

Elizabeth Shriver

Research Interests Network storage, storage systems, web searching, file system performance, workload characterization, parallel I/O, out-of-core algorithms, parallel file systems.

Education **PhD** September 1991–May 1997
New York University
Computer Science. Dissertation title: Performance modeling for realistic storage devices. Advisors: Alan Siegel and John Wilkes. Committee: Larry Carter, Tom Cormen, and Garth Gibson.

Master of Science September 1988–November 1989
Brown University
Computer Science. Graduated May 1990. Thesis title: Optimal disk I/O with parallel block transfer. Advisor: Jeff Vitter.

Bachelor of Science September 1984–December 1987
State University of New York at Stony Brook
Computer Science and Mathematics. Graduated Magna Cum Laude. Dean's List (1984–1987).

Research Experience **Member of technical staff** May 1997–2002
Bell Laboratories, Lucent
Research and publish in areas such as network storage, file system performance, web search, and storage systems research. Applied knowledge of disk performance to develop analytic models for FFS file system performance and performance of multiple disks on a bus, and to develop a random bit generator. Worked on task scheduling for tape-resident data.

Research Intern, Visiting Scholar June 1995–April 1997
Hewlett-Packard Laboratories
Defined and validated a performance model for complex storage devices. This model allows one to understand the interactions of the workload supported by devices and the various components of a device and their policies (such as disk-scheduling algorithms and the size of the disk cache) on the performance of the devices. Used a disk simulator for the validation. Defined a model of workload and storage devices to be used in self-configuring, self-managing storage systems. Reduced the problem to one that has been solved by the operations research community. Used Tcl, awk, and a small amount of C++.

Research Assistant Fall 1993–Spring 1995
New York University
Implemented and measured performance of algorithms (matrix-matrix multiplication and matrix-matrix addition) on the Whiptail File System (WFS) on the

Intel Paragon. Developed a simulator for parallel block transfer to study the needed application programmer/tool writer interface for a parallel disk system. Used C.

Research Intern

Summer 1994

Sandia National Labs

Designed a parallel file system (called the Whiptail File System) for the Intel Paragon which utilizes the Parallel Disk Model paradigm in its application programmer interface. WFS is implemented on top of UFS and PFS. It contains functions for striped and independent access to and from parallel disks to main memory. This file system is scalable in the number of processors and disk arrays it supports. Used C.

Systems Engineer and Software Engineer

June 1988–April 1997

Bell Communications Research, Inc.

Performing project management for two regional telephone companies for the NetPilot product. (NetPilot is a system that supports the provisioning of the intelligent switches in the Common Channel Signaling Network.) Developing NetPilot system requirements. Performed human factors engineering by designing the NetPilot user interface. Performed development work on a major subsystem of a mainframe-based system. Used PLI/JCL in an IBM mainframe environment.

Teaching Experience

Teaching assistant for undergraduate and graduate courses (algorithms, databases, and mathematics). Instructor for an undergraduate college algebra course. New York University, Brown University, and SUNY at Stony Brook. Fall 1991–Fall 1993, Fall 1988, Spring 1987–Fall 1987.

Honors and Awards

Janet Fabri Award (Outstanding NYU Computer Science dissertation), 1998
New York University Computer Science Fellowship, 1991–1994, 1995–1997
James Arthur Fellowship (NYU grant), 1994–1995
Sandra Bleistein Prize (Courant Institute), 1994
Phi Beta Kappa since 1986

Publications

Wee Teck Ng, Bruce Hillyer, Elizabeth Shriver, Eran Gabber, and Banu Ozden. “Obtaining high performance for storage outsourcing,” In *Proceedings of the USENIX Conference on File and Storage Technologies (FAST '02)*, pages 145–158, January 28–30, 2002.

Mark Hansen and Elizabeth Shriver. “Using navigation data to improve IR functions in the context of Web search,” In *Proceedings of the Tenth International Conference on Information and Knowledge Management (ACM CIKM 2001)*, pages 135–142, November 5–10, 2001.

Kit August, Mark Hansen, and Elizabeth Shriver. “Mobile web searching,” Bell Labs Technical Journal, Volume 6, Number 2, July–Dec. 2001.

Elizabeth Shriver, Eran Gabber, Lan Huang, and Christopher Stein. “Storage management for web proxies,” In *Proceedings of the 2001 USENIX Annual Technical Conference*, pages 203–216, June 2001.

David Petrou, Dushyanth Narayanan, Gregory R. Ganger, Garth A. Gibson,

and Elizabeth Shriver. "Position summary: Hinting for goodness' sake," In *Proceedings of the 8th Workshop on Hot Topics in Operating Systems (HotOS-VIII)*, May 2001.

Eran Gabber and Elizabeth Shriver. "Let's put NetApp and CacheFlow out of business!," In *Proceedings of the 9th ACM SIGOPS European Workshop*, pages 85–90, September 17–20, 2000.

Ari Juels, Markus Jakobsson, Elizabeth Shriver, and Bruce K. Hillyer. "How to turn loaded dice into fair coins," *IEEE Transactions on Information Theory*, May 2000, pages 911–921, Volume 46, Number 3.

Elizabeth Shriver, Bruce K. Hillyer, and Avi Silberschatz. "Performance analysis of storage systems," Published as a chapter in *Performance Evaluation: Origins and Directions*. Editors: Gunter Haring, Christoph Lindemann, Martin Reiser. Lecture Notes in Computer Science 1769, pages 33–50, Springer Verlag, 2000.

