

ABSTRACT

Web-based applications like Assurance Case Playground (ACP) feature complex and dynamic user interfaces that require well-structured and maintainable code. Problems arise when development lacks modularity, leading to code duplication and difficulty in future maintenance. This study applies the Component-Based Development (CBD) approach to the front-end development of ACP using React.js. The process includes requirement analysis, component hierarchy design, and modular implementation. Evaluation was conducted using a static analysis tool to calculate the Maintainability Index (MI) across 22 developed components. Results show an average MI score of 122.8, indicating a highly maintainable system. In addition, the application of SOLID principles reinforces code flexibility and organization. This research demonstrates that CBD effectively enhances maintainability and development efficiency, contributing to the establishment of a robust front-end architecture for complex web applications like ACP.

Keywords: *component-based development, maintainability, front-end, assurance case, React.js*