

Somaiya Vidyavihar University

CodeCat - Online Compiler

Submitted at the end of semester IV in partial fulfillment of requirements of

Bachelors in Technology in Computer Engineering

by

Pargat Singh Dhanjal

Roll No: 16010121045

Meet Gala

Roll No:16010121051

Vishrut Deshmukh

Roll No: 16010121043

Guide



Dr. Zaheed Shaikh

Department of Computer Engineering

K. J. Somaiya College of Engineering, Mumbai-77

Batch 2021 -2025

Introduction

1.1 Problem Statement

The primary objective is to create an all-inclusive online coding platform that delivers an intuitive and user-friendly interface, catering to the diverse needs of programmers to write, compile, and execute code in multiple programming languages. The platform will incorporate advanced features such as an error-tolerant terminal screen, cloud storage equipped with robust user authentication, customizable input/output support, and an aesthetically designed dark/light mode. Furthermore, the platform will be architected as a progressive web application, offering a highly responsive user interface that is accessible on all devices, ensuring maximum availability and compatibility.

1.2 Motivation

During the second semester examinations, students faced challenges while using the online compiler hosted on the college's Learning Management System (LMS) platform. The inbuilt compiler only supported the C programming language, and C++ was not available. As a result, students experienced delays during the exams. Additionally, when C++ was eventually enabled, errors were not visible to users, causing further frustration.

Furthermore, the LMS compiler lacked important features, including syntax highlighting, find and replace functionality, and dark/light mode. This made it challenging for students to code effectively, and negatively impacted their exam performance.

To address these issues, we propose the development of a new and improved online coding platform that includes advanced features like multiple language support, syntax highlighting, error debugging, find and replace, and a modern, easy-to-use interface. This platform will ensure that students can efficiently code in the programming language of their choice and have access to a range of useful tools to improve their coding experience. With these features, the new platform will help students perform better in their exams and make coding a more enjoyable and productive experience.

1.3 Scope

Multi-language support: Our online coding platform will support multiple programming languages, including popular languages such as Java, Python, C++, and C. This will enable users to write code in the language of their choice and to explore different languages as they learn.

Code editor: We will provide a user-friendly and intuitive code editor that supports syntax highlighting, code completion, and code formatting. The code editor will be equipped with a command palette similar to the one in VS Code, which will make it easier for users to access different features.

Compile and run: Our platform will allow users to compile and run their code directly within the platform, without the need for additional software or tools. This will save users time and effort, and make it easier to test and debug their code.

Terminal screen: We will include a terminal screen that displays errors and debugging information, which will help users to quickly identify and resolve issues. This will make it easier for users to test their code and to learn from their mistakes.

Performance and reliability: Our platform will be optimized for performance, with quick response times and reliable uptime. This will ensure that users can work on their projects without interruption and with minimal downtime.

Accessibility: Our platform will be designed to be accessible from a range of devices, including desktop and mobile devices. It will also be user-friendly for users with different abilities and needs. We will also support dark/light mode, which will make it easier to use for users who prefer a particular color scheme.

Find and replace: We will provide a find and replace functionality, which will make coding easier and more efficient. This feature will help users to quickly find and replace specific parts of their code.

Easy authentication: Our platform will include easy authentication, which will make it easier for users to log in and access their projects securely.

Plug and play: Our platform will be designed to be easy to use and set up, with plug and play functionality that will make it easy for users to get started and begin coding quickly.

1.4 Tech Stack

UI/UX Design: **Figma**

Front-End : **React.js**

Back-End : **Firebase**

Hosting : **Vercel, Microsoft Azure, Docker**

Literature Survey

To ensure that our online coding platform would be the best in the market, we conducted a comprehensive research on existing platforms, including their features, limitations, and user feedback. We also evaluated academic research papers and articles to understand the latest advancements in the field and gather potential solutions.

One platform that stood out to us was Replit, which supported over 50 programming languages, an integrated development environment (IDE), code editor, and collaboration tool.

Additionally, we explored academic research papers and articles that discuss the design and development of online coding platforms and similar platforms. This gave us an insight into the latest advancements in the field and similar projects, the challenges faced by developers, and potential solutions that can be applied in our project.

We looked in a research paper titled *"A Review of Online Code Learning Platforms"* by Dara Pirie and Robert McCartney. This paper reviews online coding platforms that are used for teaching and learning programming. It examines the features of these platforms, their effectiveness for learning, and their potential for promoting collaboration among users.

Link for reference : : <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7481138/>

Our research helped us understand the essential features that an online coding platform should have, such as multi-language support, a user-friendly code editor, easy compilation and running of code, a terminal screen for error debugging, and optimized performance and reliability. We also looked into additional features like a command palette, find and replace functionality, and dark/light mode support, all of which would make the platform more accessible and user-friendly.

