

BINA RAMAMURTHY

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PROFESSIONAL PREPARATION

SUNY at Buffalo, New York	Electrical Engineering	Ph.D., 1997
Wichita State University, Kansas	Computer Science	M.S., 1984
University of Madras, India	Computer Engineering	M.E., 1982
University of Madras, India	Electronics Engineering	B.E.(Honors), 1979

APPOINTMENTS

2009–	Research Associate Professor, Dept. of Computer Science and Engineering
2006–	Teaching Associate Professor, Dept. of Computer Science and Engineering, University at Buffalo
1997–06	Research Assistant Professor, Dept. of Computer Science and Engineering, University at Buffalo
1986–97	Lecturer, Department of Computer Science, University at Buffalo
1984–86	Lecturer, Department of Computer Science and Math, SUNY at Brockport, New York

INTEREST AREAS

My research area is in distributed systems with focus on data-intensive computing, cloud computing and infrastructures for biological research. My teaching interest is in the area of computer systems: embedded systems, multi-core architectures, operating systems, semantic web and service-oriented architectures.

NSF GRANTS AWARDED

1. NSF OCI CI-TEAM: A Cloud-enabled Evolutionary Genetics Learning Tool for Engaging the Net-Savvy Generation. This is in collaboration with Dr. Jessica Poulin and Dr. Katharina Dittmar De la Cruz of Biological Sciences department, approx. \$250K, (9/2010–8/2012).
2. NSF DUE CCLI: Phase II: A Comprehensive Framework for Timely Introduction of Emerging Data-Intensive Computing to STEM Audiences, PI and Director of TIDE. Co-PI Dr. Vipin Chaudhary and Dr. John van Benschoten. approx. \$250K, (9/2009–8/2012). This is a Phase II of the NSF Grid computing grant in item 4 below.
3. NSF DUE CCLI: Collaborative: NEXOS: A next Generation Operating Systems Curriculum and an Innovative Support Environment, PI. Lead in this Phase I - Course, Curriculum Laboratory Improvement (CCLI) grant; the collaboration is with Dr. Dennis Brylow of Marquette University, Milwaukee, Wisconsin, approx. \$75K each, (6/2008–4/2010).
4. NSF CCLI A&I: Collaborative: A Multi-tier Model for Adaptation of Grid Technology into CS-based Undergraduate Curriculum, lead PI, collaborative with SUNY Geneseo, approx. \$150K for UB (7/2004–6/2007).

OTHER GRANTS

1. NCWIT (National Center for Women & Information Technology) travel grant for attending Computing Education in 21st Century (CE21) at New Orleans, LA, Jan 2011, Approx. 1K.
2. American Association of Advancement in Sciences (AAAS) conference grant for NSF CCLI PIs, by invitation only. Washington DC, approx. 1K, Jan. 26-28, 2011.
3. NSF Transforming Undergraduate Education Phase 2 proposal preparation training (TREP2), team leader for the one of the 8 teams selected. El Paso, Texas, approx. 1K. Aug. 17-18, 2010.
4. Amazon.com Amazon Cloud Services for educational use, approximately \$10000 worth of resources, 2010-2011.

5. Microsoft Azure Cloud Computing resources grant worth \$3500, 2010-2012.
6. NSF-CRA (Computing Research Association) grant (invited) for attending Hadoop Data-Intensive computing conference, March 2008, San Jose, CA.Approx.\$1K.
7. Educational Technology Center at SUNY Buffalo, ViGOR: Visual Grid Tutorial for Learning Grid Technology Concepts, approx. \$6K. (8/2005-5/2006).
8. TCIE (The Center for Industrial Excellence): IQuote: Health Insurance Renewal Comparison Software, for Walsh Group Inc. approx. \$20K; (8/2004-5/2005).

