Curriculum Vitae (July 2025)

Andrew Cooke

Personal Details

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Place of birth:	Harrogate, Yorkshire, UK.
Nationality:	Chilean / British.
Languages:	English; Spanish.

Summary

PhD in astronomy + over 25 years of experience in software engineering. I have written numerical software in Python, Java, C, and Fortran; maintained messaging libraries; designed database schemas and implemented the associated loaders; implemented scalable, responsive web sites; used containerization locally in docker and remotely on Azure; deployed complex systems using ansible and AWS CDK. I am very self–motivated, reliable, independent and productive with many years' experience in telecommuting.

Professional Interests

– How to involve the client in "lightweight" development — balancing iterative, adaptable development with clear estimates and a useful development history.
– Domain–specific and 'little' languages/parsing/code–as–data/flexible configuration. These ideas often provide a good abstraction layer for building adaptable, maintainable systems.
– Efficient numerical and semi-numerical algorithms. For example, I have developed new, efficient approaches for filtering data in one and two dimensions; I worked on generating correlated, uniformly distributed random numbers.

Skills

– Decades of OO design experience.
– Strong mathematical and statistical background.
– Experience with Agile, Requirements–Driven and Iconix (UML) processes.
– Self–motivated problem solver.
– Educated to PhD level (Astronomy, Cambridge University).

Languages:	Python, C, Java, JS, SQL, Bash (some C++, OpenCL, Julia).
Platforms:	Linux (OpenSuse, CentOS, Rocky, Debian, Fedora), Windows.
Web:	React, JS, Django, Flask, Spring, SVG.
Databases:	PostgreSQL, PostGIS, Oracle, MySQL; JDBC, SQLAlchemy, Spring.
Virtualisation:	AWS, Azure, Docker, Kubernetes, VirtualBox.

Work Experience

2008— **Senior Software Engineer. ISTI, USA (Telecommute).**

ISTI develop custom software for the geophysical research community; they are based in the USA but have engineers in several countries. On most projects below I was responsible for design and implementation, and usually interacted with the client (typically in parallel with one of the company founders).

AWS — Build and deploy scalable test system using CDK and Ansible (complex system tests running in parallel on many machines).

Azure — Server-side support for high-availability web application. Hosted on Azure with many components running in Kubernetes, updates pushed via SignalR, data stored in PostgreSQL.

ETL / Schema — Developed PostgreSQL/PostGIS schema and extract, transform, load tools (Python) to store data from earthquake alert tests for further analysis.

CI / Testing — Configured Jenkins with git and JIRA (including a Jenkins plugin to automatically raise and close JIRA issues). Advised on use and helped develop tests.

Hardware / Numerical — A set of loosely coupled C programs that calibrate seismic detectors. These can be run separately, by hand, or under the control of a scheduler for automated calibration.

GPU / Numerical — Optimization of numerical Matlab/Octave code using OpenCL. Reduced calculation from 12m (Xeon CPU) to 10s (low cost NVidia GPU), shifting work from "batch processing" to "interactive data exploration".

Web / Database — Several projects constructing database representations of complex systems and then providing a variety of ways to access and manipulate that data — both directly (HTML, Ajax) and via additional services (REST, XMLRPC). Implemented with Java (Spring/JSP) and Python (Django/YUI).

Client Application — Python (WXWidgets) GUI to simplify management of remote data processing system, including a "map" of interconnected components (auto–layout via simulated annealing).

Other — I have helped introduce a variety of ideas to the company, including the use of continuous integration, lightweight progress tracking, and wider test use.

2007—2008 **Software Engineer. MuleSource, San Francisco, USA (Telecommute).**

MuleSource was the company formed to support and develop Mule, an open source Enterprise Service Bus (ESB). I was part of a geographically–diverse team maintaining the core system, particularly TCP related transports.

XML Schema — I was also responsible for the main user–visible change in Mule 2.0: an XML-based configuration system using Spring's extensible schema.

2003—2007 **Scientific Programmer. CTIO, La Serena, Chile.**

The team in La Serena was part of a larger development group based in Tucson, USA, that developed software for NOAO observatories.

Numerical — I designed and implemented the Gemini/IRAF GNIRS Package, to process spectral data. This was based on the existing (but incomplete) NIRI package and implemented in IRAF CL/SPP (Fortran).

SOA / ESB — The NOAO Science Archive was developed to store and retrieve astronomical data. I worked on analysis, design, implementation, testing and documentation of the system.

This included assessing ESB systems and selecting Mule as a solution that provided good scalability, wide compatability with existing transports, and support for rapid development with Java-based messages — a good, future–proof balance for a SOA that was still largely internal.

