FACULTY OF INFORMATION TECHNOLOGY CTU IN PRAGUE

Supervisor's statement of a final thesis

Supervisor:	doc. Ing. Filip Křikava, Ph.D.
Student:	Bc. Adam Plodek
Thesis title:	Out of process byte-code copiler for the R programming language
Branch / specialization:	System Programming
Created on:	3 June 2024

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

All items from the assignment were implemented.

2. Main written part   70 / 100 (C)

The textual part lacks behind the implementation. The main content is there and it serves a good enough overview of the implementation. However it would greatly benefit from a proofread. Not only to polish the style (or at least to keep the same style which currently varies between formal thesis text and a blog post), but also to fix some type setting problems like runaway text.

3. Non-written part, attachments   95 / 100 (A)

The project involved a lot of engineering effort and Adam did a great job. While there is already an implementation that can be used for inspiration. In fact, since one of the goal is to produce a byte-to-byte identical bytecode to GNU R compiler, the compiler must follow a similar structure to the original compiler. However, it is often more of a hindrance than a help as the GNU R compiler is implemented in R (with bits in C) and it will not be easy to find a programming language that is further apart from Rust.

One thing that could be considered (and I hope it will be) is an alternative memory management which might simplify the code, reduce the need for cloning and overall improve the performance.

4. Evaluation of results, publication outputs and awards 95 /100 (A)

It is interesting to have an alternative implementation of an existing, widely used software.
Once we have a full compiler, we can start asking questions about the pros and cons of the different implementation such as what is the performance, maintainability, extensibility, etc.

5. Activity of the student

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

Working with Adam was a pleasure.

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

Adam knows what he is doing and he led the project well. Unfortunately, he got carried a bit too much by the implementation while he should have allocate more time for the textual part.

The overall evaluation 90 /100 (A)

Having recently implemented a GNU R byte code compiler myself (the more the merrier) I can confirm that it is a lot of work (more than I would have admit when writing the assignment). This does not include just the compiler itself, but also a complete representation of R types in the target language and a way how to communicate with R.
The well chosen RDS protocol itself is labour-intensive to implement, simply because there is no documentation and one has to follow the C source code to learn all the details. Next to this, Adam also experimented with the client-server model. In summary, as far as the implementation goes Adam did a great job and I'm happy with the result. The textual part would definitely benefit from an editorial pass to polish the writing.

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.