SIGNIFICANT PUBLICATIONS

1. B. Ramamurthy and E. Slate. Introducing Cloud Computing into CSE Curriculum, (to be submitted to SIGCSE 2012)
2. B. Ramamurthy, Invited NSF Showcase of funded projects at SIGCSE 2004, 2005, 2009, 2011.
3. K. Madurai and B. Ramamurthy. Map-Reduce Programming Model and Hadoop Distributed File System for Use in Undergraduate Curriculum, Journal of Computer Sciences in Colleges, Vol.24, Issue 6, pp.84-86, June 2009.
4. D. Patrone and B. Ramamurthy. Toward Dynamic Application Protocols in Heterogeneous Distributed Computing Systems, GMU-AFCEA Symposium: Critical Issues in C4I. Lansdowne, VA, May 19-20, 2009.
5. D. Brylow and B. Ramamurthy. NEXOS: Next generation embedded operating systems laboratory, ACM SIGBED Review (Special Interest Group on Embedded Systems)), Vol. 6, Issue 1, article 7, pp.18-28, January 2009.
6. D. Patrone and B. Ramamurthy. Sharing Application Logic Across Programming Language Boundaries, The 20th International Conference on Software Engineering and Knowledge Engineering (SEKE 2008),pp.227-231, July 1-3,San Francisco, CA, 2008.
7. B. Ramamurthy. GridFoRCE: A Comprehensive Resource Kit for Teaching Grid Computing, IEEE Transactions on Education, special issue on Grid Computing, pp.10-16, Feb.2007.
8. A. Kumar, R. Shumba, B. Ramamurthy, and L. DAntonio. Emerging Areas in Computer Science Education, SIGCSE 2005, pp.453-454, St. Louis, Missouri, Feb., 2005.
9. B. Ramamurthy. GridForce: A Comprehensive Model for Improving Technical Preparedness of our Workforce for the Grid, presented at grid.edu workshop, IEEE/ACM CCGrid2004 International Conference, pp.168-173,Chicago, IL, April 19-22, 2004.
10. P. Ventura, and B. Ramamurthy. Wanted: CS1 Students. No Experience Required., SIGCSE 2004, pp.240-244, Norfolk, VA, March 2004.
11. N. Vu and B. Ramamurthy. Properties of Composite of Closure and Choice Function, pp.457-465, Acta Cybernetica Scientific Journal, 2002, Hungary.
12. B. Ramamurthy, S.J. Upadhyaya and B. Bhargava. Design and analysis of a hardware-assisted checkpointing and recovery scheme for distributed applications, *IEEE Transactions on Knowledge and Data Engineering*, Vol.12, No. 2, pp.174-186, April 2000.
13. B. Ramamurthy, S.J. Upadhyaya and R.K. Iyer.An object-oriented testbed for the evaluation of checkpointing and recovery systems, *IEEE Int. Symposium on Fault Tolerant Computing (FTCS-27)*, Seattle, WA, pp. 194-203, June 1997.
14. S. J. Upadhyaya and B. Ramamurthy.Concurrent Process Monitoring With No Reference Signatures, *IEEE Transactions on Computers*, Vol.43, no.4, pp.475-480, April 1994.
15. B. Ramamurthy, and A. C. Melton Jr. A Synthesis of Software Measures and The Cyclomatic Number, *IEEE Transactions on Software Engineering*, vol.14, No. 8, pp.1116-1121, August 1988.