Elizabeth Shriver, Christopher Small, and Keith Smith. "Why does file system prefetching work?," In *Proceedings of the 1999 USENIX Annual Technical Conference*, pages 71–83, June 6–11, 1999.

Sachin More, S. Muthukrishnan, and Elizabeth Shriver. "Efficiently sequencing tape-resident jobs," In *Proceedings of the Eighteenth ACM SIGMOD-SIGACT-SIGART Symposium on Principles of Database Systems*, pages 33–43, May 31–June 4, 1999.

Rakesh Barve, Elizabeth Shriver, Phillip B. Gibbons, Bruce K. Hillyer, Yossi Matias, and Jeffrey Scott Vitter. "Modeling and optimizing I/O throughput of multiple disks on a bus," In *Proceedings of Sigmetrics '99*, pages 83–92, May 1–4, 1999.

Rakesh Barve, Phillip B. Gibbons, Bruce K. Hillyer, Yossi Matias, Elizabeth Shriver, and Jeffrey Scott Vitter. "Round-like behavior in multiple disks on a bus," In *Proceedings of IOPADS*, pages 1–9, May 5, 1999.

Markus Jakobsson, Elizabeth Shriver, Bruce K. Hillyer, and Ari Juels. "A practical secure physical random bit generator," In *Proceedings of the Fifth ACM Conference on Computer and Communications Security*, pages 103–111, November 1998.

Elizabeth Shriver, Arif Merchant, and John Wilkes. "An analytic behavior model for disk drives with readahead caches and request reordering," In *Proceedings of Sigmetrics '98*, pages 182–191, June 22–23, 1998.

E. Borowsky, R. Golding, A. Merchant, L. Schreier, E. Shriver, M. Spasojevic, and J. Wilkes. "Using attribute-managed storage to achieve QoS," Presented at *The 5th Intl. Workshop on Quality of Service*, (Columbia University, New York, June 1997). Published in *Building QoS into distributed systems*, page 203–206, edited by Andrew Campbell and Klara Nahrstedt, 1997.

Elizabeth Shriver, "Performance modeling for realistic storage devices," PhD Thesis, New York University. May 1997.

Elizabeth Borowsky, Richard Golding, Arif Merchant, Elizabeth Shriver, Mirjana Spasojevic, and John Wilkes. "Eliminating storage headaches through self-management," Work-in-progress at *1996 OSDI Symposium* October 28-31, 1996.

Elizabeth Shriver and Mark Nodine, "An introduction to parallel I/O models and algorithms." Chapter 2 of *Input/output in parallel and distributed computer systems*, Kluwer Academic Publishers, pages 31-68, 1996.

Elizabeth A. M. Shriver and Leonard F. Wisniewski, "An API for choreographing data accesses," NYU Computer Science Technical Report 708, November 1995.

Richard Golding, Elizabeth Shriver, Tim Sullivan, and John Wilkes, "Attribute-managed storage," *Workshop on Modeling and Specification of I/O (MSIO)*, Held in conjunction with the Seventh IEEE Symposium on Parallel and Distributed Computing, October 1995.

Jeffrey S. Vitter and Elizabeth Shriver, "Algorithms for parallel memory I: two-level memories," *Algorithmica*, 12(2/3), 1994.

Jeffrey S. Vitter and Elizabeth Shriver, "Algorithms for parallel memory II: hierarchical multi-level memories," *Algorithmica*, 12(2/3), 1994.

Jeffrey S. Vitter and Elizabeth Shriver, "Optimal disk I/O with parallel block transfer," In *Proceedings of the 22nd Annual ACM Symposium on Theory of Computing*, pages 159-169, May 14-16, 1990.

Elizabeth Shriver, "Optimal disk I/O with parallel block transfer," Master's Thesis, Brown University. November 1989.

Patents

U.S. Patent Number 6321317: Apparatus for and method of multi-dimensional constraint optimization in storage system configuration, Elizabeth Borowsky, Richard Golding, Arif Merchant, Elizabeth Shriver, Mirjana Spasojevic, Tim Sullivan, and John Wilkes. Hewlett-Packard Co. Disclosed on June 1998. Filed on December 16, 1998. Issued on November 20, 2001.

U.S. Patent Number 6317499: Storage Device Random Bit Generator, Bruce Hillyer, Markus Jakobsson, and Elizabeth Shriver. Filed on August 3, 1998. Issued on November 13, 2001.

U.S. Patent Number 6301640: System and Method for Modeling and Optimizing I/O Throughput of Multiple Disks on a Bus, Rakesh D. Barve, Phillip B. Gibbons, Bruce K. Hillyer, Yossi Matias, Elizabeth Shriver and Jeffrey S. Vitter. Filed on July 2, 1998. Issued on October 9, 2001.

U.S. Patent Number 6260108: System and Method for Modeling and Optimizing I/O Throughput of Multiple Disks on a Bus, Rakesh D. Barve, Phillip B. Gibbons, Bruce K. Hillyer, Yossi Matias, Elizabeth Shriver and Jeffrey S. Vitter. Filed on July 2, 1998. Issued on July 10, 2001.

Professional Activities

Have served on program committees for a number of conferences. Have refereed papers for *Algorithmica*, *Journal of Parallel and Distributed Computing*,

Concurrency: Practice and Experience, and a number of conferences.