**FACULTY
OF INFORMATION
TECHNOLOGY
CTU IN PRAGUE**

Supervisor's statement of a final thesis

Supervisor:	Ing. Petr Máj
Student:	Bc. Martin Slávik
Thesis title:	TinyC Optimizing Compiler
Branch / specialization:	System Programming
Created on:	9 May 2023

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

Student has fulfilled the assignment of creating an optimizing compiler for the TinyC language. His work exceeds the standards of the NI-GEN projects compiler was to improve on.

2. Main written part   70 / 100 (C)

The written part would certainly benefit from more time. Although I could eventually find almost all information, I would have expected to somewhere it the thesis, it was often mentioned in unnatural places that make reading the text not as easy as it should have been. That said, compared to the first revisions, the student has made an impressive improvement to the thesis text and I fully believe that much of the remaining difficulties are attributable to the fact that the thesis is written in English (and I firmly believe that even flawed english thesis is much better than perfect text written in Czech).

3. Non-written part, attachments   90 / 100 (A)

The technologies and algorithms used are sound and are part of modern optimizing compilers, albeit in a more complex form, unfit for educational purposes the student aimed for. The testing and evaluation would benefit from a more rigorous testing with more tests, including regressions and larger integration tests as well as targetted and explained microbenchmarks, but overall the work is sound.

4. Evaluation of results, publication outputs and awards   80 /100 (B)

Overall the student succeeded in the implementation of an optimizing compiler for the TinyC language and the t86 backed (both used in the NI-GEN course). My only objections affecting the mark would be towards the scope of the project - for optimizing compiler, one would expect more work in the optimizer part. And while the selection of implemented optimizations is thoughtful, it does not demonstrate the complex interactions between analyses and optimizations in compiler's middle-end.

5. Activity of the student

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

The student was active and motivated throughout the development of his thesis.

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

Student's self-reliance is what I would believe an average for a master's student. The student is certainly capable of independent and creative thought, but can relatively easily veer off and requires a more detailed guidance. That said, the student actively asks for such guidance making the cooperation useful from the very beginning.

The overall evaluation   85 /100 (B)

Overall, the thesis presents an optimizing compiler for the TinyC language and t86 virtual machine that does outperform the Ni-GEN projects in both code quality of the compiler itself and speed of the compiled code. Only two points affect the overall mark really - the difficulties of the written part and the lack of more complex palette of compiler optimizations implemented.

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.