

Sara Sprenkle

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Education

University of Delaware

Newark, DE

Ph.D. in Computer Science, August 2007. Thesis: *Strategies for Automatically Exposing Faults in Web Applications*. Advisor: Dr. Lori Pollock.

Duke University

Durham, NC

Master's Degree in Computer Science, May 2004. Project: "Exploring Availability and Usage Guarantees in Resource Allocation Through Leases." Advisor: Dr. Jeff Chase.

Gettysburg College

Gettysburg, PA

Bachelors of Science in Computer Science and Mathematics, May 1999. Graduated Summa Cum Laude.

Current Position

Assistant Professor of Computer Science

July 2007 – Present

Washington and Lee University, Lexington, VA.

Research Interests

Automation in software testing for various domains—specifically focused on web applications; software maintenance, software engineering; empirical methodologies; distributed systems.

Teaching Experience

Assistant Professor, Washington and Lee University

Software Development (CSCI209), Fall 2008, Fall 2009. Third programming course for majors. Students transition from the Python programming language to Java, learn standard software development tools and techniques, and develop larger applications. Topics include static vs dynamic typing, testing, code coverage, JUnit, interfaces, code smells, design patterns, version control, and Eclipse.

Tools for the Software Life Cycle (CSCI297), Spring 2009. New elective I developed for majors on software tools to give students the tools to improve their productivity—working smarter, not harder. Students read research papers about cutting-edge software development tools. Topics include Unix tools, Bash scripting, version control, FindBugs, search/navigation tools, profiling, Mylyn, issue tracking, and refactoring.

Algorithm Analysis (CSCI211), Winter 2009, Winter 2010. Required core course for majors. Focused on applications. Topics covered include algorithm analysis, graphs, greedy algorithms, dynamic programming, divide and conquer, network flow, and computational intractability.

Software Engineering through Web Applications (CSCI335), Spring 2010. New elective I developed for majors on designing and implementing Web applications, with a rigorous software engineering focus. Topics include iterative development, requirements gathering, distributed applications, Java servlets, JSPs, JavaScript, JSTL, usability, testing and debugging, security, and use of tools such as Eclipse Web Tools Platform, Subversion, Firefox plugins, and Selenium. Earlier version of the course: Web Applications, CSCI297.

Human-Computer Interaction (CSCI397), Fall 2008. New elective I developed for majors in theories and practices of HCI. Topics include iterative design, discount usability engineering, discovery, user and task analysis, human capabilities, rapid prototyping, and hierarchical evaluation techniques. Course capstone: large development project or research proposal.

Web Applications (CSCI297), Spring 2008. New elective I developed for majors on designing and implementing Web applications. Topics include advanced software engineering concepts, distributed applications, Java servlets, JSPs, JavaScript, JSTL, usability, testing and debugging, security, and use of tools such as Eclipse Web Tools Platform, Subversion, Firefox plugins, and Selenium.

Fundamentals of Programming I (CSCI111), Fall 2007, Winter 2008, Winter 2009, Winter 2010. Introductory programming course for majors and non-majors in the Python programming language. Web site: <http://www.cs.wlu.edu/~sprenkle/cs111/> Beyond the typical coverage of introductory programming, directed weekly discussions about broader issues in computer science, such as bridging the digital divide and challenges and rewards of applying computer science to other fields.

Course Instructor, University of Delaware

Object-Oriented Programming in Java (CISC370), Summer 2006. University of Delaware. Java elective for majors, typically taken during junior year. Augmented curriculum with coverage of JUnit and Eclipse, created and presented lectures, designed weekly assignments, designed and graded two projects and one exam, and supervised a teaching assistant.

General Computer Science Course (CISC105), Summer 2005. University of Delaware. Introductory C course for non-majors and majors without programming experience. Created and presented lectures, designed weekly lab assignments, designed and graded two projects and two exams, and supervised a teaching assistant. My assignments and projects have been used in subsequent instantiations of the course by other instructors.

Teaching Assistant, University of Delaware

Advanced Compiler Construction (CISC672), Fall 2006. Taught by Dr. Lori Pollock. Graded labs and homework assignments and held office hours.

Parallel Programming (CISC372), Fall 2006. Taught by Dr. Lori Pollock. Graded labs and homework assignments and held office hours.

General Computer Science (CISC105), Fall 2004, Spring 2005. Taught by Mr. Terry Harvey. Led weekly lab sessions for four lab sections of course, graded labs, homework assignments, quizzes, and projects, held office hours, individual help sessions, created midterm review questions, and held midterm review session for all four sections of course.

