MARK TERENCE BURTON CARROLL, B.A. (HONS), M.A. (CANTAB), MBCS, CITP *mtbc@bcs.org*

For many years I have worked as a software engineer specializing in difficult problems across science and engineering. I research the application domain and requirements then use my broad experience to devise, implement, document and test a sound and reliable software solution, independently or within a team. I hold Professional Membership of the British Computer Society through which I qualified as a Chartered Information Technology Professional in 2007.

Image Management Application Development, 2012 to 2020

Software Developer, *School of Life Sciences, University of Dundee*, Scotland

Development of server-client system for secure, collaborative management of images and metadata, written in Python and Java with Hibernate and Spring; pytest, Robot Framework and TestNG for testing; Sphinx for documentation; metadata stored in XML and PostgreSQL. Presented work at meetings and conferences, trained colleagues, provided end-user support. Tasks included:

- updating the metadata model, providing accompanying XSLT and PL/pgSQL for upgrades
- devising means to execute data updates modeled as state transitions in a directed graph
- creating a command-line client for resumable download of image pixel data and metadata
- making the access control system for administrator privileges more fine-grained
- investigating and fixing most of the product's security vulnerabilities in recent years
- performance measurement and improvement using profiling, caches and parallelization
- adapting legacy server code to run without write access to database or filesystem
- writing technical documentation for software developers and system administrators
- management of Linux systems on OpenStack and VMware, directly and via Ansible.

J2EE Web Application Development, 2010 to 2012

Software Engineer, *Cambridge Research Laboratory, Vecna Medical*, Massachusetts

End-to-end software design and development using Oracle, PostgreSQL, PL/pgSQL, Java, JDBC, Hibernate, Lucene, Jasypt, Joda, Spring, Struts, JSTL, SiteMesh, Tiles, JavaScript (Prototype, jQuery). Subversion and Git used for version control, Maven for build management, Tomcat for servlet container. Documentation was produced with LATEX and TikZ. Tasks included:

- internationalization of hospital infection surveillance software: language, time-zone, etc.
- Payment Card Industry compliance: implementing administrative functions for managing payment card data encryption, producing internal and customer-facing documentation
- using BioPerl to apply BLAST and MUSCLE tools in predicting viral polyprotein cleavage
- on-site consulting for a Fortune 100 client on development of a school wellness application
- construction of an Ubuntu-based PXE boot image for self-service touchscreen kiosks
- fixing bugs in various web applications from SQL all the way up to JavaScript.

Led R&D on Department of Defense Software Projects, 2000 to 2010

<u>Software Engineer, System Administrator, *Aetion Technologies*, Ohio</u>

Applied Artificial Intelligence to solve Defense problems for the Federal Government. Wrote most of the funded proposals, acted as Principal Investigator on most projects, hired and managed other engineers, wrote technical reports and papers, substantially assisted with business administration. Met with customers, studied background materials, wrote parsers to ingest data. Devised various approaches centered on automated reasoning, modeling and planning. Set up and managed Linux servers and desktop machines. Mostly developed in Haskell with some Java and Perl 5.

Application domains included molecular docking, drug screening, investment portfolios, geocoding, source reliability, network disruption, antenna manufacturability, aircraft maintenance, tactical enemy intent inference, sonar multi-pathing, multi-modality sensor fusion, abductive inference.

Scientific Programming for Research Groups, 1996 to 1999

<u>Senior Technical Officer, *European Bioinformatics Institute*, England</u>

Used OKBC and Common Lisp to represent and query genomic data in knowledge bases. Created frame representation for genes, proteins, complexes, biological function. Used Perl 5 for taxonomy inference from co-occurrence of terms in database records. Maintained IRIX workstation.

<u>Visiting Scholar, *Laboratory for Artificial Intelligence Research, The Ohio State University*, Ohio</u>

Used Modula-3 and C to implement a robust, distributed simulation system to support engineering design optimization from Simulink-based models. Used SQL with Sybase. Maintained HP-UX workstations. Co-inventor on three issued U.S. patents for multi-criterial optimization.

Other Experience

<u>Other Projects as Lead Developer</u>

– C++: file archiving: file system traversal, compression, strong encryption, error correction.
– Modula-3: a simulator for composable models, including solving of conditional equations.
– 6502 Assembly: adaptive Morse code encoding to and decoding from audio.

Education

1996 – Graduate Record Examination: scores in the general test, each out of 800:
      Verbal: **610** (top 15%); Quantitative: **800** (top 2%); Analytical: **800** (top 1%)
1996 – B.A. (Hons) 2.ii, Computer Science, King's College, University of Cambridge
1993 – A-Level: Pure Mathematics (A), Applied Mathematics (A), Physics (A), Chemistry (B)