RAMANUJAN COLLEGE

UNIVERSITY OF DELHI

LAB PRACTICAL

MINOR PROJECT – 1

(REAL-TIME COLLABORATIVE CLOUD IDE)

CODECOLLAB

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SYMPOSIUM REPORT
Project Title: Real-Time Collaborative Cloud IDE – CODECOLLAB

1. Problem Statement

Modern software development requires teamwork and fast updates. But collaboration becomes difficult due to several problems:

1. **Different Development Environments:**
   Developers often say *"It works on my system!"* because everyone's local setup is different.

2. **Use of Multiple Tools:**
   Developers need to switch between IDEs, Git etc. This reduces focus and slows down work.

3. **Difficult & Risky Access Sharing:**
   Sharing code for quick review becomes risky because of permission issues.

Vision of Our Project
To create a platform where coding together is as simple as editing a Google Doc — **real-time, secure, and effortless collaboration**.

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1. Proposed Solution: A Cloud-Driven Real-Time IDE

We built a browser-based development environment that allows multiple users to collaboratively edit, run, and debug code with **zero setup**.

Key Benefits

- **Instant Collaboration:** Join with a single shared link — no cloning required.
- **Universal Access:** Works directly inside the browser—no installations.
- **Secure Sharing:** Granular access control for every project.
- **Professional Experience:** A modern IDE interface with powerful development tools.

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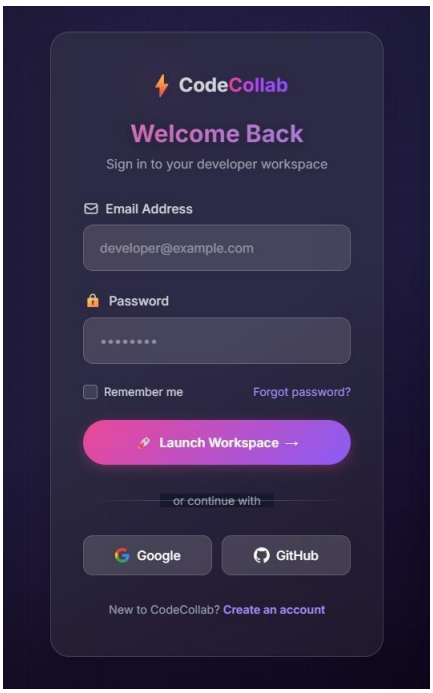
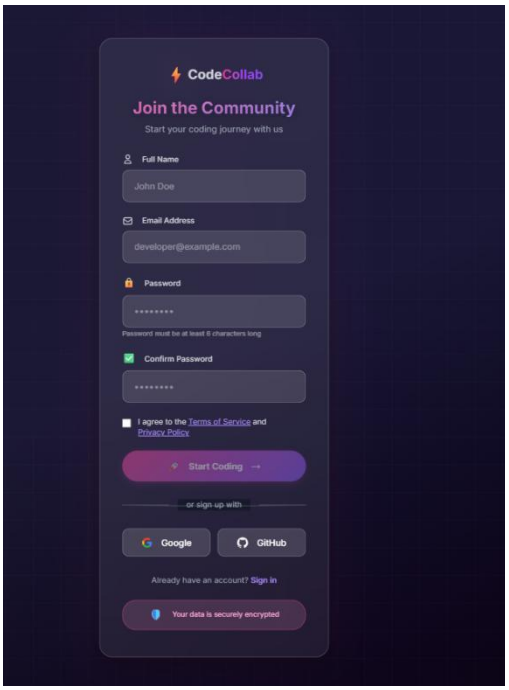
2. Core Functional Features

