

Lavanya Ramakrishnan

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Education

Ph.D. Computer Science, Indiana University, Bloomington, 2009

M.S. Computer Science, Indiana University, Bloomington, 2002

B.E. Computer Engineering, VJTI, University of Mumbai, India, 2000

Professional Experience

Scientist
Berkeley, CA
Lawrence Berkeley National Laboratory
2011-Present
Research and develop key computer science solutions for enabling computational sciences.

Alvarez Fellow
Berkeley, CA
Lawrence Berkeley National Laboratory
2009-2011
Evaluate cloud computing technologies and infrastructure for scientific applications.

Sr Research Programmer,
(Started as Research Programmer)
Chapel Hill, NC
Renaissance Computing Institute
2004-2006
Technical lead on a number of national inter-disciplinary collaborations. Coordination and leadership for the research and development of open-source distributed solutions to serve the needs of application scientists from mesoscale meteorology, storm surge modeling, bioinformatics and biomedical. Other responsibilities include project management, assisting in the development of technical strategies for the institute and hiring of personnel, proposal development, mentoring graduate students, and representing the team at key national meetings. Research areas - portal solutions, resource management, performance and reliability monitoring, and workflow orchestration.

Research Engineer,
(Started as Grid Developer)
Research Triangle Park, NC
MCNC
2002-2004
Developed middleware and security architectures for grid based systems including the North Carolina BioGrid. Integrated various middleware solutions for access to grid resources. Worked on workflow audit representation for an insider detection system.

Givens Associate, Summer Internship
Argonne, IL
Argonne National Laboratory
Summer 2002
Developed a graphical interface for composing and launching applications in Common Component Architecture (CCA) frameworks. Developed prototype XML schema for standardization of component metadata to facilitate portability between frameworks.

Academic Experience

Research Assistant
Bloomington, IN

Indiana University
2007-Present

Developing an architecture and associated techniques for workflow adaptation required in the context of meteorological workflows for the Linked Environments for Atmospheric Discovery (LEAD) project in distributed environments (e.g., Grid, cloud). Specifically this architecture enables proactive planning and adaptation across the multi-layered web service architecture to balance the performance and reliability needs of the application.

Research Assistant
Bloomington, IN

Indiana University
2001-2002

Worked on developing an authorization framework for a component based distributed environment, XCAT. Component specification was based on the Common Component Architecture (CCA) Forum. Worked on designing the security architecture for the Application Factory, that helps solve the problem of building reliable, scalable grid applications, by separating the process of application deployment from execution.

Teaching Assistant
Bloomington, IN

Indiana University
2000-2001

Teaching, grading and designing lab activities for “Introduction to Computing” course in the Department of Computer Science.

Publications

Book Chapters

- [1] R. J. Fowler, T. Gamblin, G. Kandaswamy, A. Mandal, A. K. Porterfield, L. Ramakrishnan, and D. A. Reed, *High Performance Computing and Grids in Action*, ch. Challenges of Scale: When All Computing Becomes Grid Computing. IOS Press, 2008.
- [2] D. Gannon, R. Ananthakrishnan, S. Krishnan, M. Govindaraju, L. Ramakrishnan, and A. Slominski, *Grid Computing: Making the Global Infrastructure a Reality*, ch. 9, Grid Web Services and Application Factories. Wiley, 2003.

Journals

- [1] K. R. Jackson, K. Muriki, L. Ramakrishnan, K. J. Runge, and R. C. Thomas, “Performance and cost analysis of the supernova factory on the amazon aws cloud,” *Sci. Program.*, vol. 19, pp. 107–119, April 2011.
- [2] L. Ramakrishnan, D. Gannon, J. Chase, D. Nurmi, and R. Wolski, “Deadline-Sensitive Workflow Orchestration Without Explicit Resource Control,” in *Journal of Parallel and Distributed Computing*, 2011.
- [3] L. Ramakrishnan and D. A. Reed, “Predictable quality of service atop degradable distributed systems,” in *Journal of Cluster Computing*, 2009.
- [4] K. K. Droegemeier, D. Gannon, D. Reed, B. Plale, J. Alameda, T. Baltzer, K. Brewster, R. Clark, B. Domenico, S. Graves, E. Joseph, D. Murray, R. Ramachandran, M. Ramamurthy, L. Ramakrishnan, J. A. Rushing, D. Weber, R. Wilhelmson, A. Wilson, M. Xue, and S. Yalda, “Service-Oriented Environments for Dynamically Interacting