By considering user feedback and academic research, we ensured that our platform would be user-friendly, accessible, and designed to meet the needs of learners and developers of all abilities and needs.

Product Design

3.1 System Design

CodeCat is an online code-compiler as well as a platform to develop and save your codes online. While designing CodeCat we first thought about the features and the functionalities of the application. The features include :

- 1) It supports 30+ languages
- 2) It includes syntax highlighting for most of the popular languages such that it feels like your daily IDE's like atom and VS Code.
- 3) It is also available as a PWA(progressive web application) so it can be downloaded and be used on smartphones.
- 4) It has both Light and Dark modes built-in such that the users can customize their working environment.

3.2 Requirements

3.2.1 Software Requirement

Code editor: We would need a code editor that supports syntax highlighting, code completion, and code formatting for multiple programming languages.

Web development framework: we would need a web development framework to develop the platform's front-end and back-end components.

Database management system: We would need a database management system to store and manage user data, project data, and other platform data.

Version control system: We would need a version control system to track changes and collaborate on coding projects.

Collaboration tools: We would need collaboration tools such as chat, video conferencing, and project management tools to facilitate teamwork among users

3.2.2 Hardware Requirement

Web server: We would need a web server to host the online coding platform and serve user requests. Storage device: We would need a storage device to store user data, project data, and other platform data.

Network infrastructure: We would need a reliable network infrastructure to ensure that users can access the platform quickly and reliably.

Backup and disaster recovery infrastructure: We would need backup and disaster recovery infrastructure to

ensure that user data is secure and protected in case of a disaster or hardware failure

3.3 System Architecture

The project is built on React JS. For the online Compiler , we have used the Judge0 Api.

Judge0 is a Robust, scalable, and open-source online code execution system Api that can be used to build a wide range of applications that need online code execution features.

The judge0 servers restrict the API calls to their servers at only 50 per day. Due to this reason we choose to host the API live on our own Azure cloud server which allows unlimited access to the API.



3.4 Software Project Management Plan

Task	Member1 Pargat Singh	Member2 Meet Gala	Member 3 Name Vishrut Deshmukh
UI:			
Design	X		
Coding	X		
Database:			
Table design		X	
Query design		X	X
Coding	X		
Program:			
Log-on System	X		
Execution / Api connection	X		X
Input Validation	X	X	
Boiler-plate for each language		X	
Progressive Web App	X		
Testing:			
Testing approach		X	
Front End positioning	X		X

Database creation and insertion operations	X		
Input Validation		X	X
Presentation			
Report and Documentation	X	X	X

Implementation and Testing of project work

4.1 Proposed system model

CodeCat is a web application built using React.js for the frontend, Firebase As the database and the backend. The application is currently deployed on Vercel for the frontend and on Azure as an always-on virtual machine for the backend. Real-time code execution is enabled using the Judge0 environment.

To handle API requests from the frontend, Axios is used as a reliable and efficient solution. For syntax highlighting, the application utilizes Monaco Editor, the same editor used in modern text editors like VSCode, making for a familiar and user-friendly experience.

The backend of Codecat is designed to provide easy OAuth-based login, allowing users to authenticate with their GitHub account and access their account stats. This encourages users to code more projects and provides a seamless login experience.

The chosen tech stack and implementation plan are aligned with industry standards, making Codecat a modern and robust web application for coding enthusiasts.

4.2 Functions Implemented

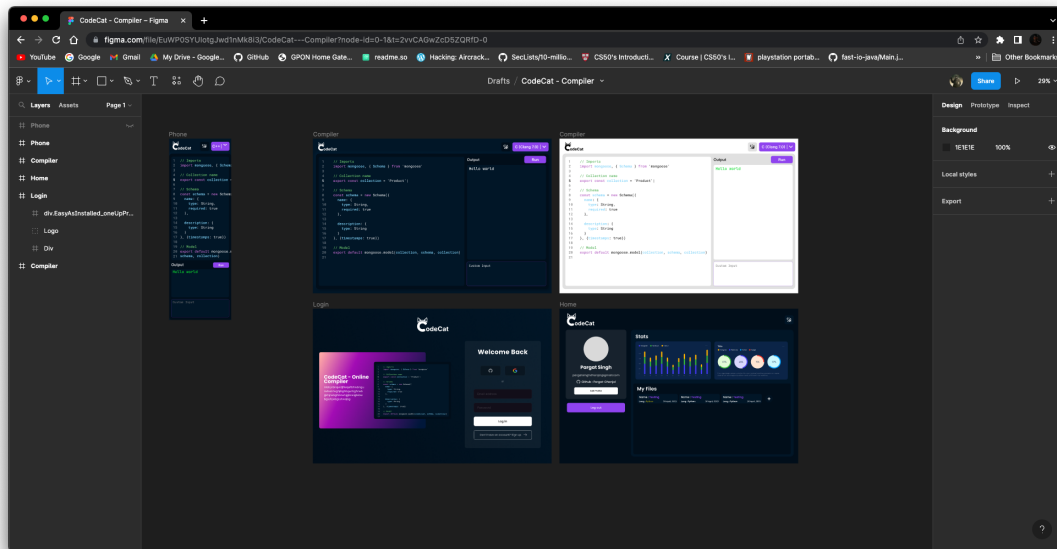
1. Login / Register for users
2. Compile and execute
3. Support for compiling 30 + languages
4. Syntax Highlighting
5. Error and success alerts
6. Multi-line Input Output windows
7. Light/Dark mode support
8. Progressive web application which can be used on any mobile device.

