CODECOLLAB: A Livecode editor for Multiuser

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Abstract :   Our project CodeCollab is a tool that enables instant coding and testing. It displays code output in real-time, allowing immediate observation of changes in webpage appearance and functionality. This tool is particularly advantageous for web development, facilitating rapid experimentation with various different types of designs and interactions. CodeCollab does not only focus on the real-time code compiling but it also helps the user in understanding the different tags and different code in an interactive way. CodeCollab helps share the code with the friends and taking their suggestions about the code and provide the feedback in the same application. Our project stands out from others in several ways. Firstly, it allows easy sharing of code with other users, collaboration. Our platform incorporates coding challenges designed to facilitate learning. These challenges serve as valuable educational resources, offering users the opportunity to enhance their coding skills and deepen their understanding of programming concepts. By providing a hands-on learning experience, our platform empowers users to engage actively with coding tasks, leading to accelerated skill development and proficiency in coding languages. Our project is specifically developed for HTML, CSS and JS language, providing a focused environment for web development tasks providing an edge of advantage over other platform which provide the code editor for C / C++ or OOP languages.

IndexTerms :- **CodeCollab, CodeCollab, Compilation, Interactive Code, Learning, HTML, CSS, JavaScript**

I. INTRODUCTION:

CodeCollab is a game-changer in software development and programming education. It offers a user-friendly platform for writing, running, and testing code in real-time. Whether you're a beginner learning web development or an experienced developer trying new ideas, CodeCollab encourages hands-on learning and collaboration. You can code in HTML, CSS, and JavaScript and instantly see the results. This quick feedback loop allows for fast learning and experimentation. CodeCollab also integrates with educational materials, providing interactive lessons and a practical learning environment. It helps learners progress at their own pace, making coding education more effective and enjoyable.

1.1 Key Features:

Key features of CodeCollab include:

1. Real-time Coding and Testing: Write and execute code in real-time, with immediate feedback on changes.
2. Collaboration Tools: Effortlessly share code, collaborate with others, and receive feedback within the platform.
3. Integrated Coding Challenges: Engage in coding challenges to enhance skills and deepen understanding.
4. Focused Environment: HTML, CSS, and JavaScript, providing a dedicated space for web development tasks.
5. Educational Integration: Integrates with educational materials and interactive lessons to facilitate practical learning   experiences.
6. User-friendly Interface: Designed for users of all skill levels, promoting experimentation, collaboration, and continuous learning.

1.2 Development Process:

1. Choose Web as Development Platform: Select appropriate tools and technologies such as HTML, CSS, JavaScript.
2. Firebase Integration: Incorporating Firebase for real-time database functionality, enabling seamless data storage and synchronization for collaborative features within CodeCollab.
3. Design: The design phase focuses on creating user interface (UI) designs. It involves defining the layout, color schemes, typography, and overall visual aesthetics of the platform..
4. Deployment: Once the platform has been thoroughly tested and approved, it is deployed to a production environment where it is made available to users.
5. Feedback and Iteration: After deployment, the platform is continuously monitored, and user feedback is collected to identify areas for improvement.

II. LITERATURE REVIEW AND OBJECTIVE:

2.1 Literature Review:

i. Association for Computing Machine "**Real-time collaborative coding in a web ID",** Feature used: Integrating Collaborative Program Development and Debugging within a Virtual Environment

ii. **"V-Code: Online Code Editor" 2023, Feature used:** Responsive Design

iii. Author-Aditya Kurniawan1*, Aditya Kurniawan2, Christine Soesanto3, Joe Erik Carla Wijaya4, name- "**coder: real-time code editor application for collaborative programming**", publication- International Conference on Computer Science and Computational Intelligence, date- 2015.[6]

iv. J. Bo, B. Jiajun, C. Chun, and W. Bo. "**Semantic consistency maintenance in collaborative graphics design systems**". In Proc. Computer Supported Cooperative Work in Design, pages 35–40. IEEE, Apr. 2008.K. M. Hussain, Aerodynamic Performance Evaluation of a Novel Turbine, PhD thesis, Department of Mechanical Engineering, IIT Guwahati, India, 2016.[3]

v. "**CoVSCode: A Novel Real-Time Collaborative Programming Environment for Lightweight IDE**", 31 October 2019[9]

