Gregory Schare

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EDUCATION

Columbia University, New York, NY May 2024
B.A. in Computer Science and Mathematics. (GPA: 3.83)
Relevant coursework: Programming Languages and Translators. Systems Programming (Unix, C, networking). Data Structures. CS Theory. Computer Systems. Modern Analysis. Modern Algebra. Multivariable Calculus and Linear Algebra (Honors). Discrete Mathematics. Readings in Analysis of Boolean Functions, Cryptography, Representation Theory. Macro and Microeconomics.

PROFESSIONAL EXPERIENCE

Software Engineering Intern, Evolution Team, CertiK. New York, NY June 2022 – present

- Brought 4-year stagnated project into production, allowing auditors to automatically verify Solidity NFT contracts
- Successfully patched tool to verify 30 contracts for high-profile client while tool development was still in progress
- Designed improvements to formal specification language, including streamlined syntax, loop and contract invariants
- Implementated parser and translator from formally-specified source code to z3 SMT solver using Python and antlr4

Programmer, Making and Knowing Project, Columbia University. New York, NY June 2020 – present

- Achieved 77x speedup of text analysis pipeline by replacing regex with XML parsing using Python lxml library
- Rendered dataset generation more convenient and accessible for non-technical researchers by leading refactor of legacy code from the ground up, implementing optional filters, and providing three additional data metrics
- Led archiving, data cleanup, and fully navigable web presentation of student lab reports and essays using Google Drive API and Pandoc, with emphasis on minimal computing principles
- Generated static sites to exhibit ongoing projects and editorial discussion by augmenting Pandoc and Jekyll with custom content management and templating systems written in Haskell and JavaScript

PROJECTS

Imperative Programming Language. *Programming Languages and Translators* with Professor Ronghui Gu.
As a team of 5 students, designed and implemented an imperative programming language designed to enable type-safe task automation scripting. Prepared language proposal, formal language specifications, grammar, and final language report. Implemented language in OCaml using ocamllex for scanning and ocamlyacc for parsing. Built abstract syntax tree, semantic checker, and compiler to LLVM. Highlights: dynamic Python-like lists, C-like structs, Bash library functions.

Scheme Interpreter. *Structure and Interpretation of Computer Programs.*
Implemented a meta-circular evaluator, i.e. a Scheme interpreter written in Scheme.

Visual algorithms: metaballs, Floyd-Steinberg dithering, boid flocking.
Metaballs: algorithm for blending 2D shapes. Floyd-Steinberg dithering: algorithm for reducing colors in images while preserving content. Boids: simulation of bird flocking behavior.

HTTP web server. *Advanced Programming* with Professor Jae Woo Lee.
Developed HTTP web server and data server from scratch using Unix sockets API in C. Implements three-tier architecture. In addition to serving static HTML and media, the web server communicates over TCP with data server to dynamically deliver results of searching a database.

Programming Challenge in Haskell. *Advent of Code 2020.*
Solved 25 days of programming challenges. 78% pure functionally programmed in Haskell. Highlights: comonads, functional caching using lazy evaluation of infinite data structures, Chinese Remainder Theorem, parsers and domain-specific language implementations. Solutions available at github.com/gschare/aoc2020.

SKILLS

Programming languages: Proficient in C, Java, Python, Haskell, Racket. Experienced in Javascript, HTML, CSS.
Technologies: Proficient in Git, Unix, Node, React, SQL, Processing, Jekyll, Photoshop. Experienced in AWS, Digital Ocean, spaCy, Next.js.

LEADERSHIP AND ACTIVITIES

Instructor, *Mastery Learning Hour.* Tutor K-12 students one-on-one in mathematics with a drop-in session format.
Webmaster, *Columbia Space Initiative.* Maintain statically-generated (Jekyll) club website. See columbiaspace.org.
President, *Philolexian Society.* Moderate weekly debates. Organize public and private events and finances. Liaison with Philolexian Foundation board members.
Treasurer, *Columbia Platypus.* Manage club finances and guest speaker honorariums. Lead weekly reading group.