Christian DeLozier

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EDUCATION

University of Pennsylvania – PhD in Computer and Information Science September 2010 – May 2018 (expected)

- Advisor: Prof. Joseph Devietti (Formerly advised by Prof. Milo M. K. Martin)

University of Pittsburgh – Bachelor of Science in Computer Science and Mathematics August 2006 – May 2010

- Graduated Summa Cum Laude
- Directed Studies: Multicore Scheduling and Fault Tolerant Memory (Advised by Prof. Bruce Childers)

AWARDS AND HONORS

Qualstar Hall of Fame - For outstanding contributions to MARE parallel framework at Qualcomm

Upsilon Pi Epsilon – Founding Member, University of Pittsburgh Chapter

PUBLICATIONS

Conference Papers

- SOFRITAS: Serializable Ordering-Free Regions for Increasing Thread Atomicity Scalably. **Christian DeLozier,** Ariel Eizenberg, Brandon Lucia, Joseph Devietti. To appear at ASPLOS 2018.
- TMI: Thread Memory Isolation for Effective False Sharing Repair. **Christian DeLozier**, Ariel Eizenberg, Shiliang Hu, Gilles Pokam, Joseph Devietti. MICRO 2017.
- Ironclad C++: A Library-Augmented Type-Safe Subset of C++. **Christian DeLozier**, Richard Eisenberg, Santosh Nagarakatte, Peter-Michael Osera, Milo M. K. Martin, and Steve Zdancewic. OOPSLA 2013.

Workshop Papers

- MAMA: Mostly Automatic Management of Atomicity. **Christian DeLozier**, Joseph Devietti, Milo M. K. Martin. WoDet 2014 (Co-Located with ASPLOS 2014).

Technical Reports

- ORCA: Ordering-free Regions for Consistency and Atomicity. **Christian DeLozier**, Yuanfeng Peng, Ariel Eizenberg, Brandon Lucia, Joseph Devietti. CIS Technical Report #MS-CIS-16-01.
- Core Ironclad. Peter-Michael Osera, Richare Eisenberg, **Christian DeLozier**, Santosh Nagarakatte, Milo M. K. Martin, Steve Zdancewic. CIS Technical Report #MS-CIS-13-06.

In Submission

- Hurdle: Securing Jump Instructions Against Code Reuse Attacks. **Christian DeLozier**, Kavya Lakshminarayanan, Gilles Pokam, Joseph Devietti. In submission to ISCA.

Journal

- Using ecological momentary assessment to determine media use by individuals with and without major depressive disorder. Brian Primack, Jennifer Silk, **Christian DeLozier**, William Shadel, Francesca Dillman Carpenter, Ronald Dahl, Galen Switzer. In Archives of Pediatric and Adolescent Medicine, 2011.

RESEARCH EXPERIENCE

Univeristy of Pennsylvania (Research Assistant) *September 2010 - Present*

- Serializable Ordering-Free Regions for Increasing Thread Atomicity Scalably (SOFRITAS)
  - Designed and implemented highly efficient runtime system that manages lock operations for ordering-free regions in software
- Ordering-Free Region for Consistency and Atomicity (ORCA)
  - Approximates the necessary atomicity for parallel programs at ordering boundaries
  - Designed lock cache and hardware address translation to accelerate lock operations
  - Performed user study on students ability to correctly synchronize code using pthreads and OFRs
- Thread Memory Isolation for Effective False Sharing Repair (TMI)
  - Efficient repair of false sharing bugs in parallel programs using processes and virtual memory
  - Designed ptrace mechanism that converts running threads into processes
  - Improved virtual memory false sharing repair techniques to support code-centric synchronization and targeted repair of specific pages
- Securing Jump Instructions Against Code Reuse Attacks (Hurdle)
  - Secures indirect jump and call instruction against code reuse attacks
  - Designed an extended branch history register (BHR) to provide context-sensitive information about an application's dynamic control-flow
  - Used the Z3 SMT solver to generate runtime constraints based on dynamic control-flow histories
- Bringing Efficient Type-Safety to C++ (Ironclad C++)
  - Provides type-safety for C++ at a relatively low performance overhead using static source-code validation, minimal runtime checks, and garbage collection
  - Implemented a static source-code validator and a source-to-source refactoring tool using *clang*
  - Augmented the Boehm-Demers-Weiser garbage collector to perform precise marking for heap objects
- Memory Safety for GPU Applications
  - Implemented an Ocelot compiler pass that instruments PTX kernels for memory safety
  - Worked with NVIDIA scientists to optimize performance of memory safety instrumentation

Qualcomm Research Silicon Valley June 2013 – August 2013

- Intern, MARE Parallel Programming SDK (Mentored by Pablo Montesinos Ortego and Calin Cascaval)
- Developed synchronization constructs for task parallel programming framework
- Debugged 64-core and algorithmic performance bugs

University of Pittsburgh Center for Health and Media January 2008 – August 2010

- Undergraduate Research Assistant (P.I. Dr. Brian Primack)
- Designed and implemented web-based surveys on substance use and media habits
- Assisted with literature review, performed qualitative analysis of data, and provided insights on media use habits for study on effects of media use and depression in teenagers

TEACHING EXPERIENCE

University of Pennsylvania Center for Teaching and Learning Certificate *Awarded September 2017*

- Attended seminar series on teaching computer science
- Taught graduate computer architecture lesson to 40 students under observation by a CTL fellow
- Discussed teaching philosophy and goals with member of the Center for Teaching and Learning

Volunteer Coding Instructor, Saint Francis de Sales School (5th-8th grades) *Fall 2017 and Spring 2018*

- Introduced computer science curriculum for 5th through 8th grade students in a diverse classroom

Instructor, Penn Institute for Computational Science C/C++ Tutorial (Graduate) *August 2015*

- Introduced students in engineering and life sciences to programming with C and C++
- Materials available at https://github.com/crdelozier/picstutorial

Instructor, CIS 190: C++ Programming (Primarily Undergraduate) *Fall 2014 and Spring 2015*

- Covered introductory syntax and semantics, pointers and memory management (with a focus on memory safety), classes and object-oriented programming, templates, parallel programming with C++11, and GPU programming with CUDA
- Designed new homework assignments on debugging, memory safety errors, smart pointers, templates, and memory allocators
- Lecture notes available at http://www.cis.upenn.edu/~cis190/fall2015/

Instructor, Embedded Systems C Bootcamp (Graduate) *September 2014*

- Introduced embedded systems students to C programming in a two day course

Teaching Assistant, Computer Organization and Design (Undergraduate) *Spring Semester 2012*

- Substitute taught lecture on Virtual Memory

Teaching Assistant, Computer Architecture (Graduate) *Fall Semester 2011*

- Assisted with homework design and grading
- Held weekly office hours and answered student questions on Piazza

MISCELLANEOUS

Office Committee – University of Pennsylvania, Computer and Information Science Department

Section Leader – University of Pittsburgh Marching Band

Kappa Kappa Psi Honorary Marching Band Service Fraternity