

Perry's Résumé - Digital & AI Architecture

Perry Kundert <perry@kundert.ca> +1-780-970-8148

2026-08-07 07:00:00

R&D engineer and architect with 30+ years designing systems that must keep working when parts of them fail, and that must be able to explain afterward what they did and why. Now applying that discipline to AI-enabled platforms: designing, deploying and operating production generative-AI services end to end, from model selection and inference-cost engineering through integration, delivery and observability. Deep expertise in Python, C++ and Rust; distributed systems, cryptography, and the integration seams where enterprise architectures actually break. Equally comfortable setting technology standards, mentoring delivery teams, and reading the stack trace at 2 AM. (PDF, Text)

Technical Skills

- **Data Sovereignty:** self-hosted inference, client-side credential ceremonies and key custody, relying-party-controlled authentication; architectures where sensitive material never transits a third party
- **AI/ML Systems:** LLM application architecture (RAG and long-context knowledge grounding), prompt and KV-cache engineering, model selection and evaluation across quantizations and architectures, inference cost and latency budgeting, streaming APIs, multi-tenant session isolation, hosted vs. self-hosted inference tradeoffs; generative speech and media pipelines
- **AI/ML Platforms & Tooling:** Anthropic API (prompt caching, tool use), Ollama, MLX, PyTorch and Transformers-based pipelines, HuggingFace model distribution, GPU/unified-memory capacity planning
- **Architecture:** solution and integration architecture, API and service boundary design, event and message-driven integration, state-machine and workflow modelling, architecture decision records, technology standards, vendor and platform evaluation, proof-of-concept to production
- **Cloud, Edge & DevOps:** Cloudflare Workers and Zero Trust tunnels, Linux, Docker, CI/CD, Nix deterministic builds and reproducible environments, service hardening and supervision, health and telemetry endpoints, cost-aware deployment topologies
- **Security & Data Protection:** PKI, Ed25519, mTLS 1.3, WebAuthn/FIDO2, Shamir secret sharing (SLIP-39), zero-knowledge proofs, origin and credential isolation, threat modelling for OT and public-facing services
- **Languages:** Python (15+ yrs), C++ (25+ yrs), Rust (5+ yrs), C, Go, Solidity, JavaScript/Node, SQL, assembly
- **Distributed & Real-Time Systems:** CAP/BFT design, partition tolerance, consensus without global coordination, lock-free concurrency, hard-latency embedded pipelines
- **Delivery:** agile and product-oriented teams, code review, mentoring, incremental delivery against systems that cannot be taken offline

Experience

R&D Consultant & Architect - *Dominion R&D Corp.* (Remote, 2009–Present)

Architect and sole operator of production AI, blockchain and industrial systems; retained by energy, fintech and industrial clients to design the parts that have to be right the first time.

AI-Enabled Platform Design & Operation

- Designed, built and operate BUCKy, a public-facing generative-AI assistant grounding a ~100K-token curated knowledge base, serving live at perry.kundert.ca and bucky.kundert.ca.
- Architected it against **three interchangeable inference backends** (hosted Anthropic API, local Ollama, and direct MLX library integration) behind one stable API contract, so model and hosting decisions stay reversible and are not a vendor lock-in.
- Engineered the inference economics: hosted path exploits provider prompt caching to reduce per-query cost by roughly an order of magnitude after first call; self-hosted path pre-computes the knowledge-base KV cache once at startup and clones it copy-on-write per session, eliminating ~100K tokens of prefill on every request.
- Diagnosed and designed around a hybrid-attention model constraint (recurrent linear-attention layers whose state cannot be rewound, unlike full-attention KV layers), which invalidated the obvious cache-trimming approach; documented the reasoning in-tree so the next maintainer does not re-learn it the hard way.
- Ran real model-selection evaluation across model families, sizes and quantizations (4-bit/8-bit, MOE and dense, NVFP4), recording the ones that produced degraded output or silently truncated context rather than only the ones that worked.
- Built the operational surface: per-session concurrency slots with TTL reclamation, streaming NDJSON responses, CORS origin allow-listing, health and throughput telemetry, and warm-start cache persistence to cut a 15-minute cold start.
- Delivered it over Cloudflare Zero Trust tunnels with remotely-managed ingress pushed from version-controlled configuration, and hardened the connector daemon after diagnosing a boot race and a graceful-drain restart race that had caused multi-hour outages.
- Built a multi-engine generative speech pipeline (Kokoro, Qwen3-TTS, Higgs Audio, Dia, StyleTTS2) with per-engine reproducible Nix/venv environments, producing narrated presentation content from source documents.
- Use LLM-assisted workflows heavily in my own R&D on math- and protocol-heavy systems, under a strict rule: nothing the model asserts enters a design until it is confirmed by an executed proof, a passing test, or a derivation I can defend myself. Most of the value is in knowing which confident answers to distrust.