4.3 Test plan

Test case	Description	Intended result	Actual result	Completed by
Front-end Design	To have a check if the webpage designed is as same as the figma design created	The figma design had to be coded using react.js	The webpage resembled the design and had a very similar look	Pargat
Checking if all languages are supported	Boiler plates of every language where to be added and checked if its functioning properly	Every language need to be supported and complied with a initial example code	All languages where supported and example code of each language where seen.	Meet
Code Validation	Check whether the complier shows a error or not for a false input by the user	The intended result was the error must be thrown with a specified line number	The result was achieved	Vishrut
Platform Check (Pwa test)	Check where the complier works properly on a portable mobile device	To create a progressive web app and check if works as per the desire of the team	Yes Pwa was successful and user friendly too.	Pargat
Login and register validation	To check if mail entered while login are in a proper format or not. (eg. abc@gmail.com)	The system should throw error if the mail format is not correct and user is successfully registered.	Validated	Meet and Vishrut

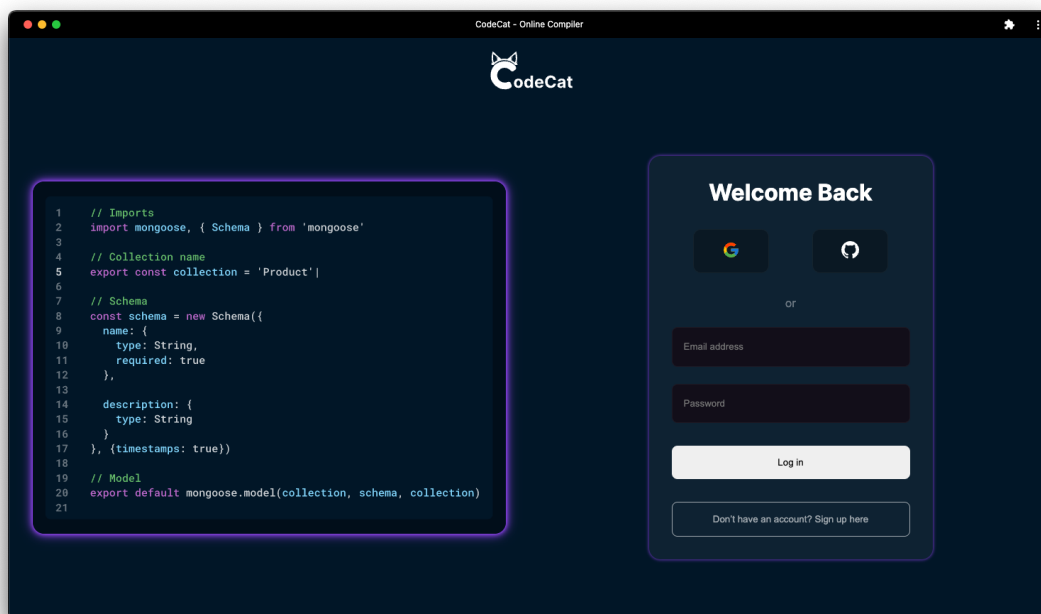
4.4 User interface

Based on our design process, we utilized Figma as the primary tool for creating our website's pages. By using Figma, we were able to effectively design and refine each page's layout, including all of the required elements and visual aesthetics, before proceeding with the actual creation of the website. This approach allowed us to streamline our development process and ensure that the end result was aligned with our initial design vision.

