Ashutosh Panda

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Education

Bachelor of Technology in Electronics and Communication Jun 2023 – Present
National Institute of Technology, Patna *CGPA: 7.72/10*

Projects

Gader – Asymmetric Log Streaming Pipeline Apr 2026
***Rust**, QUIC, Tokio, Ratatui, Docker API*

- Engineered a decoupled client-agent architecture in Rust, offloading TUI rendering to minimize CPU overhead on remote servers.
- Designed a **zero-copy** ingestion pipeline using byte-slice tokenization from container streams to eliminate heap allocations on the hot path.
- Decoupled transport loops from UI rendering with a reactive state-caching layer to eliminate allocation thrashing.
- Secured data channels with a **TOFU** verifier (`rustls`), using constant-time token validation (`subtle`) to prevent timing side-channel attacks.

ROC – Client-Server Database Feb 2025
***Rust**, quinn, Tokio*

- Built an asynchronous key-value database with user-scoped data isolation and crash recovery.
- Implemented secure client-server communication over **QUIC** protocol.
- Developed core database operations (SET, GET, DELETE, RANGE, LIST) using actor-based concurrency.
- Added **Write-Ahead Logging** for durability and persistent user session management with UUIDs.

Creo OS: x86_64 Operating System Mar 2025 – Present
***Rust**, x86_64 Assembly, VirtIO, ACPI/APIC, UEFI GOP, QEMU*

- Developed a custom Unix-like File System featuring on-disk superblocks, layout serialization, inode allocation bitmaps, and single-indirect block pointers for deterministic path resolution.
- Implemented an asynchronous storage driver subsystem using custom PCI configuration space scanning to discover and interface with virtualized **VirtIO block devices**.
- Engineered a interrupt routing core utilizing memory-mapped Local **APIC** and I/O APIC configurations parsed dynamically via custom **ACPI** table identification.
- Configured a custom **Global Descriptor Table** and **Task State Segment** with unique interrupt stack tables to prevent cascading hardware triple faults.

Mini TCP – Userspace TCP/IP Stack Jan 2025
***Rust**, tshark*

- Engineered a minimal TCP/IP stack in userspace with full packet-handling control.
- Implemented parts of RFC 793 compliant TCP state machine from the ground up.
- Created low-level packet parsing for payload extraction, resolving protocol edge cases.
- Developed **concurrent connection manager** with explicit synchronization to handle multiple TCP states safely.

Technical Skills

Languages & Protocols: Rust, C++, Python, Go, C, Java, SQL, QUIC, TCP/IP
Tools & Infrastructure: Git, GitHub, Docker, Kubernetes, AWS, Linux/Unix Environments, Postman
Coursework: Data Structures, Object-Oriented Programming, Computer Networks

Certifications

Machine Learning [Udemy by Jose Portilla]: Built ML models using Python libraries Apr 2024
Cloud & DevOps [IT World Education]: Deployed and scaled applications using AWS services June 2024

Positions of Responsibility

Team Gray Interface, HackSlash Apr 2024 - Present
Administrative and ML Lead

- Led technical initiatives and mentored students on software development; organized engineering hackathons and managed club operations.