PSoft Tools

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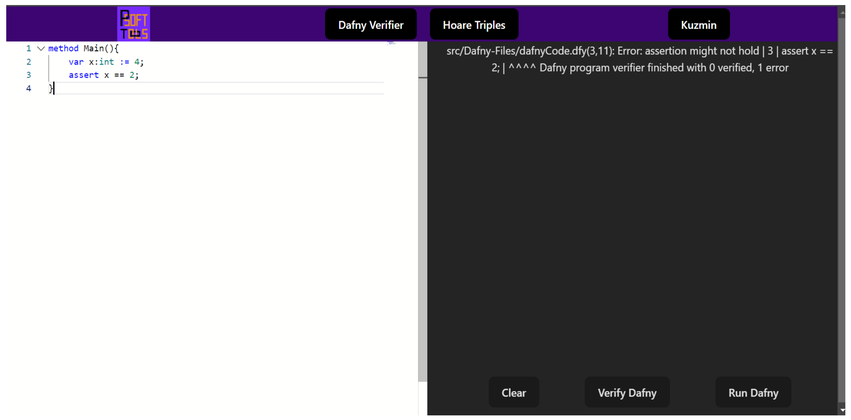
Front End

Our Accomplishments This Semester:

- Component-based front end design following React conventions
- Implemented front end code editor interface for running and verifying Dafny code
- Has display for the results that Dafny returns
- Buttons for either verifying or running Dafny code in the back end
- Implemented front end interface for testing validity of Java Hoare Triples using Dafny
- Parser to turn Java Hoare Triples into a verifiable Dafny method



PSoft Tools

Interactive Web Tools for Students Taking Principles of Software

Semester Goals:

•Set up and style web pages
•Do research into how to implement Dafny into react websites (Monaco Editor)
•Try to implement functionality for PSoft coursework, starting with Dafny Verification and Hoare Triples
•Publish the webpage so the first draft can be used by PSoft students next semester
•Professional Aesthetics and page Layout

Tech Stack:

Front-end: React, Vite, Tailwind
Back-end: Express.js

Team Structure:

Team Split Into Two Subgroups: Front-end & Back-end

Emphasis on communication and integration of code between Front and Back end

Project Organization:

- Project stored in 2 separate repositories on GitHub, one for front-end and one for back-end
- Work done in separate branches

Back-End

Our Accomplishments This Semester:

- API for receiving code from front end, verifying/running with Dafny in the back end, and sending results back
- Working Dafny Execution from backend post request
  - Using input code, the backend runs Dafny executable and returns results.
  - Front end parses results for real time error detection.
  - Detailed error messages for verification problems from Dafny
- Functioning Backend Domain and Server running.
- Flawless backend to front end communication.

```
[nodemon] 3.0.3
[nodemon] to restart at any time, enter `rs`
[nodemon] watching path(s): *.*
[nodemon] watching extensions: ts,json
[nodemon] starting `ts-node ./src/index.ts`
Example app listening on port 3000
Compile error: Error: Command failed: /mnt/c/users/andre/desktop/PSoft-Tools-Backend/src/dafny/dafny verify /mnt/c/users/andre/desktop/PSoft-Tools-Backend/src/Dafny-Files/dafnyCode.dfy

stdout: src/Dafny-Files/dafnyCode.dfy(3,11): Error: assertion might not hold
  |
3 |     assert x == 2;
  |            ^^^^


Dafny program verifier finished with 0 verified, 1 error

stderr:
```

Future Plans

Front End:

- Make editor more user friendly
  - Allow comments without disrupting parser
  - Allow user to code in language that gets translated to Dafny
- Extend usage of site to more PSoft applications
  - Specifications
  - Counterexamples for Hoare Triples
  - Forward and Backward reasoning
  - Control Flow Graph Generator
- Improve CSS styling and make site look more clean

Back End:

- Update API calls for any new features we add to the site
- Add functionality for users to save previously written Dafny code or Hoare Triples, can integrate with login functionality to save code to user accounts

PSOFT TOOLS REPOSITORIES

GitHub Frontend

GitHub Backend

Challenges

- Integrating Monaco Editor with our site and reading documentation to fully understand how to use it
- Implementing custom syntax highlighting for Dafny language in Monaco Editor
- First exposure to Express.js and back end technologies in general for many of our members
- Figuring out how to run Dafny in the back end and output verification results
- Parsing Dafny code from editor to a verifiable Dafny code file and parsing Java Hoare Triples to Dafny methods

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