

Jonathan Bell

CONTACT INFORMATION	Department of Computer Science George Mason University 4400 University Drive MSN 4A5 Fairfax, VA 22030 USA	Office: +1-703-993-6089 E-mail: bellj@gmu.edu WWW: jonbell.net
RESEARCH INTERESTS	Software engineering: software quality, reliability and security, software testing, fault reproduction and privacy, program analysis, software systems, mobile computing	
EDUCATION	Columbia University , New York, NY USA Ph.D., Computer Science , May 2016 <ul style="list-style-type: none">• Advisor: Professor Gail Kaiser• Area of Study: Software Engineering and Software Systems• Thesis Topic: <i>Making Software More Reliable by Uncovering Hidden Dependencies</i> M.Phil., Computer Science , February 2014 M.S., Computer Science , May 2011 B.S., Computer Science , May 2010, <i>Cum Laude</i>	
AWARDS AND HONORS	Distinguished Paper Awards Awarded to the top papers at a conference. Received at ICPC 2016 and ICSE 2014. Paul Charles Michelman Memorial Award for Exemplary Service Columbia University Department of Computer Science. Given to a student in Computer Science who has performed exemplary service to the department, devoting time and effort beyond the call to further the department's goals. 2013, 2014 and 2016. Andrew P. Kosoresow Memorial Award for Excellence in Teaching and Service Columbia University Department of Computer Science. Given to a student in Computer Science who has made outstanding contributions to teaching in the Department and exemplary service to the Department and its mission. 2010.	
PUBLICATIONS	Conferences and Journals <ol style="list-style-type: none">1. Su, F.-H., Bell, Jonathan, K. Harvey, G. Kaiser, S. Sethumadhavan, and T. Jebara (2016). Code Relatives: Detecting Similarly Behaving Software. In: <i>Proceedings of the 2016 ACM SIGSOFT International Symposium on the Foundations of Software Engineering</i>. FSE 2016. http://jonbell.net/publications/dyclink.2. Su, F.-H., Bell, Jonathan, G. Kaiser, and S. Sethumadhavan (2016). Identifying Functionally Similar Code in Complex Codebases. In: <i>Proceedings of the 24th IEEE International Conference on Program Comprehension</i>. ICPC 2016. Acceptance rate: 30%. Distinguished Paper Award. http://jonbell.net/publications/hitoshio.3. Bell, Jonathan, G. Kaiser, E. Melski, and M. Dattatreya (2015). Efficient Dependency Detection for Safe Java Test Acceleration. In: <i>Proceedings of the 10th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering</i>. ESEC/FSE 2015. Acceptance rate: 25.4%. http://jonbell.net/publications/electrictest.4. Bell, Jonathan, E. Melski, M. Dattatreya, and G. Kaiser (2015). Vroom: Faster Build Processes for Java. In: <i>IEEE Software</i>. Vol. Special Issue: Release Engineering, March/April 2015. IEEE Computer Society.5. Bell, Jonathan, C. Murphy, and G. Kaiser (2015). Metamorphic Runtime Checking of Applications Without Test Oracles. In: <i>CrossTalk, the Journal of Defense Software Engineering</i>. Vol. March 2015. http://jonbell.net/publications/columbus.6. Viennot, N., M. Lecuyer, Bell, Jonathan, R. Geambasu, and J. Nieh (2015). Synapse: A Microservices Architecture for Heterogeneous-Database Web Applications. In: <i>Proceedings of The 2015 European Conference on Computer Systems (EuroSys)</i>. Acceptance rate: 21%. http://jonbell.net/publications/synapse.	

7. Spahn, R., **Bell, Jonathan**, M. Lee, S. Bhamidipati, R. Geambasu, and G. Kaiser (2014). Pebbles: Fine-Grained Data Management Abstractions for Modern Operating Systems. In: *Proceedings of the 11th USENIX Symposium on Operating Systems Design and Implementation*. OSDI 2014. Acceptance rate: 18.4%. <http://jonbell.net/publications/pebbles>.
8. **Bell, Jonathan** and G. Kaiser (2014). Phosphor: Illuminating Dynamic Data Flow in Off-The Shelf JVMs. In: *Proceeding of the 29th ACM SIGPLAN Conference on Object Oriented Programming Systems Languages and Applications*. OOPSLA 2014. Acceptance rate: 28%. Artifact accepted as meeting reviewer expectations. <http://jonbell.net/publications/phosphor>.
9. **Bell, Jonathan** and G. Kaiser (2014). Unit Test Virtualization with VMVM. In: *Proceedings of the 2014 International Conference on Software Engineering*. ICSE 2014. Acceptance rate: 20%. **ACM SIGSOFT Distinguished Paper Award**. <http://jonbell.net/publications/vmvm>.
10. **Bell, Jonathan**, N. Sarda, and G. Kaiser (2013). Chronicler: Lightweight Recording to Reproduce Field Failures. In: *Proceedings of the 2013 International Conference on Software Engineering*. ICSE 2013. Acceptance rate: 18.5%. <http://jonbell.net/publications/chronicler>.

