

**SETU Code Lab**

**Research Document**

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# Abstract

# Introduction

# Technologies

## Front-End

The front-end of SETU Code Lab needs to be clean, responsive and user-friendly so that users can focus on solving coding problems rather than learning how to navigate the platform. The chosen technologies for the front-end are React, Vite, TypeScript, and Tailwind CSS. They have been chosen for their modularity, easy interactivity, performance and support of modern browsers.

### React

React is an open-source JavaScript library developed by Meta (formerly Facebook) and first released in 2013 (GeeksforGeeks, 2025). It is used for building user interfaces and works by allowing the developer to create reusable user interface (UI) components. These components can then be put together to construct the full UI. React uses a virtual Document Object Model (DOM) to optimize rendering and improve performance by only updating the parts of the UI that have changed and not the whole page (Meta Platforms, Inc., 2025).

### Angular

Some alternatives to React that were considered were Angular and Vue. Both Vue and Angular also use reusable UI components. Angular is full-featured framework developed by Google and released in 2010, with a more opinionated architecture suitable for larger-scale, enterprise-level applications. React on the other hand is a more lightweight and flexible, component-based library. React was chosen instead of Angular due to its simplicity, ease of integration with other libraries and suitability for more medium sized applications (Google, 2025), (GeeksforGeeks, 2025).

### Vue

Vue is a front-end framework developed by Evan You and first released in 2014. Vue was considered as a potential front-end technology for this project due to its simplicity, high performance and reactive two-way binding, which allows automatic synchronization of the UI and the underlying data (GeeksforGeeks, 2025). React in comparison only allows data to move in one direction, from parent components to child components. However, the MobX state management library allows for the implementation of two-way binding if needed (MobX, 2025).

React was ultimately chosen instead of Vue because this unidirectional data flow simplifies debugging and state management. It is also more flexible than Vue and integrates more naturally with the chosen technology stack, particularly TypeScript which provides strong static typing and full compatibility with JSX the syntax extension used by React (Microsoft, 2025).

### Vite

Vite is a modern front-end build tool and development server known for its fast speed, simplicity and support of modern browsers. It offers Hot Module Replacement (HMR) which updates the react application instantly in the browser without needing a full page reload. Vite has been chosen as a build tool for use with React to speed up development and for its support of the latest versions of modern browsers (Vite, 2024).

### TypeScript

TypeScript is a syntactic superset of JavaScript developed by Microsoft and first released in 2012. It extends JavaScript by adding static typing, which allows compile-time type checking. This means TypeScript will report any mismatched type errors before running the code whereas JavaScript will not. This is very helpful for debugging and helps improve the quality and performance of the code. For these reasons, TypeScript has been chosen over JavaScript for development (Microsoft, 2025).

### Tailwind CSS

## Back-End

## Database

## Code Editors

# Code Sandboxing

# Testing

# Gamification

# Similar Platforms

# Conclusion

# Appendix

# Glossary

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