
Assignment for Bachelor Thesis “Dafny VSCode Server Redesign”

Marcel Hess / Thomas Kistler

1. Supervisor and Advisor

This bachelor thesis will be conducted with the Institute for Software at HSR. It will be supervised by Thomas Corbat and Fabian Hauser, HSR, IFS.

2. External Examiner

- Guido Zraggen - Google

3. Students

This project is conducted in the context of the module “Bachelorarbeit Informatik” in the department “Informatik” by

- Marcel Hess
- Thomas Kistler

4. Introduction

“Dafny is a programming language with built-in specification constructs. The Dafny static program verifier can be used to verify the functional correctness of programs.

The Dafny programming language is designed to support the static verification of programs. It is imperative, sequential, supports generic classes, dynamic allocation, and inductive datatypes, and builds in specification constructs. The specifications include pre- and postconditions, frame specifications (read and write sets), and termination metrics.” - (Microsoft, 2019)

In a preceding bachelor thesis at HSR a Visual Studio Code plug-in to support Dafny development has been developed. It facilitates a language server for source code analysis and aids the programming with context sensitive completion suggestions, automated refactorings and performs formal verification on the fly (Dafny VSCode Server). This language server is accessed through the language server protocol (LSP). The VSCode Server relied on the DafnyServer for these analyses, which had been accessed through a proprietary API¹. For a visual overview of the architecture see Figure 1. In the preceding term project by Marcel Hess and Thomas Kistler the architecture has been improved. They eliminated the unnecessary separation of the Dafny VSCode Server and the DafnyServer.

¹ <https://github.com/DafnyVSCode/Dafny-VSCode>

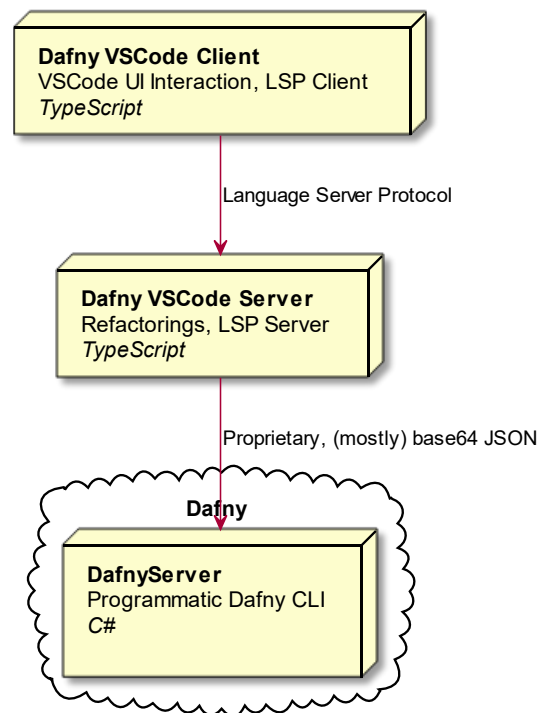


Figure 1 Initial Dafny VSCode Plug-in Architecture

5. Goals of the Project

The primary goal of this project is to continue the work on the Dafny VSCode Server and improve it to a releasable state. The following tasks are planned:

- Project clean up:
 - Splitting the repository of the client and the server into distinct repositories
 - Rebase the language server to the newest Dafny upstream and bring it into a state that can be merged back. This includes avoiding non-portable parts, like local paths and environment workarounds.
 - Clean up code of the server and the client (no unused/dead code). Eliminate the command line calls for the Dafny Library by accessing it directly
 - Clean up tests, but leave e2e testing be
 - Make SonarQube run
 - Clean logging
- Improve existing features according to the Conclusion of the preceding project
- Implement a proper symbol table to improve “go to definition” and support further features
- Optional: Implement new features:
 - Hover information
 - CodeLens
 - Refactorings like Extract Method
 - Automated Contract Generation

6. Documentation

This project must be documented according to the guide lines of the “Informatik” department [4]. This includes all analysis, design, implementation, project management, etc. sections. All documentation is expected to be written in English. The project plan also contains the documentation tasks. All results must be complete in the final upload to the archive server [5]. Two copies of the documentation must be handed-in:

- One in color, two-sided
- One in B/W, single-sided

7. Important Dates

17.02.2020	Start of the semester and the bachelor thesis
Until 10.06.2020	Hand-in of the abstract to the supervisor for checking (on abstract.hsr.ch) Poster hand-in to SGI (until 10:00)
12.06.2020, 12.00	Final hand-in of the report through archiv-i.hsr.ch

8. Evaluation

A successful bachelor thesis awards as 12 ECTS point. The estimated effort for 1 ECTS is 30 hours. (See also the module description ²). The supervisor will be in charge for all the evaluation of the project.

Criterion	Weight
1. Organisation, Execution	1/6
2. Report (Abstract, Management Summary, technical and personal reports) as well as structure, visualization and language of the whole documentation	1/6
3. Content	3/6
4. Final presentation and oral exam	1/6

Furthermore, the general regulations for bachelor theses of the department “Informatik” apply.

Rapperswil, 17.02.2020

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