SENIOR SOFTWARE ENGINEER

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Ben Racine

Software engineer focused on high-assurance, safety-critical, and distributed systems.

EXPERIENCE

CIMARRON SOFTWARE SERVICES → AXIOM SPACE — Houston, TX — 3/2023-present

- Built and integrated components of the command-and-display stack for Astrolab's CLV-1 lunar rover prototype: a Rust vehicle simulator, a Rust UDP message router, and a Qt/C++ operator interface (ongoing); also contributed to embedded C++ software connecting the physical dashboard to the vehicle.
- Built Rust command, anomaly, and telemetry services for Axiom Station, connecting mobile crew applications to the Commercial and Flight Control networks using Tokio.
- Designed an event-sourced procedure system that enables ground and crew to collaborate over intermittent connections, preserving a durable history of changes and synchronizing progress after reconnection.
- Introduced type-driven design practices across the engineering team, encoding safety-critical invariants to prevent invalid states at compile time.
- Deployed and operated Rust services on Linux-based crew systems using reproducible builds, health monitoring, automated assurance, and controlled GitLab releases.
- Led requirements-based verification of mission-critical station software through Critical Design Review, producing auditable test evidence with automated testing tools.

WEATHER SOURCE — Salem, NH — 4/2021-3/2023

- Developed a mission-specific weather alerting system with team-wide notifications in TypeScript.
- Published type-safe geographic and meteorological APIs with OpenAPI documentation.
- Applied functional programming principles using fp-ts to ensure modular, verifiable, maintainable systems.
- Built microservices for auth, billing, mapping, data transforms, and weather-rule logic.
- Deployed a secure Snowflake–DWAS portal as the single source for client analytics.
- Scaled and hardened production to support and retain multiple Fortune 500 clients.

RACINE DESIGNS — Box Elder, SD — 4/2020-3/2021

- Developed online learning software using C#, React, Redux, and Azure for enterprise clients.
- Enforced strict TDD discipline, sustaining 80-100% coverage for React components.
- Delivered high-volume software on tight timelines, ensuring consistent, high-quality output.
- Led biweekly client demos, driving alignment and satisfaction across stakeholders.
- Founded and operated Racine Designs LLC, managing full-cycle projects and client relations.

CORNERSTONE SYSTEMS NW — Lynden, WA — 4/2011-3/2019

- Enhanced CISNET's C++ Smoking History Generator for lung cancer research modeling.
- Modeled U.S. smoking-policy outcomes using C++ and Python simulation frameworks.
- Shipped Daycast.com, a real-time planner using Node, SQL, WebSockets, and Electron.
- Delivered a single-page application that meets complex PHMSA regulatory requirements.
- Developed genetic-simulation frameworks for the National Cancer Institute

- Created a web-based data visualization dashboard for Massachusetts General Hospital cancer-surveillance analytics.

GLOSTEN — Seattle, WA — 11/2006-3/2011

- Predicted hydro-elastic loads on the SR520 floating bridge for Washington State DOT.
- Optimized anemometer performance for Boeing's Sea-Based X-Band (SBX) Radar using OpenFOAM CFD and parallel simulation on a custom Linux Beowulf cluster.
- Designed underwater transducer fairings for NOAA research vessels using CFD.
- Built a tool mapping FEA results from MAESTRO to NASTRAN for detailed fatigue analysis.
- Successfully authored proposals securing over $85k in engineering services.

SKILLS AND TECHNOLOGIES

- Networking & Distributed Systems: Tokio, UDP/IP, TCP/IP, NATS, publish/subscribe messaging, event sourcing, WebSockets, SSE
- Languages: Rust, C++, TypeScript, Python, Bash
- Systems & Runtime: Linux, embedded Linux, systemd, Docker, Podman
- Simulation & Integration Testing: Vehicle simulation, software/hardware integration testing, Playwright, Vitest
- Embedded & Hardware: GPIO, I²C, libgpiod
- Rust Ecosystem: Tokio, Tauri, Axum, Reqwest
- Observability: OpenTelemetry, Grafana
- Cloud & Data: AWS, Kubernetes, PostgreSQL, SnowflakeDB, CosmosDB
- Application Development: Qt, React, Vite
- Identity & Security: Keycloak

EDUCATION

MS in Computational Fluid Dynamics, Pennsylvania State University, State College, PA

BS in Naval Architecture and Marine Engineering, Webb Institute, Glen Cove, NY

REFERENCES

Mark Gibbas (Weather Source), Shawn Freeman (Weather Source), Stephen Schutt (CSNW), John Cross-Whiter (Glosten), and Dr. Eric G. Paterson (PSU-ARL)

PUBLICATIONS

CFD-Based Methods for Simulation of Marine-Vehicle Maneuvering, B. Racine and E. Paterson, AIAA 2005-4904, 35th AIAA Fluid Dynamics Conference and Exhibit, June 2005, Toronto, Canada

Application of the Free Wave Spectrum to Minimize and Control Wake Wash, Justus Heimann, Bruce L. Hutchison, and Benjamin J. Racine, Paper No. SMTC-049-2008, SNAME Annual Meeting and Expo, 15-17 October 2008, Houston, TX

Holford, T. R., Levy, D. T., McKay, L. A., Clarke, L., Racine, B., Meza, R., … Feuer, E. J. (2014). Patterns of birth cohort-specific smoking histories, 1965-2009. American journal of preventive medicine, 46(2), e31–e37. doi:10.1016/j.amepre.2013.10.022