Code Editor & Similarity Scoring System Website

Design Manual

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Introduction

This documentation outlines the design requirements for developing a web-based code editor corrector with a similarity scoring system.

Purpose

The purpose of the coding test correcting website is to create a platform that allows users to enhance their coding skills through practice and receive constructive feedback. It serves several key functions:

- Skill Improvement: The website provides a space for users to practice coding questions, improve their problem-solving abilities, and gain hands-on experience in writing code.
- Feedback and Assessment: Users can submit their code solutions, which are then compared to sample solutions. The website determines whether their output is the correct output wanted and gives them a score to let them know they finished this coding question
- Learning and Growth: The platform fosters continuous learning and growth by offering a wide range of coding questions and challenges across different programming languages and domains.
- Preparation for Job Interviews: The website can also serve as a valuable resource for job seekers preparing for coding interviews and technical assessments, as it offers real-world coding challenges.

Target Audience

The target audience includes coding enthusiasts, students, and job seekers looking to improve their programming skills, this includes:

- Coding Enthusiasts: Individuals who are passionate about coding and programming and want to sharpen their skills.
- Students: College and university students pursuing degrees in computer science, software engineering, or related fields seeking practical coding exercises and feedback.
- Job Seekers: Individuals preparing for job interviews, particularly in tech-related roles where coding assessments are a common part of the hiring process.
- Self-Learners: People who are self-motivated and looking to learn or improve their coding skills independently.
- Coding Bootcamp Graduates: Graduates of coding boot camps or coding academies who wish to continue practising and refining their coding skills.
- Professional Developers: Experienced developers who want to maintain and enhance their coding skills.

Design Principles

Design principles are fundamental guidelines that underpin the visual and user experience design of the coding test correcting website. They serve as a foundation for creating a cohesive, user-friendly, and pleasing platform. The following design principles are as follows:

Simplicity:

The principle of simplicity involves keeping the design clean, and free from unnecessary complexity. It means avoiding the overuse of elements, features, and visual effects that can overwhelm users.

Simplicity helps users focus on the core functionality and content of the website. Guidelines for achieving simplicity include:

- Minimising the number of interface elements on each page
- Maintaining an easy-to-get-around UX for users using the website
- Providing clean and concise instructions/paths to their decided task

Clarity:

Clarity in the design manual ensures every aspect of the website from text to interactive elements is easy to understand for the user. It aims to try and eliminate confusion in user interactions. Guidelines for achieving clarity include:

- Using straightforward instructions and descriptions
- Providing labels and tooltips for icons and buttons
- Ensuring that buttons and links and easily visible and recognisable
- Consistently using the same design and colours for text and pages
- Using icons and symbols that have been widely used in other websites that have accepted meanings.

Accessibility

Accessibility is a crucial design principle that focuses on making the website usable and understandable for all users. Guidelines for achieving accessibility may include:

- Ensuring colour contrast for text and background for users with visual impairments.
- Enabling keyboard navigation and making interactive elements accessible through keyboard input.
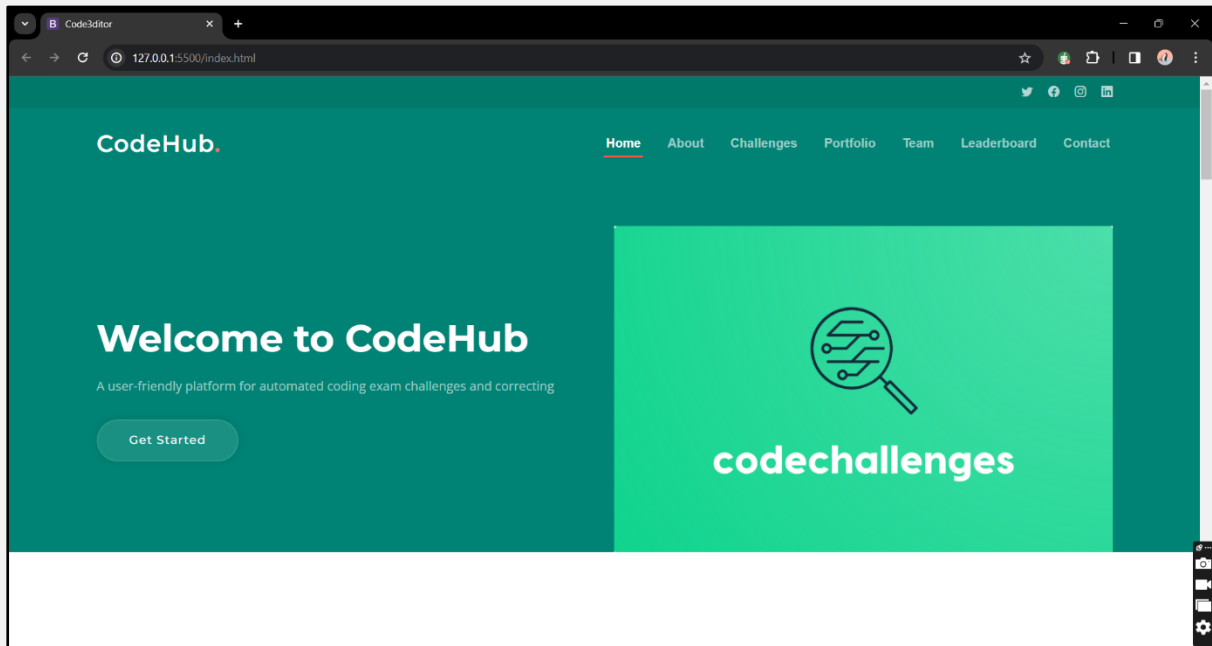
Layout and Navigation

