Steven Feldman

Mr.StevenFeldman@gmail.com | Linkedin: mrstevenfeldman | 772.214.4643

EDUCATIONAL BACKGROUND

Ph.D. in Computer Science from the University of Central Florida — Expected Fall 2015 | GPA: 3.577
Dissertation Title: Design, Implementation, and Refinement of Wait-Free Algorithms and Containers.

M.S. in Computer Science from the University of Central Florida — Fall 2013 | GPA: 3.625
Concentration: Parallel and Multicore Algorithms.

B.S. in Computer Science from the University of Central Florida — Spring 2012 | GPA: 3.242
Minor: Secure Computing and Networking.

RESEARCH EXPERIENCE

UCF's Computer Software Engineering - Scalable and Secure Systems Lab

Advisor: Dr. Damian Dechev — Lab website: cse.eecs.ucf.edu

- Primary Area of Research: Develop non-blocking synchronization methodologies and use them to design non-blocking algorithms and containers.
- Results: Designed and implemented a wait-free hash map, multi-word compare-and-swap, vector, ring buffer, and adjacency list. Created a framework, Tervel, to improve the usability of these algorithms by application developers.
  - Learn about it at cse.eecs.ucf.edu/tervel
- Continuation: Develop performance metrics to determine how various synchronization methods impact performance.

Publication Count

Journals: 5 Conferences: 4 Workshops: 2 Posters: 5 *Recent publications listed on the reverse.

INDUSTRY EXPERIENCE

LLNL | Intern at Lawrence Livermore National Laboratory

May 2014 to Aug 2014 | Livermore, CA

- Primary Project: Identify and overcome scalability and performance limitations in a distributed graph partitioning algorithm.
- Results: A ground-up reimplementation that increases the maximum number of nodes from 2^{30} to 2^{40}.
- Achievement: LLNL's Catalyst cluster, using this implementation, constructed the second largest graph on the Graph500.

DISNEY | Intern in the GBTS Department

May 2012 to Aug 2012 | Orlando, FL

- Primary Project: Understand the control flow and identify the source of dead-locks in a java enterprise application.
- Results: Successfully identified the source and modified the synchronization methodologies to remove the danger.
- Secondary Project: Replace existing caching scheme with Ehcache.

TECHNICAL EXPERIENCE

Operating Systems: Linux, OSX, ChromeOS, Windows
Development Environments: Sublime, Vim, Eclipse, Netbeans, Xcode, MyEclipse
Development Tools: GDB, TotalView, Java VisualVM, Git, gprof, Whiteboard, Web Search
Technologies: MPI, C++11, Boost, DIMMAP, jBoss, Tomcat, Ehcache, SQL, clang-format
Programming Langauges:

Proficient	C++, C, Java
Moderate	Python, LaTeX, Node.js, Arduino
Basic	SQL, HTML, XML, CSS

SIGNIFICANT ACHIEVEMENTS

2013 Stamatis Vassiliadis Best Paper Award
2011 Top 10 in NSF Visualization Challenge
2011 Young Entrepreneur and Scholars
2008 UCF EXCEL Program
2007 Eagle Scout, Boy Scouts of America

PERSONAL PROJECTS

DALEK | Full Scale, Controllable Replica

- Primary Goal: Have an awesome Doctor Who themed prop that is controllable from an android tablet.
- Tech Skills: Android App Development, BeagleBone, Node.js, motor controllers, I2C, servo controllers, LED, and more.
- Other skills: Wood working, sanding, filling, fiber glassing, 3D printing.

INGRESS | First Saturday Scoring System

- Primary Goal: Create an automated check-in and check-out system for ingress events.
- Tech Skills: Python, terracota ocr, google api.
- Status: Alpha implementation created and future development suspended.

Steven Feldman

Mr.StevenFeldman@gmail.com | Linkedin: mrstevenfeldman | 772.214.4643

DISSERTATION ABSTRACT

My research has been on the development of concurrent algorithms for shared memory systems that provide guarantees of progress. Research into such algorithms is important to developers implementing applications on mission critical and time sensitive systems. These guarantees of progress provide safety properties and freedom many hazards, such as dead-lock, live-lock, and thread starvation. In addition to the safety concerns, the fine-grained synchronization used in implementing these algorithms promises to provide scalable performance in massively parallel systems.

