Balasubramaneyam Maniymaran
Ph.D. Candidate
http://www.cs.mcgill.ca/~bmaniy

26-7830 Ave. Mountain Sights,
Montreal, QC, Canada H4P 2B2
Phone: 1.514. 476.4131

Objective

To find a career as a designer/developer in computer system development.

Education

- Ph.D. in Electrical and Computer Engineering (Expected graduation in Spring 2008)
  "Resource Addressable Networks (RAN): An Adaptive Peer-to-Peer Discovery Substrate for Internet-Scale Service Platforms"
  McGill University, Montreal, QC, Canada
- M.Sc. in Electrical and Computer Engineering (December 2002)
  "Heuristics for Enforcing Service Level Agreements in a Public Computing Utility"
  University of Manitoba, Winnipeg, MB, Canada.
- B.Sc. in Electrical and Electronic Engineering (August 1999)
  University of Peradeniya, Peradeniya, Sri Lanka.

Work Experience

- Researcher at Advanced Network Research Laboratory, McGill University, Montreal, QC, Canada. (Jan. 2003 – to date).
  - Simulation and implementation of P2P resource discovery mechanism.
  - Partial supervision of M.Sc. students in system implementations.
- Software developer at Network and Communications Services at McGill University, QC, Canada (Mar. 2007 – to date).
  - Development of web-based network monitoring and managing software for the McGill computer network.
- Internship at INRIA/IRISA at Rennes, France (May 2006 – July 2006).
  - Combining structured and unstructured P2P systems.
- Teaching assistant at McGill University (Aug. 2003 – April 2006).
  - Courses: Operating Systems, Advanced Computer Networks.
- Researcher/Graduate Student at TRLabs, Winnipeg, MB, Canada (Jan. 2001 – Dec. 2002).
  - Design and simulation of an optimal resource allocation mechanism.
- Teaching assistant at University of Manitoba (Sep. 2001 – Dec. 2001).
  - Course: Electronics III
- Lecturer at University of Peradeniya, Sri Lanka (Jan. 2000 – Dec. 2000).
  - Courses: Communication Networks and Digital Electronics.

Projects

- **Research Projects:**
  During my research, I involved in number of research projects in P2P distributed systems. All the projects consist of phases of problem analysis, system design, theoretical analysis, simulation and implementation. The implementations are tested on the PlanetLab test bed, which is a Internet-wide collection of workstations hosted by many collaborating institutions.
  - Landmarking scheme for bandwidth prediction:
    Knowledge of end-to-end bandwidth is crucial in wide-area systems. Therefore, it is essential to design a scheme for bandwidth prediction. However, being bandwidth a non-additive metric, design of such a scheme is not as simple as a scheme for predicting network latencies. This project proposes a landmarking scheme for bandwidth prediction where the autonomous systems are used as landmarks. The primary goals of this project are to keep the node states minimal and to improve the prediction accuracy.
    - Application: bandwidth prediction between Internet hosts; To design a bandwidth-aware discovery mechanism.
    - Status: Design complete and evaluated using simulation and implementation.
  - *Landmark aided positioning* (LAP):
    LAP is a network positioning mechanism where the network hosts are mapped on to Cartesian space such that there is a linear relationship between the network latency between two hosts and the Euclidean distance between two mapped positions. This research concentrated mostly on reducing message complexity and handling various errors in network measurements.