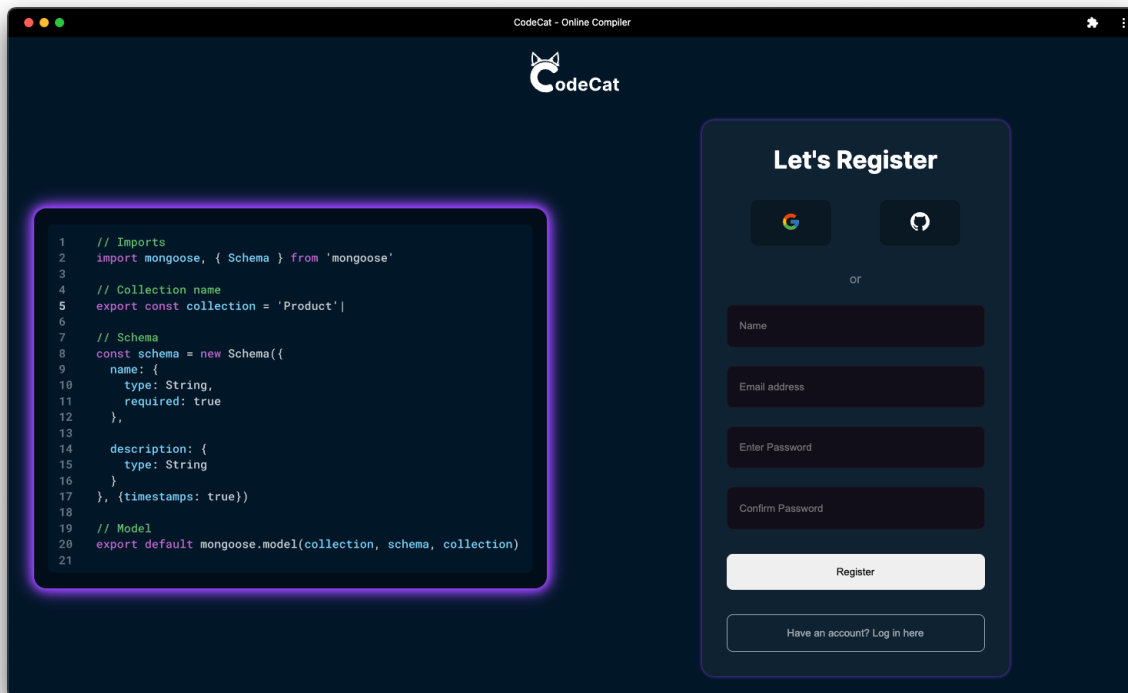


2. Product on laptop

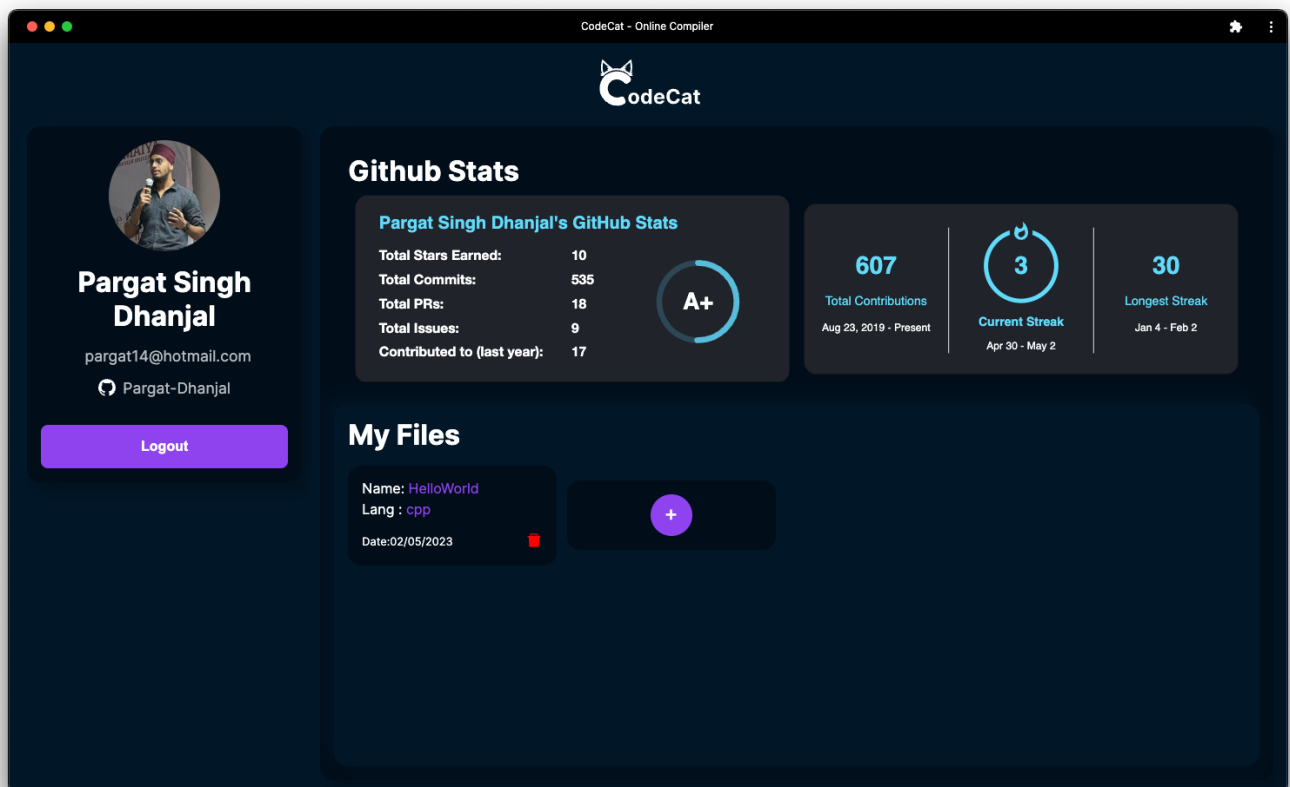
a. Login page



b. Sign up page

