
- Revisit of Automatic Debugging via Human Focus-Tracking Analysis 808
Xiaoyuan Xie, Zicong Liu, Shuo Song, Zhenyu Chen, Jifeng Xuan, and Baowen Xu
— *Wuhan University, China; Nanjing University, China*
- RETracer: Triaging Crashes by Reverse Execution from Partial Memory Dumps 820
Weidong Cui, Marcus Peinado, Sang Kil Cha, Yanick Fratantonio, and Vasileios P. Kemerlis
— *Microsoft Research, USA; KAIST, South Korea; University of California, Santa Barbara, USA; Brown University, USA*

Requirements

- Are "Non-functional" Requirements really Non-functional? An Investigation of Non-functional Requirements in Practice 832
Jonas Eckhardt, Andreas Vogelsang, and Daniel Méndez Fernández
— *Technische Universität München, Germany*

Probing for Requirements Knowledge to Stimulate Architectural Thinking	843
<i>Preethu Rose Anish, Balaji Balasubramaniam, Abhishek Sainani, Jane Cleland-Huang, Maya Daneva, Roel J. Wieringa, and Smita Ghaisas</i>	
— <i>TATA Consultancy Services Ltd., India; DePaul University, USA; University of Twente, The Netherlands</i>	
Risk-Driven Revision of Requirements Models.....	855
<i>Dalal Alrajeh, Axel van Lamsweerde, Jeff Kramer, Alessandra Russo, and Sebastian Uchitel</i>	
— <i>Imperial College London, United Kingdom; Université catholique de Louvain, Belgium; Universidad de Buenos Aires and CONICET, Argentina</i>	
Discovering "Unknown Known" Security Requirements	866
<i>Awais Rashid, Syed Asad Ali Naqvi, Rajiv Ramdhany, Matthew Edwards, Ruzanna Chitchyan, and M. Ali Babar</i>	
— <i>Lancaster University, United Kingdom; University of Adelaide, Australia</i>	

Dynamic Analysis

Behavioral Log Analysis with Statistical Guarantees.....	877
<i>Nimrod Busany and Shahar Maoz</i>	
— <i>Tel Aviv University, Israel</i>	
Efficient Large-Scale Trace Checking Using MapReduce.....	888
<i>Marcello M. Bersani, Domenico Bianculli, Carlo Ghezzi, Srdan Krstic, and Pierluigi San Pietro</i>	
— <i>Politecnico di Milano, Italy; University of Luxembourg, Luxembourg</i>	
Feedback-Directed Instrumentation for Deployed JavaScript Applications.....	899
<i>Magnus Madsen, Frank Tip, Esben Andreasen, Koushik Sen, and Anders Møller</i>	
— <i>University of Waterloo, Canada; Samsung Research America, USA; Aarhus University, Denmark; University of California, Berkeley, USA</i>	
DoubleTake: Fast and Precise Error Detection via Evidence-Based Dynamic Analysis.....	911
<i>Tongping Liu, Charlie Curtsinger, and Emery D. Berger</i>	
— <i>University of Texas at San Antonio, USA; Grinnell College, USA; University of Massachusetts, Amherst, USA</i>	

Security

Automated Partitioning of Android Applications for Trusted Execution Environments	923
<i>Konstantin Rubinov, Lucia Rosculete, Tulika Mitra, and Abhik Roychoudhury</i>	
— <i>Politecnico di Milano, Italy; Application Threat Intelligence - Ixia, Romania; National University of Singapore, Singapore</i>	
"Jumping Through Hoops": Why do Java Developers Struggle with Cryptography APIs?.....	935
<i>Sarah Nadi, Stefan Krüger, Mira Mezini, and Eric Bodden</i>	
— <i>Technische Universität Darmstadt, Germany; Universität Paderborn & Fraunhofer IEM, Germany; Lancaster University, United Kingdom</i>	
Finding Security Bugs in Web Applications Using a Catalog of Access Control Patterns.....	947
<i>Joseph P. Near and Daniel Jackson</i>	
— <i>University of California, Berkeley, USA; Massachusetts Institute of Technology, USA</i>	

Reference Hijacking: Patching, Protecting and Analyzing on Unmodified and Non-rooted Android Devices	959
<i>Wei You, Bin Liang, Wenchang Shi, Shuyang Zhu, Peng Wang, Sikefu Xie, and Xiangyu Zhang</i>	
— <i>Renmin University of China, China</i>	

