

# Symposium Presentation Document

**Project Title:** Real- Time Collaborative Cloud IDE with Project Repositories and Access Control

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## 1. Problem Statement: Challenges in Modern Coding Collaboration

Software development today demands fast iteration and teamwork. However, collaboration often becomes inefficient due to:

- **Environment Mismatch:** “*It works on my system!*”—local configurations differ across machines.
- **Fragmented Tools:** Switching between IDEs, Git platforms, and messaging services interrupts focus.
- **Complex Access Permissions:** Sharing repositories for quick reviews can compromise security.

 **Our Vision:** Enable seamless, secure, and real-time collaboration — as effortless as editing a shared document online.

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## 2. 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**.

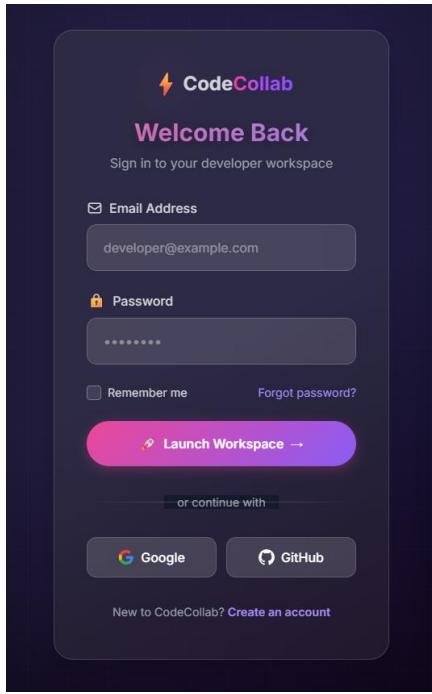
### Key Benefits

- **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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## 3. Core Functional Features

### A. Effortless Onboarding & Project Setup

- Sign in using Google or GitHub.
- Create new projects or import directly from GitHub.



## B. Real-Time Collaborative Editing

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

📌 *Insert Image:* Editor view showing two or more users editing simultaneously

## C. Secure & Granular Access Permissions

- Collaborators invited via email.
- Role options: **Viewer / Editor**

📌 *Insert Image:* Permissions modal with access roles

## 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

📌 *Insert Image:* Full UI layout — File Explorer + Editor + Terminal

## 4. Architecture Overview

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

### Technology Stack

<b>Component</b>	<b>Technology</b>
UI Framework	Angular
Code Editor	Monaco Editor
Server	Node.js + Express.js
Real-Time Engine	Socket.io
Database	MongoDB
Authentication	OAuth 2.0 (Google, GitHub)

📌 *Insert Image: System Architecture Diagram*  
Client ⇔ Socket.io ⇔ Node.js Server ⇔ MongoDB  
  └ OAuth Providers (Google / GitHub)

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## 5. Data Integrity & Activity Logging

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

### Example Audit Log Entry

```
{
  "action": "file_updated",
  "user": "alice@example.com",
  "timestamp": "2025-10-22T12:00:00Z",
  "details": "Resolved authentication bug."
}
```

- ✓ Accountability
  - ✓ Version Transparency
  - ✓ Simplified reversals of unintended changes
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## 6. Design Principles: Performance, Security, Reliability

<b>Principle</b>	<b>Objective</b>	<b>Implementation</b>
<b>Speed</b>	Sub-200 ms collaboration latency	Event optimization, local buffering
<b>Reliability</b>	Zero-data loss	Auto-save + reconnection recovery
<b>Security</b>	Protected code and access	Encrypted tokens, HTTPS, OAuth

Principle	Objective	Implementation
<b>Scalability</b>	Teams & classrooms supported	Modular microservice-ready design

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## 7. Conclusion & Future Enhancements

Our platform removes traditional barriers to collaboration in software development. It delivers:

- ✓ Seamless cloud productivity
- ✓ Strong access governance
- ✓ A familiar yet innovative development environment

### Roadmap Features

- Support for more programming runtimes (Python, Java, Go)
  - Built-in audio/video for pair-programming
  - One-click deployment workflows
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### Thank You!

We appreciate your valuable time and feedback.

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 **Project Link:** [Website / GitHub]