2.2 Objectives:

The development of CodeCollab includes various key components to create collaborative coding environment. The proposed methods for CodeCollab are follows:

- User Interface Design:
  The design of CodeCollab's user interface is needs to be very enthusiastic and clean. CodeCollab should provide different sections for input, output of the code. The CodeCollab provides the simple user interface that can be understood by any type of users with different level of expertise. Emphasis should be placed on simplicity and ease of navigation to ensure an optimal user experience.

- Real Time Code Execution:
  CodeCollab has core functionalities to show output for code that has been written in the interface of the CodeCollab. This functionality provides great time saving to the developers and new learners to overcome their mistakes and solving errors. As developer writes the code in code editor it interprets the code in real time and shows output in corresponding output panel. We have usen the flutter for developing the project that will show the output in real time. Real time code execution will encourage the user and developers to write clean code to make changes in the code in real time.

- Text Editor Component:
  CodeCollab has components layout which is easy to understand. The text editor component arranges according to user need and easy to navigate.

- Code Execution Environment:
  CodeCollab runs code on web browser interpreter. There is no need to install any external compiler or interpreter for executing the code of code editor. CodeCollab shows output for input code in real time. The user is able to check the output and make changes and then see the outcomes in real time. CodeCollab has integrated interpreting environment.

- Communication With Execution Environment:
  Implement a communication channel between components of code editor and execution environment of CodeCollab. This process involved sending of code typed by user into the text editor to the execution engine and runtime environment.

- Execution Control:
  CodeCollab provides user and developers of different level of expertise the control over the execution of code. Code can be easily maintained edited changes and see output in real time.

- The CodeCollab has integrated execution environment. CodeCollab has additional feature like coding challenges where the users and developers can check their knowledge. The CodeCollab is providing the coding challenges and answers of coding challenges in real time. The CodeCollab has feature to guide the new users and developer to use the code editor and learning new languages interactively.

- Testing and Optimization:
  Thoroughly the CodeCollab checks across various browsers. The execution of code in CodeCollab is done internally in integrated environment in real time. The code can be easily edited due to separate sections provided for editing the code at same time and gives output in real time. This feature of CodeCollab enables user to write optimized code.
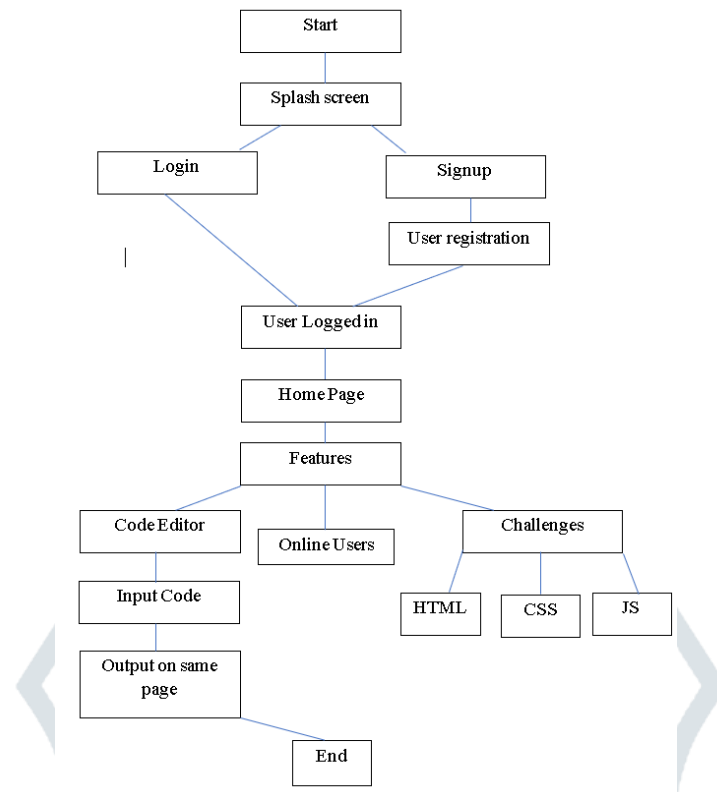
Data Flow Diagram:

