Bachelor's Thesis

Developing Efficient Data Structures and Algorithms for Web Applications: Optimizing Python Performance using WebAssembly (Wasm)

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Abstract

This thesis investigates the development of efficient data structures and algorithms (DSA) for web applications, specifically focusing on optimizing Python performance through WebAssembly (Wasm). The research evaluates the integration of high-performance modules written in Rust and Zig into Python-based systems. By benchmarking various data structures, including Linked Lists, Heaps, and Red-Black Trees. This study quantifies the performance gains achieved when moving computationally intensive tasks from the Python interpreter to the Wasm execution environment.

Keywords: WebAssembly, Rust, Zig, Data Structures, Performance Optimization, Python, Benchmarking.

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