Figure 0.1 Homepage for website

Layout Structure:

The layout structure plays a fundamental role in how users interact with your platform. A well-organized and responsive layout ensures a seamless user experience. Some features to include are:

- Responsive Design: The website should be responsive, meaning it adapts to various screen sizes and devices, including desktops, laptops, tablets, and smartphones. This ensures that users have a consistent and user-friendly experience, regardless of the device they use.
- Header: The header section typically contains essential elements like the website logo, navigation menu leading to different parts of the website, including the challenges page, and user account-related options (log-in or user profile). It serves as a visual anchor and allows users to access these functions quickly.
- Footer: The footer appears at the bottom of each page and often contains links to important pages, contact information, and copyright notices. It provides a convenient way for users to find additional information and navigate to key sections of the website.
- Sidebar: A sidebar is included to aid in navigation. It can house additional links, filters, or other features to help users find coding questions, access their profiles, or customize their experience.

Navigation Menu

The navigation menu is a critical component of the user interface, and its organization can significantly impact user engagement and satisfaction. It's essential to create a logical and user-friendly navigation structure:

- Main Sections: The navigation menu is organized into main sections that reflect the primary functions and features of the website. These sections include "Home," "Coding Challenges," "Profile," "Contact" and more

- Labels: Clear labels for each menu item. Labels are accurately used to represent the content or functionality users will find when they click on a particular item.
- Consistency: Maintain a consistent menu structure across all pages of the website. Users should easily recognize and access the same menu items from any part of the site.

Responsive Menu

Ensure that the navigation menu remains user-friendly on smaller screens, such as mobile devices, by using techniques like responsive design or a mobile-friendly menu.

Database design
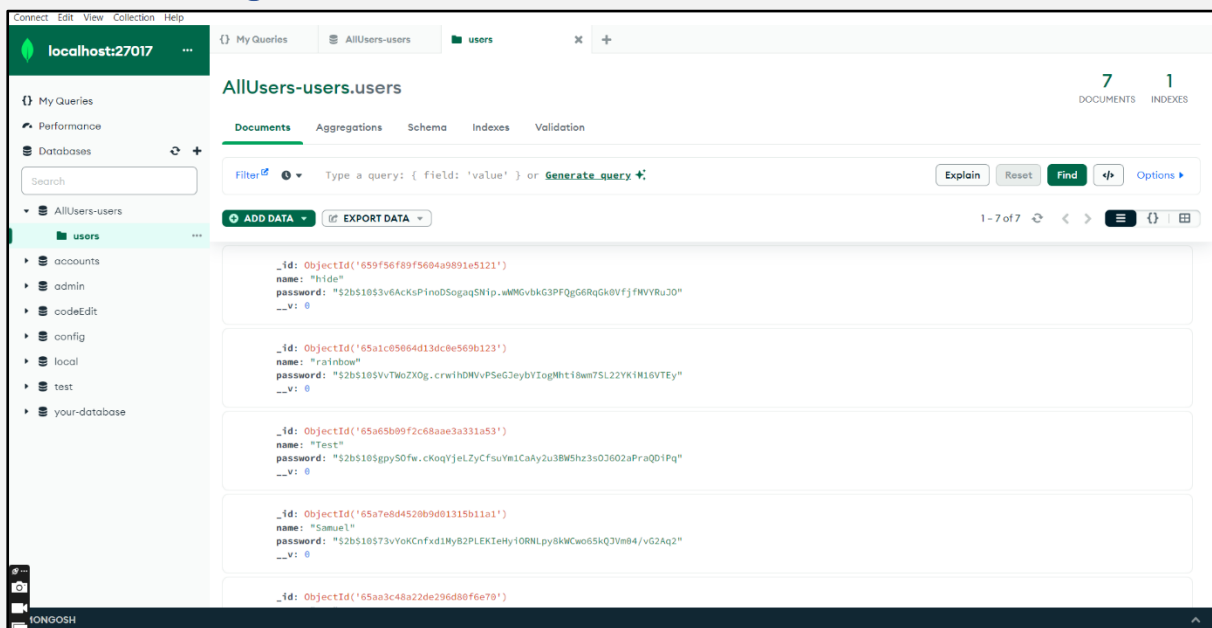
MongoDB Compass is employed as the database management tool, facilitating the MongoDB database. The database stores information related to usernames, emails, passwords, code questions, and scores