PRESENTATIONS and OTHER PUBLICATIONS

1. B. Ramamurthy. A Roadmap to Migrating Computing Infrastructures to the Cloud, invited talk to be presented to the Rochester Public Library System employees, Monroe County, Rochester, NY, Dec.2, 2010.
2. B. Ramamurthy. Cloud Computing: Benefits and Limitations, invited talk at Calspan-University of Buffalo Research Center (CUBRC), Nov.4, 2010.
3. B. Ramamurthy. Cloud:The Next Generation Computer, invited plenary talk at International Conference on Advances and Emerging Trends in Computing Technologies (ICAET) Chennai, India, Jun.21-26, 2010. See: <http://www.cse.buffalo.edu/faculty/bina/TheCloudJune24.pdf>
4. A. Agarawal and B. Ramamurthy. MOPS: A Modified Priority Scheduler for Improving Performance in a Hadoop Cluster, poster presented at 2009 IEEE International Conference on Cluster Computing and Workshops, New Orleans, Louisiana, August 31-September 4, 2009.
5. K. Madurai and B. Ramamurthy. Map-Reduce Programming Model and Hadoop Distributed File System for Use in Undergraduate Curriculum, tutorial presented at Consortium for Computer Sciences - Northeast Region (CCSCNE 2009), Plattsburgh, NY, April 24-25, 2009.
6. D. Brylow and B. Ramamurthy. Nexos: A Next Generation Embedded System Laboratory. 2008 Workshop on Embedded Systems Education (WESE 2008), October 23-24, 2008, Atlanta, GA.
7. B. Ramamurthy. Emerging trends in Service-enabled Enterprises. Invited talk at SASTRA University, a TIFAC CORE (Technology Information, Forecasting and Assessment Council of India Center of Relevance and Excellence), Thanjavur, India, July 16, 2008.
8. M. Faramawi, D.P. Shah, B. Jayaraman, and B. Ramamurthy. A Constraint-Based Framework for Effective use of Service Level Agreements in Web Services. Graduate Conference, University at Buffalo, 2007.
9. B. Ramamurthy. A Synergistic Undergraduate Research Model Leveraging Capstone Projects and Grid Computing, The Frontiers in Education (FIE 2006), San Diego, CA, October 28-31, 2006.
10. B. Ramamurthy. An Overview of Grid Computing and its Adaptation to CSE Curriculum, Invited talk at SIGCSE 2005 Panel on Emerging Technologies, SIGCSE 2005, St. Louis, MO, February 2005.
11. B. Ramamurthy. Emerging Areas in Computer Science Education, invited position paper presented at a panel in CCSCE 2004, Twentieth Eastern Conference of the Consortium of CS in Colleges, Loyola College of Maryland, Baltimore, MD, October 15 -16, 2004.
12. B. Ramamurthy. Technology Culture, invited talk, Seventh Bi-Annual Statewide Graduate School Awareness Conference for Minorities, October 2004.
13. B. Ramamurthy. Grid:The Social Imperative, Invited presentation at Erie Community College, Buffalo, NY, May 2004.
14. B. Ramamurthy. GridForce: Grid For Research, Collaboration and Education, Invited poster at AAAS/NSF Invention and Impact Conference, Washington DC, April 2004.
15. B. Ramamurthy. A Multi-tier Adaptation of Grid Computing in Computer Science Curriculum, presented at faculty poster session at Special Interest Group in Computer Science Education (SIGCSE) 2004 Conference, Norfolk, VA, March 2004.
16. B. Ramamurthy, and E. Crahen. A Pedagogy to Support Modern Concepts in Distributed Systems Courses, American Association of Engineering Education (ASEE) 2003 Annual Conference, Information Systems Track, June 23-25, Nashville, Tennessee, 2003.
17. P. Gopalam, B. Ramamurthy and A. Cartwright. Java Enabled Opto-Electronic Learning Tools and a Supporting Framework, Proceedings of the American Society for Engineering Education (ASEE) Annual Conference, Albuquerque, NM, 2001.

18. A. Thakkar and B. Ramamurthy. An Event Pipeline Pattern, presented at the workshop on Jini Patterns at *OOPSLA 2000*, Minneapolis, MN, October 2000.
19. B. Ramamurthy. Learning and Teaching Object Technology, Workshop conducted at SIGCSE 1999, New Orleans, LA.
20. B. Ramamurthy. Future of CS2, Position paper presented at OOPSLA 1998, Vancouver, BC, 1998.

ACADEMIC PROJECTS

Infrastructure for Biological Informatics: This research deals with new approaches to the analysis and dissemination of biological knowledge for the benefit of the scientific community and the STEM (K-21) students. We are specifically interested in the development of tools and resources that have the potential to advance and transform, research and education in bioinformatics. This research is in collaboration with Biological Sciences department at UB. Future plan includes collaboration with Bio Statistics department. Biological informatics is a killer application for cloud computing. We have developed deep expertise in this area and NSF is very much interested in what we are doing. For example, we have developed a cloud-based evolutionary genetics tool that is used by 1200 freshmen in the Biological Sciences department at UB. Funding for this project is from the NSF Office of the Cyber Infrastructure: NSF-OCI-CITEAM-1041280.

