ROY WILLIAM WARD

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PROFILE

Senior software engineer with 20+ years' experience in C++ application development, real-time systems, and high-performance data platforms. Skilled in graphics APIs (Vulkan, GLSL), optimisation, compilers, and algorithm design. Strong mathematical foundation (First Class Honours in Mathematics, University of Otago). Collaborative and outcome-driven, with mentoring and leadership experience. orange-kiwi.com includes exemplars of my work, including posts on optimisation and systems design. New Zealand citizen with full right to work.

CAREER HIGHLIGHTS

- Architected a high-performance in-memory database for geospatial and time-series data, processing 100M+ records/sec/core.
- Built a streaming compression/ETL tool in C++, producing archives 35–50% the size of gzip with real-time road/region matching.
- Developed graphics-heavy projects including a procedural galaxy generator (400B stars) in C++/Vulkan with real-time navigation.
- Led and mentored engineering teams, embedding performance-focused practices into delivery.
- Co-developed a video/image scripting language, adding efficient vectorised image processing.
- Inventor on 12 US and 7 international software patents for high-performance software systems.

EXPERIENCE

Senior Prolog Developer — LogicMoo (2024–2025)
Enhanced the MeTTa programming environment.

- Extended the MeTTa–Prolog compiler and interpreter, improving performance and functionality.
- Delivered a Language Server Protocol service for IDE integration and real-time diagnostics.

Lead Applications Engineer / Architect — Moonshadow Mobile (2010–2024)
Designed high-performance geospatial and real-time data systems.

- **MMZIP:** Built a fully streaming compression/ETL tool in C++, producing archives 35–50% the size of gzip. Added adaptive compression analysis per column, custom compressor/decompressor, and high-speed road/region matching at millions of rows/sec.
- **Ephemeris:** Architected a multithreaded in-memory columnar database in C++, optimised for live geospatial time-series data. Deployed for disaster-response traffic analysis across seven US states, operating on only two commodity servers.
  - Built both an interpreter (∼50M records/sec/core) and a just-in-time compiler (100–200M records/sec/core) for query execution.
  - Implemented JSON/CSV parsers handling 100k+ records/sec.
  - Implemented in-engine PNG tile generation for visualisation.
  - Ensured mission-critical reliability by collaborating with engineers and analysts under real-time conditions.
  - Supervised and mentored other developers, embedding performance-focused practices into the team.

EXPERIENCE (CONTINUED)

Lead Developer / Architect — BuyMusicHere (2002–2010)
Developed caching and search systems for large-scale media metadata.

- Built a multithreaded Java-based cache with Lucene + PostgreSQL backend, providing business logic between a PHP frontend and the database.
- Designed compact memory structures for 100k+ strings, reducing memory and improving responsiveness.
- Wrote monitoring/control panels in Java/Swing and distributed load logic across multiple servers.

Part-time Developer — Videoscript, Inc. (1998–2000)
Contributed to a scripting language for video/image processing.

- Helped design and implement the ANTLR-based language.
- Implemented high-performance image processing and matching using vectorised instructions.

PROJECTS

- orange-kiwi.com — Blog with technical articles on optimisation, compilers, algorithms, and systems performance.
- pseudo-double — Floating-point emulation library in Rust/C/C++, implemented entirely with integer arithmetic.
- Galaxy Generator — Real-time procedural galaxy simulator (400B stars) in C++/Vulkan, featuring efficient rendering pipelines and interactive navigation across platforms.

EDUCATION

B.Sc. (Hons), First Class in Mathematics — University of Otago, Dunedin, NZ
Recipient of University of Otago Prize for Science. Additional study in Physics and Computer Science.

SKILLS

Languages: C++, C, Rust, Java, Python, SQL, Prolog, Haskell, Verilog, Assembly (x86-64/AVX and others)
Graphics/Rendering: Vulkan, GLSL, shader programming, real-time pipelines
Platforms: Linux, Android NDK, Windows
Tools and Libraries: PostgreSQL, ANTLR, Lucene, git, gdb, valgrind, LaTeX, Dear ImGui
Hardware: Xilinx FPGAs/CPLDs, PIC microcontrollers
Expertise: Optimisation, algorithms, data structures, microprocessor architecture, concurrency/multithreading, compilers, compression, GPU rendering, systems design, mentoring

REFERENCES

Available on request.