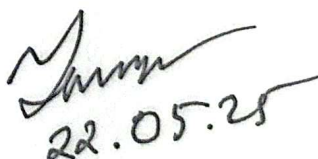# Daffodil International University

Department of Computer Science and Engineering

Final Year Design Project

Title Defense Report

Project Identification:

I. Project Title	**CodeMate - Real-Time Collaborative Coding Platform**	
II. Group Members	**Name:** Faysal Hassan Torjo	**Student ID:**221-15-5926
	Name: Mahmud Hassan Anik	**Student ID:**221-15-4733
III. Supervisor	**Name:** Ms. Tanzina Afroz Rimi	**Designation:** Lecturer (Senior Scale)
IV. Co-Supervisor	**Name:** Pranto Protim Choudhury	**Designation:** Lecturer
V. Submission Date:		
VI. Certificate :	"This is to certify that the final year design project works until Title defense evaluation held on CodeMate - Real-Time Collaborative Coding Platform titled as stated in *Sec. I*, executed by the students' group mentioned in *Sec. II*, have been found satisfactory and every section of this report is reflecting the same."	22.05.25

1. Background Study:

In the era of digital education, especially after the COVID-19 pandemic, the need for interactive and collaborative learning platforms has significantly increased. For Computer Science and Engineering (CSE) students, programming education is a cornerstone of their academic journey. Traditionally, practical coding classes are conducted in labs where instructors demonstrate code on a projector while students simultaneously write the same code on their systems. However, this model has various shortcomings.

Firstly, students often struggle to keep up with live coding demonstrations. Minor syntax errors, differing software environments, or version mismatches can cause their code to fail even when they copy the teacher's logic exactly. Once behind, they find it difficult to catch up, losing both engagement and understanding. Furthermore, students don't have access to the teacher's code in real-time, which further hampers the learning process.

On the instructor's side, there is a lack of mechanisms to verify whether students are genuinely understanding the material. Teachers usually ask students if they understand the content, to which students often reply "yes" regardless of their comprehension, leaving the teacher with no way to validate or interact meaningfully. During lab assessments, academic dishonesty becomes another serious issue. Many students resort to copy-pasting code from the internet without understanding the concepts. Traditional systems do not provide any way to track or restrict such activities in real time.

Several tools like Google Docs or Replit offer collaborative features, but they lack integration with educational monitoring, evaluation, and real-time lab test features. Additionally, solutions like Zoom or Google Meet only offer screen sharing without real-time code interaction. These existing solutions are either too general or not tailored for educational programming environments.

CodeMate addresses these issues by offering a comprehensive platform built using Django, Celery, Redis, Docker, and WebSocket technologies. It allows real-time collaborative coding between teachers and students, tracks copy-paste actions during lab sessions, and provides instructors with tools to

monitor and verify student participation interactively. This project aims to bridge the gap between passive code demonstrations and active student engagement through a modern, secure, and scalable solution.

2. Problem Statement:

Despite advancements in remote learning, existing tools fail to provide a real-time, interactive, and monitored coding environment for both students and teachers. Students often lag behind due to syntax errors or mismatched environments and lose access to the instructor's code. Teachers cannot effectively verify student understanding during lectures or monitor copy-paste behavior during lab tests. There is a pressing need for a real-time, collaborative coding platform that facilitates hands-on learning, active participation, and academic integrity in coding education.

3. Research Question:

How can we develop a real-time collaborative coding platform that enhances student engagement, ensures academic integrity, and improves the effectiveness of coding instruction in remote or in-person educational settings?

4. Objectives:

- To enable real-time collaborative coding between teachers and students.

- To provide live coding session channels where teachers can monitor and interact with students individually.

- To develop a lab test system with copy-paste detection and logging.

- To ensure seamless synchronization of code snippets using WebSocket.

- To create a secure, role-based user environment for teachers and students.

- To build a scalable and deployable system using Docker and Celery for background tasks.

5. Expected Outcome:

The expected outcome is a fully functional, scalable, and interactive coding platform tailored for educational use. Teachers will be able to conduct live coding sessions, assign tasks, and evaluate students in real-time. Students will experience enhanced engagement by coding alongside instructors, accessing real-time updates, and receiving individual attention. The system will provide a new level of transparency and accountability in lab sessions through copy-paste detection and user monitoring. Ultimately, CodeMate will contribute to more effective programming education and reduce the gap between instruction and practice.

6. Scope of Work:

- **In-Scope:**

    - Development of real-time collaborative editor using Django and WebSocket.

    - Implementation of user roles (teacher, student) and access control.

    - Copy-paste detection mechanism with event logging.

    - Dockerized deployment for scalability.

- **Out of Scope:**

- Full-scale code auto-evaluation and grading based on output.

- Voice/video communication features (planned for future enhancement).

7. References:

- *Django Documentation* – *https://docs.djangoproject.com/*

- *Celery Documentation* – *https://docs.celeryq.dev/*

- *Redis Documentation* – *https://redis.io/docs/*

- *Docker Documentation* – *https://docs.docker.com/*

- *WebSocket API* – *https://developer.mozilla.org/en-US/docs/Web/API/WebSocket*

Supervisor's Feedback:

Supervisor's Signature: _____

Date: __22 05.25_____