CS Education

1. Sheth, S., **Bell, Jonathan**, and G. Kaiser (2013). A Competitive-Collaborative Approach for Introducing Software Engineering in a CS2 Class. In: *Proceedings of the 2013 Conference on Software Engineering Education and Training*. CSEET 2013. <http://jonbell.net/publications/cseet2013>.
2. **Bell, Jonathan**, S. Sheth, and G. Kaiser (2011). Secret ninja testing with HALO software engineering. In: *Proceedings of the 4th international workshop on Social software engineering*. SSE '11. <http://jonbell.net/publications/halo-sse>.
3. Sheth, S., **Bell, Jonathan**, and G. Kaiser (2011). HALO (Highly Addictive, socialLy Optimized) Software Engineering. In: *Proceeding of the 1st international workshop on Games and software engineering*. GAS '11. <http://jonbell.net/publications/halo>.

Other Short Papers

1. Su, F.-H., **Bell, Jonathan**, and G. Kaiser (2016). Challenges in Behavioral Code Clone Detection. In: *Proceedings of the 10th International Workshop on Software Clones*. IWSC 2016. <http://jonbell.net/publications/iwsc16>.
2. **Bell, Jonathan** and G. Kaiser (2015). Dynamic Taint Tracking for Java with Phosphor (Demo). In: *Proceedings of the 2015 International Symposium on Software Testing and Analysis*. ISSTA 2015. <http://jonbell.net/publications/phosphor-demo>.
3. **Bell, Jonathan** (2014). Detecting, Isolating and Enforcing Dependencies Between and Within Test Cases. In: *Proceedings of the 22nd ACM SIGSOFT International Symposium on Foundations of Software Engineering Doctoral Symposium*. SIGSOFT/FSE 2014. <http://jonbell.net/publications/fse-docsym>.
4. **Bell, Jonathan** and G. Kaiser (2014). VMVM: Unit Test Virtualization for Java (Formal Tool Demonstration). In: *Proceedings of the 2014 International Conference on Software Engineering*. ICSE 2014. Acceptance rate: 36%. <http://jonbell.net/publications/vmvm-demo>.
5. **Bell, Jonathan**, S. Sheth, and G. Kaiser (2013). A Large-Scale, Longitudinal Study of User Profiles in World of Warcraft. In: *Proceedings of the 5th international workshop on web intelligence and communities*. WiC '13. <http://jonbell.net/publications/wow>.

INVITED TALKS “Making Software More Reliable by Uncovering Hidden Dependencies,” University of Washington, November 2016.

“Making Software More Reliable by Uncovering Hidden Dependencies,” University of Delaware, September 2016.

“Making Software More Reliable by Uncovering Hidden Dependencies,” George Mason University, March 2016.

“Making Software More Reliable by Uncovering Hidden Dependencies,” Georgia Tech, February 2016.

“Making Software More Reliable by Uncovering Hidden Dependencies,” IBM TJ Watson, January 2016.

“Faster, More Reliable Builds,” University of Illinois at Urbana-Champaign, December 2015.

“Practical Dynamic Taint Tracking in the JVM,” University of Illinois at Urbana-Champaign, December 2015.

“Practical Dynamic Taint Tracking in the JVM,” IBM Programming Languages Day, November 2015.

“Test Dependencies and the Future of Build Acceleration,” CUNY City Tech Computer Systems Colloquium, September 2015.

“Accelerating Software Testing”, Georgia Tech Software Engineering Group Seminar, November 2014.

“Accelerating Software Testing”, Electric Cloud, inc. internal all-hands meeting, November 2014.

TEACHING
EXPERIENCE

Columbia University, New York, NY USA
Teaching Assistant **September 2009 to December 2012**

- Head TA for COMS 4156: Advanced Software Engineering
 - Autumn 2009, 2010, 2011, 2012; Spring 2012
 - Lectured on EJB implementation
 - Created a shared git, Confluence, and JIRA environment to support students
 - Developed supplementary course material, including EJB tutorials and sample documents, archived online at <https://ase.cs.columbia.edu/confluence/display/CS4156F11/Home>
- Head TA for COMS 6125: Web enHanced Information Management
 - Spring 2012, Summer 2012
 - Course web page: <http://www.psl.cs.columbia.edu/courses/whim/>
- TA for COMS 4444: Programming and Problem Solving
 - Autumn 2010
 - Created simulators for testing student submissions
 - Course page archived online at: <http://www.cs.columbia.edu/~kar/4444f10/>