Teaching Assistant, Duke University

Undergraduate Operating Systems (CPS110), taught by Dr. Jeff Chase, Spring 2000. Assisted professor during class, established grading criteria for Nachos assignments, created solution guides for problem sets, held office hours, and graded Nachos assignments.

Research Experience

University of Delaware

Newark, DE

[February 2004 – August 2007] **Graduate research assistant** under the supervision of Dr. Lori Pollock in the web application testing group. Focused on automating maintenance testing—specifically, using field data to test subsequent versions of an application. Developed customized tools for analyzing and testing the effectiveness of automated testing techniques, e.g., test-case generation, test-case replay, and oracle comparators, for web applications.

Duke University

Durham, NC

[August 2000 – January 2004] **Graduate research assistant** under the supervision of Dr. Jeff Chase on the Cluster-on-Demand and Ivory research projects. Lead student on the web service infrastructure and the scalability and performance of the database-backend on the COD project team. For Ivory, developed infrastructure for data caching and replication for scalable, wide-area applications.

IBM T.J. Watson Research Lab

Hawthorne, NY

[June – August 2002] **Co-op Pre-Professional Programmer** supervised by Dr. Khalil Amiri on the DBProxy research project. Designed and implemented consistency policies for DBProxy, an edge-of-network semantic dynamic data cache. Resulted in one journal and one workshop publication.

IBM T.J. Watson Research Lab

Hawthorne, NY

[June – August 1999] **Co-op Pre-Professional Programmer** supervised by Dr. Mark Chu-Carroll on the Manitoba (later renamed Stellation) project. Implemented the client side of a distributed programming environment designed to coordinate programmers collaborating on large software projects. Resulted in one conference and one workshop publication.

University of Delaware

Newark, Delaware

[June – August 1998] **Undergraduate research assistant** advised by Dr. Lori Pollock with the CRA Distributed Mentor Project. Developed static slicing techniques for MPI C-style programs. Resulted in one conference publication.

Gettysburg College

Gettysburg, PA

[June – August 1997] **Undergraduate research assistant** under the supervision of Dr. Rod Tosten and Dr. Carl Leinbach. Implemented distributed algorithms using JavaRMI and Java threads and compared the running time and code complexity of the two implementations.

Journal Publications

S. Sampath, S. Sprenkle, E. Gibson, A. Souter and L. Pollock, “Applying Concept Analysis to User-session-based Testing of Web Applications.” *IEEE Transactions on Software Engineering*, October 2007.

K. Amiri, S. Sprenkle, R. Tewari and S. Padmanabhan, “Scalable consistency maintenance for edge query caches.” *Web Content Caching and Distribution*. F. Douglis and B. Davison (Eds), Kluwer Academic Publishers, 2004.

Conference Publications

S. Sprenkle, H. Esquivel, B. Hazelwood, and L. Pollock. "WEBVIZOR: A Visualization Tool for Applying Automated Oracles and Analyzing Test Results of Web Applications." In *Proceedings of the Testing: Academic & Industrial Conference, Practice and Research Techniques (TAIC-PART)*, IEEE, Windsor, UK, August 2008.

S. Sprenkle, L. Pollock, H. Esquivel, B. Hazelwood, and S. Ecott. "Automated Oracle Comparators for Testing Web Applications." In proceedings of the *18th IEEE International Symposium on Software Reliability Engineering (ISSRE)*, Trollhattan, Sweden, November 2007. Acceptance Rate: 30%.

S. Sampath, S. Sprenkle, E. Gibson, and L. Pollock. "Web Application Testing with Customized Test Requirements—An Experimental Comparison Study." In proceedings of the *17th IEEE International Symposium on Software Reliability Engineering (ISSRE)*, Raleigh, NC, November 2006. Acceptance Rate: 30%

S. Sprenkle, E. Gibson, S. Sampath, and L. Pollock. "Automated Replay and Failure Detection for Web Applications." In proceedings of the *20th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, Long Beach, CA, November 2005. Acceptance Rate: 10%

S. Sprenkle, S. Sampath, E. Gibson, L. Pollock, and A. Souter. "An Empirical Comparison of Test Suite Reduction Techniques for User-session-based Testing of Web Applications." In proceedings of the *IEEE International Conference on Software Maintenance (ICSM)*, Budapest, Hungary, September 2005. Acceptance Rate: 30%

J. Chase, L. Grit, D. Irwin, J. Moore, and S. Sprenkle. "Dynamic Virtual Clusters in a Grid Site Manager." In proceedings of the *Twelfth International Symposium on High Performance Distributed Computing (HPDC)*, Seattle, WA, June 2003. Acceptance Rate: 20%

M. Chu-Carroll and S. Sprenkle. "Coven: Brewing Better Collaboration through Software Configuration Management." In proceedings of the *Eighth International Symposium on the Foundations of Software Engineering (FSE)*, San Diego, California, November 2000. Acceptance Rate: 18%

D. Shires, L. Pollock, and S. Sprenkle. "Program Flow Graph Construction for Static Analysis of MPI Programs." In *Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA)*, Las Vegas, NV, June 1999.

