

Aryan Mishra

aryanmishra4002@gmail.com | aryan-mishra.site | linkedin.com/in/aryan-mishra | github.com/aryan55254

PROFILE SUMMARY

Systems Engineer focused on C++, concurrency, memory management, networking, and low-level software. Builds systems projects from scratch to understand runtime and machine-level behavior.

EDUCATION

Guru Tegh Bahadur Institute of Technology
Bachelor of Technology in Information Technology

New Delhi, India
Aug. 2024 – June 2028

PROJECTS

AEGIS | *C++, Memory Management, CMake, Benchmarking*

[GitHub](#)

- Built a manually managed bump-pointer arena allocator supporting aligned allocation, zeroed allocation, resizing, and bulk reset.
- Added correctness and hardening tests covering allocation behavior, alignment requirements, resizing, and invalid alignment inputs.
- Benchmarked fixed-batch allocations against `malloc()`, `calloc()`, and `std::pmr::monotonic_buffer_resource`.
- Packaged AEGIS as a reusable CMake library with separate benchmark and correctness test targets.

Chronos | *C++, Lock-free Programming, Atomic Operations, Multithreading*

[GitHub](#)

- Built a job scheduler using a lock-free work-stealing deque and an MPSC mailbox for communication between worker threads.
- Used cache-line alignment with `alignas` to reduce false sharing between execution threads.
- Implemented randomized work stealing to distribute jobs across worker threads.

Scruffy | *C++, Tracing Garbage Collection, Memory Management, Concurrency*

[GitHub](#)

- Built a stop-the-world Mark & Sweep garbage collector from scratch for explicitly managed runtime objects.
- Implemented a fixed-size virtual machine stack and global root array for tracking reachable objects.
- Implemented a manually managed heap with allocation tracking and object reachability handling.
- Added automatic collection thresholds and mutex-based synchronization for multi-threaded allocation.

Senitel | *TypeScript, PostgreSQL Wire Protocol, Network Security*

[GitHub](#) | [Demo](#)

- Built a protocol-layer PostgreSQL query firewall that intercepts wire messages before they reach the database.
- Implemented PostgreSQL wire protocol decoding and encoding with connection multiplexing over authenticated backend sessions.
- Blocked destructive SQL patterns including unguarded `DELETE`, `DROP`, `TRUNCATE`, and `ALTER TABLE` while forwarding safe queries unchanged.

Pulse | *C++, POSIX Sockets, RFC 6455, OpenSSL*

[GitHub](#)

- Built a C++ WebSocket echo server from scratch using POSIX TCP sockets.
- Implemented the HTTP/1.1 WebSocket upgrade handshake and connection handling.
- Implemented byte-level WebSocket frame parsing, including payload unmasking and frame processing.

TECHNICAL SKILLS

Languages: C++, C, SQL, TypeScript

Systems: Memory Management, Concurrency, Lock-free Programming, Garbage Collection, Multithreading

Networking & OS: POSIX Sockets, TCP/IP, WebSocket (RFC 6455), Linux Environment, OS Fundamentals

Tools: Git, Github, CMake, GDB, OpenSSL, PostgreSQL, Docker, Redis

TECHNICAL WRITING

Engineering Blog: Technical writing on memory systems, operating system concepts, and systems programming at aryan-mishra.site/blog.