



Supervisor's statement of a final thesis

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Thesis title: An overview of gradual typing approaches in dynamic programming languages
Branch / specialization: Web and Software Engineering, specialization Software Engineering
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Evaluation criteria

1. Fulfillment of the assignment

- ▶ [1] assignment fulfilled
- [2] assignment fulfilled with minor objections
- [3] assignment fulfilled with major objections
- [4] assignment not fulfilled

The assignment has been fulfilled.

The main artifact of this thesis is the written part which summarizes the development of gradual typing in three popular dynamically typed programming languages. It has been carried in a form of a exploratory literature review. By exploratory I mean that the corpus of the references we collected in an adhoc way during the whole review. This is to be expected given the scope of the thesis.

To fit inside this evaluation form I will split the assessment of this thesis into two parts:

1. assessing the content and the style of the document (main written part), and
2. assessing the framework upon which the approaches were reviewed (non-written part).

2. Main written part

90/100 (A)

The written part is rather extensive. This is to be expected as it is the main output. It is well organized and well written. The chapters are trying to more or less systematically navigate the reader through the story of retrofitting types onto languages that are well known for their dynamic nature.

What I would have liked are more examples and more compact style.

3. Non-written part, attachments

90/100 (A)

The goal of this thesis are two-fold: present the story of introducing types into dynamic programming languages and from that synthesis some common themes that would be

useful in doing the same exercise in the R programming language.

The author does that by developing a small framework which is used to show and compare the approaches.

The work does not just look at the technological side of the problem, but also at the social one, i.e., the reactions of the community towards a fairly dramatic change in those languages.

The part where I have some reservations is the chapter about R. There the synthesis from the previous chapter could be better mapped to the constructs of the R programming language.

4. Evaluation of results, publication outputs and awards 90/100 (A)

I could see a blog series about the different gradual typing approaches.

This would also be a good resource for the ongoing endeavor of retrofitting types in R that is being worked at the PRL lab at FIT.

5. Activity of the student

- ▶ [1] excellent activity
- [2] very good activity
- [3] average activity
- [4] weaker, but still sufficient activity
- [5] insufficient activity

This type of thesis is somewhat harder than the common one that include code. The reason is that one does not have a compiler nor tests or benchmarks that could guide the implementation. In literature review one has to develop these tools from scratch and manually assessing the work.

6. Self-reliance of the student

- ▶ [1] excellent self-reliance
- [2] very good self-reliance
- [3] average self-reliance
- [4] weaker, but still sufficient self-reliance
- [5] insufficient self-reliance

Without student's organizational and time management skill, this would be very difficult to finish.

The overall evaluation 90/100 (A)

This thesis is not an easy one in neither execution nor evaluation. Unlike the common ones which bring also a code artifact, this thesis is close to a literature review. The result is a good overview of how types were added into three popular dynamic programming languages with some initial hints on how it could be done for R.

Instructions

Fulfillment of the assignment

Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.

Main written part

Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies?

Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 52/2021, Art. 3.

Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.

Non-written part, attachments

Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.

Evaluation of results, publication outputs and awards

Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

Activity of the student

From your experience with the course of the work on the thesis and its outcome, review the student's activity while working on the thesis, his/her punctuality when meeting the deadlines and whether he/she consulted you as he/she went along and also, whether he/she was well prepared for these consultations.

Self-reliance of the student

From your experience with the course of the work on the thesis and its outcome, assess the student's ability to develop independent creative work.

The overall evaluation

Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.