

Rahul Kumar

Full Stack Engineer · Chandigarh, India

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ABOUT ME

I am **Rahul**, a **19-year-old BCA student** with a strong interest in building real-world software systems. Alongside my academic studies, I focus on hands-on development, full-stack engineering, DSA, and designing scalable applications through practical projects.

TECHNICAL SKILLS

- **Languages:** TypeScript, JavaScript, Python, C++, SQL
- **Frontend:** Next.js, React.js, Tailwind CSS, Shadcn UI, HTML5/CSS3
- **Backend:** Node.js, Express.js, WebSockets (Socket.io), REST APIs
- **Databases & Infra:** PostgreSQL, MongoDB, Redis, Docker, Prisma, Drizzle ORM, Vercel, Cloudinary
- **Core Concepts:** Data Structures, Algorithms, [LeetCode Profile](#), System Design

KEY PROJECTS

DevSync – Real-Time Collaborative Coding Platform | *Next.js, Node.js, Prisma, WebSocket, Yjs, Express, Docker*
[Live Demo](#)

- Built **DevSync**, a full-stack **Next.js**-based **collaborative coding platform** enabling multiple developers to edit code **simultaneously with real-time synchronization** using **Yjs CRDTs** over **WebSocket + Express**.
- Architected a **distributed microservices system** separating the collaboration layer (WebSocket orchestration, CRDT sync, presence) from the persistence and execution layers, ensuring scalability under high concurrent editing sessions.
- Implemented **cursor, scroll, and selection synchronization** to provide a Google-Docs-like collaborative coding experience with low-latency state propagation.
- Engineered an **incremental snapshot and delta-based persistence system** to efficiently store CRDT document updates, minimizing network payloads and storage overhead.
- Developed a **Dockerized execution backend** with isolated disk storage capable of running frontend (React), backend (Express/WebSocket), and GUI applications (e.g., Tkinter), exposed securely to the web via a **reverse proxy**.
- Integrated a **real-time chat system** alongside the editor to enable seamless team communication during collaborative coding sessions.
- Resolved complex **race conditions in file and execution workflows** using database-level advisory locks and optimistic concurrency control.

BookWise – Enterprise Library Management System | *Next.js, Upstash, Neon Db, Drizzle, Redis, Nodemailer*
[Live Demo](#)

- Developed **BookWise**, a full-stack library management system allowing users to securely log in, browse, borrow, and return books.
- Implemented a protected **admin-only dashboard** to manage user approvals, book inventory, and borrowing workflows.
- Integrated **QStash-based background workflows** with **Nodemailer** to automatically send reminder emails for overdue books.
- Added **API rate limiting and request throttling** to mitigate abuse and protect the platform against DDoS attacks.

NewTube – Scalable Video Sharing Platform | *React.js, Express, MongoDB, Cloudinary* [Live Demo](#)

- Built **NewTube**, a social media platform combining video, photo, and short-form content browsing inspired by Instagram, Twitter, and YouTube Shorts.
- Implemented core engagement features including **views, likes, dislikes, comments, retweets**, and real-time interaction updates.
- Designed user-centric content management with **custom playlists**, saved content, and persistent **watch history tracking**.
- Engineered a scalable backend with optimized media delivery, secure authentication, and role-based access control for content moderation.