- with Mesoscale Weather,” *Computing in Science and Engg.*, vol. 7, no. 6, pp. 12–29, 2005.
- [5] L. Ramakrishnan, “Securing Next-Generation Grids,” *IT Professional.*, vol. 6, no. 2, pp. 34–39, 2004.
- [6] D. Gannon, R. Bramley, G. Fox, S. Smallen, A. Rossi, R. Ananthakrishnan, F. Bertrand, K. Chiu, M. Farrellee, M. Govindaraju, S. Krishnan, L. Ramakrishnan, Y. Simmhan, A. Slominski, Y. Ma, C. Olariu, and N. Rey-Cenvaz, “Programming the Grid: Distributed Software components, P2P and Grid Web Services for Scientific Applications,” *Journal of Cluster Computing*, vol. 5, pp. 325–336, July 2002.

Conference and Workshop Publications

- [1] E. Dede, M. Govindaraju, D. Gunter, and L. Ramakrishnan, “Riding the elephant: Managing ensembles with hadoop,” in *4th Workshop on Many-Task Computing on Grids and Supercomputers (MTAGS)*, 2011.
- [2] D. Ghoshal, R. S. Canon, and L. Ramakrishnan, “I/o performance of virtualized cloud environments,” in *The Second International Workshop on Data Intensive Computing in the Clouds (DataCloud-SC11)*, 2011.
- [3] L. Ramakrishnan, R. S. Canon, K. Muriki, I. Sakrejda, and N. J. Wright, “Evaluating interconnect and virtualization performance for high performance computing,” in *Proceedings of 2nd International Workshop on Performance Modeling, Benchmarking and Simulation of High Performance Computing Systems (PMBS11)*, 2011.
- [4] Z. Fadika, E. Dede, M. Govindaraju, and L. Ramakrishnan, “Mariane: Mapreduce implementation adapted for hpc environments,” *Grid 2011: 12th IEEE/ACM International Conference on Grid Computing*, vol. 0, pp. 1–8, 2011.
- [5] Z. Fadika, E. Dede, M. Govindaraju, and L. Ramakrishnan, “Benchmarking mapreduce implementations for application usage scenarios,” *Grid 2011: 12th IEEE/ACM International Conference on Grid Computing*, vol. 0, pp. 1–8, 2011.
- [6] Y.-W. Cheah, B. Plale, J. Kendall-Morwick, D. Leake, and L. Ramakrishnan, “A noisy 10gb provenance database,” in *Second International Workshop on Traceability and Compliance of Semi-Structured Processes (TC4SP2011)*, August 2011.
- [7] L. Ramakrishnan, P. T. Zbiegel, S. Campbell, R. Bradshaw, R. S. Canon, S. Coghlan, I. Sakrejda, N. Desai, T. Declerck, and A. Liu, “Magellan: Experiences from a science cloud,” in *Proceedings of the 2nd international workshop on Scientific cloud computing, ScienceCloud ’11*, (New York, NY, USA), pp. 49–58, ACM, 2011.
- [8] K. Jackson, L. Ramakrishnan, K. Muriki, S. Canon, S. Cholia, J. Shalf, H. Wasserman, and N. Wright, “Performance Analysis of High Performance Computing Applications on the Amazon Web Services Cloud,” in *2nd IEEE International Conference on Cloud Computing Technology and Science*, 2010 [**Acceptance rate: 23%, Best Paper Award**].
- [9] Y. Simmhan, E. Soroush, C. van Ingen, D. Agarwal, and L. Ramakrishnan, “Brew: Blackbox resource selection for e-science workflows,” in *Fifth Workshop on Workflows in Support of Large-Scale Science (WORKS10)*, 2010.

