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Work Experience

Senior Software Engineer (VeriSilicon, 2019-2021)

Between January 2019 and February 2021, I was a software engineer at VeriSilicon, serving on the ZSP tools team. During this time, I was promoted to senior software engineer. My responsibilities during this time included:

- Developing a ZSP-to-x86 binary translator, first for Nano and subsequently for Nano+

- Developing an instruction scheduler and register allocator for multiple ZSP G5 architectures

- Developing a multicore network-based debugging infrastructure using GDB and MDI

- Porting the Windows tools from MSVC and Cygwin to mingw, then from 32-bit to 64-bit

- Developing an automated build and validation infrastructure for Linux tools

- Deploying a Linux-to-mingw cross compiler in order to add the Windows tools to the automated build infrastructure and WINE to add the Windows tools to the automated validation infrastructure

  I received VeriSilicon's Outstanding Engineer Award in 2019.

Lecturer (Georgia College, 2014-2018)

Between January 2014 and May 2018, I was a full-time Lecturer at Georgia College. In this role, I taught classes including Introduction to Computers, Computer Science I, Programming II, Programming Languages, and Computer Security. Introduction to Computers is a class for non-majors covering computer literacy, Microsoft Office, and introductory programming in the Alice programming environment. Teaching that class greatly sharpened my ability to clearly communicate complex ideas to nontechnical individuals.

As part of my service to the university, I purchased several Raspberry Pi computers and hooked them to the dozen TVs in a newly renovated nontraditional classroom, so that the instructor's computer screen could be shared on all the TVs in the room.

Although not part of my official duties as a Lecturer, during this time period I wrote several computer programs to assist myself and others in teaching classes. Among my works are:

- An interpreter for a new programming language – Bolvangar – which I designed and implemented to assist in teaching Programming Languages

- The Philotes interpreter for a subset of the Java programming language, which I used when teaching Georgia College's Computer Science I class

- An automatic grader for student homeworks. I hosted this automatic grader on a personal server that I rented for this purpose, giving me experience in hosting and administering a complex web application. I also administered and continue to administer VPN software on this same rented server.

During this time, I also programmed an email client for my own personal use, in order to help me efficiently respond to the many emails I received from the 120-150 students I taught each semester. I named this email client MailTask. As another side project, I wrote a patch for the Linux kernel's network bonding driver which adaptively sends more traffic over higher-capacity interfaces.

I have donated the source code to all of the computer programs I just described (except, to prevent cheating, the autograder), along with that of others I have developed over the years, to open source. These works are available for inspection, download, or use at `https://github.com/linuxrocks123`.

Office Automation Startup (Plano, TX, 2012-2013)

From 2011 to 2013, I worked on an office automation startup for law firms. I wrote a dependency analyzer library and used the FLTK graphics kit to create a user interface for the application. I also learned the PerfectScript macro language in order to automate WordPerfect. I gained experience with C++11 from this position.

Course Instructor for Computer Architecture I
(University of Illinois at Urbana-Champaign, 2011)

During the summer of 2011, I was the instructor for Computer Architecture I. I was solely responsible for the lectures for the class and for supervising the work of a teaching assistant and grader. My duties also included creating the exams for the class. From this position, I gained experience teaching and administering a college-level course. I learned how to use the Blackboard course management system from this position.

Doctoral Research
(University of Illinois at Urbana-Champaign, 2008-2011)

From 2008 to 2011, I was a doctoral candidate in computer science at the University of Illinois at Urbana-Champaign. During my courses and research, I gained experience in the following areas:

- **LLVM compiler infrastructure:** designed and implemented shared memory isolation pass in C++ using LLVM, DSA, and automatic pool allocation technologies

- **Assembly language and security:** designed and implemented Loop-Amnesia, a cold-boot immune disk encryption system, in x86 assembly language

- **Systems programming and security:** designed and implemented PALLOC2, a high-performance implementation of C malloc/free providing baggy bounds checking as a side effect of its design and making use of pthread locking and lock-free concurrency control

- **Web programming, multimodal transportation, website scraping, graph theory, databases:** designed and implemented "Go Away!" multimodal travel recommendation system in Python and JavaScript

College Tutor (University of Texas at Austin, 2007-2008)

My last year of undergraduate college, I worked as a tutor in computer science. I gained a great deal of experience teaching students one-on-one from this position and received high feedback scores from the students I tutored, many of whom signed up for multiple sessions.

