Curriculum Vitae **Peter M. Musial**

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MIT - CSAIL Cambridge, MA [http://csail.mit.edu]
Research Staff, 2011 – current
University of Puerto Rico Rio Piedras, PR [http://ccom.uprrp.edu]
Assistant Professor, 2009 – 2011
Naval Postgraduate School Monterey, CA [http://nps.edu]
Postdoctoral Fellow, 2007 – 2008
VeroModo, Inc. Brookline, MA [http://www.veromodo.com]
Java Developer, 2005 – 2007
University of Connecticut Storrs, CT [http://www.cse.uconn.edu]
Ph.D., Computer Science, 2007

Thesis title: *From High Level Specification to Executable Code: Specification, Refinement, and Implementation of a Survivable and Consistent Data Service for Dynamic Networks*
Thesis advisor: Prof. Alexander A. Shvartsman

Research Interests

- Design, verification, analysis, and implementation of fault-tolerant distributed systems
- Methods for distributed code derivation
- Design and analysis of parallel algorithms
- Documentation driven development of complex systems
- Task scheduling in asynchronous distributed settings

Professional Preparation

MIT – CSAIL Since July 2011

Several formal frameworks exist for modeling and reasoning about complex systems and for which software support was developed. These frameworks provide a high level notation that can be used to express concurrent systems (resp. distributed algorithms) at various levels of abstraction, and the mathematical support to reason about their properties. However, for the existing formal frameworks automated software development support is limited or nonexistent. During implementation, when high level abstractions are left up to human interpretation then this opens the possibility of undesirable behaviors being introduced into the final code thereby nullifying all formal efforts. There is a documented success for automated code generation for embedded systems. A natural question to ask if the same can be repeated for concurrent systems in general or under what constraints. Closing the gap between formal frameworks and code generation motivates my research at MIT.

EMC^2 January 2012 (Consulting)

Starting January of 2012 I joined the research/product group at EMC^2 as a consultant. Together we are designing the next version of their flagship cloud solution called *Atmos*.

University of Puerto Rico - Rio Piedras January 2009 – May 2011

A tenure track faculty position, with split teaching and research responsibility, which I resigned prior to evaluation of my tenure. This decision was made primarily on the financial and governing instability of the institution (Google: *2010 2011 UPR strikes*).

First, notable contribution to the department was a CPATH award to revitalize the undergraduate computer science curriculum by assimilating parallel computational thinking throughout all of the core courses. The premise of the award is based on the observation that the current practice in computer science education is to brain-wash students into sequential thinking, where the academic and industry reality is much different. Second, I helped in the development of the masters program that is just beginning to take shape at my old department.

Naval Postgraduate School October 2007 – December 2008

My postdoctoral research project involved derivation and formalization methods of system documentation and its use during software development life cycle. The key difficulty is to resolve system requirements as seen by the client and formulate these as concrete development goals. The process involves maintenance of project documentation and ensuring consistency as new changes are introduced throughout the process. This work proposes new methods for developing and managing project documentation to reduce specification ambiguities, verify system requirements, and simplify architecture design.

VeroModo, Inc. May 2005 until November 2007

At VeroModo, Inc. I was a Java developer of the TEMPO toolkit. This is a start-up company developing computer-aided tools for specification and analysis of complex distributed systems. This company is committed to the development of a comprehensive toolset for verification and simulation of specifications written in the Timed Input/Output Automata (TIOA) model. My responsibility was the development of the simulator plug-in. This tool can be used to guide the strategy to be followed in proving correctness of a source specification. This project was funded through a DARPA STTR grant.

Recently, I extended the toolkit with a new translation module to Java that is capable of automatically translating high level TEMPO models into executable Java code for a variety of distributed platforms. My involvement as the developer continues on and off.

Teaching Experience

University of Puerto Rico - Rio Piedras *Assistant Professor*

Twice, offered a master's-level course on the subject of *high level programming languages*. In the pragmatic sense this course completes the education of programming languages by explaining nuances of programming language syntax, their origins and evolution. In the philosophical sense this course benefits students by providing answers to the basic questions why have so many programming languages and why there is not a single unified programming model.

Also offered undergraduate courses on *computer networks*, *operating systems*, and *high level programming languages*. My teaching philosophy is to design a course that includes a healthy

mixture of theory and practice. Students are expected to be knowledgeable about the subject issues and at the same time to be able to apply the newly learned concepts in a practical setting.

University of Connecticut *Lecturer & Teaching Assistant*

In 2005, I was given an opportunity to lecture an undergraduate operating systems course, which covered the key aspects of operating systems such as: process scheduling, memory and cache architectures, and resource management. Enrolled in this course were more than fifty students. A teaching assistant was assigned to me. I was given a free hand in the design of lectures and evaluation methods.

The more interesting teaching assignments were *introduction to discrete systems*, *operating systems*, *digital logic design*, and *microprocessor laboratory*. My involvement varied from a grader to lecturer. Personally I benefited from these assignments by being exposed to the different teaching techniques, improving and solidifying my knowledge of these subjects, and very importantly having an opportunity to develop my own philosophy on teaching.

