**IDE Project Documentation**

**Introduction**

This project is about creating an IDE inspired by Visual Studio Code, designed to be both user-friendly and powerful. The goal is to make it easier for users to:

* Select programming languages they want to work with.
* Write, run, and debug code.
* Share code snippets and interact with a collaborative coding community.

Let’s dive into the details of what this IDE will offer.

**Features Overview**

**Key Features**

1. **Language Selection** Users can pick their preferred programming language. The editor will adjust its settings (like syntax highlighting) accordingly.
2. **Code Editor**
   * A sleek editor with syntax highlighting.
   * Intelligent auto-complete and error checking.
   * Support for light and dark themes to match user preferences.
3. **Code Execution**
   * Run code directly within the IDE.
   * Display output instantly and show detailed error messages for debugging.
4. **Snippet Sharing Community**
   * Share code snippets with others.
   * Browse and search for useful snippets.
   * Engage with the community through comments and feedback.
5. **Authentication and Authorization**
   * Users can create accounts and log in securely.
   * All interactions are protected with secure tokens (JWT).

**Additional Ideas**

* Real-time collaboration for multiple users to edit the same file.
* Offline mode, so users can work without an internet connection.
* Plugin support for advanced customizations.

**Technical Details**

**Frontend**

* Built using **React.js** for a dynamic user experience.
* Styled with **Tailwind CSS** for modern, responsive designs.
* Core editor functionality powered by **Monaco Editor** or **CodeMirror**.

**Backend**

* Developed with **Node.js** and **Express** for robust API handling.
* Data is stored in **MongoDB**, including user profiles, snippets, and logs.
* Code execution is isolated in **Docker containers** for safety and consistency.
* Background jobs managed via **BullMQ** for reliable task scheduling.

**Security**

* Passwords are encrypted with **bcrypt**.
* User sessions are maintained with secure **JWTs**.

**Hosting**

* Frontend deployed on **Netlify** or **Vercel**.
* Backend hosted on **AWS** or similar platforms, with databases on **MongoDB Atlas**.

**Architecture**

The IDE is designed with a modular structure for scalability and maintainability:

* **Frontend:** Handles the user interface and communicates with the backend using REST APIs.
* **Backend:** Manages authentication, code execution, and data handling.
* **Database:** Stores user data, snippets, and execution logs efficiently.
* **Code Execution Service:** Safely executes user code in isolated environments.
* **Snippet Sharing Service:** Enables community engagement with sharing, searching, and commenting on snippets.

**Development Roadmap**

Here’s the step-by-step plan to bring this IDE to life:

1. **Authentication:** Start by building user sign-up and login systems.
2. **Code Editor:** Add the language selection and editor functionality.
3. **Execution Engine:** Set up the backend for running user code.
4. **Community Features:** Build the snippet sharing system.
5. **UI/UX Enhancements:** Focus on design and usability.
6. **Launch and Feedback:** Release a beta version, gather user feedback, and improve further.

This document outlines the foundation for developing the IDE. It’s flexible enough to evolve as new ideas and challenges come up. Let me know if anything needs refining!