Figure 1 : **Flow Diagram of CodeCollab**
The data flow diagram of the CodeCollab application

2.3 System Specifications

2.3.1 Hardware specification:
- CPU: Dual-core processor or higher.
- GPU: Adreno 540 or higher for Android devices, Apple A9 or higher for iOS devices.
- RAM: 2GB or higher.
- Storage: At least 16GB of available storage space.

2.3.2 Software specification:
- For desktop/laptop computers: Windows 10, macOS, or Linux.
- For mobile devices: iOS 11 or later for iPhones and iPads, Android 7.0 (Nougat) or later for Android smartphones and tablets. 3.IDE: VS Code
- Database: Firebase
- Mobile: Android or iOS mobile
- Language: HTML, CSS, JavaScript

3.2 FUTURE SCOPE

1. **Support for Different Languages**: Making CodeCollab work with more programming languages so more people can use it.
2. **Better Tools for Designing Code**: Adding features to help users design their code better and make it easier to understand.
3. **Easier to Use Interface**: Making CodeCollab easier to use by improving how it looks and how people interact with it.
4. **Using with Version Control**: Making it easier to use CodeCollab with tools like Git, which help manage changes to code over time.
5. **Sharing Code Snippets**: Allowing people to easily share bits of code with each other.
6. **Building a Community**: Making a place where people can talk to each other, ask questions, and work together on projects using CodeCollab

IV. RESULTS:

First off, it has made teamwork on coding projects much easier, so people can work together smoothly and get more done. Plus, our focus on hands-on learning with coding challenges and instant feedback has really helped users learn programming better, no matter their skill level. With CodeCollab, you can try out ideas quickly and see what works right away, which has made coding a lot faster and more fun. We've also found that lots of different people are using CodeCollab, from beginners just starting out to experienced pros trying out new stuff. And by integrating educational stuff into the platform, we've made it even easier for people to learn coding in a practical way. Overall, CodeCollab has been a big help for coding together, learning, and coming up with cool new ideas.

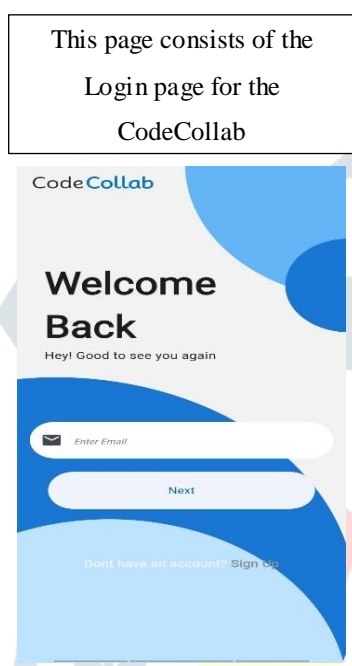The First page consists of the splash screen for the CodeCollab.

This page consists of the Login page for the CodeCollab

This page consists of the Sign Up for the CodeCollab.

This page consists of the Home Page for CodeCollab

Figure 2: Splash Screen .

Figure. 3 : Login Page
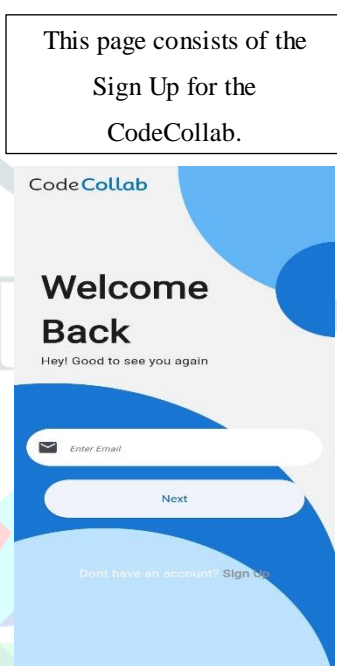
Figure 4. Sign Up Page