        - Application: To predict network latency or expected QoS between two hosts without introducing additional traffic in the system; To build proximity-aware overlays.
        - Status: Design complete, implemented and tested in PlanetLab, and conducted a detailed simulation study.
        - http://www.cs.mcgill.ca/~bmaniy/research/lap.pdf
    - Leveraging the coexistence of structured and unstructured P2P systems:
      With the growing number of P2P systems available, it can be expected for an Internet host to be a part of more than one P2P system. Often these P2P systems are self-contained generating their own traffic for managing the overlays. This project evaluates the feasibility of making structured and unstructured P2P systems to collaborate in maintaining their overlays and to trade-off performance for reducing the overall system overhead. This is the project I undertook during my internship at INRIA, France in 2006.
        - Application: To reduce the Internet traffic and to provide inter-schema support between P2P systems.
        - Status: Completed with simulation study. A publication is accepted in ICDCS 2007.
    - *Resource addressable network* (RAN):
      RAN is a proximity-aware self-organizing resource discovery mechanism for a peer-to-peer (P2P) resource pool. It uses the network positioning mechanism called LAP (see below) and organizes the resources in a P2P overlay using the mathematical construct called space filling curve. This enables a *O(log n)* resource discovery.
        - Application: Can be used to build quality of service (QoS)-aware service overlays (e.g.: for content delivery and multiplayer games)
        - Status: Design is complete and a detailed simulation is in progress. I partly supervised the implementation of the system by a few M.Sc. students. Possibility of making the system bandwidth aware is being explored.
        - http://www.cs.mcgill.ca/~bmaniy/research/proposal.pdf
    - Profile-based resource discovery:
      Resource discovery based on the attributes of the resources can involves tremendous overhead due to the possibility of infinite number of attributes a resource can have. However, an analysis on CNET.com desktop review database showed that the actual attributes of resources are very much skewed to a small subset of attribute combinations or *profiles*. I showed how this awareness of popular profiles can be used to create an efficient resource discovery mechanism.
        - Application: For any resource discovery mechanism where attributes of the resources are important (e.g.: computing utilities and Grid computing)
        - Status: The design is complete and a simulation study shows promising results.
        - http://www.cs.mcgill.ca/~bmaniy/research/profile_based_naming.pdf
    - Optimal resource allocation for QoS-aware services:
      Resource allocation is mostly done manually considering worst-case scenarios. This approach results in poor resource utilization at the same time makes the services vulnerable to demand-spikes. This project proposes a semi-dynamic resource allocation mechanism which optimally allocates the resources and can handle demand-spikes with certain tolerance value.
        - Application: For any resource allocation services.
        - Status: Design and simulation for single service is complete.
        - http://www.cs.mcgill.ca/~bmaniy/research/msc_thesis.pdf

- **Course Projects:**
  These are the projects I carried out under the requirements of the courses I took during my M.Sc. and Ph.D. periods.
    - WIG Compiler: A compiler from scratch that compiles state-full web services written in WIG language into C++ CGI scripts.
    - Peephole Optimizer: a peephole optimizer for Java byte code; won 4th place in the class competition.
    - Design and Implementation of a Gas Station Controller: Implemented in VHDL on Altera FPGA EPF10K20RC240-4 with optical sensor input and keyboard and VGA interfaces.
    - Implementation of Distributed Mutual Exclusion Algorithms.
    - Implementation of Connection Migration in a Mobile Environment with Persistent Connection: Issues addressed: dynamic IP address switching, TCP packet mangling, and packet re-routing.
    - Network Packet Analyzer: Implementation of a tool similar to TCPdump.

- **Other Projects:**

These are projects I developed for the interest of our research group.

- ***gLoader:*** for the GINI toolkit.
  GINI is an educational toolkit to teach computer networks. It enables the students to create virtual Internet within a computer using *user mode linux* (UML) and unix sockets. GLoader is a tool to automate the virtual network creation based on the network specification given via an XML file.
  - http://www.cs.mcgill.ca/~anrl/projects/gini/
- ***pShell:*** an interactive shell for managing PlanetLab slices.
  pShell is an interactive shell for managing a PlanetLab slice. It acts like a control center from where you can add/remove nodes to/from a slice, launch commands on the slice nodes, and transfer files to and from those nodes. It simplifies the experience of conducting experiments in PlanetLab.
  - http://www.cs.mcgill.ca/~anrl/projects/pShell/

Skills

- Programming knowledge in Java, C, Python, PHP, Perl, and XML.
- Programming experience (in the past) in C++, Shell Scripting, MATLAB and VHDL.
- Simulation languages/tools: JiST, PeerSim, Parsec
- Web hosting with HTML, CSS, PHP, MySQL, Ajax, Java Scripts and CGI scripts.
- Good knowledge in Linux-based system and network administration.
- Workable knowledge in GIMP and MS Office tools.
- Operating systems: Linux, Windows and FreeBSD.