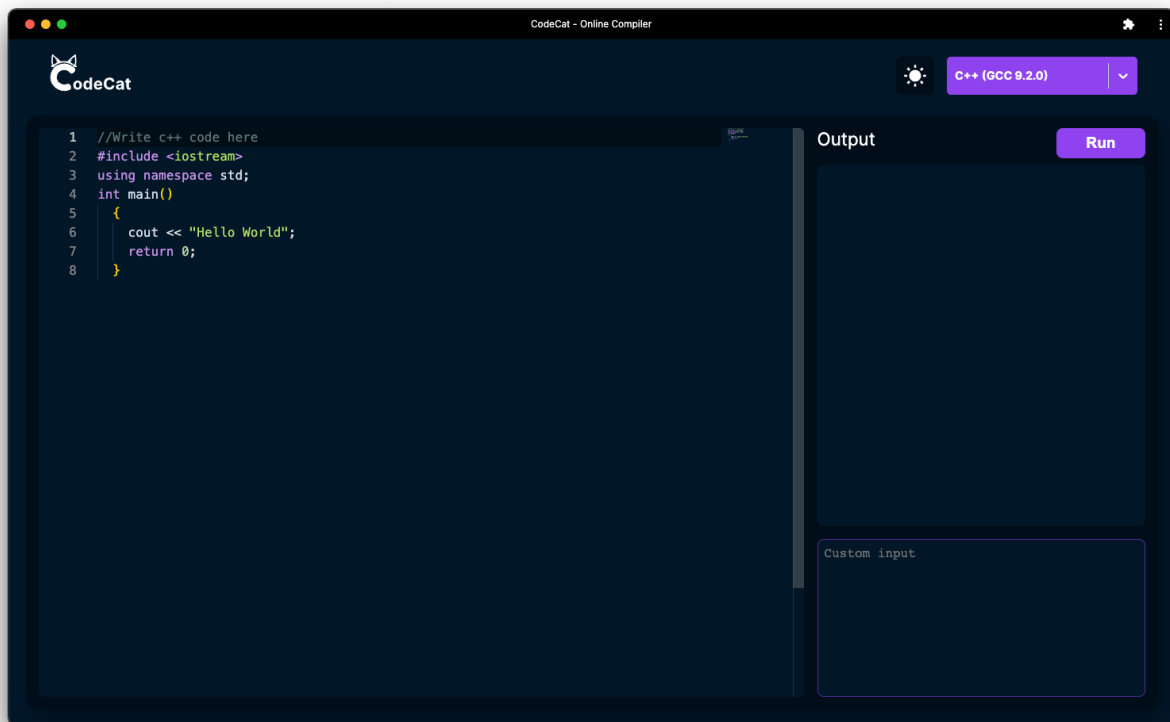


c. Home Page

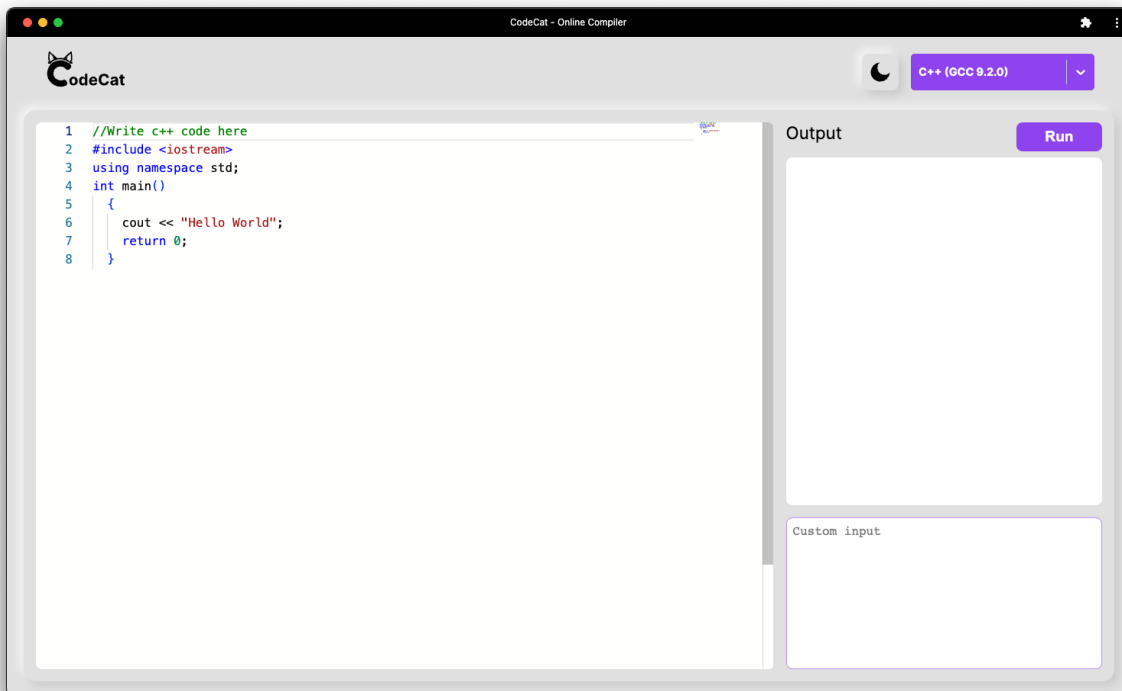


c. Compiler

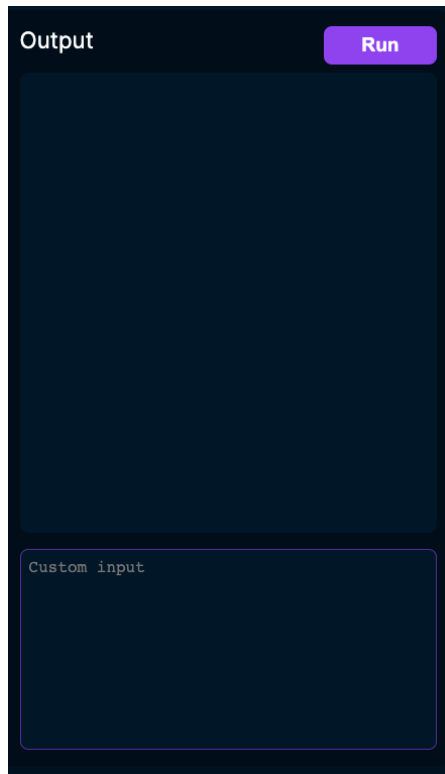