Data-intensive Computing Certificate: Data-intensive computing deals with computational methods and architectures to analyze and discover intelligence in huge volumes of data generated in many application domains. This undergraduate-level certificate program addresses the increasing need for workforce personnel who are competent in data-intensive computing and other closely related technologies such as grid computing, parallel computing, and cloud computing. The interdisciplinary program consists of a total of five courses: three required CSE courses, one elective course from the major discipline of the student and a capstone project course that applies the concepts in the earlier courses of the certificate. This program is partially supported by NSF grant DUE-CCLI-0920335.

This certificate program has been approved as a SUNY certificate program.

Project NEXOS: Next Generation Embedded Operating Systems Course and an Innovative Support Environment: (NSF CCLI grant 2008-2010). The major goal of this project is to innovate and invigorate traditional embedded systems courses by creatively infusing modern concepts. Embedded systems have evolved significantly from simple microprocessors controlling analog IO devices to complex systems embedding entire operating systems. Embedded operating systems are used in diverse applications ranging from automotive dash boards to medical diagnostics, and from sensor motes to deep space probes. This project aims to improve embedded system competencies of our students by offering an all-inclusive package of learning materials, from curriculum to hands-on lab environment, and a research testbed.

Project GridFoRCE: A project Grid For Research, Collaboration and Education (GridFoRCE) was initiated at University of Buffalo (UB) with the support of NSF CCLI grant (2004-2007). The objective of this project is to spread grid awareness and improving the technical preparedness of our workforce. A sequence of two courses in grid-computing based Distributed Systems has been designed and implemented along with a laboratory prototype.

DOCTORAL STUDENTS

Major Professor for

1. P. Ventura (2003). *Predictors of success for Objects First in CS1*. Assistant Professor, Broward College, FL.
2. D. Patrone. (current). *Lizard: An Efficient Architecture for Sharing Application Logic Across Programming Language Boundaries*. plans to defend proposal in Jan. 2009.

Ph.D. Committee Member for

1. P. Gestwicki (2005). *Interactive Visualization of Object-oriented Programs*.
2. L. Mandwekar (current). *Realizing Virtual Networking Environments on NSF GENI*.

MASTERS STUDENTS

I advise about 10 graduate students per year on their master's projects (CSE700 and CSE799). Few representative projects are listed below:

1. Scalable Web Crawler Using Hadoop File System: H. Vijay, 2008.
2. Distributed Implementation of Markovitz Model using Mapreduce and Hadoop File System: N. Mahajan, 2007.
3. Towards an Architecture for Mobile Object in Heterogeneous Systems: D. Patrone. Best Paper award in Grad. Conference Feb. 19, 2006.
4. Reliable Storage using Redundant Copies: A. James. Sigma-Xi Research Conference, UB, 2006.

PROFESSIONAL SERVICES

1. Panelist for NSF proposal review in the areas of (i) Biological Information Integration and Informatics CAREER panel (2010), (ii) Advances in Biological Informatics (ABI)(2010), (iii) Information systems and integration (2009); Also served as chair panelist for panels in CCLI A&I program (2004-2009).
2. In Spring 2009 and in Fall 2010, introduced Computer Science and Engineering career to about 50 middle school children in Niagara Gaskill Middle School (70% of children under poverty level), as an invited speaker.
3. Invited panelist at National Association of Black Engineers (NSBE) at UB: 2009, 2010.
4. Reviewer for IEEE Transaction on Engineering Education and SIGCSE.
5. Chair of Birds of Feather program for SIGCSE 2007.
6. Program committee member for CCGrid 2005 (IEEE International Symposium on Cluster Computing and the Grid), and ADCOM 2005 (International Conference on Advanced Computing and Communications).
7. Conference committee member for Special Interest Group in Computer Science Education (SIGCSE) 2007.
8. Session Chair of technical paper session on Computer Games in the Curriculum at SIGCSE 2006, and the technical paper session on Computer Networking SIGCSE 2005.
9. University Service: Mentor for honors students and (K-12) minority high school students participating in CSTEP (Collegiate Science and Technology Program), LSAMP (Louis Stokes Alliance for Minority Participation) and BEAM (Buffalo Engineering Awareness for Minority) program for more than 10 years.
10. Community service: Conduct workshops for high school girls from inner city schools on behalf of Erie County Executive's Commission on Status of Women.