A. Effortless Onboarding s Project Setup

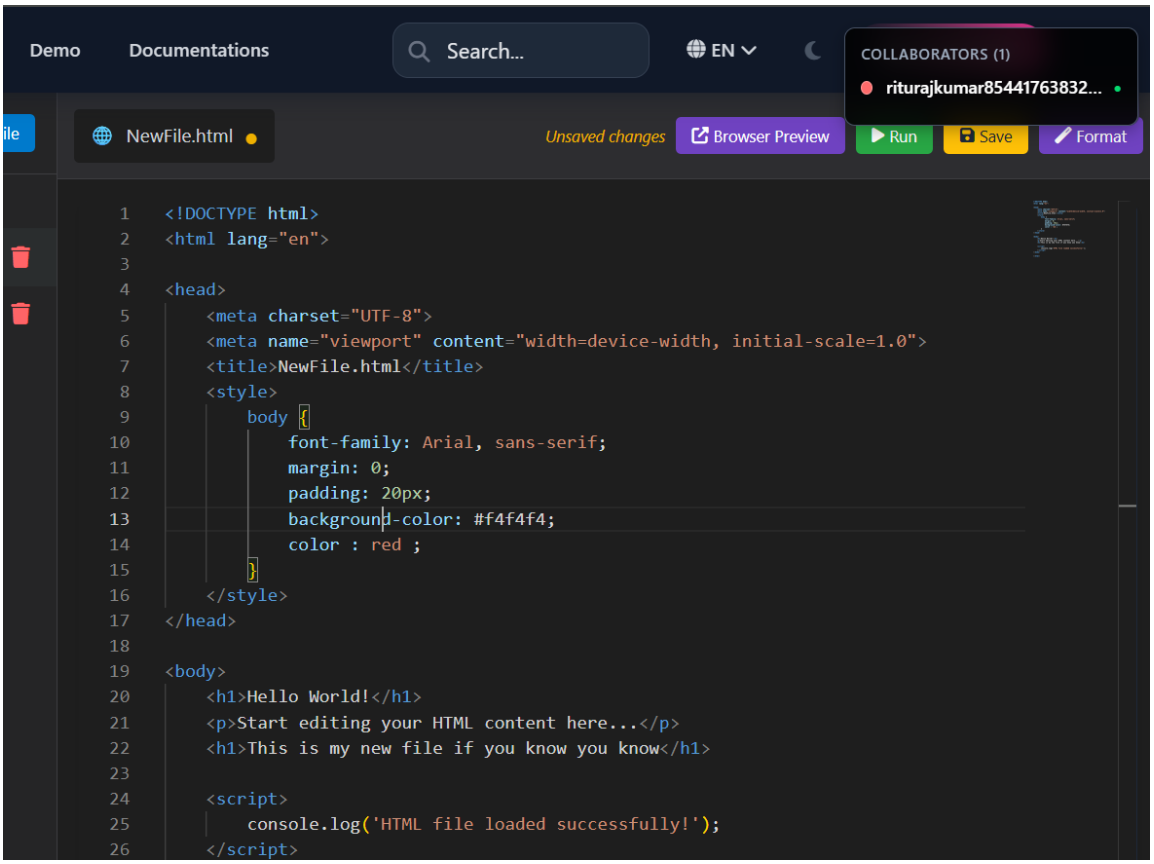
- Sign in using Google or GitHub.





B. Real-Time Collaborative Editing

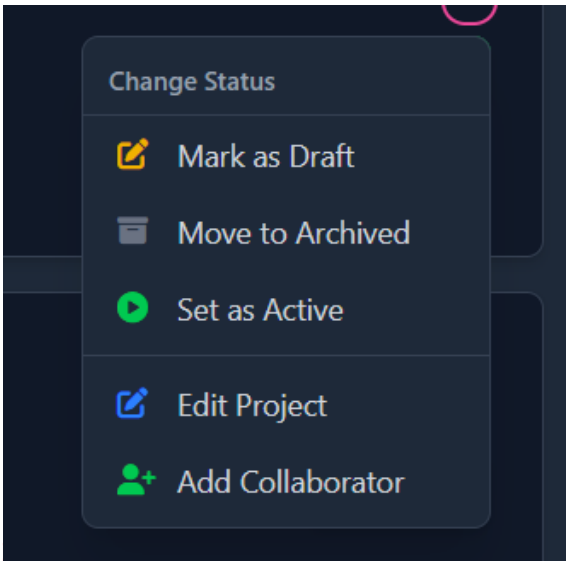
- Live cursor tracking and instant synchronized code updates.
- Low-latency interaction powered by real-time protocols.