- [10] L. Ramakrishnan and B. Plale, "A multi-dimensional classification model for scientific workflow characteristics," in *Workshop on Workflow Approaches to New Data-centric Science, Indianapolis, Indiana*, June 2010.
- [11] Y. Simmhan and L. Ramakrishnan, "Comparison of resource platform selection approaches for scientific workflows," in *1st Workshop on Scientific Cloud Computing, co-located with ACM HPDC 2010 (High Performance Distributed Computing), Chicago, Illinois*, 2010.
- [12] K. Jackson, L. Ramakrishnan, R. Thomas, and K. J. Runge, "Seeking supernovae in the clouds: A performance study," in *1st Workshop on Scientific Cloud Computing, co-located with ACM HPDC 2010 (High Performance Distributed Computing), Chicago, IL*, June 2010 [**Best Paper Award**].
- [13] L. Ramakrishnan, K. Jackson, S. Canon, S. Cholia, and J. Shalf, "Defining Future Platform Requirements for e-Science Cloud (Position paper)," in *ACM Symposium on Cloud Computing 2010 (ACM SOCC 2010), Indianapolis, Indiana*, June 2010 [**Acceptance rate: 19%**].
- [14] L. Ramakrishnan, D. Gannon, and B. Plale, "WORKEM: Representing and Emulating Distributed Scientific Workflow Execution State," in *10th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid 2010), Melbourne Australia*, 2010 [**Acceptance rate: 23%**].
- [15] L. Ramakrishnan, C. Guok, K. Jackson, E. Kissel, D. M. Swany, and D. Agarwal, "On-demand Overlay Networks for Large Scientific Data Transfers," in *10th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid 2010), Melbourne Australia*, 2010 [**Acceptance rate: 23%**].
- [16] L. Ramakrishnan, D. Nurmi, A. Mandal, C. Koelbel, D. Gannon, T. M. Huang, Y.-S. Kee, G. Oberteli, K. Thyagaraja, R. Wolski, A. Yarkhan, and D. Zagorodnov, "VGrADS: Enabling e-Science Workflows on Grids and Clouds with Fault Tolerance," in *Proceedings of the ACM/IEEE SC2009 Conference on High Performance Computing, Networking, Storage and Analysis, Portland, Oregon*, (Portland, Oregon), November 2009 [**Acceptance rate: 22%**].
- [17] L. Ramakrishnan and D. A. Reed, "Performability Modeling for Scheduling and Fault Tolerance Strategies for Scientific workflows," in *ACM/IEEE International Symposium on High Performance Distributed Computing, Boston Massachusetts*, 2008 [**Acceptance rate: 23%**].
- [18] L. Ramakrishnan, Y. Simmhan, and B. Plale, "Realization of Dynamically Adaptive Weather Analysis and Forecasting in LEAD," in *In Dynamic Data Driven Applications Systems Workshop (DDDAS) in conjunction with ICCS (Invited), Beijing, China*, 2007.
- [19] L. Ramakrishnan, L. Grit, A. Iamnitchi, D. Irwin, A. Yumerefendi, and J. Chase, "Toward a Doctrine of Containment: Grid Hosting with Adaptive Resource Control," in *Proceedings of the ACM/IEEE SC2006 Conference on High Performance Computing, Networking, Storage and Analysis, Tampa, Florida*, 2006 [**Acceptance rate: 23%**].
- [20] L. Ramakrishnan, B. O. Blanton, H. M. Lander, R. A. Luetlich, Jr, D. A. Reed, and S. R. Thorpe, "Real-time Storm Surge Ensemble Modeling in a Grid Environment," in *Second International Workshop on Grid Computing Environments (GCE), Held in conjunction ACM/IEEE Conference for High Performance Computing, Networking, Storage and Analysis, Tampa, Florida*, November 2006.