DEPARTMENTAL SERVICE

1. Curriculum Development: Long-standing member of the Undergraduate Studies Committee; Chaired the subcommittee that redesigned the BA program.
2. Faculty advisor for CSE Undergraduate Association (CSEUGA).
3. Active participant in CSE Open houses and Discovery days.
4. Short Courses and Industrial Training: Developed short courses to train programmers from the local industry. Topics include: Java Enterprise Edition (J2EE), Object-oriented (OO) design, Embedded system design using UML, Programming in C++, Programming in Java, Component-based Design and Programming. Recent locations: Veridian Engineering Inc., ATTO Tech, and UB.

COURSES TAUGHT

I teach courses at all levels from introductory to graduate courses in multiple disciplines: Computer Science (CSE) and Engineering and Applied Sciences (EAS) and Industrial Engineering (IE). Course content, technology used, pedagogical tools used, and student management in these courses are quite diverse as shown below.

<u>Semester</u>	<u>Course</u>	<u>Special Features</u>
Spring 2008	CSE421: Operating Systems	Unix C++, TCP/IP
	CSE4/586: Distributed Systems	Web services and service-oriented architectures
	IE565: Service-enabled Enterprises	Semantic web-enabled enterprises
Fall 2008	CSE4/521: Operating Systems	Unix, C, C++
	CSE321: Embedded and Realtime Systems	C, NEXOS: NSF Supported
Spring 2009	CSE421: Operating Systems	Unix C++, TCP/IP
Fall 2009	CSE 341: Computer Organization	Data Path Design and Verilog
	CSE421: Operating Systems	Nachos Syscall API, Unix C++, OO, UML
Spring 2010	CSE 321: Embedded and Realtime Systems	Embedded Linux and device drivers
	CSE4/586: Distributed Systems	Grid computing: NSF Supported
	CSE4/521: Operating Systems	C, C++
Fall 2010	CSE241 Digital Systems	Boolean algebra, gates
	CSE4/587: Data-intensive Computing	Cloud Computing, NSF Supported
	CSE4/521: Operating Systems	Multi-threading, C, C++ (140 students)
Spring 2011	CSE 321: Embedded and Realtime Systems	Embedded Linux and device drivers
	CSE4/586: Distributed Systems	Grid computing: NSF Supported
	CSE4/521: Operating Systems	Unix, C, C++

COURSES CREATED/REVISED

1. Introduced Distributed Systems curriculum into the CSE program: Created two new courses CSE486/586 Distributed Systems and CSE4/587 Data-intensive Computing; Supported by NSF DUE CCLI grants Phase 1 and Phase 2.
2. Co-created a new course CSE321: Embedded and Real-time Systems to satisfy the major program revisions approved for BS in CS and CEN degrees. This course is currently supported by National Science Foundation Grant from the division of undergraduate education NSF-DUE-0737243 (2008-2010) approx 75K.
3. Created two new courses for a multi-disciplinary graduate program in Industrial Engineering: CSE507 and IE 565.

AWARDS AND HONORS

1. CSTEP Research Mentor Award, presented at annual dinner for graduating CSTEP mentees, 2008.
2. Award of Appreciation presented by SUNY AMP, at Seventh Bi-Annual Statewide Graduate School Awareness Conference (for minorities), October 9, 2004. Participated in an invited forum/ panel on technology and presented a talk titled "Technology Culture".
3. Certificate of Recognition presented by Career Services Division of Student Affairs at University at Buffalo for being a positive influence on the students who graduated in 2003, as evidenced in a survey filled by students.

PROFESSIONAL AFFILIATIONS

1. Member, Institute of Electrical and Electronics Engineers (IEEE) Computer Society, USA.
2. Member, Association of Computing Machinery (ACM), USA.