Database Schema
Users Collection:

'**_id':** (ObjectId): Unique identifier for each user

'**username':** (String): User's chosen username

'**password':** (String): Encrypted password for secure authentication

Security
Encryption:

Passwords are securely stored using encryption techniques within MongoDB Compass to safeguard user credentials

Access Controls:

MongoDB Compass enforces access controls to ensure that only authenticated users with appropriate privileges can access and modify the database

Scalability
MongoDB, coupled with MongoDB Compass, provides scalability options to handle an increasing number of users

In summary, MongoDB Compass forms a secure and efficient database solution for storing user credentials on the website. The database prioritises data security through password encryption and enforces access control to protect user information, allowing for a secure authentication process
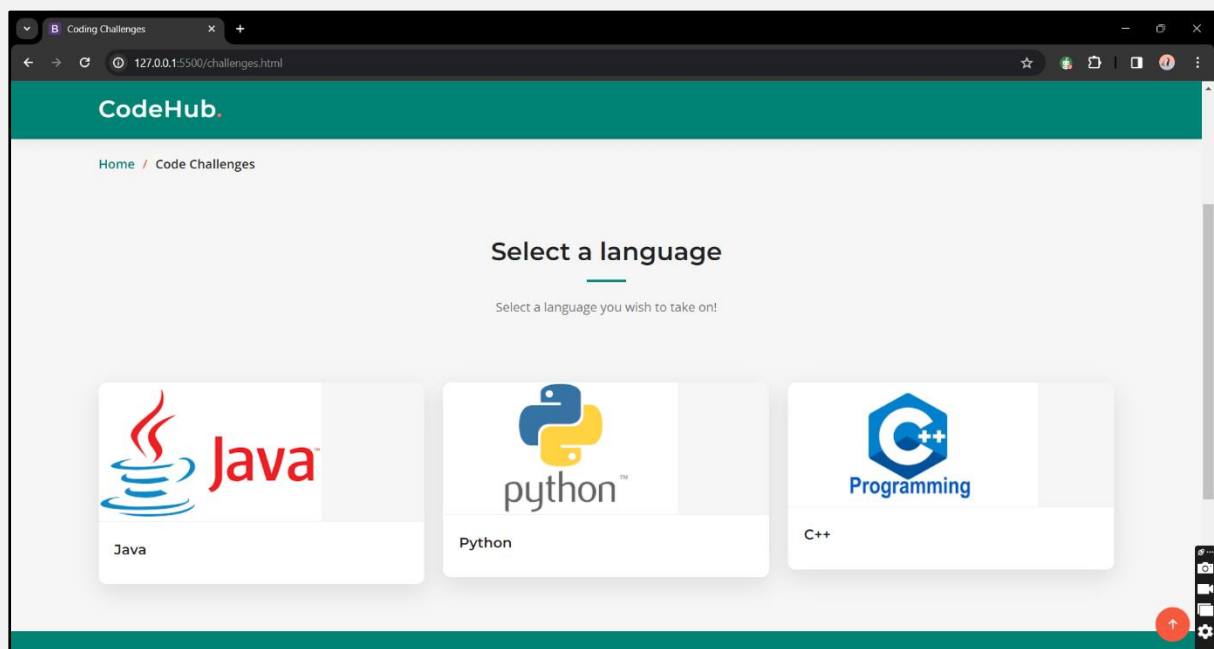
Code Editor Overview

Figure 0.1 Page for selecting a language

User-Friendly Interface
This code editor provides a clean and intuitive user interface, with a focus on simplicity, users can easily navigate around the code editor page