- [21] L. Ramakrishnan, M. S. Reed, J. L. Tilson, and D. A. Reed, “Grid Portals for Bioinformatics,” in *Second International Workshop on Grid Computing Environments (GCE), Held in conjunction with ACM/IEEE Conference for High Performance Computing, Networking, Storage and Analysis, Tampa, Florida*, November 2006.
- [22] T. J. Smith and L. Ramakrishnan, “Joint Policy Management and Auditing in Virtual Organizations.,” in *Grid Computing, Phoenix, Arizona*, 2003 [**Acceptance rate: 35%**].
- [23] L. Ramakrishnan, H. N. Rehn, J. Alameda, R. Ananthakrishnan, M. Govindaraju, A. Slominski, K. Connelly, V. Welch, D. Gannon, R. Bramley, and S. Hampton, “An Authorization Framework for a Grid Based Common Component Architecture,” in *Proceedings of the 3rd International Workshop on Grid Computing, Baltimore, Maryland*, pp. 169–180, Springer Press, 2002 [**Acceptance rate: 35%**].

Other Publications

- [1] L. Ramakrishnan and D. Gannon, “A Survey of Distributed Workflow Characteristics and Resource Requirements,” Tech. Rep. TR671, Department of Computer Science, Indiana University, Indiana, September 2008.
- [2] H. M. Lander, R. J. Fowler, L. Ramakrishnan, and S. R. Thorpe, “Stateful Grid Resource Selection for Related Asynchronous Tasks,” Tech. Rep. TR-08-02, RENCI, North Carolina, April 2008.
- [3] L. Ramakrishnan and D. A. Reed, “Performability Modeling for Scheduling and Fault Tolerance Strategies for Grid workflows (referred poster),” in *Proceedings of the ACM/IEEE SC2007 Conference on High Performance Computing, Networking, Storage and Analysis, Reno, Nevada*, 2007.
- [4] L. Ramakrishnan, “Multi-level Adaptation for Performability in Dynamic Web Service Workflows (referred poster),” in *Grace Hopper Celebration, Orlando Florida*, 2007.
- [5] L. Ramakrishnan and D. A. Reed, “Monitoring and Orchestrating a Mesoscale Meteorological Cyberinfrastructure,” in *21st International Conference on Interactive Information Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology, 85th AMS Annual Meeting San Antonio Texas*, January 2007.
- [6] P. Bogden, G. Allen, G. Creager, S. Graves, R. Luettich, W. Perrie, L. Ramakrishnan, P. Sheng, and H. Wang, “Designing a Collaborative Cyberinfrastructure for Event-Driven Coastal Hazard Prediction and Response (refereed poster),” in *Proceedings of the ACM/IEEE SC2006 Conference on High Performance Computing, Networking, Storage and Analysis, Tampa, FL*, 2006 [**Acceptance rate: 32%**].
- [7] L. Ramakrishnan, B. O. Blanton, H. M. Lander, R. A. L. Jr, D. A. Reed, and S. R. Thorpe, “Grid case study: Scoop storm surge model,” in *The Grid Technology Cookbook*, 2006.
- [8] L. Ramakrishnan, B. Viviano, K. Gamiel, Y. Zhang, and D. Reed, “Performance and Reliability Monitoring of a Mesoscale Meteorological Cyberinfrastructure (refereed poster),” in *Proceedings of the ACM/IEEE SC2005 Conference on High Performance Computing, Networking, Storage and Analysis, Tampa, FL*, 2005.
- [9] A. Blatecky, K. Gamiel, L. Ramakrishnan, D. Reed, and M. Reed, “Building the Bioscience Gateway,” in *Science Gateways: Common Community Interfaces to Grid Resources Workshop, Chicago, IL, GGF14*, June 2005.

