**FACULTY
OF INFORMATION
TECHNOLOGY
CTU IN PRAGUE**

Review report of a final thesis

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

As specified by the assignment, the thesis implements a novel profiler for the R virtual machine, develops a way to connect the profiler observations to line numbers in the source code and thoroughly evaluates the profiler. The thesis focuses on supporting the AST interpreter, which is a well-chosen direction for the thesis.

2. Main written part   95 / 100 (A)

The text of the thesis is well-written and logically structured. Given the nature of the work, it focuses on providing technical description of the evaluation and reporting evaluation results. It does both of these well - it provides clear explanation of how the interpreter is implemented and clearly reports detailed evaluation results.

3. Non-written part, attachments   98 / 100 (A)

The thesis is concerned with extending an existing complex software system. It tackles this very well by finding the right place to make suitable modifications (minimal, as required by the assignment). The resulting work shows a detailed understanding of the broader context to which the extension has to fit.

4. Evaluation of results, publication outputs and awards   98 / 100 (A)

The thesis makes the first step in developing a practically useful tool, building on recent academic research. The student solved a number of challenges that required novel approach. The work is thus both academically and practically interesting and valuable.

The overall evaluation   98 /100 (A)

My evaluation of the work is based on three main points. First, the thesis successfuly tackles a technically very challenging task of making sense of and modifying an existing non-trivial software system (R virtual machine). Second, it fulfils all aspects of the specified assignment. Third, the thesis itself is clear, well-written and includes a thorough evaluation of the system.

Questions for the defense

I do not have any questions that need to be answered in order to finalise my assessment of the work, but the work has triggered a couple of questions that I'd be curious to hear about at the defence:

* You (very reasonably) focus on extending the AST interpreter. However, I'm curious what would be the challenges of extending the system to also work on the byte-code interpreter? Is this mainly more work, or are there some fundamental differences that would make this harder?

* Would it be possible to keep track of time in the main interpreter loop (in some way) as opposed to using OS signals in order to trigger the sampling? Or are there some fundamental reasons (overhead, measuring of native execution, etc.) that make such alternative method impossible?

* (Additional question if there is more time.) The work required modifying the interpreter, which makes me wonder - what would be the minimal set of extension points that the interpreter would have to expose so that something like this can be done without modifying it? (That is, what kind of "meta-programming" or "reflective" capabilities would the R interpreter need to provide in order to allow programmers to create something like your profiler without actually modifying the interpreter?)

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.

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.