Activities

- **24^{th}DISC** `http://ccom.uprrp.edu/DISC2010`
  Program Committee member of 24'th International Symposium on Distributed Computing (DISC). (DISC is one of the top conferences in the area of distributed computing.) Held in Boston, MA, USA.

- **10^{th}ICA3PP** `http://cse.stfx.ca/~ica3pp2010`
  Technical Program Committee member of 10'th International Conference on Algorithms and Architectures for Parallel Processing. Held in Busan, Korea.

Grants, Awards, and Honors

- 2010 - 2013: (Co-PI) Title, *Collaborative Research: Cyberinfrastructure-enabled Computational Nanoscience for Energy Technologies*. Source: National Science Foundation (NSF) program EPSCoR. Total $2.7M. This is a multi-disciplinary effort. On my part the goal is to design of the physical and software infrastructure to support the grant activities. The amount dedicated to the infrastructure renovation is $445K. The direct funds under my disposition: $41K in wages (not including fringe benefits and other overhead costs), support for a postdoctoral associate and technical support (estimated at $25K), and $25K for travel. The remaining budget was divided among other PIs for their wages, materials and supplies, publication costs, computer and consultant services, and finally 47% going to the administration. (non-transferable)

- 2009 - 2012: (PI) Title, *Asserting Parallel, Computational Thinking into Undergraduate 4-year Computer Science Curriculum*. Source: National Science Foundation (NSF) program CISE Pathways to Integrated Undergraduate Computing Education (CPATH). Total $300K (non-transferable).

- 2009 - 2011: (PI) Title, *Specification, Implementation, and Evaluation of a Complex Distributed Atomic Memory Middleware Service*. Source: Fondo Institucional Para la Investigacion (FIPI) an internal to the University of Puerto Rico - Rio Piedras funding organization. Granted based on internal competition that involves external evaluation. Total $13.3K.

- 2007: Recipient of *National Research Council Postdoctoral Fellowship*. The laboratory of choice was the Naval Postgraduate School (NPS), Computer Science Department, and Prof. Luqi as mentor.
- 2006: Recipient of *Doctoral Dissertation Fellowship Award* from the Research Foundation at University of Connecticut.
- 2003–2005: Four-time recipient of *Graduate PreDoctoral Fellowships*. Award based on recommendation by the department faculty on the premise of academic achievement and the extent of involvement in the department.
- 2003: *Taylor L. Booth Memorial Scholarship*. Award for effort, excellence, and experience in teaching.

Publications

Note that authors are listed in alphabetical order.

Journal Publications

- C. Georgiou, P.M. Musial, and A.A. Shvartsman. *Developing a Consistent Domain-Oriented Distributed Object Service*. IEEE Transactions on Parallel and Distributed Systems, accepted. In IEEE Transactions Parallel Distributed Systems, 20(11), 2009.
- G. Chockler, S. Gilbert, V.C. Gramoli, P.M. Musial, and A.A. Shvartsman. *Reconfigurable Distributed Storage for Dynamic Networks*. In Journal of Parallel Distributed Computing, 96(1), 2009.
- C. Georgiou, P.M. Musial, and A.A. Shvartsman. *Long-Lived RAMBO: Trading Knowledge for Communication*. In Journal of Theoretical Computer Science, 383(1), 2007.

Conference Publications

1. A.W. Heinisch, J.-C. Lapayre, P.M. Musial. *There is no 'I' in Consensus*. In submission.
2. C. Georgiou, P.M. Musial, C. Ploutarchou, T. Radeva. *Tempo-toolkit: Tempo to Java Translation Module*. In submission.
3. C. Georgiou, P.M. Musial, C. Ploutarchou. *Using Timed Input/Output Automata to Implement Distributed Systems*. In submission.
4. P.M. Musial. *Invited Position Paper: From Formal Methods to Executable Code*, 10'th Languages for Distributed Algorithms (LADA) workshop, 2012.
5. P.M. Musial, R. Arce-Nazario, E. Orozco. *Asserting Parallel Computational Thinking into an Undergraduate Computer Science Curriculum*. In Proc. of the 2nd International Conference on Computer Science Education: Innovation and Technology (CSEIT), 2011.
6. C. Georgiou, P. Hadjiprocopiou, P.M. Musial. *On the Automated Implementation of Time-based Paxos Using the IOA Compiler*. In Proc. of the 14th International Conference On Principle Of Distributed Systems (OPODIS), 2010.

7. B. Englert, C. Georgiou, P.M. Musial, N. Nicolaou, A.A. Shvartsman. *On the Efficiency of Atomic Multi-Reader, Multi-Writer Distributed Memory.* In Proc. of the 13th International Conference On Principle Of Distributed Systems (OPODIS), 2009.

8. C. Georgiou, N. Hadjiprocopiou, P.M. Musial. *Evaluating a Dependable Sharable Atomic Data Service on a Planetary-scale Network.* In Proc. of the 9th International Conference on Algorithms and Architectures for Parallel Processing, 2009.

