Efficient Approaches for
Web Validation and Client-side Calculation

☒ Bachelor thesis

☒ Master thesis

Context

With the introduction of Single Page Applications (SPA), e.g. written in Angular or React, it has become possible to give the user immediate feedback on entered data even for complex validations like cross-field dependencies. This enhances usability significantly. However, it also comes at a cost. Since the web client is generally not trustworthy, the same validations need to be repeated in the backend when the data is received. Otherwise a tech-savvy user could intercept and manipulate the requests to the backend and thus bypass the validations of the frontend. Similar problems arise for logic that precalculates and displays, for instance, an insurance premium on the client-side.

In current implementations, this usually leads to a double implementation and later maintenance of the validations in the frontend and backend. Especially in complex domains, such as the insurance business with a large number of validation rules, this implies a considerable additional effort and source of inconsistencies.

With advancing progress in web development, new possibilities are opening up that allow the problem to be tackled by using the same code base for frontend and backend validations. The validation code is executed on the client through transpilation or VMs. One recent option is WebAssembly (wasm) that allows to reuse e.g. Java code from the backend for validations in the browser.

Goals

The goals of this thesis are to

- Perform a research of *novel* (e.g. wasm) and *existing* (e.g. validation DSL) approaches to avoid the duplicate maintenance of validations and client-side calculations, both through literature research and interviews with experts at itestra
- Design and implement a prototype that makes use of the most promising *novel* approach for a realistic example
- Evaluate the approach and compare it with other approaches

Company profile

This project is offered in cooperation with itestra GmbH (www.itestra.de). itestra GmbH is an independent, innovative software solution provider and consultancy. Its services include business process analysis, development of core software systems as well as renovation, optimization and migration and strategic consulting.

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