R. Tosten, C. Ferraro, S. Sprenkle, B. Steiner, and P. Tymann. "Using Java Remote Method Invocation in a Parallel and Distributed Processing Course." In *Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA)*, Las Vegas, NV, June 1999.

C. Leinbach, R. Johnsonbaugh, R. Tosten, S. Sprenkle, and P. Tymann. "Investigating JavaRMI for a Computer Science Curriculum." In *Proceedings of the 14th annual Eastern Small Colleges Computing Conference (ESCCC)*, Marist, NY, October 1998.

Workshop Publications

S. Sprenkle, E. Gibson, and L. Pollock. "Learning Effective Oracle Comparator Combinations for Web Applications." *First International Workshop on Software Test Evaluation (STEV)*, colocated with *Seventh International Conference on Quality Software (QSIC)*, Portland, OR, October 2007.

S. Sprenkle, E. Gibson, S. Sampath, and L. Pollock. "A Case Study of Automatically Creating Test Suites from Web Application Field Data." *Workshop on Testing, Analysis and Verification of Web Services and Applications (TAVWEB)*, colocated with *International Symposium on Software Testing and Analysis (ISSTA)*, Portland, ME, July 2006.

S. Sampath, S. Sprenkle, E. Gibson, and L. Pollock. "Integrating Customized Test Requirements with Traditional Requirements in Web Application Testing." *Workshop on Testing, Analysis and Verification of Web Services and Applications (TAVWEB)*, colocated with *International Symposium on Software Testing and Analysis (ISSTA)*, Portland, ME, July 2006.

S. Sampath, S. Sprenkle, E. Gibson, L. Pollock, and A. Souter. "Analyzing Clusters of Web Application User Sessions." *The Third International Workshop on Dynamic Analysis (WODA)*, colocated with *27th International Conference on Software Engineering (ICSE)*, St. Louis, MO, May 2005.

K. Amiri, S. Sprenkle, R. Tewari, and S. Padmanabhan. "Exploiting Templates to Scale Consistency Maintenance in Edge Database Caches." *The Eighth International Workshop on Web Content Caching and Distribution (WCW)*, Hawthorne, NY, September 2003.

M. Chu-Carroll and S. Sprenkle. "Software Configuration Management as a Mechanism for Multidimensional Separation of Concerns." In the *22nd International Conference on Software Engineering (ICSE2000)* Workshop on Multi-dimensional Separation of Concerns, Limerick, Ireland, June 2000.

Research Mentor

Research mentor for undergraduate projects in web application testing. Designed research projects to be completed within the given timeframe and worked closely with students to guide them through implementation and the research process, including searching for related work, reading and critiquing research papers effectively, brainstorming new strategies to problems, data analysis, setting up evaluation studies, and presenting research in poster and paper formats.

Kathryn Baldwin (University of Delaware '10), Camille Cobb '12, and Caroline Hopkins '12, "Exploring data models for automatically generating tests for web applications." CRA-W Distributed Research Experiences for Undergraduates (DREU), Summer 2009.

Natallia Robinson (University of Delaware, Masters '09), "A Case Study of Faults in Web Applications." Independent Study, Summer 2009.

Lucy Simko '11, "Automatically Creating Test Cases from User Accesses." R.E. Lee Scholar, Summer 2008.

Holly Esquivel (University of Nebraska-Kearney '07), "A Visualization Tool for Web Application Testing", CRA Distributed Mentor Program, Summer 2006. Honorable Mention in CRA Outstanding Undergraduate Awards 2007.

Barbara Hazelwood (Xavier University '07), "A Visualization Tool for Web Application Testing", CRA Distributed Mentor Program, Summer 2006.

Stacey Ecott (Tufts University '07), "Fault-based Mutation Operators for Web Applications", CRA Distributed Mentor Program, Summer 2005.