Dark Mode:



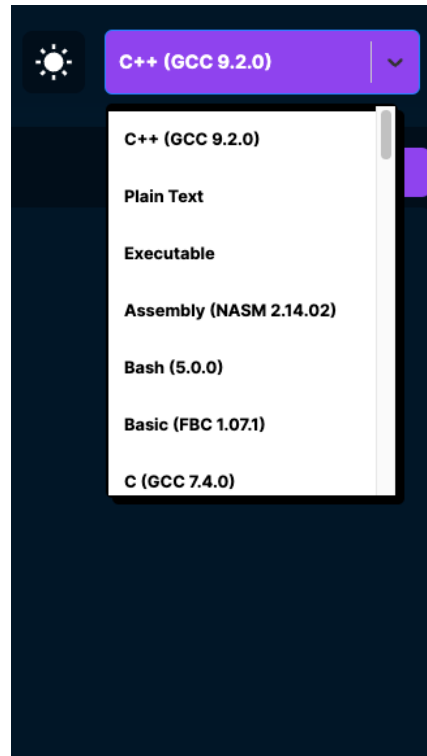
Light mode:



Output screen

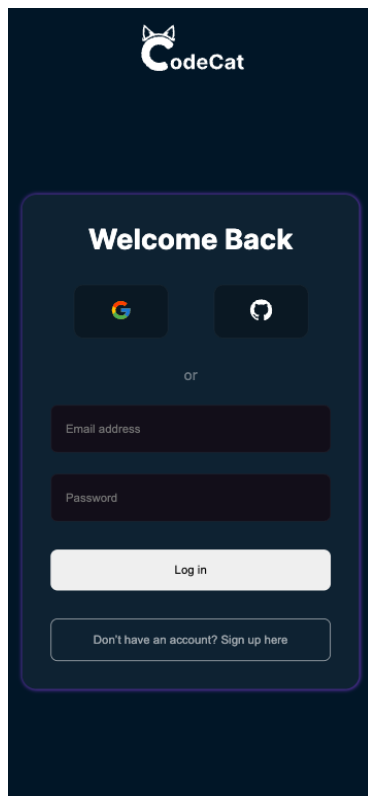


Languages bar :