PROFESSIONAL
AND RESEARCH
EXPERIENCE

George Mason University, Fairfax, VA USA
Assistant Professor, Department of Computer Science **August 2016 to Present**

Electric Cloud, Inc, San Jose, CA USA
Consulting Research Scientist **July 2014 to November 2014**

- Worked with in-house engineers to integrate **VmVm** with Electric Cloud’s testing products.
- Extended **VmVm** to execute JUnit test cases across a cluster of machines, automatically detecting and isolating dependencies between test cases.
- Built **ElectricTest**, a tool to automatically discover dependencies between test cases, allowing for safe auto-parallelization of unisolated test suites.

Programming Systems Laboratory, Columbia University, New York, NY USA
Graduate Research Assistant **January 2011 to August 2016**

- Performed research in software engineering and software testing
- Increase the resiliency of software test acceleration techniques such as test selection in the presence of unknown test dependencies with **ElectricTest**.
- Created a novel set of data abstractions to help users understand and manage their mobile data with **Pebbles**.

- Created a fast, portable dynamic data flow analysis for Java, **Phosphor**.
- Optimized the JUnit testing process, reducing testing time by up to 97%, **VmVm**.
- Created support for *logical data objects* in Android as part of the **Pebbles** project.
- Designed and implemented novel tools to aid in field-fault reproduction for Java programs, creating **Chronicler**.

RentPost, LLC, Atlanta, GA USA

Co-Founder and Advisor

May 2010 to Present

- Designed the architecture for and implemented a tenant - landlord relations management package
- Provide general software engineering guidance

SERVICE

Conference/Workshop Organization

2015, 2014 and 2013

SPLASH SV Conference Co-Chair for Student Volunteers at ACM's SPLASH (OOPSLA) conference

2012

GAS Workshop co-organizer at the International Workshop on Games and Software Engineering, Co-Located with ICSE 2012

Conference/Workshop Program Committee Membership

2017

MSR/Challenge Mining Software Repositories Challenge PC

2016

RELENG Release Engineering Workshop co-located with FSE

OOPSLA/Artifacts Artifacts track at the ACM OOPSLA conference

ICST/Tools Tool papers track at the IEEE ICST conference

2015

OOPSLA/Artifacts Artifacts track at the ACM OOPSLA conference

ISSTA/Artifacts Artifacts track at the ACM ISSTA conference

Journal Reviewing

2016

JSS Elsevier's Journal of Systems and Software

ESE Springer's Empirical Software Engineering

Department Service

Columbia University Department of Computer Science, New York, NY

Chairman of the Social Committee

January 2011 to May 2016

- Created social programming to bring students and faculty together, encouraging cross-lab collaboration and camaraderie.
- Events include weekly coffee hours, monthly happy hours, and semesterly barbecues and excursions.

STUDENT
ADVISING

Mandy Wang (MS), "Extending Test Suite Minimization," Fall 2014, Spring 2015.

Emilia Pakulski (BS), "Automating Test Suite Minimization," Fall 2014. Interned at Microsoft and MongoDB.

Alana Ramjit (BS), "Optimizing Scala Test Suites," Fall 2014. Now at UCLA.

Jennifer Lam (BS), "Analyzing Regression Testing Practices in OSS," Spring 2014. Interned at Citi and Bloomberg.

Xingzhou Derek He (BS), "Symbolic String Analysis for Java," Spring 2014, Fall 2014, Spring 2015. Interned at Dropbox and D.E. Shaw.

Sidharth Shanker (BS), "Comparing test suite minimization techniques," Fall 2013. Now at Counsyl.

Winnie Narang (MS), “Reproducing Java application field-failures with limited user information,” Fall 2013. Now at Amazon.

Nikhil Sarda (MS), “Creating an efficient and robust Java *in-vivo* testing framework,” Summer 2012. Now at Mattermark.

Miriam Melnick (BS), “Detecting state-based metamorphic properties with *in-vivo* testing,” Spring 2012. “HALO-SE web portal,” Fall 2011. Now at Google.

Ethan Hann (MS), “Visualizing World of Warcraft player data,” Spring 2012. Now at Columbia Medical Center.

Alison Yang (BS), “Research notebook for *genSpace*,” Spring 2012.

Jason Halpern (MS), “Understanding user retention in *genSpace*,” Fall 2011. Now at SecondMarket.

Evgeny Fedetov (MS), “Towards social diversity in tool recommendations with *genSpace*,” Summer 2011. Now at JP Morgan.

Aditya Bir (MS), “Managing complex data sets in *genSpace*,” Spring 2011. Now at UBS.