# Pratham K

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## TECHNICAL SKILLS

**Tools**: Git, Docker, GDB, Strace, Perf, GNU Make, CMake, Meson, Autotools
**Languages**: Bash / POSIX sh, C, C++, Golang, Python, Rust, TypeScript, Zig
**Miscellaneous**: Network & Systems Programming, Distributed Systems, FFI

## PROFESSIONAL EXPERIENCE

**Software Engineer**                                                    Feb 2024 – Present
*Dyte (now Cloudflare)*

- Worked on the **pion**-based **WebRTC SFU** in **Golang**, fixing various concurrency bugs, memory leaks & performance issues with tools like **pprof**, optimizing **UDP** network throughput using **sendmmsg**, and building a custom protocol for cascading media data across nodes
- Implemented the coordination layer for supporting a distributed, horizontally scalable multi-node **SFU** architecture, involving **k8s**-based auto-scaling, **RabbitMQ**-based **Pub-Sub**, helping support rooms with thousands of participants spread across multiple nodes
- Reworked usage of **RabbitMQ** queues & **Redis** distributed locks, improving throughput of the **WebSocket** layer from **8k msg/s** to **40k msg/s** and significantly reducing room join times

**System Engineer**                                                    Aug 2023 – Feb 2024
*Subconscious Compute*

- Integrated code coverage visualization and performance reports in CI using **Rust** language tooling like **grcov**, **flamegraph**, and system profiling tools like **perf** to catch performace regressions and facilitate code coverage
- Developed Dockerfiles and Bash/Powershell scripts for CI pipelines to execute tests, and cross-compile release packages to various targets on Windows, Linux (**deb** and **rpm** formats) and MacOS platforms

## OPEN SOURCE EXPERIENCE

**Package Maintainer and Core Team Member**                            2022 – Present
*KISS Linux Community*

- Participated in the packaging and upkeep of software packages including Compiler Toolchains, Containerization Tools and Browsers, working with build systems like **CMake** and **Meson**, and writing **runit**-based service scripts
- Developed automation projects to streamline the maintenance workflow, including the implementation of a sandboxed multi-stage rootfs bootstrap script utilizing **unshare** and **bubblewrap**: maintainer-utils

**Open Source Contributor**                                            2022 – Present
*Notable Contributions To Projects Used In Personal FOSS Endeavours*

- Resolved a bug in **Chromium** that caused page crashes on **GCC** builds due to undefined behavior: #4546610
- Contributed new interfaces, portability fixes, and support for mouse events to **termbox2**, a TUI library: termbox2
- Fixed a crash in the **nouveau** driver's firmware loading code due to erroneous usage of the Linux DMA API: #24

## PROJECTS

**vmm** | *Rust, Linux KVM*                                            Jan 2024 - Present

- Developed a **Qemu**-like hypervisor from scratch utilizing the Linux **KVM** APIs, implementing low-level bootup code involving paging, long mode and the Linux Boot Protocol, capable of booting Linux images into userspace

**dabba.rs** | *Rust, User Namespaces, CGroups, slirp4netns*           Sep 2023 - Present

- Developed a small, fully rootless container runtime akin to **runc** using Kernel APIs like **User Namespace** and **CGroups**, with the ability to run basic **OCI**-complaint container images, using **OverlayFS** to mount layers
- Implemented networking between the container namespace and host using **TAP** devices via **slirp4netns**, allowing programs to connect to the internet from the container and expose ports to the host system

**landbox** | *C, Make, Linux Syscalls*                                Oct 2022 - Present

- Developed a CLI and helper library inspired by **bubblewrap**, using the Linux **Landlock** API for filesystem sandboxing allowing restriction of read, write and execute permissions for arbitrary paths