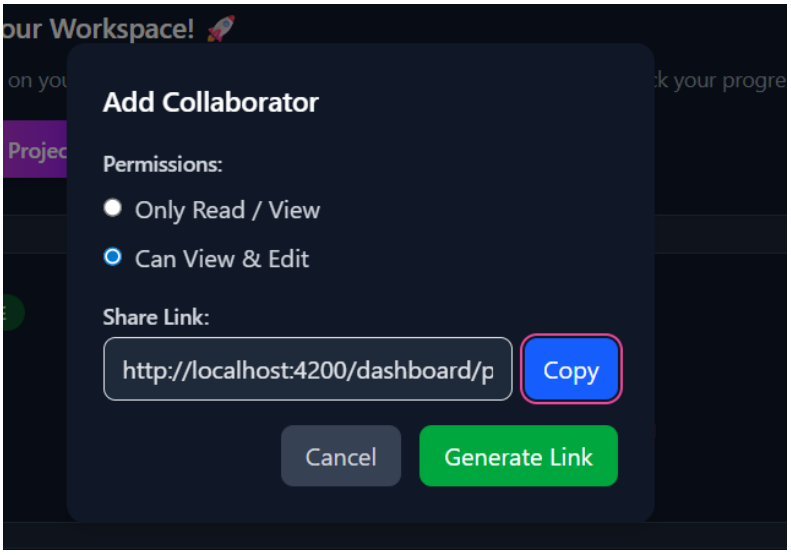


C. Secure s Granular Access Permissions

- Collaborators invited via link.

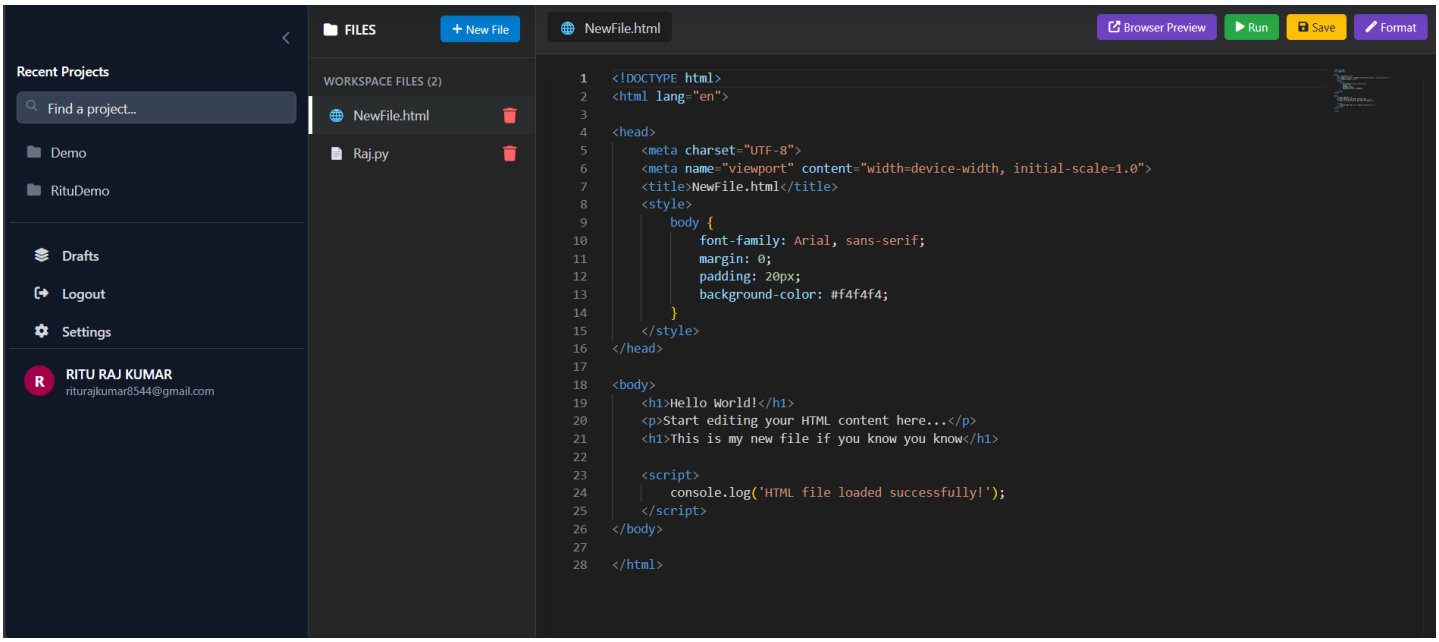
- Role options: **Viewer** / **Editor**





D. Fully-Featured Web IDE

- **Code Editor:** Monaco-based with autocomplete, syntax highlighting, themes
- **Integrated Terminal:** Execute system commands in-browser
- **Project Explorer:** File/folder management on-cloud



