Benjamin Scher Purcell

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Objective

Skilled software developer proficient in multiple languages and complex software design seeking an

Career History

- **Sabbatical/Break**—Mexico City, Mexico
  Personal Project Work: January 2017–present
  - Wrote an *n*-body simulator that models gravitational interactions on the order of thousands of bodies. Uses velocity verlet integration together with a Barnes-Hut quad-tree data structure to reduce calculations to

    $$O(n\log(n))$$

    complexity. Has a fully graphical front-end which allows for creation of new bodies/galaxies among other interactive features.
  - Wrote an assembler/emulator for the **MIX** computer architecture. This is the computer architecture used for the seminal computer science textbook *The Art of Computer Programming*. It can compile and execute all examples and exercises from *TAOCP*.
  - Worked on a C compiler that uses a *continuation passing style* intermediate representation for the backend/optimization stage. Front end is complete, currently working on translation to *CPS*
  - Wrote *AVL* and red-black binary search tree implementations in a number of languages: C, C++, Go, SML, and OCaml. This is one way I learn new languages.
  - I am a developer with commit access to an actively developed *Plan 9* operating system fork. I committed various bug fixes and other development work during this period including working on a file-system check for an experimental new *Plan 9* filesystem.
- **Backstop Solutions Group**—Chicago, IL
  Software Engineer: April 2015–January 2017
  - Provided bug fixes and new development for combined CRM and financial accounting platform for the alternative investment community.
  - Also worked on *.NET* suite of applications to help executives interface with main platform via *Microsoft Office* and *Excel.*
  - Developed location search functionality for the CRM platform: Javascript front-end, Java/Oracle backend. Allowed fund managers to find clients along multiple vectors.
  - Developed *Microsoft Outlook* calendar integration with the CRM platform. Provided automatic syncing of Outlook meetings with the CRM. C#/*WPF* frontend, interfacing with REST backend in Java.
- **IPsoft Inc.**—Chicago, IL
  Devops Engineer: October 2014–April 2015
  - Wrote programs/scripts to automate systems deployments and uptime management for Fortune 500 level corporations.
  - Primary development languages were Perl, Javascript, Bash, and a proprietary internal scripting language.
  - Scale of automated management was on the order of hundreds of servers.
- **WiredTree Managed Hosting**—Chicago, IL

Supervisor of Technical Support/Devops Engineer: September 2013–October 2014

- Supervised teams of 3–5 support administrators and set system administration policies.
- Created software for deployment, automation, and monitoring of servers for in-house use.

- **The Academic Approach**—Chicago, IL
  Mathematics Writer: October 2012–September 2013
  - Wrote and edited mathematics curriculum for Chicago Public Schools and charter schools.
  - Engineered formatting packages for published curriculum materials.

Skill Highlights

- Expertise in C, Java, C#, C++, Go, SML, OCaml, Perl, ARM assembly, x86 assembly, and x86_64 assembly.
- Agile/Scrum methodology.
- API design.
- Algorithms and Data Structures.
- Skilled experience with the various and issues and pitfalls of maintaining legacy code and reducing technical debt.

Education

- **University of British Columbia**—British Columbia, CA
  Master's Degree in Mathematics: September 2007–December 2009
  - Worked on applicaitons of algebraic geometry to string theory. Specifically Donaldson-Thomas invariants as a generalization of Gromov-Witten invariants.
  - Coursework complete but I did not complete the thesis for the degree.
- **Oberlin College**—Oberlin, OH
  Bachelor's Degree in Mathematics magna cum laude: September 2002–December 2006
  - Graduated with an honor's thesis on the category theory of groups.
  - Also completed original research in number theory which was published in *The Fibonacci Quarterly* Volume 45, Number 3, August 2007.

Miscellaneous Achievements and Skills

- I have completed a highly optimized regular expression matching library which is currently in use in a community maintained fork of the *Plan 9* operating system. It provides the full *POSIX* regular expression syntax with guaranteed worst-case performance time that is linear in the length of the input.
- I have published original number theory research: under the title: Burns and Purcell, "Counting the number of winning binary strings in the 1-dimensional same game," *The Fibonacci Quarterly*, Volume 45 Number 3, August 2007
- Implemented numerous synthetic network filesystems.
- I have written a C programming language compiler extension that adds support for concurrency operations such as type-checked thread creation and type-checked channel passing between threads.

I maintain a portfolio of personal work at `https://github.com/spewspew`