Frank Zappaterrini (University of Delaware '05), "Support Tools for a Capture/Replay Framework", Independent Study, January 2005, Summer 2005.

Poster Presentations

K. Baldwin, C. Cobb, C. Hopkins, S. Sprenkle, and L. Pollock, "Exploring Data Models for Automatically Generating Tests for Web Applications." Grace Hopper Celebration of Women in Computing. September 2009.

A. Van Devender and S. Sprenkle. "Duo: An Integrated Development Environment Designed for Pair Programming." Science, Society and the Arts, A Washington and Lee Student Research Conference. February 2009.

N. Carter, J. Davis, and S. Sprenkle, "Web-based Logic Tutorial." Science, Society and the Arts, A Washington and Lee Student Research Conference. February 2009.

L. Simko, S. Sprenkle, and L. Pollock. "An Empirical Study of Statistical Models for Effective Automated Testing of Web Applications." SHOWCASE of Summer 2008 Student Scholarship, W&L University. October 2008.

S. Ecott, S. Sprenkle, and L. Pollock. "Fault Seeding vs. Mutation Operators: An Empirical Comparison of Techniques for Web Applications." The Grace Hopper Celebration, San Diego, CA, October 2006.

S. Sprenkle, S. Sampath, E. Gibson, A. Souter, and L. Pollock. "An Empirical Comparison of Test Suite Reduction Techniques for User-session-based Testing of Web Applications." CRA DMP Reunion, Chicago, Illinois, October 2004.

S. Sprenkle and J. Chase. "Automatic State Management for Dynamic Services Using Ivory." 18th Symposium on Operating Systems Principles (SOSP-18), Chateau Lake Louise, Banff, Canada, October 2001.

Oral Presentations

For presentations not associated with publications listed elsewhere.

"Customized Oracles to Automatically Detect Faults in Web Applications." Invited talk at the University of Richmond's Mathematics & Computer Science Colloquium Series, October 2009.

"Women in Computer Science." Invited talk for KEWL (Knowledge Empowering Women Leaders) at Washington and Lee University, November 2007.

"Customized Oracles to Automatically Detect Faults in Web Applications." Invited talk at Mt. Holyoke College, South Hadley, MA, November 2006.

"Strategies for Automatically Exposing Faults in Web Applications." Ph.D. Forum at the *Grace Hopper Celebration of Women in Computing (GHC2006)*, San Diego, CA, October 2006.

"Strategies for Automatically Exposing Faults in Web Applications." Doctoral Symposium at the *International Symposium on Software Testing and Analysis (ISSTA 2006)*, Portland, ME, July 2006.

"Towards Automatically Creating Test Suites from Web Application Field Data." S. Sprenkle, E. Gibson, S. Sampath, and L. Pollock. Presented at the *Mid-Atlantic Student Workshop on Programming Languages and Systems (MASPLAS)*, Rutgers University, April 2006.

Research Funding

Washington and Lee University Lenfest Grant, awarded a stipend and expenses to work at the University of Delaware for 8 weeks during summer on automated test-case generation for web applications, 2009.

Washington and Lee University Hess Fellow, awarded to two faculty members to fund summer research, 2008. Awarded a stipend and expenses to work at the University of Delaware for 5 weeks on automated test-case generation for web applications.

Non-Research Independent Studies

David Vaught '09: Modeling physics in Java, Spring 2009

Jack Ivy '11: Developing Android applications, Fall 2009

Industry Experience

IBM Cambridge Lab **Cambridge, MA**
[June – August 2003] **Software Engineer Intern** worked with a four-person team of Extreme Blue interns on the Mobile Moscow project. The team was responsible for designing and implementing a technical and business plan, culminating in a presentation and demonstration to IBM executives.

IBM Tivoli **Research Triangle Park, NC**
[June – August 2000] **Summer Intern** supervised by Dr. James Jennings on Tivoli Device Management team. Designed and implemented a prototype for an online front end to a Tivoli personalized services product. The new front-end primarily used Java servlet technology.

Technical Reports

S. Sampath, E. Gibson, S. Sprenkle, and L. Pollock. "Coverage Criteria for Testing Web Applications." Technical Report 2005-017, Department of Computer and Information Sciences, University of Delaware, April 2005.

S. Sprenkle, S. Sampath, E. Gibson, A. Souter, L. Pollock. "An Empirical Comparison of Test Suite Reduction Techniques for User-session-based Testing of Web Applications," Technical Report 2005-009, Computer and Information Sciences, University of Delaware, November 2004.

