Nat Lund

Curriculum Vitae

Nathaniel J. Lund
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New Zealand Citizen
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Physicist venturing into software development. Passionate
about code readability and clear technical writing.

Online Book **My opinions on writing good code:** `https://natlund.github.io/software_engineering/principles_of_code_structure/`

Computer Skills

Good   Python, Code Review, Software Design Analysis, Documentation

Adequate   SQL, Linux, Git, Bash, LaTeX

Basic   Python libraries: SQLAlchemy, Matplotlib, Pandas, Numpy, Scipy, Keras

C++, Amazon cloud services, Django web framework

Communication Skills

Written   **Technical Writing:** PhD thesis noted for outstanding depth and clarity.

Work History

March 2022 – **Senior Software Engineer (Quant)**, Chetwood/Yobota *(merged)*
Present   Yobota was merged with Chetwood, a challenger bank based in Wrexham, Wales. I continued to work on the same Quant code base that administered account business logic and maths.

- Was Tech Lead on a sub-project to deliver variable interest rates on deposit accounts, as part of a project to deliver 'easy access' deposits.
  - Worked with a product expert to develop a domain model to precisely describe the mechanism of rate changes.
  - Spent many weeks in analysis with a database engineer, writing engineering specs.
  - Supervised engineers in building various components, and built some myself.
  - Every fortnight, conferred with engineers and updated a Gantt chart, to give management a view on progress.
  - When the wider project was jeopardised by personnel losses following the merger, raised this to management. (Project was ultimately cancelled.)
- Worked on project to deliver Upfront Fees on loans, with appropriate fee rebates.
  - Worked closely with fellow Quant engineers on analysis and proposing solutions.
  - Created a slide deck with diagrams to explain issues and options to non-techical stakeholders, and met daily with product experts to discuss and decide on solutions.
  - To maximise Quant team throughput while keeping code quality high, I prioritised doing multiple rounds of thorough code review, and in-depth design discussions.
  - Carefully extended complex, fragile existing code to reconcile any fee rebates due to events occurring in the grace period of a scheduled payment.
  - The Quant team met a tight self-imposed deadline for our work, to give the wider team a chance to meet a quarterly objective. Our efforts and discipline were commended at the highest level.

July 2019 – **Mid Software Engineer (Quant)**, Yobota, London UK, www.yobota.xyz
March 2022 Yobota was a startup building a banking software platform in the cloud. I worked in the
Quant team, on the core code base that administered the business logic and financial
mathematics throughout the life cycle of each loan or deposit account.

- ○ The platform code base was rapidly-written 'startup-style' code with business logic scattered throughout the Quant code and database functions. Because the system was 'event-driven', code units with no connection were nevertheless tightly coupled. I eventually became a relative expert in Quant code and system behaviour, second only to the programmers who originally built the system.
- ○ Fixed numerous bugs, most of which required weeks of analysis, coding, and testing via simulations.
- ○ As the last line of customer support, did deep analysis into loans in an inconsistent state (usually due to bugs). Provided forensic analysis of what went wrong, made recommendations for the support fix, and specified the bug fix in code.
- ○ Built a module to replay the history of a loan, automatically re-pricing it, assuming a payment had been received at an earlier time.
- ○ Built a module with a 'fluent' method-chaining interface to systematically generate the hundreds of lines of JSON needed for database function calls, that were previously being assembled in an ad hoc fashion.
- ○ Was Tech Lead on a project to add the capability of fees onto loans. Did analysis of full event-driven flow, worked with product expert, created an engineering spec with diagrams, communicated the spec to other engineers, and wrote my part of the code. The project was rumoured to be the first to complete on time, with all functionality in place, and high-quality code.
- ○ Was Tech Lead on a project to add Account Opening fees on loans. Checked the maths, and productionised a prototype Newton-Raphson numerical solver for Annual Percentage Rate (APR), that was given to us by management.
- ○ Acquired a reputation for 'brutal' but kind and constructive code reviews: thorough and deep, focusing on readability, and simple, maintainable code.
- ○ Mentored more junior engineers, especially in the art of writing readable code.
- ○ Created a slide deck to drive discussions on engineering management, met with engineering managers, and captured a decent consensus view of our best engineers and engineering managers.