Publications

- B. Maniymaran and M. Maheswaran, *"Bandwidth Landmarking: A Scalable Bandwidth Prediction Mechanism for Distributed Systems,"* accepted to appear in GLOBECOM 2007, Nov. 2007.
- B. Maniymaran, M. Bertier and A-M. Kermarrec, *"Build One, Get One Free: Leveraging the Coexistence of Multiple P2P Overlay Networks," Accepted to appear in International Conference on Distributed Computing Systems, June 2007.*
- B. Maniymaran, M. Maheswaran, and Y. Gao, *"Benefits of Clustering in Landmark-Aided Positioning Algorithms,"* In the proceedings of High Performance Computing Symposium (HPCS), May 2007.
- B. Maniymaran and M. Maheswaran, *"Virtual Clusters: A Dynamic Resource Co-allocation Strategy for Computing Utilities,"* 16th International Conference on Parallel and distributed Computing and Systems (PDCS 2004), Nov. 2004, pp. 53 – 58.
- B. Maniymaran and M. Maheswaran, *"On the Benefits of Profile-Based Naming for Large Network Computing Systems,"* 16th International Conference on Parallel and Distributed Computing and Systems (PDCS 2004), Nov. 2004, pp. 671 – 676.
- M. Maheswaran, B. Maniymaran, S. Asaduzzaman, and A. Mitra, *"Towards a Quality of Service Aware Public Computing Utility,"* 1st IEEE NCA Workshop on Adaptive Grid Computing (in the proceedings of 3rd IEEE Symposium on Network Computing), Aug. 2004, pp 376 – 379.
- M. Migliardi, M. Maheswaran, B. Maniymaran, P. Card, and F. Azzedin, *"Mobile Interfaces to Computational, Data, and Service Grid Systems,"* ACM Mobile Computing and Communication Review, Vol. 6, No. 4, Oct. 2002, pp. 71 – 73.
- M. Maheswaran, B. Maniymaran, P. Card, and F. Azzedin, *"MetaGrid: A Scalable Framework for Wide-Area Service Deployment and Management,"* 16th International Symposium on High Performance Computing Systems and Applications (HPCS 2002), June 2002, pp. 61 – 71.
- M. Maheswaran, B. Maniymaran, P. Card, and F. Azzedin, *"Invisible Network: Concepts and Architecture,"* 2002 International Workshop on Invisible Computing, May 2002.
- P. Card, B. Maniymaran, M. Maheswaran, and F. Azzedin *"Invisible Networking: A Service Model for the Networks of the Future"* Advanced Topic Workshop on Middleware for Mobile Computing (held with IFIP/ACM Middleware 2001 Conference), Nov. 2001, appeared as a short paper/poster.

Awards Obtained

- Ceylon Electricity Board Prize and Gold Medal for the best performance in Electrical and Electronics Engineering at the Final Year Examination, University of Peradeniya.
- Ranjan Herath Gunaratne Memorial Prize for the best performance in the second year examination in engineering, University of Peradeniya.
- University Scholarship for the best performance at the first year examination in Engineering, University of Peradeniya.

Personal Information

- **Hobbies:** Photography, reading, bicycling, music, and movies.
- **Extra curricular activities:**
  - IEEE student member.
  - Webmaster of Advanced Networking Research Lab, McGill University.
  - Treasurer, TRLabs Winnipeg Social Club.
  - Webmaster, Web Publication Officer, Sangeetha Nattiya Sangam, University of Peradeniya.
  - Vice President, Peradeniya Electrical and Electronics Engineering Society (PEEES).
  - Won prizes in drama competitions in University of Peradeniya.
  - Member of the high school cricket team.
  - Head prefect at high school.

References

Available on request.