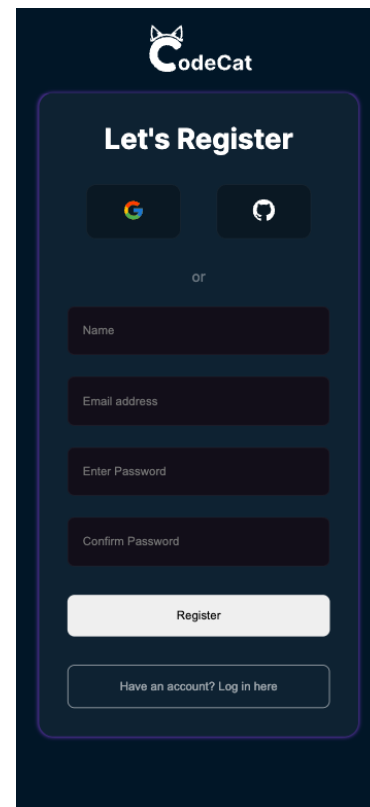


3. Mobile View

Login page



Signup page



Compiler : Dark mode



The screenshot shows the CodeCat compiler interface in dark mode. The top bar includes the CodeCat logo, a sun icon for theme toggling, and a dropdown menu set to 'C++ (GCC 9....)'. The main code editor contains the following C++ code:

```
1 //Write c++ code here
2 #include <iostream>
3 using namespace std;
4 int main()
5 {
6     cout << "Hello World";
7     return 0;
8 }
```

Below the editor is an 'Output' section with a 'Run' button. At the bottom, there is a 'Custom input' text field.

Light mode:



The screenshot shows the CodeCat compiler interface in light mode. The top bar includes the CodeCat logo, a moon icon for theme toggling, and a dropdown menu set to 'C++ (GCC 9....)'. The main code editor contains the following C++ code:

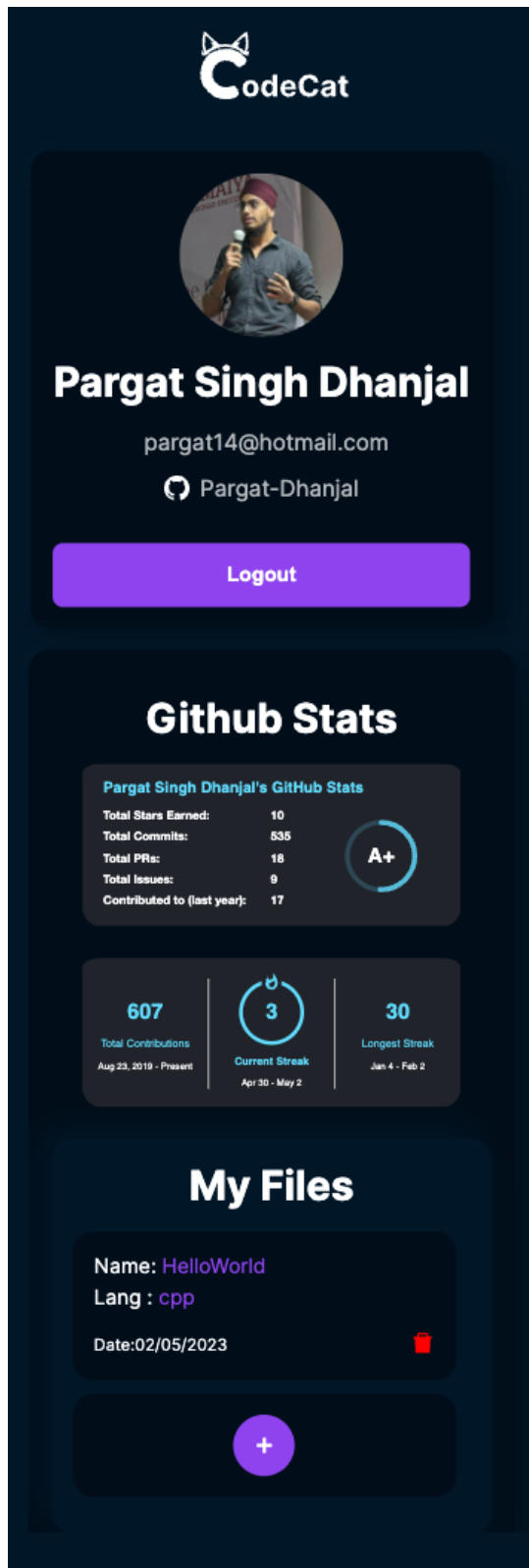
```
1 //Write c++ code here
2 #include <iostream>
3 using namespace std;
4 int main()
5 {
6     cout << "Hello World";
7     return 0;
8 }
```

Below the editor is an 'Output' section with a 'Run' button. At the bottom, there is a 'Custom input' text field.