Aug 2018 – **Data Engineer**, Flexciton, London UK, www.flexciton.com
April 2019 Flexciton helps industrial factories solve the problem of production scheduling, by providing
a web interface to a state-of-the-art scheduling optimisation algorithm.

- ○ Worked on the repository code layer that translates between a Postgres database and Python domain model objects using the sqlalchemy library.
- ○ General back-end development in the Flask web app.
- ○ Wrote an Ontology, working with all stakeholders to converge on definitions of all key concepts, and creating schematic diagrams of the conceptual relationships.
- ○ Wrote documentation, including docs that reduced the on-boarding time for a new developer from three days down to one day.

Sep 2016 – May 2018	**Software Engineer, Data Scientist**, Metail, Cambridge UK, www.metail.co.uk Metail is a fashion-tech startup that builds virtual fitting-room 3-D modelling technology for use on fashion retail websites, and provides a digital composite photography service. ○ **Data Science** Various ad-hoc business analyses, typically using Python and SQL to query an Amazon Redshift database, and Python pandas for data processing. ○ Maintained and extended Looker, a graphical business intelligence tool. Trained users. ○ **Physics Modelling** Learnt C++, and analysed and documented an 8,000-line physics modelling code that had been untouched for 5 years. Did minor refactoring and extension. ○ Wrote 40 pages of technical documentation and 80 slides of diagrams detailing the physics modelling code. Explained how it works to non-technical users. ○ **Machine Learning** Converted an image segmentation Convolutional Neural Network from the R&D team into Python code. Helped deploy it as a microservice on Amazon.
Jun – Aug 2016	**Data Analyst**, Booking.com, Cambridge UK, www.booking.com Worked in the Pay-Per-Click Webmarketing department of a large internet travel retailer, writing Python code to do data analysis and automate various business processes. ○ Text-processing to automatically shorten hotel names to fit into advertisement formats. ○ Developed scoring system to rate relevance of advertising copy to search query terms. Wrote code to score advertisements, generate a table of actionable items, and email the table to automatically assigned Account Managers.
Jun 2014 – Mar 2015	**Data Scientist**, Publons, Wellington NZ, www.publons.com Worked in a rapidly-growing internet startup using the Python web framework Django. Main projects included data cleanup, name disambiguation, text matching, search, and statistics. Additional work included basic web programming, and user interface design. ○ Wrote heuristic code to flag suspicious data, thus enabling data cleanup. ○ Researched string matching algorithms, and implemented a modified version that gave best results for matching names. ○ Built a prototype search engine from basic Python language processing and linear algebra components.

Tutoring

2005 - 2006	One-on-one mathematics tutoring of a student with Asperger's syndrome.
2004	Small-group tutoring of first-year mathematics.

Education

2014	**PhD in Theoretical Physics**, *Victoria University of Wellington*, New Zealand Fluid Mechanics (Microfluidics)
2006	**BSc Honours in Physics**, *Victoria University of Wellington*, New Zealand First Class Honours
2004	**BSc in Mathematics and Physics**, *Victoria University of Wellington*, New Zealand

Doctoral Thesis

Title	*Effective Slip Lengths for Stokes Flow over Rough, Mixed-Slip Surfaces*
Supervisor	Professor Shaun Hendy
Description	The motivation was the recent development of surfaces patterned on the nano scale that offer reduced drag to liquids flowing over them. The physics was modelled as incompressible Stokes flow with a rough, periodic boundary condition. Analytic solutions were obtained by the perturbation and homogenization methods, yielding a prediction of the improved flow of liquids over nano-patterned surfaces.

Examiner's Remark "[This] chapter describes ... fluid mechanics concepts with a **depth and clarity which is very rarely found even in classical fluid mechanics textbooks**. It is an absolute pleasure to read... The candidate does a very good job of explaining complex concepts with clear and concise arguments."

Interests

- Economics
- Philosophy of Science

- Guitar
- Music from Bluegrass to Heavy Metal