J. Moore, D. Irwin, L. Grit, S. Sprenkle, and J. Chase. "Managing Mixed-Use Clusters with Cluster-on-Demand." Department of Computer Science, Duke University Technical Report, January 2003.

S. Sprenkle and J. Chase. "Scaling Java-based Dynamic Web Services." Department of Computer Science, Duke University Technical Report CS-2001-02, May 2001.

Professional and Institutional Service

Technical

Conference Program Committee Member, International Symposium on Software Reliability Engineering (ISSRE), 2008, 2009; Testing: Academic and Industrial Conference - Practice and Research Techniques (TAIC PART), 2009.

CRA-W Distributed Research Experiences for Undergraduates (DREU) Research Mentor, selected by committee for Summer 2009. Mentored two undergraduates.

Technical Paper Reviewer, Encyclopedia of Software Engineering, 2009; Journal on Software Testing, Verification, and Reliability (JSTVR), 2007, 2008; International Conference on Software Engineering (ICSE), 2006, and Web Caching and Content Distribution (WCW), 2001.

Conference Poster and Panel Reviewer, Richard Tapia Conference, 2009.

Increasing Diversity in Computing

Panel and Workshop Selection Committee Member, Grace Hopper Celebration of Women in Computing, 2010.

Panelist, NSF Broadening Participation in Computing, 2008, 2009.

Student Scholarship Reviewer, Grace Hopper Celebration of Women in Computing, 2008, 2009.

Member of University Faculty Committee on Inclusiveness, 2008-.

Lead Organizer for the University of Delaware women in computer science support group, called CISTers. Co-organize events for all women in the Computer & Information Sciences department, 2005-2007. Events included stress management, how to choose courses, and events for Pre- and Early Majors—women who are in introductory courses and early in a potential computer science career. Organized support request to administration for ten students to attend the Grace Hopper Celebration in 2006; request was fully funded. Communicated with the Chair of the Department about budget and recruitment issues. Prepared internal and external publicity materials. Maintained the group's web presence.

Maintainer of Web Presence for Washington and Lee's Women's and Gender Studies Program, 2009-. <http://wgs.wlu.edu>

University Committee Member, Women's and Gender Studies Program Advisory Committee, 2009-.

Research Group Web Presence Maintainer, maintained the web presence of Dr. Lori Pollock's Research Group, including the digital publications library, 2004-2007.

Organization Committees Co-Chair, MASPLAS (Mid-Atlantic Student Workshop on Programming Languages and Systems) Organizing Committee: Public Relations, Registration Committees, 2005.

Presenter for SIG-NewGrad, a course for University of Delaware first-year graduate students in Fall 2004, Fall 2005. Led lecture in Fall 2005 on "Life Balance". Participated in panels on "Managing yourself" and "Training beyond research in grad school" about balancing graduate school and personal obligations and about internships and networking, respectively.

Student Committee Chair of Duke Computer Science Graduate Student Recruitment Committee, 2000–2002. Coordinated recruitment activities for the prospective graduate students with current graduate students. Served on committee in 2003.

Student Committee Co-Chair of Duke Computer Science Faculty Search Committee, 2002–2003. Coordinated graduate student participation in faculty search, with Patrick Reynolds. Served on committee in 2000.

Seminar Organizer of Duke Computer Science Systems and Architecture Groups weekly seminar, called SPIDER, 2000-2001.

Honors and Awards

Lauri Pfeffer Shinn Memorial Award, awarded to one undergraduate and one graduate woman in recognition of academic success and contribution to the department by the University of Delaware Department of Computer and Information Sciences, 2006.

Department of Computer and Information Sciences **Graduate Teaching Assistant Award**, University of Delaware, 2005, a monetary award given to a Computer and Information Sciences graduate teaching assistant in recognition of teaching excellence.

National Science Foundation **Graduate Research Fellowship**, 2000–2003.

Duke Computer Science Department **Service Award**, 2000, 2002, 2003.

Phi Beta Kappa, Gettysburg College, inducted in 1999.

Rev. George N. and M. Naomi Lauffer Scholarship Award, awarded to a rising junior at Gettysburg College for scholarship, character, and ability, 1997.

1996 Benjamin Fine Awards for Outstanding Education Reporting, earned as a correspondent with *The York Daily Record*, from NASSP.

Other

Member of the Association of Computing Machinery (ACM), SIGSOFT, SIGCSE; IEEE, Computer Society

Citizenship: United States.

Interests: ultimate, baseball, ACC basketball, pop culture

Please refer to <http://www.cs.wlu.edu/~sprenkle/> for additional information.