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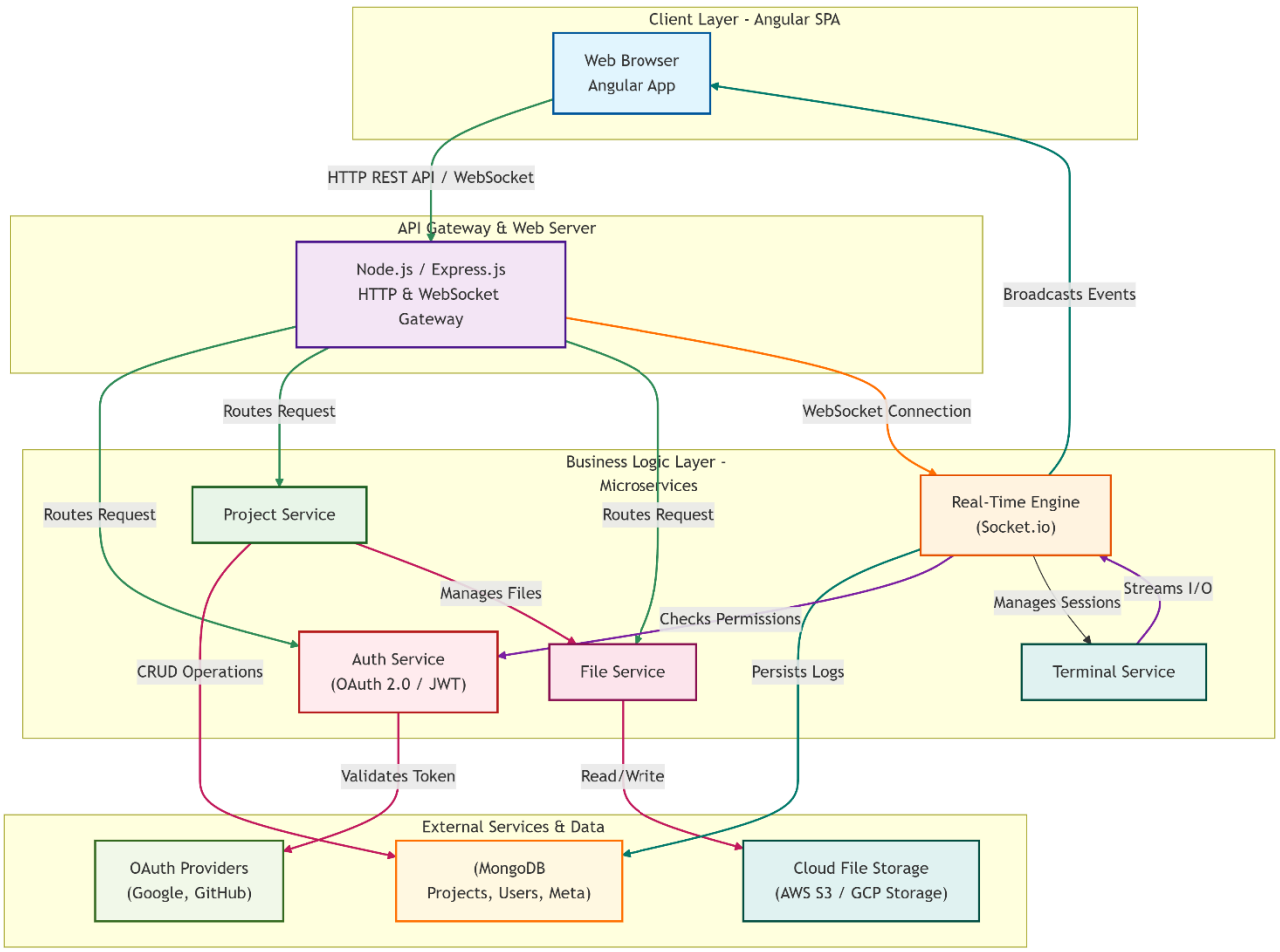
3. Architecture Overview

Our scalable design leverages modern web technologies and real-time infrastructure.