Figure. 5 : Homepage

This page consists of Editor with the HTML and CSS code Written and executed

This page consists of the HTML Questions

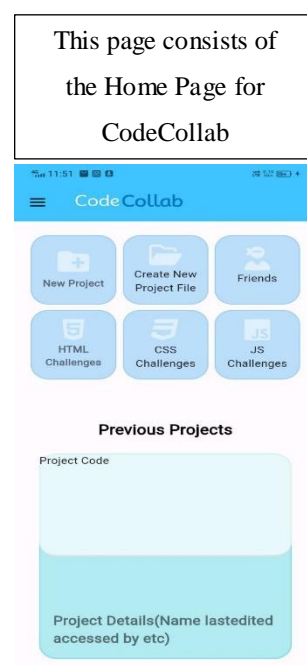This page consists of the Menu Function for CodeCollab

This page consists of Editor with no input.

Figure 6: HTML,CSS Code Entered.
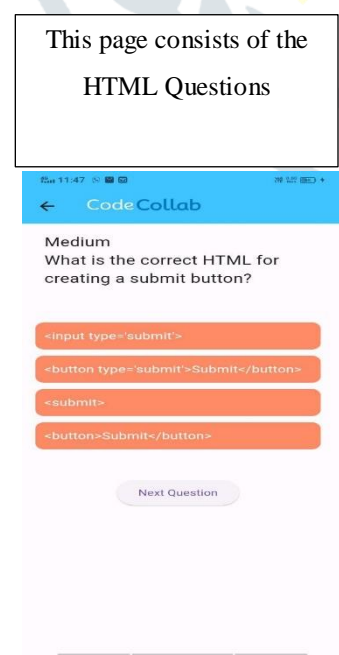
Figure 7: HTML Coding Challenges
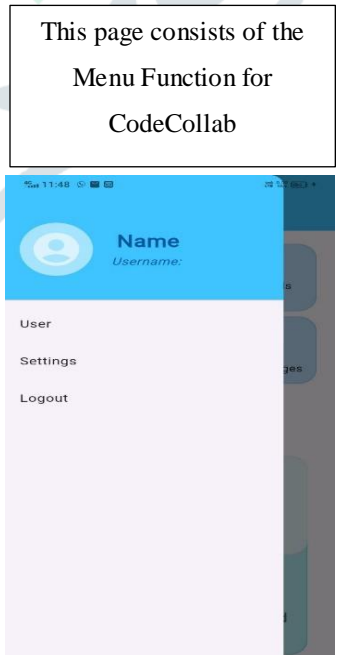
Figure 8: User Menu

Figure 9: HTML CSS & JS Editor

This page consists of challenges in html with correct answer selected.

This page consists of the challenges in html with incorrect answer.
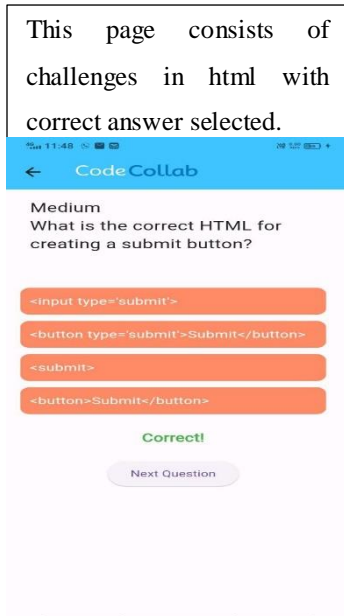
Figure 10 : HTML Question with Correct Answer

Figure 11 : HTML Coding Question with Incorrect

V. CONCLUSION:

The development of CodeCollab project represents a significant advancement in the real time software development tools. By enabling real-time editing, effective communication, and version control integration, such a project addresses the growing need for collaborative coding environments in modern software development. CodeCollab provides interactive environment for editing and execution of code. CodeCollab provides collaborative environment that makes revolutionary changes in development process.

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