Software Engineering Intern (Texas Instruments, 2006-2008)

During summers 2006-2008, I interned at Texas Instruments in Houston as a software engineer on the compilers team. I gained experience in general systems programming as well as the following areas:

- **Dynamic loader implementation:** During summer 2008, I was responsible for implementing the first ELF dynamic loader for the C6x DSP architecture. This loader, written in C, is now used in production and is included in the open-source code releases at `http://www.linux-c6x.org/wiki/index.php/Releases`

- **Software testing and self-hosting compilers:** During summer 2007, I enhanced the TI compiler team's testing infrastructure by porting several Linux applications to the C6x architecture, including primarily a self-hosting version of TI's C6x Linux compiler, written in C++. This effort resulted in the detection of several previously unknown bugs in the C6x compiler and gave me experience making changes to the large code base of a highly optimizing industrial compiler.

- **Assembler and bootloader modification:** During summer 2006, I was responsible for adding instructions to TI's ARM assembler, written in C++, and making modifications to the ARM bootloader, written in ARM assembly language.

Programming Language Familiarity

Expert Knowledge: C++, C, Java, Python2, Bash
Good Knowledge: Python3, SQL, multiple assembly languages
Basic Knowledge: Tcsh, Scheme, Expect/Tcl, Haskell, Simula, Pascal
Somewhat familiar: Perl, Emacs LISP, Common LISP, Matlab, R

Academic Qualifications

- University of Illinois at Urbana-Champaign
  Thesis Masters in Computer Science conferred Spring 2011

- University of Texas at Austin
  Bachelors of Science in Computer Science conferred Spring 2008 with Honors
  Completed Turing Scholars Honors coursework sequence

- Academic Honors
  Ray Ozzie Fellowship Recipient Fall 2008 - Spring 2009
  U.T. College of Natural Sciences Dean's List Fall 2005 - Fall 2007
  U.T. University Honors Fall 2005 - Fall 2007
  U.T. College of Natural Sciences Distinguished College Scholar
  National Merit Finalist and Scholarship Recipient

- Grades and Standardized Test Scores
  Overall undergraduate GPA: 3.8571/4.0
  Undergraduate GPA across CS department classes: 4.0/4.0
  Graduate Records Exam: 800Q / 730V / 4.0W / 810CS
  Plano Senior High School GPA: 4.45/4.0
  Plano Senior High School class rank: 3/1100
  SAT I scores: 730 M / 770 V

- Selected Course History (courses before Fall 2008 were taken as undergraduate)

CS498dp: Multicore, Cluster Parallel Programming   Fall 2008, instructor Dr. David Padua
CS598wg: Architecture, Algorithms, & Models   Fall 2008, instructor Dr. William Gropp
CS533: Parallel Computer Architectures   Spring 2009, instructor Dr. Josep Torrellas
CS526: Advanced Compiler Construction   Spring 2009, instructor Dr. David Padua
M412: Graph Theory   Fall 2009, instructor Dr. Sujith Vijay
CS411: Database Systems   Fall 2009, instructor Dr. Kazuhiro Minami
CS422: Programming Language Design   Spring 2010, instructor Dr. Grigore Rosu

CS352H: Honors Computer Architecture   Fall 2006, instructor Dr. Stephen Keckler
CS105: Python Language   Spring 2006, instructor Mr. Alan Oursland
CS341H: Honors Automata Theory   Spring 2007, instructor Dr. Elaine Rich
CS375: Compilers   Spring 2007, instructor Dr. Gordan Novak
CS380C: Compilers (graduate level)   Fall 2007, instructor Dr. Keshav Pingali
CS357: Algorithms   Fall 2007, instructor Dr. Charles Plaxton

Publications

References

[1] Robert L Bocchino Jr, Vikram S Adve, Danny Dig, Sarita V Adve, Stephen Heumann, Rakesh Komuravelli, Jeffrey Overbey, Patrick Simmons, Hyojin Sung, and Mohsen Vakilian. A type and effect system for deterministic parallel java. In *ACM Sigplan Notices*, volume 44, pages 97–116. ACM, 2009.

[2] Patrick Simmons. Security through amnesia: a software-based solution to the cold boot attack on disk encryption. In *Proceedings of the 27th Annual Computer Security Applications Conference*, pages 73–82. ACM, 2011.

[3] Patrick A Simmons. Palloc: parallel dynamic memory allocation. Master's thesis, 2011.

Professional references are available upon request.