Gerald Roth

Department of Electrical Engineering and Computer Science
School of Engineering
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Education

Ph.D., Computer Science, Rice University, 1997
    Dissertation: Optimizing Fortran90D/HPF for Distributed-Memory Computers
    Advisor: Ken Kennedy
M.S., Computer Science, Rice University, 1993
M.S., Computer Engineering, Santa Clara University, 1987
B.S., Mathematics and Computer Science, Gonzaga University, 1982

Research and Academic Experience

Associate Professor of the Practice of Computer Science, Vanderbilt University, 2006-present
    Responsible for teaching undergraduate CS classes, service to department and university
Consultant, The College Board, October 2008
    Participated in the AP Computer Science National College Faculty Colloquium
Associate Professor, Gonzaga University, 2002-2005 (tenured 2005)
    Responsible for teaching full range of CS classes, advising students, service to department and
    university
Computer Science Coordinator, Department of Math & Computer Science, 2000-2005
    Assistant to department chair, overseeing scheduling of CS courses, CS budgets, the computer lab,
    and computer lab systems administrator. Liaison to other departments (*e.g.* the School of
    Engineering) on CS curriculum issues.
Assistant Professor, Gonzaga University, 1998-2002
    Responsible for teaching full range of CS classes, advising students, service to department and
    university
Research Assistant, Center for Research on Parallel Computation at Rice University, 1993-1997
    Research on advanced analysis and optimizations for compiling Fortran90/HPF to distributed-
    memory architectures. Designed and implemented compiler analyses and transformations within
    Rice's D System.
Teaching Assistant, Rice University, 1989-1992
    Organized and directed the graduate seminar on Advanced Compilation for Vector and Parallel
    Processors. Directed the lab work and gave occasional lectures for several undergraduate classes.
Lecturer, Gonzaga University, 1981
    Taught *Introduction to Fortran Programming* to a group of high school honors students.

Industrial Experience

Consultant, Microsoft Corporation, Summer 2004
    Software development for the Phoenix program analysis framework. Worked on an interface between a C#
    front-end and the Phoenix system.
Consultant, Cray Inc., Summer 2000
    Software development on the Fortran90 compiler for the MTA (Tera) architecture. Similar to work performed
    at Sun Microsystems.
Consultant, Sun Microsystems, Summer 1999
    Developing advanced scalarization and loop fusion algorithms for Sun's Fortran90 compiler. This was a
    continuation of prior work at Sun.

Staff Software Engineer, Sun Microsystems, 1997-1998
    Member of the Fortran Technology team, developing high-level optimizations for Sun's Fortran90 compiler. Designed and implemented a new scalarizer for the compiler which resulted in significant performance improvements.
Staff Software Engineer, IBM Corporation, 1994-1997
    Member of the VisualAge for Basic development team. Developed support for embedded SQL in the Basic interpreter. Designed and implemented the automatic cataloging of DB2 stored procedures. Enhanced the client/server interface to support the passing of structures and arrays.
Resident Study Fellow, IBM Corporation, 1989-1994
    Graduate research fellowship at Rice University.
Software Engineer, IBM Corporation, 1987-1989
    Responsible for enhancing the vectorization capabilities of the VS Fortran compiler by automatically vectorizing code containing specific intrinsic functions. Responsible for general bug fixing throughout the compiler's optimizer.
Programmer Analyst, IBM Corporation, 1982-1987
    Directed the Software Quality Assurance activities for several IBM language products, including VS Fortran and Assembler H. Involved in all aspects of software project management.

Publications

G. Roth, "Evaluation of Array Syntax Dependence Analysis," Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications, CSREA Press, pp. 129-134, June 2001. (refereed)

G. Roth, "Advanced Scalarization of Array Syntax," Proceedings of the 9th International Conference on Compiler Construction, Springer, pp. 219-231, March 2000. (refereed)

G. Roth, "Mastering Internet Skills for the Nonmajor," The Journal of Computing in Small Colleges, pp. 15-21, vol. 15, no. 2, January 2000. (refereed)

G. Roth and K. Kennedy, "Loop Fusion in High Performance Fortran," Proceedings of the 12th ACM International Conference on Supercomputing, ACM Press, pp. 125-132, July 1998. (refereed)

G. Roth, J. Mellor-Crummey, K. Kennedy, and R. G. Brickner, "Compiling Stencils in High Performance Fortran," Proceedings of SC'97: High Performance Networking and Computing, ACM & IEEE, November 1997. (refereed)

G. Roth, Optimizing Fortran90D/HPF for Distributed-Memory Computers, Ph.D. Dissertation, Dept of Computer Science, Rice University, April 1997.

