

Introduction

The planned project is a digital note-taking and annotation tool designed to help engineering students take structured notes and enrich them with multimedia annotations. With the possibility to work collaboratively on notes in real-time, the choice of technology stack is critical for scalability, ease of development and delivering a smooth user experience.

The proposed stack is:

- **Frontend:** React + Tailwindcss
- **Backend:** Node.js + Express
- **Database, storage and authentication:** Supabase
- **Package manager/Runtime:** Bun

Frontend: React

- **Component-based architecture:** React allows building reusable, modular UI components, ideal for complex note-taking interfaces like editors and annotation tools
- **Rich ecosystem:** Libraries for rich text and code editing for react are abundant (Draft.js, Slate.js, Quill)

Backend: Node.js + Express

- **Event-driven architecture:** Node.js is great for handling multiple simultaneous connections, making it suitable for collaborative features and real-time updates.
- **Express:** Lightweight, flexible and well documented for building REST APIs to connect the frontend with Supabase services.

Supabase (Database, file storage, authentication)

- **PostgreSQL database:** Supabase provides a fully managed, scalable postgresSQL instance which goes hand-in-hand with the project requirement of a relational database.
- **Authentication:** Ready to use authentication system that supports email, OAuth and third-party logins greatly reduces development time and improves user experience.
- **File storage:** Supabase provides a scalable solution for storing and serving files, with a global CDN and access controls using Postgres RLS policies.
- **Realtime API:** Supabase offers built-in realtime subscriptions, enabling us to build collaborative editing features similar to Google docs

Bun as package manager and runtime

- **Fast:** Bun offers faster install times and runtime performance compared to npm/yarn
- **All-in-one Tooling:** Includes a bundler, test runner, and transpiler, reducing the need for additional tooling.
- **Modern Ecosystem:** Compatible with Node.js APIs, making it easier to adopt while maintaining performance advantages

Summary

This note-taking application leverages a modern and performance centered technology stack for an efficient and scalable solution.

Frontend: React and Tailwind provide easy to implement architecture that will provide rich text editing possibilities.

Backend: Node.js and Express provide a simple and lightweight API layer for handling collaborative features.

Database services: Supabase serves as a solid backend service providing PostgreSQL for structured data and built in authentication, and easy to use file storage for images.

Runtime: Bun is a fast and runtime efficient package management system, with integrated testing tools, streamlining development.