Work Experience (cont.)

2002—2003 **Head of development / Consultant. Webtron Finance, Santiago, Chile.**

At Webtron I implemented a system to receive and process financial data. That involved learning, over 7 months, how to develop J2EE–based web applications, in a new language and culture. I started as a single Java programmer, writing to a dictated design, but finished leading a small team (two programmers and web designer) to beat an impossible deadline with shifting requirements.

1998—2001 **Software Engineer. Intertrader Ltd, Edinburgh / Leicester, UK (Telecommute).**

For the Intertrader CashBox System I designed and implemented most of the server–side application, combining standard Java components (to become 'J2EE') within a dynamically configurable framework (similar to the 'Spring' framework, although I was unaware of that at the time) to give the flexibility necessary when working for different clients with conflicting requirements.

1997—1998 **Software Engineer. Concept Systems, Edinburgh, UK.**

Responsible for algorithms to calculate the position of long (5km) cables towed behind boats prospecting for oil. I developed a novel, fast algorithm for median filtering (using a sorted tree for the data within the window) and helped start an internal discussion group to encourage movement from C to C++.

1995—1997 **Postdoc. Institute for Astronomy, Edinburgh, UK.**

Numerical analysis (Fortran 77; maximum likelihood estimates; integration; optimization) of the distribution of Lyman–α absorption lines to estimate the evolution of the ionizing background at high redshifts.

1994 **Research Assistant. CTIO, La Serena, Chile.**

Analysis of Hubble and ground–based long–slit and Fabry–Perot observations. Fortran (fitting models of gas flow to 3D spectral data) and IRAF.

1988—1993 **PhD in Astronomy. Institute of Astronomy, Cambridge, UK.**

Voigt profile fitting in Fortran. Observed (mainly echelle spectroscopy) at AAT, CTIO 4m, WHT. Wrote software in Fortran with IRAF / Imfort to do optimal data extraction (not supported in IRAF for echelle spectra at the time) with automatic cosmic ray rejection.

1985—1988 **BA in Natural Sciences (Maths and Physics); Christ's College, Cambridge, UK.**

First class honours (final result and all intermediate examinations); received various scholarships.

Personal Software / Hardware

Synthesizer Currently programming a Raspberry Pico based (audio) synthesizer module in C++.

Plotter An extremely basic '1D' plotter that uses a pen on a rotating (and slowly translating) cylinder, controlled by Arduino (C++), driven via serial comms from Processing (Java). I acquired the electronic hardware as mentor in a project encouraging Chilean schoolgirls to be engineers (Niñas Pro 2023).

Previously Training diary similar to Strava; Recursive descent parser for Python; CRC library in Julia; Google App Engine service to generate 'user icons'; a 'concatenative' language; Haskell library for functional images.

Education / Outreach

2025 Apr— **Volunteer, CreceChile**

Weekly support for online english classes.

2024 May—Sept **Volunteer, PreuJCT**

Weekly, in-person physics classes for up to 20 students in the José Carrasco Tapia prep school (FCFM, U Chile), alongside other volunteers.

2023 July—August **Mentor, Niñas Pro**

Fortnightly on-line meetings with a couple of students (8th basic to 4th middle school) to help them understand computing and electronics concepts, solve problems, and complete personal projects.

1996—1997 **Community Support, Number Shop**

Weekly support for residents with numeracy problems (teaching maths, planning budgets, explaining bills, etc) (Number Shop was a charity in Edinburgh).

1998—1993 **Christ's College Tutor**

Weekly, in–person physics tutorials (pairs of physics undergrads).

Educación / Divulgación

Traducción de la sección previa.

2025 Apr— **Voluntario, CreceChile**

Apoyo semanal en clases y tutorías en linea.

2024 Mayo—Sept **Voluntario, PreuJCT**

Voluntario en el preuniversitario José Carrasco Tapia (FCFM, U Chile). Clases presenciales y semanales de física a un grupo de hasta 20 estudiantes junto con otros voluntarios.

2023 Julio—Agosto **Mentoría, Niñas Pro**

Mentor de un par des estudiantes (8vo básico a 4o medio) por Zoom cada 15 dias para ayudarles entender conceptos de computación e electrónica, solucionar problemas, y armar proyectos personales.

1996—1997 **Apoyo Comunitario, Number Shop**

Apoyo semanal para residentes (edades de 18 a 80 años) con problemas de aritmética (enseñar matemática, ayudar manejar presupuestos, explicar boletas, etc) (Number Shop era una organización sin fines de lucro en Edimburgo).

1988—1993 **Tutoría, Christ's College**

Clases presenciales y semanals de física (pares de estudiantes de pregrado).