9. V. Berzins, Luqi, P.M. Musial. *Formal Reasoning about Software Object Translations.* In Proc. of 15th Monterey Workshop, 2008.

10. K.M. Konwar, P.M. Musial, and A.A. Shvartsman. *Spontaneous, Self-Sampling Quorum Systems for Sensor Networks.* To Proc. of 7'th International Symposium on Parallel and Distributed Computing (ISPDC), 2008.

11. C. Georgiou, P.M. Musial, A.A. Shvartsman, and E. Sonderegger. *An Abstract Channel Specification and an Algorithm Implementing It Using Java Sockets.* In Proc. of 7'th IEEE International Symposium on Network Computing and Applications (IEEE NCA), pp. 211–219, 2008.

12. K. Konwar, P.M. Musial, N. Nicolau, and A.A. Shvartsman. *Indirect Learning in Dynamic Networks to Enhance Operation Liveness.* In Proc. of the 6th IEEE International Symposium on Network Computing and Applications (IEEE NCA), pp. 223–230, 2007.

13. V. Berzins, Luqi, P.M. Musial. *Reliability Properties of Models for Flexible Design and Runtime Analysis.* In Proc. of 13'th Monterey Workshop, pp. 207–219, 2006.

14. G. Chockler, S. Gilbert, V.C. Gramoli, P.M. Musial, and A.A. Shvartsman. *Reconfigurable Distributed Storage for Dynamic Networks.* In Proc. of the 9'th International Conference on Principles of Distributed Systems (OPODIS), pp. 272–283, 2005.

15. V.C. Gramoli, P.M. Musial, and A.A. Shvartsman. *Operation Liveness in a Dynamic Distributed Atomic Data Service with Efficient Gossip Management.* In Proc. of the 18'th International Conference on Parallel and Distributed Computing Systems (PDCS), 2005.

16. C. Georgiou, P.M. Musial, and A.A. Shvartsman. *Developing a Consistent Domain-Oriented Distributed Object Service.* In Proc. of the 4'th IEEE International Symposium on Network Computing and Applications (IEEE NCA), pp. 149–158, 2005.

17. D. Kowalski, P.M. Musial, and A.A. Shvartsman. *Explicit Combinatorial Structures for Cooperative Distributed Algorithms.* In Proc. of the 25'th International Conference on Distributed Computing Systems (ICDCS), pp. 49–58, 2005.

18. C. Georgiou, P.M. Musial, and A.A. Shvartsman. *Long-Lived RAMBO: Trading Knowledge for Communication.* In Proc. of the 11'th Colloquium on Structural Information and Communication Complexity (SIROCCO), pp. 185–196, 2004.

19. P.M. Musial and A.A. Shvartsman. *Implementing a Reconfigurable Atomic Memory Service for Dynamic Networks.* In Proc. of the 18'th International Parallel and Distributed Symposium – FTPDS WS, pp. 208b, 2004.

20. P.M. Musial, A.C. Russell, and A.A. Shvartsman. *Reducing Doppler Filtering Processing in STAP Implementations.* In TechOnLine: OSEE II, 2001.

Invited Talks, Short Papers, Technical Reports

- P.M. Musial. *Invited Talk: On Atomic MWMR Registers*, EMC^2, Cambridge, MA 2011.
- P.M. Musial. *Using Timed Input/Output Automata for Implementing Distributed Systems*, MIT–CSAIL, Technical Report (number pending).
- C. Georgiou, P.M. Musial, A.A. Shvartsman, and E. Sonderegger. *Implementing Abstract Channels with Java Sockets*. In Proc. of the 26'th Symposium on Principles of Distributed Computing (PODC) as a Brief Announcement, pp. 334–335, 2007.
- S. Dolev, S. Gilbert, N. Lynch, P. Musial, A.A. Shvartsman, J. Welch. *Atomic object services for mobile and dynamic networks*. In Proc. of the the 7'th International Workshop on Interconnection Networks (IWIN), pp. 15, 2003.
- C. Georgiou, K. Konwar, P.M. Musial, and A.A. Shvartsman. *Survivable and Consistent Data for Dynamic Networks*, a poster abstract for International Conference on Advanced Technologies for Homeland Security (ICATHS), Storrs, CT, 2003.

Miscellaneous Skills

- Design and implemented few web applications based on PHP, SQL, and HTML.
- Built, maintained, and used a Beowulf cluster (Linux) of 14 machines; supervised construction of a 16 node Mini-Mac cluster.
- Helped PolTech solutions with the network configuration of an IP based surveillance system for the Greenwich Hospital in Connecticut.
- A technical contact and local administrator for U. Conn. *Planet-Lab*. Initial setup and hardware maintenance.
- Participated in the *Professional Grant Proposal Writing* workshop, 2007, offered by the Institute for Communication Improvement *The Grant Institute*. This course covered program development and evaluation, professional grant writing, and grant research.