Digital Platform & Integration Architecture

- Designed the **Alberta Buck** platform end to end: identity, ledger, privacy and settlement. Solidity contract system (ERC-20 with on-chain credit enforcement, ERC-721 insured-asset registry), an on-chain credential registry using Pointcheval-Sanders signatures with ElGamal-encrypted identity, and a privacy-preserving bearer-note layer built on Groth16 SNARKs over Poseidon Merkle commitment pools; implemented and verified on BN254.

- Compiled the identity and wallet kernel to browser WebAssembly so the full credential ceremony and receipt verification run client-side, in the reader's page, with no server trust.
- Authored the full architecture documentation set: design rationale, data flows, threat and malfeasance analysis, and a phased transition roadmap; published as a maintained corpus rather than a one-time deliverable.
- Created **crypto-licensing**: Ed25519-signed license verification with DNS-based public key distribution (DKIM model), offline validation, and REST license-server operations.
- Delivered rugged satellite-connected monitoring, communications and video systems across Alberta oilfields; field-serviceable and diagnosable from 400 km away.
- Mitigated a critical security flaw in a major enterprise collaboration suite, deployed globally.
- Guide client development teams through cryptographic, AI and distributed systems architecture; author technical articles on consensus, monetary system design and industrial communications.

Distributed Systems R&D - *Holo Ltd.* (Kelowna, BC 2018–2020)

Architected and validated prototypes of HoloFuel's distributed transaction engine.

- Designed a partition-tolerant mutual credit system achieving cryptographic finality without global consensus; agent-centric accounting scaling linearly rather than quadratically.
- Validated simultaneous atomic settlement across deliberately partitioned networks.
- Developed statistical models and PID control systems for economic stabilization across distributed agents.

Software Engineer - *clearGRID Ltd.* (Kelowna, BC 2017–2022)

Replaced expensive proprietary radio telemetry with commodity hardware, by recovering signal the vendor's receivers discarded as noise.

- Built an end-to-end real-time receiver decoding 64 concurrent channels from a 25 Msps I/Q stream on commodity x86 and ARMv8, sustained, with no dropped samples.
- Applied learned per-transmitter priors to recover messages sitting below the noise floor; inference against a physical channel, with the same discipline a model pipeline demands.
- Built a recorded-signal regression harness so algorithm changes were measured against real captured field data rather than synthetic benchmarks.

Sr. IT Advisor - *Enbridge Pipelines* (Edmonton, AB 2002–2009)

Reduced the risk profile of a hydrocarbon pipeline control system with a cryptographically secure, fault-tolerant multi-route protocol, still in operation today.

- Architected a Reed-Solomon erasure-coded multi-route protocol for real-time SCADA, maintaining cryptographic integrity and continued operation through communications degradation and failure.
- Developed solid-state RTU firmware for continuous 24/7 control at under 1 defect per 10,000 lines, measured in the field rather than in the lab.
- Deployed hundreds of ruggedized units across critical infrastructure sites; securing communications for \$100B+ of critical energy infrastructure.

Software Developer - *Hewlett-Packard* (Calgary, AB 1989–1996)

Pioneered a radical re-architecture of a core SCADA automation alarm system component.

- Re-engineered RTAP’s core alarm engine on DFA state machines, enabling end-users to configure complex, geographically distributed safety-critical workflows with deterministic, auditable state transitions.
- Still deployed continent-wide in pipeline SCADA systems, 30+ years on.

Open Source & Publications

- cppo: the widely used Python EtherNet/IP and CIP industrial protocol library; the integration layer between analytics platforms and the PLCs on the plant floor.
- ezipwd-reed-solomon: high-throughput C++/JavaScript/Python Reed-Solomon and BCH codecs, used by aerospace and defence developers globally.
- python-slip39: cross-platform SLIP-39 Shamir secret sharing application for secure seed backup and recovery.
- holofuel-model: distributed mutual-credit economic simulation.
- localwebauthn: TypeScript/NPM library implementing both the browser and relying-party sides of WebAuthn passkey authentication; phishing-resistant login with no dependency on a third-party identity provider, and no credential material leaving the operator’s control.
- Technical papers on blockchain architecture, zero-knowledge identity, cryptographic protocol composition, consensus algorithms and monetary system design: perry.kundert.ca/range/finance/

Education

B.Sc. Computer Science - *University of Calgary* (Calgary, AB 1984-1989)