# Paul Halvorsen

Sr Backend Engineer
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## Summary

Backend engineer with 15+ years building systems at scale. Expert in designing distributed systems that process billions of events daily with focus on performance, reliability, and maintainability. Polyglot developer (Python, GoLang, C, Rust) comfortable learning new languages and frameworks. Proven track record of end-to-end ownership in high-autonomy environments, from architecture to production support. Passionate about clean code, testing, and pushing systems to their limits.

## Work Experience

### *Abnormal AI*

**Software Engineer**: Jan 2026 - Present (Remote)

- **Infrastructure at Scale**: Build and maintain 10 Kubernetes clusters across US East, US West, EU West, and government regions with auto-scaling and sophisticated deployment pipelines
- **Distributed Data Systems**: Architect and maintain services that aggregate real-time and long-term storage for multiple customers simultaneously
  - Python and GoLang microservices
  - Comprehensive pytest-driven test coverage and unit testing at all layers
  - Designed for auto-scaling to increase efficiency and reduce costs
  - Implemented compression strategies for large-scale data management
- **API & Job Systems**: Build cron job orchestration in Kubernetes, manage RBAC across infrastructure
- **Ownership**: Own meaningful outcomes across full stack - design, implementation, deployment, monitoring
- **Collaboration**: Heavy inter-team communication in monorepo environment with shared ownership model
- **Team**: Work with 5-person engineering team in flat, high-trust structure

### *Binary Defense*

**Sr Software Engineer**: April 2022 - Oct 2025

- **Large-Scale Backend Systems**: Engineered systems serving Fortune 500 companies with thousands of endpoints, handling billions of events daily
- **Performance Optimization** - Demonstrated deep expertise in identifying and eliminating bottlenecks:
  - Reduced CPU usage by 90% through intelligent filtering of previously observed issues
  - Reduced memory consumption by 60% using regex patterns and targeted filtering
  - Reduced network traffic by 80% through data transformation and optimization
  - Reduced disk storage by 20% by converting multiple string patterns to compiled regex
- **Distributed Event Processing**: Built multi-platform event streaming libraries (Windows, Linux, macOS) with event-driven architecture watching filesystem, user, Windows events, and network changes
  - White/blacklist systems with complex filtering logic
  - Data sanitization, decoration, and serialization for backend transmission
  - De-duplication to reduce network load and backend storage costs
- **Infrastructure & Deployment**: GitLab CI/CD pipelines for cross-platform testing and deployment (Docker, Windows VMs, macOS)
  - Integration testing across VMs, temporary servers, and pre-configured environments
  - Cross-compilation for multiple OS targets (Windows Server 2009-2019, Windows XP-11, Linux, macOS)

- **Technology Stack**: Rust (tokio, reqwest, serde), Python (pyenv, pipenv, cython), Docker, SQLite with encryption, Azure API integrations
- **Code Quality**: Nextest and unit testing at all layers; writing RFCs and ADRs to drive architectural decisions
- **Team Dynamics**: SCRUM-based environment with high code review standards and collaborative architecture discussions

*Kyrus Tech*

**Sr Software Engineer**: Nov 2020 - April 2022

- **Distributed Systems Design**: Built covert communication systems with Apache Thrift, HTTPS, and REST APIs routing through multiple layers
  - Multi-threaded architecture with RSA key exchange and encrypted transfers
  - C front-end, middleware, Python backend composition
- **Test-Driven Development**: Implemented comprehensive testing strategy using C, Python, and Pytest within GitLab CI/CD
- **Low-Level Systems**: Router fingerprinting and vulnerability analysis on Android with compact/rolling log aggregation

## Technical Skills

**Distributed Systems**: Kubernetes (10+ clusters), microservices architecture, event-driven design, job orchestration, auto-scaling, cross-region deployment

**Languages**: Python (Advanced), GoLang (Advanced), Rust, C, JavaScript - Quick learner of new languages and frameworks

**Backend Stack**: REST APIs, Redis, Elasticsearch, Docker, containerization, database design (SQLite, MySQL), encryption (RSA, AES)

**Testing & Quality**: Pytest, RSpec patterns, TDD methodology, comprehensive test coverage, Factory Bot approach to test data

**Infrastructure**: Kubernetes, AWS, GitLab CI/CD, Docker, cross-platform deployment, performance profiling and optimization

**Methodologies**: High-autonomy ownership, end-to-end feature delivery, code review culture, architectural documentation (RFC/ADR), SCRUM

## Education

- **University of Maryland Baltimore Campus** - Masters in Computer Science (2013)
  - Thesis: "Stateless Detection of Malicious Traffic: Emphasis on User Privacy"
- **Salisbury University** - Bachelors in Computer Science (2009) - Magna Cum Laude