Multi-Language Support
Having the option between multiple languages a user wishes to challenge, a selection from Java, C++ and Python and available to the user allowing them to grow their skills in different programming languages and broaden their expertise

Syntax Highlighting
Syntax highlighting improves code readability, the editor colours different elements of the code matching its selected language making it visually distinct and also aiding users in identifying errors and understanding the structure of their code

Real-time code output

Receive instant results with real-time code output. Users can see their code output immediately after compiling their code, enabling quick debugging and experimentation
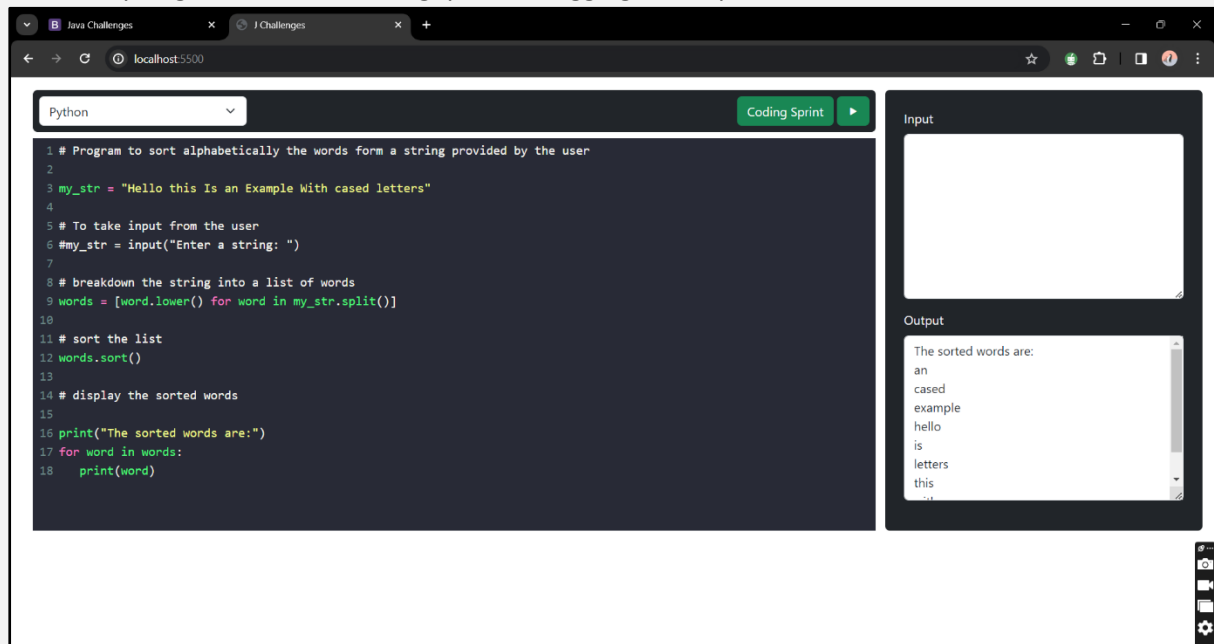

Figure 0.2 Example solution with output

Coding Website Inspiration

While in the research and development of the website, I analysed various existing websites with similar features. Websites such as LeetCode, TopCoder, Project Euler, and more significantly influenced my approach to the user interface and user experience design. Areas like responsive design navigation and layout, and in general feature inspiration provided me with a wealth of insight, practises, and design inspiration. These insights helped in the overall structure of the website and helped me create a platform that helps make the website as pleasant as it can be for its users.

Conclusion

In the development of the coding test correcting website, this design manual serves as a compass towards the creation of a user-centric, efficient, and aesthetically pleasing platform, outlining a set of guidelines and principles that underpin the design and functionality of the website.

The layout and navigation recommendations described here prioritise responsiveness, efficient organisation, and a user-friendly design to cater to the needs of a diverse audience, including coding enthusiasts, students, job seekers, and self-learners. The exploration of existing coding practice websites has provided valuable insights and inspiration for creating an engaging and interactive user interface

This conclusion emphasizes the significance of the design manual, its role in ensuring a user-centric approach, and the commitment to delivering a high-quality coding test correcting platform. It expresses enthusiasm for the project's success and acknowledges the collaborative effort of deploying a website suitable for anyone to use how they wish.

Collaboration Form

Student Name: Sam Cullen

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The following is a total list of all students I collaborated with whilst conducting research for this assignment:

Student Name: Sam Cullen

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% of collaboration within submission: 100%