

TOM RITCHFORD

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Decades of experience; a plethora of projects taken from conception to completion and production, in areas including search, large data, audio and DSP, fintech, distributed systems, lighting control, audio, and more; hundreds of thousands of lines of working, tested production code in two dozen programming languages; expert in Python and C++.

I specialize in rapid development of highly reliable, performant, scalable, minimal, clear and maintainable solutions to difficult problems. “Everything should be made as simple as possible, but no simpler.”

EMPLOYMENT HIGHLIGHTS

CTO, Engora

April 2021 – Jan 2023

Engora is an innovative search engine for mechanical engineering parts.

The founder created a good demo and then raised money through crowdfunding and Reddit and I came in after that, first as a consultant and then became CTO.

As the only full-time programmer I had my hands in everything, but here are the parts I wrote all of, all in Python:

- A *parts crawler* over two dozen disparate websites totalling almost a million parts, first directly, then proxied, finally using ScraperAPI’s fancy new asynchronous proxy, with a *searchable HTTP cache* in PostgreSQL, later rewritten entirely because it got huge and I learned better.
- A *data store* based on S3, replicated over multiple providers and with an incremental offsite “physical” backup, a *data resource management system*, for convenient replication of resources, and projects containing multiple resources, including sharded files.
- A neat little proprietary *memory-mapped index* for direct searching and retrieval, and Whoosh for text searching.
- Configuration files and variables, monitoring variables, logging, user interaction journaling, and other unsexy but satisfying details.
- “Practically complete” test coverage of everything
- And to run and keep track of all of those, a tidy typer CLI named *engora*, with over two dozen commands and subcommands, hundreds of flags and “practically complete” documentation.

Contractor, A-Team

January 2021 – January 2022

A-Team is a consultancy firm with a very usable billing and organization system, and a competent, warm and supportive management, that provided me with solid but unremarkable programming C++ and Python contracts then.

Lead developer on BiblioPixel, Maniacal Labs

(2016-2019)

Maniacal Lab’s BiblioPixel was a popular lighting control program written in Python to control LEDs in strips, matrices, cubes and other layouts, as well as other lighting systems such as the Philips Hue and DMX.

I rewrote it from the ground up, with a REST server for pixel and higher-level control, both code and data plug-ins, animators including video feedback with an IIR filter, and a new data model using `numpy` arrays, leading to very roughly a 30x speedup with perfect backwards compatibility. Mostly Python, some Cython and C++. (I’d use pybind11 if I had to do it again.)

Senior software engineer at Ripple

(2014-2016)

Ripple is a financial technology firm with its own eponymous cryptocurrency. I worked on their flagship application *rippled*, a complex and complicated C++17 crypto-ledger that actually implements their cryptocurrency, on the ledger code, on deployment, debugging, devops, build and monitoring. Mostly in C++ with some Python.

CTO, World Wide Woodshed

(2009-2014)

I had always wanted to write a complete desktop audio application!

World Wide Woodshed’s SlowGold was a leader in music practice software from the 1990s. I bought half the tiny company, and was the sole developer for a brand-new product in C++, with high-quality audio, subtle and intuitive editing tools, and little details like three second startup and shutdown.

Software engineer, Google

(2004-2009)

I joined Google New York when it was a single floor on Times Square, worked on their first question-answering system, the first Music Search, then its short-lived Real Estate search.

This led me to GoogleBase, a database of tens of billions of items planned for millions of users. Leading a tiny and changing team, over two years we built a universal reporting and computation framework I had proposed and designed. It was still in common use years later.

As a reward for this slog, I was privileged to work on GWS, the front end that generated all Google results pages, for i18n, l10n and translations, and the GWS live experiment framework.

And I interviewed hundreds of engineers, traveling twice to Korea and once to Hungary for this.

I used C++, Java and Python, and the usual string of Google technologies.

Senior software developer, Netomat

(2001-2004)

Netomat had an innovative rich media tool to let users and advertisers create and send Netomat “experiences” – little Java applet minisites with animation, sound and internal navigation - to users who could edit them within the email itself. Yes, Java applets, but it seemed very plausible at the time.

I designed and wrote the animation engine and front-end, most of the animation types and the manual.

Still one of my favorite “neat hacks” ever, I wrote a tool that converted “experiences” (animations) right into Java bytecode, for a 40-80% savings in download and memory size.

SKILLS

- expert Python: flask/SQLAlchemy/Django, numpy, Cython/C++ APIs, real-time, packaging!
- Architecture and high-level design: clean, simple, practical, scale-appropriate designs
- Data analysis and retrieval: clustering, search and indexing, data pipelines, S3, MapReduce, log analysis
- C/C++: modern C++11-23, STL, DSP, concurrency, Juce, Boost, real-time, digital audio
- PostgreSQL database design and use
- Considerable Javascript, strong Linux, `bash` and particularly `git`
- practical DevOps: sysadmin “classic”, deployment/release/integration, monitoring and logging
- Globalization: Internationalization, localization, translation, Unicode and encodings
- Java: distributed systems, automatic bytecode generation, animation
- Performance optimization
- Fintech: ledger systems, option models
- Real-time systems: digital audio and DSP, lighting control systems, MIDI
- Tool building: see the dashboard at <https://github.com/rec>

EDUCATION

I have a B.Sc. with First Class Honours in Mathematics from Carleton University, Canada.