Collaborative

Building a Theory of Job Rotation in Software Engineering from an Instrumental Case Study	971
<i>Ronnie E. S. Santos, Fabio Q. B. da Silva, Cleyton V. C. de Magalhães, and Cleviton V. F. Monteiro</i>	
— <i>Universidade Federal de Pernambuco, Brazil; Universidade Federal Rural de Pernambuco, Brazil</i>	
The Challenges of Staying Together While Moving Fast: An Exploratory Study.....	982
<i>Julia Rubin and Martin Rinard</i>	
— <i>Massachusetts Institute of Technology, USA</i>	
The Sky Is Not the Limit: Multitasking Across GitHub Projects	994
<i>Bogdan Vasilescu, Kelly Blincoe, Qi Xuan, Casey Casalnuovo, Daniela Damian, Premkumar Devanbu, and Vladimir Filkov</i>	
— <i>University of California, Davis, USA; University of Auckland, New Zealand; Zhejiang University of Technology, China; University of Victoria, Canada</i>	
Quantifying and Mitigating Turnover-Induced Knowledge Loss: Case Studies of Chrome and a Project at Avaya	1006
<i>Peter C. Rigby, Yue Cai Zhu, Samuel M. Donadelli, and Audris Mockus</i>	
— <i>Concordia University, Canada; University of Tennessee, USA</i>	

Software Quality

Quality Experience: A Grounded Theory of Successful Agile Projects without Dedicated Testers.....	1017
<i>Lutz Prechelt, Holger Schmeisky, and Franz Zieris</i>	
— <i>Freie Universität Berlin, Germany</i>	
Code Review Quality: How Developers See It.....	1028
<i>Oleksii Kononenko, Olga Baysal, and Michael W. Godfrey</i>	
— <i>University of Waterloo, Canada; Carleton University, Canada</i>	
Revisiting Code Ownership and Its Relationship with Software Quality in the Scope of Modern Code Review.....	1039
<i>Patanamon Thongtanunam, Shane McIntosh, Ahmed E. Hassan, and Hajimu Iida</i>	
— <i>Nara Institute of Science and Technology, Japan; McGill University, Canada; Queen's University, Canada</i>	

Program Analysis

IntEQ: Recognizing Benign Integer Overflows via Equivalence Checking across Multiple Precisions.....	1051
<i>Hao Sun, Xiangyu Zhang, Yunhui Zheng, and Qingkai Zeng</i> — <i>Nanjing University, China; University, Purdue University, USA;</i> <i>IBM T.J. Watson Research Center, USA</i>	
Nomen est Omen: Exploring and Exploiting Similarities between Argument and Parameter Names.....	1063
<i>Hui Liu, Qiurong Liu, Cristian-Alexandru Staicu, Michael Pradel, and Yue Luo</i> — <i>Beijing Institute of Technology, China; TU Darmstadt, Germany</i>	
Floating-Point Precision Tuning Using Blame Analysis.....	1074
<i>Cindy Rubio-González, Cuong Nguyen, Benjamin Mehne, Koushik Sen, James Demmel,</i> <i>William Kahan, Costin Iancu, Wim Lavrijsen, David H. Bailey, and David Hough</i> — <i>University of California, Davis, USA; University of California, Berkeley, USA;</i> <i>Lawrence Berkeley National Laboratory, USA; Oracle Corporation, USA</i>	
Crowdsourcing Program Preconditions via a Classification Game.....	1086
<i>Daniel Fava, Dan Shapiro, Joseph Osborn, Martin Schäef, E. and James Whitehead Jr.</i> — <i>University of California, Santa Cruz, USA; SRI International, USA</i>	

Concurrency

Scalable Thread Sharing Analysis.....	1097
<i>Jeff Huang</i> — <i>Texas A&M University, USA</i>	
Fixing Deadlocks via Lock Pre-Acquisitions.....	1109
<i>Yan Cai and Lingwei Cao</i> — <i>Chinese Academy of Sciences, China</i>	
Coverage-Driven Test Code Generation for Concurrent Classes.....	1121
<i>Valerio Terragni and Shing-Chi Cheung</i> — <i>The Hong Kong University of Science and Technology, China</i>	
Locking Discipline Inference and Checking.....	1133
<i>Michael D. Ernst, Alberto Lovato, Damiano Macedonio, Fausto Spoto, and Javier Thaine</i> — <i>University of Washington, USA; Università di Verona, Italy; Julia Srl, Italy</i>	

Maintenance

Improving Refactoring Speed by 10X.....	1145
<i>Jongwook Kim, Don Batory, Danny Dig, and Maider Azanza</i> — <i>University of Texas at Austin, USA; Oregon State University, USA;</i> <i>University of the Basque Country (UPV/EHU), Spain</i>	
SourcererCC: Scaling Code Clone Detection to Big-Code.....	1157
<i>Hitesh Sajjani, Vaibhav Saini, Jeffrey Svajlenko, Chanchal K. Roy, and Cristina V. Lopes</i> — <i>University of California, Irvine, USA; University of Saskatchewan, Canada</i>	

Understanding Asynchronous Interactions in Full-Stack JavaScript	1169
<i>Saba Alimadadi, Ali Mesbah, and Karthik Pattabiraman</i>	
— <i>University of British Columbia, Canada</i>	
Shadow of a Doubt: Testing for Divergences between Software Versions	1181
<i>Hristina Palikareva, Tomasz Kuchta, Cristian Cadar</i>	
— <i>Imperial College London, United Kingdom</i>	

Author Index