Component	Technology
Frontend	Angular
Code Editor	Monaco Editor
Backend	Node.js + Express.js
Real-Time Communication	Socket.io
Database	MongoDB
Authentication	Google/GitHub OAuth 2.0



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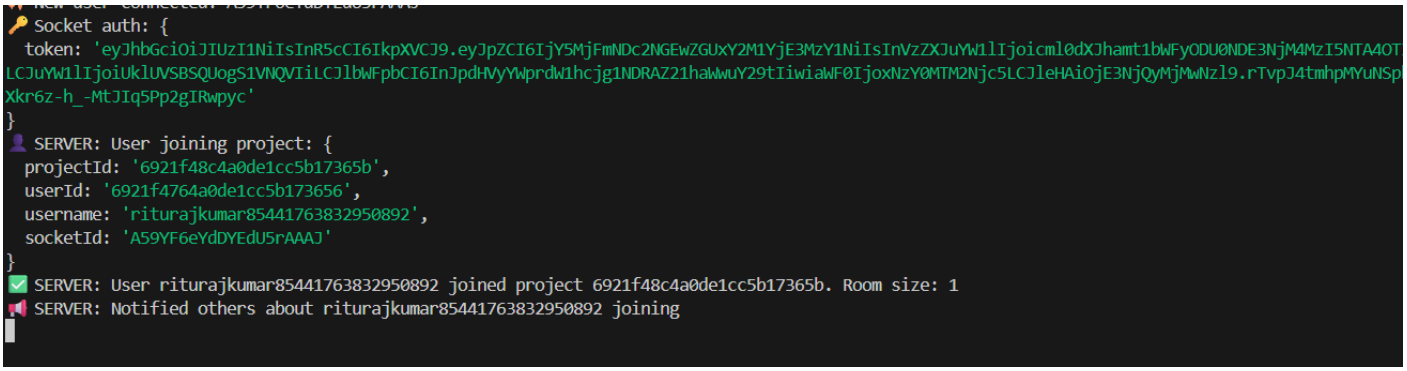
4. **Data Integrity s Activity Logging**

Every change — from editing a file to modifying access permissions — is fully tracked:

Example Audit Log Entry



✓ Accountability

✓ Version Transparency

✓ Simplified reversals of unintended changes

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5. Design Principles: Performance, Security, Reliability

Principle	Purpose	Implementation
Speed	Low latency (< 200 ms)	Real-time optimization
Reliability	No data loss	Auto-save & reconnect
Security	Safe access	OAuth, HTTPS, encryption
Scalability	Large groups support	Modular architecture

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6. Conclusion s Future Enhancements

Our Real-Time Collaborative IDE successfully eliminates the traditional barriers that developers face during team-based coding. By combining cloud technology, secure access control, and an intuitive interface, the platform ensures:

✓ Seamless cloud-based productivity
✓ Smooth real-time collaboration
✓ Safe and structured access management
✓ A modern, powerful, and user-friendly development experience

Future Enhancements (Roadmap)

To further improve collaboration and efficiency, we plan to introduce:

- **Expanded Language Support:** Python, Java, Go, and more.
- **Integrated Audio/Video Calling:** For real-time pair programming.
- **One-Click Deployment:** Easily deploy projects directly from the IDE.
- **AI-Assisted Coding Suggestions:** Smart debugging and auto-correction.

- **Live Project Analytics:** Track activity, errors, and performance in real time.
- **Mobile-Responsive Editor:** Access and view code from smartphones and tablets.

Thank You!

We sincerely appreciate your time, guidance, and feedback throughout this project. Your support has helped us shape an innovative solution for the future of collaborative software development.

Project Link: https://github.com/pra8953/-Real-Time_Collaborative_CloUd_IDE

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