ANKUR RATHORE

Technical Lead | Senior Backend & Integration Architect
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PROFESSIONAL SUMMARY

Senior Software Engineer and Technical Lead with over 12 years of experience specializing in Distributed Systems, IoT Orchestration, and Software Defined Networking (SDN). Expert in Python, Go, and Rust with a proven track record of architecting high-availability platforms using AWS, Kafka, and Apache NiFi. Highly experienced in automating complex enterprise workflows, including programmatic cloud provisioning for telecom hardware (Nokia, Equinix) and bridging legacy vendor systems with modern microservices. Extensive background in Production SRE (Kubernetes/Rancher) and network performance observability.

TECHNICAL SKILLS

- **Languages:** Python, Go, Rust.
- **IoT & Big Data:** FIWARE (Orion Context Broker, IoT Agent), Apache NiFi, Kafka, CrateDB.
- **Cloud & DevOps:** AWS (Lambda, Step Functions, EC2, S3), Kubernetes (K8s), Rancher, Docker.
- **Frameworks:** FastAPI, Django, Flask, Django Rest Framework (DRF), Bottle.
- **Databases:** PostgreSQL, MongoDB, Redis, CrateDB.
- **Tools:** Git, Linux System Administration, Bitbucket, Shell Scripting.

SOFTWARE ENGINEERING EXPERIENCE

NEC India, Noida | **Technical Lead** | *Aug 2023 – April 2026*

Project: Smart City Data Platform & IoT Orchestration

- **Integration Architecture:** Led the end-to-end integration of heterogeneous vendor applications into an enterprise-wide Smart City platform. Designed data pipelines using **Apache NiFi and FIWARE**, ensuring 100% data compatibility with NGSI standards.
- **Automation & Efficiency:** Engineered a Python-based automation framework for **FIWARE Orion** to handle device registration. Replaced legacy manual processes with automated scripts, reducing provisioning time by **95%**.

- **Complex Systems Integration:** Developed a custom **C# SignalR client** to bridge real-time biometric streams from *NeoFace Watch* (C#) into the NiFi/Python ecosystem, enabling low-latency security watchlist processing.
- **Data Discovery Tooling:** Built automated search and validation tools for **Orion and CrateDB**, allowing the team to instantly verify thousands of device records, eliminating manual look-ups.
- **Infrastructure & SRE:** Managed mission-critical deployments on **Rancher and Kubernetes**. Provided Tier-3 production support, resolving complex container orchestration and networking bottlenecks.

Project: Digital Longitudinal Monitoring & Network Visualization

- **Real-time Monitoring:** Led research and implementation of optical network monitoring (DLM, SNR) for NEC 800G transponders.
- **Network Automation:** Designed a backend platform for the automatic discovery of network nodes (Routers, L2/L3 Switches) using **Python, Bottle, and PySNMP**.

Intuitor, Bengaluru | **Senior Software Engineer** | *Jan 2017 – Aug 2023*

- **Cloud Security (Hyper Automation):** Engineered core modules for a SaaS-based AWS security automation platform. Utilized **AWS Step Functions and Lambda** to automate 90%+ of manual security remediation tasks for enterprise clients.
- **High-Performance Tooling:** Developed a high-speed **CLI tool in Go** for event-driven resource management, using **Kafka** to handle real-time security alerts.
- **Software Defined Networking (SDN):** Led a team of three engineers to build a cloud resource provisioning platform integrated with **Megaport, Equinix, and Nokia routers**. Reduced resource turnaround time by **60%** through API automation.
- **Full-Stack Development:** Architected and delivered multiple enterprise portals, including a **Network Inventory Management Portal** and a **Cisco IP Telephony Portal** using Python/Django and React.
- **Systems Monitoring:** Developed a monitoring system for Video Conferencing quality (Cisco/Polycom), implementing real-time call quality analysis and troubleshooting features.

TECHNICAL RESEARCH & OPEN SOURCE

tsastat | Rust, Linux Kernel ABI, Systems Observability |
https://www.github.com/AnkurRathore/tsastat

- **Industry Recognition:** Awarded **"Crate of the Week"** (This Week in Rust #645) for engineering a high-resolution Thread State Analysis (TSA) tool, filling a critical observability gap identified in Brendan Gregg's Systems Performance.
- **Kernel Interface:** Bypassed high-level abstractions to interface directly with the Linux Kernel Scheduler via raw Generic Netlink sockets, extracting microsecond-precision Delay Accounting (taskstats) metrics.
- **Low-Level Systems:** Implemented zero-cost binary deserialization using #[repr(C)] and std::ptr::read_unaligned to safely cast raw kernel memory buffers into Rust structures, maintaining minimal probe overhead.

- **Interactive Forensics:** Developed a real-time Terminal UI (TUI) using ratatui to visualize the "100% CPU Lie," enabling engineers to distinguish between actual execution, scheduler latency (CPU Wait), and I/O bottlenecks at the thread level.

xdp-ai-guard (eBPF Firewall) | *Rust, Aya, XDP* |
https://github.com/AnkurRathore/xdp-ai-guard

- Built a programmable firewall running in the Linux Kernel to protect AI Inference servers from volumetric attacks.
- Achieved line-rate packet filtering by executing logic in the network driver, preventing resource exhaustion from sk_buff allocation.
- Implemented stateful rate-limiting and a real-time TUI dashboard using shared eBPF Maps between kernel and userspace.

sharded-timing-wheel | *Rust, Memory Optimization* |
https://github.com/AnkurRathore/sharded-timing-wheel

- **High-Performance Memory Engine:** Engineered a custom **Slab Allocator** (Arena) using intrusive linked lists to eliminate heap fragmentation and reduce pointer-chasing overhead.
- **Research Implementation:** Developing a Hierarchical Timing Wheel based on *Varghese & Lauck (1987)* to replace standard O(logN) priority queues with **O(1) constant-time scheduling**.
- **Data-Oriented Design:** Optimized memory layout for CPU cache pre-fetching, targeting C10M-scale network driver use cases.

vmstat-rs | *Rust, Linux Kernel, System Observability* | github.com/AnkurRathore/vmstat-rs

- **Custom Kernel Observability:** Engineered a zero-dependency Linux monitoring agent in Rust, bypassing standard libraries to manually parse /proc ABI for sub-millisecond precision.
- **Latency Analysis for AI Workloads:** Implemented granular memory forensics by decoupling **Major vs. Minor Page Faults**, enabling detection of disk I/O bottlenecks that stall GPU training pipelines.
- **Reliability Engineering:** Developed real-time **OOM Kill detection** and **Context Switch** alerting (PSI), bridging the gap between system metrics and silent application failures.
- **High-Performance Architecture:** Designed with zero-cost abstractions to ensure <1% CPU overhead while sampling high-frequency kernel counters.

CORPORATE TRAINING EXPERIENCE

Orane Labs / Aptech Pvt. Ltd. | **Corporate Technical Trainer** | *Nov 2012 – Dec 2016*

- Delivered technical training in **Linux and Python** for corporate clients and engineering students.
- Managed teams of trainers, ensuring high-quality delivery and resource development.
- Developed training modules for Java application development and web technologies.

EDUCATION

- **Master of Computer Applications (MCA)** | IGNOU, Lucknow
- **PG Diploma in Bioinformatics** | DOEACC Society, Lucknow
- **Bachelor of Science (B.Sc.)** | Lucknow University
