

Pranav Purwar

Systems Engineer | JVM Internals & Android Virtualization

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Summary

Systems Engineer working on **JVM internals, compilers, AI infrastructure**, and **Android OS virtualization**. Creator of **Cosmic IDE (700+ stars, 100+ forks)**, bringing rootless Arch Linux environments to Android, and **Bryte AI Platform** (GraphRAG & FSRS v4 scheduling). Contributor to Android developer tools with **1.2M+ downloads** and **100k+ MAU**.

Experience

Cosmic IDE | Author & Maintainer

[GitHub](#)

Aug 2021 – present

- **Rootless Linux Environment:** Built a full Arch Linux ARM runtime on Android without root or proot using a custom glibc runtime and LD_PRELOAD shims to intercept execve/execvp/posix_spawn, DNS, and filesystem syscalls.
- **Recursive Process Sandboxing:** Intercepted process creation chains ensuring child processes (e.g. Gradle daemons, Cargo workers) automatically inherit the shim environment and sandbox boundaries.
- **Terminal & Package Management:** Built an integrated PTY terminal emulator with process group signal handling (SIGINT/Ctrl+C propagation) and native Arch Linux pacman package manager support.
- **Language & Project Toolchains:** Built a plugin marketplace delivering complete language, project build system (Gradle, Cargo, Maven), and on-device Language Server Protocol (LSP) support across **11+ languages** (Rust, Java, Kotlin, Scala, Go, C/C++, Python, etc.).
- **Plugin Architecture:** Engineered dynamic plugin loading for language definitions, custom build commands, and syntax schemas decoupled from core app releases.

Bryte AI Platform | Author & Maintainer

[GitHub](#)

Sept 2024 – present

- Built a **Kotlin Multiplatform** backend (Ktor CIO) ingesting PDFs (Mistral OCR), YouTube transcripts (NewPipe extractor), and web pages into structured notes.
- Implemented **GraphRAG** in Neo4j with **1024-dim vector indexing**, weighted Cypher queries balancing document vs cross-document links, automatic semantic chunk interlinking, and Cohere reranking.
- Wrote a native Kotlin port of **FSRS v4** (spaced repetition algorithm) to compute card stability, difficulty, and retrievability without external dependencies.
- Orchestrated multi-step LLM workflows using JetBrains Koog with context compression, plus a streaming Markdown parser with mid-stream table recovery.
- Streamed generated flashcards and questions in real time using type-safe **kotlinx.rpc over WebSockets**, multiplexing multiple services over a single connection.

OpenJDK & Kotlin Compiler Ports (Android) | Author & Maintainer

[OpenJDK](#) | [Kotlin](#)

Sept 2023 – present

- **Compiler Ports:** Ported javac (OpenJDK 27 EA, Java 26 support) and kotlinc (Kotlin 2.4/2.5) to run directly on Android Runtime (**ART**); published artifacts to JitPack.
- **NIO & Memory Fixes:** Bypassed Android's restricted NIO via custom ZipFileSystem for ct.sym; used HiddenApi Bypass to invoke NioUtils.freeDirectBuffer, fixing fatal off-heap OOM crashes during JAR parsing.
- **Upstream Contribution:** Authored PR [JetBrains/kotlin#5146](#) fixing a direct-buffer memory leak in ZipImplementation when using -Xuse-fast-jar-file-system.

Sketchware-Pro | Core Maintainer

[GitHub](#)

Aug 2021 – present

- Core team member for Android IDE (**1.7k+ stars, 670+ forks, 100k+ MAU**) integrating ported Kotlin/Java compilers.
- Integrated **R8/D8 Code Shrinker** and added Java 9/11+ compilation pipelines, cutting output APK sizes by **~40%**.
- Engineered on-device compile-time **ViewBinding generator** from XML layouts and recursive AAR/JAR dependency resolver.

Reef | Author & Maintainer

[GitHub](#)

Sept 2024 – present

- Built an open-source Android screen time & productivity app (**320+ stars**, on IzzyOnDroid) with **Jetpack Compose** and Material 3 Expressive.
- Normalized inconsistent UsageStatsManager events across fragmented OEM ROMs (MIUI, OneUI) to accurately calculate per-app screen time.
- Implemented real-time app and website blocking, Pomodoro focus timers, and routines using AccessibilityService and NotificationListenerService.

Skills

Languages: Kotlin, Java, Python, TypeScript, C, JVM Bytecode, DEX/ART

Compiler & Systems: OpenJDK, kotlinc, ART Runtime, LSP, Gradle, R8/D8, glibc, LD_PRELOAD, Linux Virtualization, ELF/PTY, HiddenApi Bypass

Backend & AI Infrastructure: Ktor, Neo4j, GraphRAG, Cypher, FSRS v4, LLM Agents (Koog), kotlinx.rpc, WebSockets, Mistral AI, Cohere, SSE Streaming

Mobile & Platforms: Android SDK, Jetpack Compose, Kotlin Multiplatform (KMP), Material 3 Expressive, IzzyOnDroid / F-Droid