

# ROY WILLIAM WARD

<https://www.orange-kiwi.com>

[roy@orange-kiwi.com](mailto:roy@orange-kiwi.com)

## SUMMARY

---

Software architect and engineer with exceptional record of innovation and value delivery, seeking an individual contributor role where software performance and team collaboration are emphasized. Over 20 years of full-time experience building high performance and low memory solutions, resulting in 12 US and 7 international software patents. Expertise in optimization, algorithms, data structures, compilers, microprocessor architecture, assemblers, operating systems, number representation, concurrency/multithreading and compression. Exemplars of my work available at <https://www.orange-kiwi.com>.

## PROFESSIONAL EXPERIENCE

---

**2002-2024:** Chief Software Architect and Applications Engineer for Moonshadow Mobile Inc.

- **2022-2024:** Chief developer of MMZIP, a stand alone, fully streaming, compression/annotation/filtering ETL tool, written in C++ and optimized for geospatial time series data
  - Wrote a data analyzer that looked at the structure of incoming data and adaptively determined the best compression method for each column
  - Wrote a custom compressor/decompressor that typically produced archives a third to a half the size of gzip archives
  - Built components that could match roads extracted from OSM or WKT data at over 1 million rows/second and region match at 5-20 million rows/second
- **2010-2024:** Architect and chief developer of the Ephemeris engine, a high performance, multithreaded, in memory, columnar database, written in C++ and optimized for geospatial and time series data. Ephemeris was used by the Hurricane Evacuation Traffic Project, where Wejo vehicle data (3 second frequency/vehicle) from seven states was processed and made available live using just two servers, ingesting over 100,000 records per second at peak.
  - Wrote an interpreter that could process about 50 million records/second/core
  - Wrote a JIT compiler that converted queries to x86-64 machine code (including using AVX2) in about 1-2 milliseconds, generating code that could process 100-200 million records/second/core
  - Wrote custom JSON and CSV parsing libraries for ingestion of over 100,000 records/second
  - Included performant in-engine functionality for very fast data visualization using directly generated PNG tiles
  - Wrote a lockless LRU cache, and low latency locking code for managing concurrent queries
  - Collaborated with and supervised other developers
- **2002-2010:** Lead engineer on the BuyMusicHere caching server, a multithreaded in memory store for metadata about CDs, DVDs and books, written in Java that provided caching, searching (using Lucene) and business logic between the PHP front end and the PostgreSQL backing store.

## EDUCATION

---

B.Sc. (Hons) 1st Class in Mathematics from the University of Otago, Dunedin, New Zealand.

## SKILLS

---

**Languages:** Modern C++, C, Java, SQL, Python, GLSL, Haskell, Verilog, x86-64 (with SSE, AVX, AVX512)

**Platforms:** Linux, Android, Windows.      **Hardware:** Xilinx FPGAs, Xilinx CPLDs, PIC Microcontrollers.

**Tools and Libraries:** PostgreSQL/libpq, POSIX, gdb, valgrind, Vulkan, Lucene, LaTeX.

## OTHER PROJECTS

---

<https://www.orange-kiwi.com/galaxy-generator> The Galaxy Generator Project, allowing procedural generation and fast navigation in a 400 billion star galaxy on Linux, Android and Windows.

<https://github.com/royward/pseudo-double> A relatively fast C and C++ 64 bit floating point library written using only integer operations.