- [10] R. Baker, L. Gommans, A. McNab, M. Lorch, L. Ramakrishnan, K. Sankar, and M. R. Thompson, "Conceptual Grid Authorization Framework and Classification. Authorization Frameworks and Mechanisms," in *Global Grid Forum Document GFD-I.038*, 2004.
- [11] P. Emer, C. Kesler, and L. Ramakrishnan, "MCNC's North Carolina Statewide Grid Computing Initiative," *The DoD SoftwareTech News*, vol. 7, April 2004.
- [12] T. Walsh, S. Karimi, K. Gamiel, J. Morris, and L. Ramakrishnan, "Collection Manager: Integrating Diverse Data Sources on the Grid," in *The Future of Grid Data Environments Workshop, Berlin, Germany, GGF10*, March 2004.
- [13] L. Ramakrishnan, "Policy Management for OGSA Applications as Grid Services," in *Global Grid Forum Workshop on Designing and Building Grid Services, Chicago Illinois, GGF9*, October 2003.
- [14] L. Ramakrishnan, "Writing Secure Grid Services Using Globus Toolkit 3.0," in *IBM developerWorks*, September 2003.

Selected Presentations

- [1] "Eucalyptus Overview," in *Discovery 2015: HPC and Cloud Computing Workshop*, June 2011.
- [2] "Evaluating Cloud Computing for Science," in *Discovery 2015: HPC and Cloud Computing Workshop*, June 2011.
- [3] "Magellan: Evaluating Cloud Computing for Science," in *Lawrence Livermore National Lab*, June 2011.
- [4] "Evaluating Cloud Computing for HPC Applications," in *NERSC Brown Bag*, October 2010.
- [5] "Cloud Computing Overview," in *Discovery 2015: Cloud Computing Workshop*, July 2010.
- [6] "Hadoop for Scientific Workloads," in *IBM Research Almaden*, July 2010.
- [7] "Hadoop for Scientific Workloads," in *Hadoop Summit*, June 2010.
- [8] "A Performance Comparison of Massively Parallel Sequence Matching Computations on Cloud Computing Platforms and HPC Clusters Using Hadoop," in *Using clouds for parallel computations in systems biology, Held in conjunction ACM/IEEE SC2009 Conference on High Performance Computing, Networking, Storage and Analysis, Portland Oregon*, November 2009.
- [9] "Quality of Service Guarantees for Dynamic Scientific Workflows," in *Computational Research Division, Lawrence Berkeley National Laboratory Berkeley CA*, January 2009.
- [10] "LEAD Workflow Sets on Grid and Cloud Systems," in *ACM/IEEE SC2008 Conference on High Performance Computing, Networking, Storage and Analysis Exhibition Floor Austin Texas*, November 2008.
- [11] "Fault Tolerance through Virtual Grid Abstractions," in *ACM/IEEE SC2007 Conference on High Performance Computing, Networking, Storage and Analysis Exhibition Floor Reno Nevada*, November 2007.
- [12] "Multi-level Adaptation for Performability for Dynamic Web Service Workflows," in *Distributed Systems Department, Lawrence Berkeley National Laboratory, Berkeley CA*, February 2007.

- [13] “Demonstration of GROC-Shirako,” in *ACM/IEEE SC2006 Conference on High Performance Computing, Networking, Storage and Analysis Exhibition Floor Tampa Florida*, November 2006.
- [14] “Demonstration of LEAD-VGrADS architecture,” in *ACM/IEEE SC2006 Conference on High Performance Computing, Networking, Storage and Analysis Exhibition Floor, Tampa Florida*, November 2006.
- [15] “Ask-a-Grid-Expert Panel and Interaction,” in *SURA Cyberinfrastructure Workshop: Grid Application Programming, Austin Texas*, December 2005.
- [16] “Large Scale Coastal Modeling on the Grid,” in *SURA Cyberinfrastructure Workshop: Grid Application Programming, Austin Texas*, December 2005.
- [17] “North Carolina Bioportal,” in *ACM/IEEE SC2005 Conference on High Performance Computing, Networking, Storage and Analysis Exhibition Floor, NCSA Booth, Seattle Washington*, November 2005.
- [18] “Leveraging the Grid: Application Perspective,” in *Grid Computing class on NCREN, UNC Charlotte*, November 2005.
- [19] “Grid: Next Generation Distributed Computing,” in *Graduate-level Distributed Systems Class, Department of Computer Science, UNC Chapel Hill*, November 2004.

Grants

Institutional PI, Subcontract to Duke University, The Missing Link: Connecting Eucalyptus Clouds with Multi-Layer Networks [2010-2013].

