## 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 postgreSQL 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.