G. Roth and K. Kennedy, "Dependence Analysis of Fortran90 Array Syntax," Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications, CSREA Press, pp. 1225-1235, August 1996. (refereed)

G. Roth, S. Carr, J. Mellor-Crummey, and K. Kennedy, "A General Stencil Compilation Strategy for Distributed-Memory Machines," CRPC Technical Report CRPC-TR96652-S, Rice University, June 1996.

K. Kennedy, J. Mellor-Crummey, and G. Roth, "Optimizing Fortran90 Shift Operations on Distributed-Memory Multicomputers," Proceedings of the 8th Languages and Compilers for Parallel Computing, Springer, pp. 161-175, August, 1995. (refereed)

K. Kennedy and G. Roth, "Context Optimization for SIMD Execution," Proceedings of the Scalable High Performance Computing Conference, IEEE Computer Society Press, pp. 445-453, May 1994. (refereed)

M. Hall, T. Harvey, K. Kennedy, N. McIntosh, K. McKinley, J. Oldham, M. Paleczny, and G. Roth, "Experiences Using the Parascope Editor: an Interactive Parallel Programming Tool," Proceedings of the

4th ACM Symposium on the Principles and Practices of Parallel Programming, ACM Press, pp. 33-43, May 1993. (refereed)

Grants

2009-2012

NSF - grant: *Revitalizing Computing Education Through Computational Science*, $299,953
Senior investigator responsible for developing & teaching a new data structures course designed for non-CS majors.

2003-2004

Microsoft Corp. - grant:
Software development for Phoenix program analysis framework, gift grant, $30,000. Funded.

NIOSH-SRL - grant:
Software development for a scanning laser tunnel profiler, SESGD support grant, $2,000. Funded.

2000-2001

Fluke Manufacturing - equipment grant:
Network monitoring equipment, $39,864. Funded.

Emerson Kennedy - grant:
 A Web-based Time Card System, SESGD support grant, $5,000. Funded.

Agilent Technologies Inc - software grant:
Network test and analysis software, $4,995. Funded.

1999-2000

NIOSH-SRL - grant:
Object Detection and Tracking Using Video Cameras, SESGD support grant, $2,000. Funded.

Emerson Kennedy - grant:
Visual Scrapbook Editor, SESGD support grant, $5,000. Funded.

Awards

Excellence in Teaching, Vanderbilt University School of Engineering, 2012

Wall Data Chair in Computer Science, 1998-2001

Center for Research on Parallel Computation (CRPC) Graduate Assistantship, Fall 1994

IBM Employee Graduate Resident-Study Fellowship, 1989-1994

Professional Organizations

Association of Computing Machinery (ACM)
    ACM Special Interest Group on Programming Languages (SIGPLAN)
    ACM Special Interest Group on Computer Science Education (SIGSCE)

Referee Activities

For journal submissions:
        IEEE Transactions on Parallel and Distributed Systems
        Concurrency: Practice and Experience
        Journal of Parallel and Distributed Computing
        The Journal of Supercomputing
        ACM Letters on Programming Languages and Systems

For conference submissions:
        ACM Technical Symposium on Computer Science Education
        International Conference on Architectural Support for Programming Languages and Operating Systems
        Workshop on Languages, Compilers, and Run-Time Environments for Distributed Memory
            Multiprocessors
        High Performance Networking and Computing Conference (was Supercomputing)
        IEEE International Conference on Computer Languages
        International Conference on Parallel Processing
        International Conference on Supercomputing
        International Parallel (and Distributed) Processing Symposium
        International Workshop on Languages and Compilers for Parallel Computing
        Scalable High-Performance Computing Conference

For books:
        "Communicating Online with IRC", a chapter from *The Internet Encyclopedia*, John Wiley & Sons

Professional Conference Presentations

"SPOCs: What, Why, and How," presented as panel member at ACM SIGCSE conference, Kansas City, MO, March 2015. I was also the one to organize and submit the panel to the conference. Panel members included Janet Burge (Wesleyan University), Armando Fox (UC Berkeley), Dan Grossman (University of Washington), and Joe Warren (Rice University).

"Making CS More Fun," presented as panel member at CCSC-NW conference, Tacoma, WA, October 2001.

"Evaluation of Array Syntax Dependence Analysis," presented at the International Conference on Parallel and Distributed Processing Techniques and Applications, Las Vegas, NV, June 2001.

"Advanced Scalarization of Array Syntax," presented at the 9th International Conference on Compiler Construction, Berlin, Germany, March 2000.

"Mastering Internet Skills for the Nonmajor," presented at the CCSC-NW inaugural regional conference, Gonzaga University, October 1999.

"Loop Fusion in High Performance Fortran," presented at the 12th ACM International Conference on Supercomputing, Melbourne, Australia, July 1998.

"Compiling Stencils in High Performance Fortran," presented at SC'97: High Performance Networking and Computing Conference, San Jose, CA, November 1997.

"Dependence Analysis of Fortran90 Array Syntax," presented at the International Conference on Parallel and Distributed Processing Techniques and Applications, Sunnyvale, CA, August 1996.