Co-Principal Investigator (PI: Jeffrey S. Chase, Duke University), A Grid Service for Dynamic Virtual Clusters, National Science Foundation Middleware Initiative [2003-2007].

Professional Activities

Program Committee, eScience 2012 [2012]

Program Chair Science Cloud 2012, co-located with High Performance Distributed Computing (HPDC) Conference [2012]

Program Committee, CCGrid 2012 [2012]

Program Committee The 4th Workshop on Many-Task Computing on Grids and Supercomputers (MTAGS), co-located with Supercomputing [2011]

Program Committee The 2nd Workshop on Data Intensive Computing in the Clouds, co-located with Supercomputing [2011]

Program Committee, ACM Symposium on Cloud Computing SOCC2011 [2011]

Program Committee, IEEE International Conference on Cloud Computing (CLOUD 2011) [2011]

Program Committee 2nd Workshop on Scientific Cloud Computing (ScienceCloud), co-located with ACM HPDC [2011]

Program Committee The First International Workshop on Data Intensive Computing in the Clouds (DataCloud), co-located with IPDPS [2011]

Reviewer: Future Generation Computer Systems [2011]

Reviewer: Journal of Grid Computing [2011]

Reviewer Europar 2011 [2011]

Reviewer Special Issue on Scientific Workflows, Provenance and Their Applications of International Journal of Computers and Their Applications (IJCA) [2011]

Program Committee The 3rd ACM Workshop on Many-Task Computing on Grids and Supercomputers (MTAGS), co-located with Supercomputing [2010]

Program Committee IEEE/ICDM International Workshop on Knowledge Discovery Using Cloud and Distributed Computing Platforms [2010]

Program Committee International Conference on Advanced Computing [2010]

Program Committee IADIS Multi-Conference on Computer Science and Information Systems-INFORMATICS [2010]

Program Committee ACM Workshop on Scientific Clouds, High Performance Distributed Computing [2010]

Reviewer: Special Issue of the Scientific Programming Journal on Science-driven Cloud Computing [2010]

Reviewer: The 10th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing [2010]

Reviewer: Transactions on Parallel and Distributed Systems [2009, 2010]

Reviewer: Journal for Parallel and Distributed Computing (JPDC) [2009]

Program Committee Grid Computing Environments Workshop (GCE) [2008].

Reviewer: TeraGrid Conference [2008]

Technical/Program Committee: Grid Computing Environments Workshop (GCE) [2007]

Reviewer: TeraGrid Conference [2007]

Reviewer: International Conference on Distributed Computing Systems (ICDCS) [2007]

Reviewer: IEEE Internet Computing (Special Issue: Virtual Organizations) [2007]

Reviewer: ACM Symposium for Applied Computing [2005]

Technical Evaluation Committee, MCNC- Research and Development Institute [2003].

Participated in Global Grid Forum [2002-2004].

Honors and Awards

Luis Alvarez Fellowship, Lawrence Berkeley National Laboratory, CA (also listed in employment) [2009].

Google Anita Borg Finalist [2007].

Givens Associate Fellowship, Argonne National Laboratory, IL (also listed in employment) [2002].

J.N. Tata Scholarship for higher studies abroad [2000].

Ranked 4th out of about hundred thousand students in Higher Secondary Board Examination [1996].

Scholarships

CRA-W Scholarship for CRA-W Career Mentoring Workshop [2009].

Indiana University School of Informatics Diversity Committee Scholarship for Grace Hopper [2007].

Anita Borg Institute's Grace Hopper and Tapia Bridge Day Scholarship [2007].

J.N. Tata Scholarship for higher studies abroad [2000].

Maharashtra State Fellowship for undergraduate studies [1996-1999].

Professional Affiliations

Sigma XI Member [2009-Current].

IEEE Member [1999-Current].

Volunteer Activities

Mentor for International Graduate Student at ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis [2009].

Anita Borg Institute for Women and Technology's Women of Vision Gala Awards Dinner [2008,2007].

Girls for a Change Summit [2007].

Student Volunteer at ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis [2001].