My research has resulted in the development of wait-free versions of the hash map, ring buffer, vector, and a multi-word compare-and-swap algorithms. Through this experience, I have learned new techniques and methodologies for implementing non-blocking and wait-free algorithms. I have worked with and refined existing techniques to improve their practicality and applicability. In the creation of the aforementioned algorithms, I have developed an association model for use with descriptor-based operations. This model, originally developed for the multi-word compare-and-swap algorithm, has been applied to the design of the vector and ring buffer algorithms.

To unify these algorithms and techniques, I am implementing a library of data structures. This library includes constructs and coding conventions that simplify and improve the design of non-blocking algorithms. One such convention is a call-back centric design pattern when implementing descriptor based algorithms. Compared to early implementations, this design pattern exhibits less code duplication and fewer perceivable states. When reimplementing algorithms for this library, I made modifications to their API specification. These modifications removed ambiguity and non-deterministic behavior found when using a sequential API in an concurrent environment.

The focus of my research is shifting to the testing and optimizing of the algorithms in my library. To achieve this, I am using and extending OVIS's Lightweight Distributed Metric Service (LDMS)'s data collection and transport system. I have created samplers to enable the use of perf_event and PAPI within LDMS. By monitoring hardware counters, I will attempt to identify behavior that leads to poor performance. Some behavior include thread congestion, thread preemption, edge case handling, and thread starvation.

Publications

S. Feldman, C. Valera-Leon, and D. Dechev, ``An efficient wait-free vector,'' *Parallel and Distributed Systems, IEEE Transactions on*, vol. PP, no. 99, pp. 1--1, 2015.

S. Feldman, P. LaBorde, and D. Dechev, ``Tervel: A unification of descriptor-based techniques for non-blocking programming,'' in *International Conference on Embedded Computer Systems: Architectures, Modeling and Simulation*, July 2015.

A. Barrington, S. Feldman, and D. Dechev, ``A scalable multi-producer multi-consumer wait-free ring buffer,'' in *Proceedings of the 2015 ACM Symposium on Applied Computing*, April 2015.

M. B. G. Steven D. Feldman, Roger A. Pearce, ``In-place partitioning of massive scale-free graphs in nvram,'' in *LLNL Summer Student Symposium*. Lawrence Livermore National Laboratory, 2015.

S. Feldman, P. LaBorde, and D. Dechev, ``A wait-free multi-word compare-and-swap operation,'' *International Journal of Parallel Programming*, pp. 1--25, 2014. [Online]. Available: http://dx.doi.org/10.1007/s10766-014-0308-7

------, ``A practical wait-free multi-word compare-and-swap operation,'' in *Many-Core Architecture Research Community (MARC) Symposium at SPLASH 2013*, October 2013.

S. Feldman, A. Bhat, P. LaBorde, Q. Yi, and D. Dechev, ``Effective use of non-blocking data structures in a deduplication application,'' in *In Proceedings of the Fourth Annual ACM Conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH 2013)*, October 2013.

S. Feldman, P. LaBorde, and D. Dechev, ``Concurrent multi-level arrays: Wait-free extensible hash maps,'' in *International Conference on Embedded Computer Systems: Architectures, Modeling and Simulation*, July 2013, pp. 155 -- 163.

D. Dechev, P. Laborde, and S. Feldman, ``Lc/dc: Lockless containers and data concurrency a novel nonblocking container library for multicore applications,'' *Access, IEEE*, vol. 1, pp. 625--645, 2013.

S. Feldman, P. LaBorde, and D. Dechev, ``A Lock-Free Concurrent Hash Table Design for Effective Information Storage and Retrieval on Large Data Sets,'' in *Proceedings of the 15th Annual High Performance Computing Workshop (HPEC 2011)*, 2011.