

# CodeFlow – Integrated Developer Collaboration Platform

## Project Aim

**CodeFlow** is designed to unify real-time developer communication with browser-based code execution in a single platform. The system enables developers and learners to collaborate, practice coding, exchange knowledge, and build meaningful professional connections without switching between multiple tools.

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## Project Overview

CodeFlow is a dual-module web application that integrates a modern online code editor with a full-featured social collaboration platform. It allows users to write, execute, and store code while simultaneously engaging in real-time chat, video calls, and developer networking.

The platform supports skill-based user discovery, persistent code storage, multi-language execution, and seamless onboarding, creating an efficient ecosystem for collaborative learning and development.

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## Existing System Limitations

- Code editors and communication tools exist on separate platforms
  - Limited real-time collaboration and peer interaction
  - No structured developer discovery or skill-based matching
  - Fragmented workflow for coding practice and communication
  - Lack of integrated tools for continuous skill improvement
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## Proposed Solution

CodeFlow overcomes these limitations by offering:

- An integrated code editor with real-time execution
- A developer-focused social networking system
- Real-time chat and video collaboration
- Skill-based onboarding and user matching

- Persistent and accessible code storage
  - Support for multiple programming languages
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## **System Architecture & Modules**

### **Module 1: Code Editor Module**

#### **Main Editor Page**

##### **Features**

- Split-view interface with code editor and output panel
  - Multi-language programming support (JavaScript, Python, Java, C++, etc.)
  - Monaco Editor with syntax highlighting and IntelliSense
  - Real-time code execution using Piston API
  - Compilation and runtime error handling
  - Customizable themes and editor font size
  - Automatic code saving in browser local storage per language
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### **Module 2: Chat & Collaboration Module**

#### **1. Sign Up Page**

##### **Features**

- User registration with email validation
  - Secure password hashing using bcrypt
  - Automatic profile picture generation
  - JWT-based authentication token generation
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#### **2. Login Page**

##### **Features**

- Secure user authentication with email and password
- Password verification and session management
- Protected route access after successful login

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### **3. Onboarding Page**

#### **Features**

- Profile completion with bio and location details
  - Selection of primary frontend technology stack
  - Selection of backend and database learning stack
  - Random avatar generation option
  - Synchronization of user profile with Stream Chat services
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### **4. Home Page**

#### **Features**

- Display of existing friends with tech stack badges
  - Recommended developers based on matching skills and interests
  - User discovery filtered by learning goals
  - Friend request sending functionality
  - Navigation to notifications and chat sections
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### **5. Notifications Page**

#### **Features**

- Display of incoming friend requests
  - Sender profile details with tech stack information
  - Accept friend request functionality
  - Notifications for newly established connections
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### **6. Chat Page**

#### **Features**

- Real-time one-on-one messaging using Stream Chat
- Persistent message history
- Threaded conversations for organized discussions
- Unique chat channel creation
- Video call link sharing within chat

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## 7. Call Page

### Features

- Real-time video and audio communication
  - Call controls (mute, camera on/off, end call)
  - Speaker-focused video layout
  - Automatic call joining and connection handling
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## 8. Typing Speed Test Page

### Features

- Interactive typing speed test interface
  - Real-time speed and accuracy feedback
  - Typing practice to improve developer productivity
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## 9. Code Editor Page (Embedded)

### Features

- Embedded code editor within the chat module
  - Seamless integration with the standalone Code Editor module
  - Enables live coding during discussions and collaborative sessions
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## 10. Chatbot Page

### Features

- AI-powered chatbot for instant doubt resolution
- Supports **coding-related queries** such as syntax help, debugging, and concept explanations
- Supports **general-purpose queries** for broader learning assistance
- Interactive chat-based interface for natural conversation
- Context-aware responses to improve understanding
- Accessible alongside other collaboration tools for continuous support

# Database Design

## User Model

- Stores authentication credentials and encrypted passwords
- User profile information and onboarding status
- Frontend, backend, and database tech stack preferences
- Friend list and relationship management

## Friend Request Model

- Tracks friend request lifecycle
- Maintains sender and recipient relationships
- Status management (pending, accepted)

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## Conclusion

CodeFlow delivers a comprehensive, developer-focused ecosystem that integrates coding practice, real-time collaboration, professional networking, and AI-assisted learning. The inclusion of an intelligent chatbot enhances the platform by providing instant support for both technical and general queries, reducing learning barriers and improving productivity.

With its modern architecture, scalable design, and rich feature set, CodeFlow stands as an all-in-one solution for developers seeking collaborative coding, continuous learning, and meaningful professional connections.