Output
Screen

Languages:

Home Page



The screenshot shows the CodeCat user profile for Pargat Singh Dhanjal. The profile includes a circular profile picture of a man speaking into a microphone, his name, email address (pargat14@hotmail.com), and GitHub username (Pargat-Dhanjal). A purple 'Logout' button is visible. Below the profile is a 'Github Stats' section with a table of statistics and a circular progress indicator showing an 'A+' grade. The stats table lists: Total Stars Earned (10), Total Commits (535), Total PRs (18), Total Issues (9), and Contributed to (last year) (17). Below the table are three metrics: Total Contributions (607, Aug 23, 2019 - Present), Current Streak (3, Apr 30 - May 2), and Longest Streak (30, Jan 4 - Feb 2). The 'My Files' section shows a file named 'HelloWorld' in 'cpp' language, dated '02/05/2023', with a red trash icon. A purple button with a white plus sign is at the bottom.

CodeCat

Pargat Singh Dhanjal
pargat14@hotmail.com
Pargat-Dhanjal

Logout

Github Stats

Pargat Singh Dhanjal's GitHub Stats

Total Stars Earned:	10
Total Commits:	535
Total PRs:	18
Total Issues:	9
Contributed to (last year):	17

A+

607
Total Contributions
Aug 23, 2019 - Present

3
Current Streak
Apr 30 - May 2

30
Longest Streak
Jan 4 - Feb 2

My Files

Name: HelloWorld
Lang : cpp
Date:02/05/2023

+

4.5 GitHub Implementation Details

GitHub and git were used for the purpose of version control and collaboration. A final commit was made at the end to push the completed project on GitHub. A readme file was also created explaining the team details, demo, usage, and steps to replicate the project on your local system.

The GitHub link to our Mini Project repository:

<https://github.com/Pargat-Dhanjal/Mini-Project.git>

Conclusion and Further Work

CodeCat offers a range of features, including syntax highlighting, error alerts, multi-line input/output windows, and light/dark mode support. The tech stack, including React.js, Firebase, Docker, judge0, and Azure, provides a robust foundation for building the platform. Future work can focus on adding coding practice assignments, mock sessions, and community features. The platform should prioritize security and data privacy measures. Additional features like real-time code analysis and version control system integration could be added to provide value to users. Overall, the proposed platform has the potential to provide a valuable resource for users seeking to learn and improve their coding skills in a user-friendly and intuitive environment.

Acknowledgment

The success and outcome of this project required a lot of guidance and assistance from many people and we are extremely privileged to have got this all along with the completion of our project. This would not have been possible without the support of many individuals.

We would like to express our gratitude to our college, K.J. Somaiya College of Engineering for giving us the opportunity to build this project and supporting us in the completion of the same.

We also like to thank our project guide Dr. Zaheed Shaikh sir, who took a keen interest in our project work and guided us all along till the completion of our project work by providing all the necessary information and help for developing a project on an interesting and relevant topic.

Certificate

This is to certify that the MINI PROJECT report entitled CodeCat-The Online Compiler submitted by Meet Gala, Vishrut Deshmukh and Pargat Singh Dhanjal at the end of semester IV of SY B. Tech are bona fide record for partial fulfillment of requirements for the degree of Bachelors in Computer Engineering of University of Mumbai

Guide

Head of the Department

Date:

Place: Mumbai-77

Certificate of Approval of Examiners

We certify that this Mini Project report entitled CodeCat-The Online Compiler is
bona fide record of Mini project work done by Meet Gala during
semester IV.

This Mini project work is submitted at the end of semester IV in partial
fulfillment of requirements for the degree of Bachelors in Technology in
Computer Engineering of University of Mumbai.

Internal Examiner 1

Internal Examiner 2

Date:

Place: Mumbai-77

Declaration

We declare that this written report submission represents the work done based on our and / or others' ideas with adequately cited and referenced the original source. We also declare that we have adhered to all principles of intellectual property, academic honesty and integrity as we have not misinterpreted or fabricated or falsified any idea/data/fact/source/original work/ matter in my submission.

We understand that any violation of the above will be cause for disciplinary action by the college and may evoke the penal action from the sources which have not been properly cited or from whom proper permission is not sought.

<p>_____ Signature of the Student</p> <p>_____ Roll No.</p>	<p>_____ Signature of the Student</p> <p>_____ Roll No.</p>
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Date:

Place: Mumbai-77