

# James Ross

## Staff / Principal Software Engineer

## Systems, Reliability, Deterministic Execution

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## Summary

- Staff/Principal-level systems engineer (19 years) building reliable distributed backends and operational tooling that non-engineers can run safely.
- Deep focus on deterministic, replayable execution and **provable traces for agent systems** — turning messy requirements into debuggable systems that stay trustworthy in production.

## Skills / Tech

### Languages

Rust, C, C++, C#, TypeScript, JavaScript (Node, Bun, Deno), Lua (embedded VM / production scripting), SQL

### Data / Infra

PostgreSQL (Supabase), Redis; AWS; Vercel; Docker; GitHub Actions

### Web / UI

Next.js, React, Vue, HTML, CSS, Mantine

### Systems

Distributed systems; deterministic execution; replayability; time travel debugging; reliability; observability; HTTP, cookies, reverse proxies (NGINX), edge routing

## Professional Experience

### AION / Continuum (Open Source) — Independent Researcher & Systems Engineer — Remote — 2025 – PRESENT

*Selected: Echo (Rust rewrite engine), Continuum (deterministic runtime), AION Foundations (5 papers)*

- Building open-source deterministic runtimes and time travel debugging systems (Echo / Continuum) for replayable, inspectable computation and **provable traces for agent systems**.
- Researching correctness-preserving infrastructure: deterministic execution, provenance, replayability, and distributed reliability.

### Purrfect Firs (Non-Profit) — Interim CTO (Pro Bono) — Remote — 2025 – PRESENT

- Built a full platform: Next.js public website on Vercel + local-only “air-gapped” admin tool (Docker) backed by Supabase/Postgres, Edge Functions, and pg\_cron automation.
- Designed a no-engineer workflow: one-click launcher, email OTP (no passwords), live sync via shared cloud DB; scheduled jobs run in-DB 24/7; updates ship as a simple folder refresh.

### SmileBreak (former Ember/Gala team) — Senior Software Engineer — Remote — 2024 – 2025

- Rebooted a decades-old UI framework, removing entire classes of bugs/perf issues and cutting typical UI tasks from days to hours.
- Built an allocation-free, multi-modal input system with dynamic context switching and gesture confidence scoring (touch / controller / keyboard).

### Gala Games (Ember team, post-acquisition) — Senior Software Engineer, Distributed Systems — Remote — 2022 – 2024

- Architected durable distributed job/worker systems for core services with fault-tolerant, resumable execution.
- Built real-time server simulation + networking for **1km × 1km** zones, supporting **1200+** concurrent clients and thousands of AI enemies per server.

### Ember Entertainment — Core Technology Lead / Head of Data — Seattle, WA — 2014 – 2022

- Built a deterministic, time-replayable event pipeline powering analytics/live-ops across **15+** shipped titles, processing **2B+** events in production.
- Implemented offline-first, idempotent telemetry + safe backfill/replay tooling; modernized AWS/Postgres/Redis infrastructure with ~8 years of strong data-integrity reliability.

### Various Studios — Earlier Experience — Multiple — 2007 – 2014

Real-time distributed systems, interactive simulation, and production infrastructure across AAA and mobile titles.

## Research & Publications

**AION Foundations Series:** five peer-citable technical papers on deterministic graph rewriting (WARP graphs), replayable worldlines, and observer-relative traces. This work underpins my production systems work in reliability, time travel debugging, and **deterministic provenance and inspection**.

I	WARP Graphs I: Worldline Algebra & Recursive Provenance	<a href="https://doi.org/10.5281/zenodo.17908005">10.5281/zenodo.17908005</a>
II	WARP Graphs II: Canonical State Evolution	<a href="https://doi.org/10.5281/zenodo.17934512">10.5281/zenodo.17934512</a>
III	WARP Graphs III: Computational Holography & Provenance Payloads	<a href="https://doi.org/10.5281/zenodo.17963669">10.5281/zenodo.17963669</a>
IV	WARP Graphs IV: Observer Geometry & Rulial Distance	<a href="https://doi.org/10.5281/zenodo.18038297">10.5281/zenodo.18038297</a>
V	WARP Graphs V: Emergent Dynamics from Deterministic Rewrite Systems	<a href="https://doi.org/10.5281/zenodo.18146884">10.5281/zenodo.18146884</a>

## Education

**DigiPen Institute of Technology** — B.S. Computer Science — Real-Time Interactive Simulation — 2007