"Optimizing Fortran90 Shift Operations on Distributed-Memory Multicomputers," presented at the 8th Languages and Compilers for Parallel Computing Conference, Columbus, OH, August 1995.

"Context Optimization for SIMD Execution," presented at the Scalable High Performance Computing Conference, Knoxville, TN, May 1994.

New Courses Developed or Completely Revamped

Vanderbilt University:
CS 204 Program Design and Data Structures for Scientific Computing
CS 270 Programming Languages
CS 276 Compiler Construction
CS 292 Introduction to Parallel Computing

Gonzaga University:
CPSC 428 Compiler Theory and Design
CPSC 447 Data Communications
CPSC 450 Design and Analysis of Computer Algorithms
CPSC 462 Functional Programming

University Courses Taught

Vanderbilt University:
CS 101 Programming and Problem Solving
CS 201 Program Design and Data Structures
CS 204 Program Design and Data Structures for Scientific Computing
CS 240 Undergraduate Research & Independent Study
CS 270 Programming Languages
CS 276 Compiler Construction
CS 292 Introduction to Parallel Computing

Gonzaga University:
CPSC 101 Introduction to Microcomputers
CPSC 103 Introduction to the Internet
CPSC 121 Computer Science I
CPSC 122 Computer Science II
CPSC 224 Introduction to Object-Oriented Programming
CPSC 428 Compiler Theory and Design
CPSC 447 Data Communications (a.k.a. Computer Networking)
CPSC 450 Design and Analysis of Computer Algorithms
CPSC 462 Functional Programming
CPSC 491 Software Engineering and Senior Group Design I
CPSC 492 Software Engineering and Senior Group Design II
CPSC 499 Senior Comprehensive

University Committee Membership

Vanderbilt University:
Oak/Blackboard Faculty Advisory Committee, 2014-2015, appointed

Gonzaga University:
Academic Standing committee, 2004-2005 elected
Faculty Senator, 2003-2005 elected
Speakers committee, 2003-2004 elected
Faculty Elections committee, 2003 volunteer
Arts & Sciences Curriculum committee, 2000-2005 elected
Search committee for Vice President of Information Services, 2000, appointed

Department Committee Membership

Vanderbilt University:
Search committee for teaching track faculty member (chair), 2013
Academic advisor for 30 CS majors from the Class of 2017, 2013-present
Undergraduate Curriculum Committee. 2008-present
VandyCS Club advisor, 2010-present

Gonzaga University:
Computer Science Coordinator overseeing scheduling, budgets, and the computer lab & computer lab
    systems administrator. 2000-2005
Advisor to the student chapter of the ACM, 2000-2005
ACM student programming contest coach, 2000, 2001, 2004
Senior Design Coordinator overseeing the senior projects and project day activities, 1999-2000, 2000-2001,
    2003-2004
Department Library Liaison, 1999-2000

Professional Offices Held

Registration chair, CCSC-NW 2003 conference, Ellensburg, WA, October 2003
Registration chair, CCSC-NW 2002 conference, Seattle, WA, October 2002
Registration chair, CCSC-NW 2001 conference, Tacoma, WA, October 2001
Registration chair, CCSC-NW 2000 conference, Portland, OR, October 2000
Registration chair, CCSC-NW 1999 conference, Spokane, WA, October 1999

Conference Program Committee Membership

Program committee member, International Conference on Frontiers in Education: Computer Science and
Computer Engineering (FECS'09, FECS'10)
Program committee member, International Conference on Parallel and Distributed Processing Techniques
and Applications (PDPTA'09, PDPTA'10)
Program Committee member, International Conference on Communications in Computing (CIC'02,
CIC'03, CIC'04, CIC'07, CIC'08)

Service Activities

Vanderbilt University:
Presented two faculty seminars for admitted VUSE students at the request of the Office of Undergraduate
Admissions, April 2014.
Directed a discussion-based seminar "Power to Change the World" during the Admissions Office MOSAIC
weekend of 2013.
Advisor for a 2011-2012 Mayfield Lodge.
Directed Undergraduate Research projects (CS240) for 4 students.

Nashville community:
I represented the Vanderbilt University School of Engineering at the Middle Tennessee STEM Expo for
high school and middle school students in Gallatin TN, April 2014. I acted as a project evaluator and also
selected the recipient of the VUSE award which I presented at the award ceremony following the expo.
Taught an introduction to programming course utilizing Java to a group of high school aged, home-
schooled students. 2012-13
Taught a week long course in robotics programming utilizing Lego Mindstorm robots at a church summer
camp. The course was part of a $1500 NASA Summer of Innovation Mini-Grant Program. Summer 2011
Taught an introduction to programming course, utilizing the "Scratch" environment from MIT, to sixteen
home-schooled students ages 11-16. 2010