Sara Sprenkle

Department of Computer and Information Sciences
University of Delaware
103 Smith Hall
Newark, DE 19716 USA

Office: (302) 831 6339
Fax: (302) 831 8458
sprenkle@cis.udel.edu
http://www.cis.udel.edu/~sprenkle

Research Interests

Automated software testing for various domains (e.g., web applications, concurrent and distributed applications), software maintenance, software engineering, empirical methodologies, distributed systems.

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.

Research Experience

University of Delaware **Newark, DE**
[*February 2004 – Present*] **Graduate research assistant** under the supervision of Dr. Lori Pollock in the Hiperspace 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.

COD is a framework for managing mixed-use cluster resources. The framework partitions the physical cluster into virtual clusters for different user communities. COD dynamically allocates nodes to virtual clusters in response to changes in demand on the virtual clusters. Lead student on the web services infrastructure and the scalability and performance of the database-backend in the COD project team.

Ivory is an infrastructure to automatically manage data caching and replication for scalable, wide-area applications. The prototype supports Java-based services that maintain state as Java data structures. As the senior student on Ivory, developed a Java-based implementation of Ivory and built several applications on top of Ivory. Tested Ivory's scalability with respect to throughput and client-perceived latency for the service cache application.

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." To Appear in *IEEE Transactions on Software Engineering*, 2008.

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. 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 2006)*, 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 2005)*, 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 2005)*, 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 2003)*, 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 2000)*, 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 99)*, 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 99)*, 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, New York, October 1998.

Workshop Publications

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.

Poster Presentations

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.

Teaching

Instructor, Summer 2006. University of Delaware Object-Oriented Programming in Java (CISC370). Web site: http://www.cis.udel.edu/~sprenkle/cisc370/ 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.

Instructor, Summer 2005. University of Delaware General Computer Science Course (CISC105). Introductory C course for non-majors and majors without programming experience. Web site: http://www.cis.udel.edu/~sprenkle/cisc105/ 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.

Research Mentor for undergraduate projects in web application testing. Designed research projects to be completed within the given timeframe and worked closely with the students to guide them through implementation and the research process, including searching for related work, reading research papers effectively, and presenting research in poster and paper formats.

Holly Esquivel, “A Visualization Tool for Web Application Testing”, CRA Distributed Mentor Program (Summer 2006); Honorable Mention in CRA Outstanding Undergraduate Awards 2007

Barbara Hazelwood, “A Visualization Tool for Web Application Testing”, CRA Distributed Mentor Program (Summer 2006)

Stacey Ecott, “Fault-based Mutation Operators for Web Applications”, CRA Distributed Mentor Program (Summer 2005)

Frank Zappaterrini, “Support Tools for a Capture/Replay Framework”, Independent Study (January 2005, Summer 2005)

Teaching Assistant, Fall 2006. University of Delaware graduate-level “Advanced Compiler Construction” (CISC672) and undergraduate-level “Parallel Programming” (CISC372), taught by Dr. Lori Pollock. Graded labs and homework assignments and held office hours.

Lab Instructor and Teaching Assistant, Fall 2004, Spring 2005. University of Delaware General Computer Science Course (CISC105), 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, Spring 2000. Duke undergraduate Operating Systems course (CS110), taught by Dr. Jeff Chase. Assisted professor during class, established grading criteria for Nachos assignments, created solution guides for problem sets, held office hours, and graded Nachos assignments.

Teaching Assistant, Fall 1996 – Spring 1999. Gettysburg College Teaching Assistant for data structures, machine organization, introduction to computing, parallel and distributed programming, and calculus courses. Assisted professor during class, held office hours, graded assignments, and created solution guides to problem sets.

Oral Presentations

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

"Strategies for Automatically Exposing Faults in Web Applications." S. Sprenkle. 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." S. Sprenkle. 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.

"Automated Replay and Failure Detection for Web Applications." S. Sprenkle, E. Gibson, S. Sampath, and L. Pollock. Presented at *20th IEEE/ACM International Conference on Automated Software Engineering (ASE 2005)*, Long Beach, CA, November 2005.

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

"Analyzing Clusters of Web Application User Sessions", S. Sampath, S. Sprenkle, E. Gibson, L. Pollock, and A. Souter. Presented at *The Third International Workshop on Dynamic Analysis (WODA)*, St. Louis, MO, May 2005.

Work 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 with the 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 Service

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, including events focusing on stress management and choosing 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. Communicate with the computer science chair about budget and recruitment issues. Prepare internal and external publicity materials. Maintain the group's web presence.

HiperSpace Research Group Web Presence Maintainer, maintain the web presence of the Hiperspace Research Group, including the Digital Library.

Reviewer, International Conference on Software Engineering (ICSE) and Web Caching and Content Distribution (WCW).

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

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

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

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

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

Committee Member, Duke Computer Science Graduate Student Recruitment Committee, 2003.

Committee Member, Duke Computer Science Faculty Search Committee, 2000.

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.

Department honors in Computer Science and Mathematics, Gettysburg College, 1999.

Presidential Scholar, Gettysburg College, 1995-1999.

Gettysburg College Dean's List, 1995-1999.

Earl Kresge Stock Writing Prize in the Sciences, Gettysburg College, with co-authors Andy Danner and Jay Henniger, 1998.

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.

Scholarships

CAPS scholarship to attend ICSE in St. Louis, MO, May 2005.

Scholarship to attend Grace Hopper Celebration in Chicago, Illinois, October 2004.

Scholarship to attend SOSP in Banff, Canada, October 2001.

Scholarship to attend SOSP in Kiawah Island Resort, SC, December 1999.

Other

Member of the Association of Computing Machinery (ACM), SIGSOFT.

Citizenship: United States.

Interests: ultimate, baseball, NCAA basketball, pop culture

Please refer to `http://www.cis.udel.edu/~sprenkle/` for additional information.

References

Dr. Lori L. Pollock, Professor, University of Delaware, Computer and Information Sciences. Department of Computer and Information Sciences, University of Delaware. Newark, DE 19716. (302) 831-1953. pollock@cis.udel.edu

Dr. Amie Souter Greenwald, Member Technical Staff, Lucent Technologies Bell Labs. 600 Mountain Road, Murray Hill, NJ 07974. (908) 582-0424. agreenwald@lucent.com

Dr. Kathleen F. McCoy, Professor, University of Delaware, Computer and Information Sciences. Department of Computer and Information Sciences, University of Delaware. Newark, DE 19716. (302) 831-1956. mccoy@cis.udel.edu

Dr. Terrence G. Harvey, Visiting Adjunct Professor, University of Delaware, Computer and Information Sciences. Department of Computer and Information Sciences, University of Delaware. Newark, DE 19716. (302) 831-8234. harvey@cis.udel.edu