



Supervisor's statement of a final thesis

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Student: Bc. Michal Vlasák
Thesis title: x86-64 native backend for TinyC
Branch / specialization: System Programming
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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 student was tasked with implementing a true x6-64 backend for the educational tinyC compiler used in the NI-GEN course. This is a very complex and broad task that requires extensive knowledge in compilers, CPU architectures and even operating systems. The student did an exceptionally good job in all three.

2. Main written part

95 /100 (A)

To say it is long would be an understatement. But the length is not self-serving. Michal did in his thesis a truly extensive review of current literature on compiler optimizations and target translation techniques and implemented a great deal of them in his thesis. And while not all of them are absolutely relevant to the task presented, they do form a coherent, if lengthy, text. My evaluation of the written part can perhaps best be summarized by the famous quote attributed to Blaise Pascal: "If I had more time, I would have written a shorter letter". The evaluation section pales in comparison at mere 3 pages. While evaluating a compiler backend without a truly optimizing middle-end is not an easy task, more could have been done in the sense of comparing to LLVM, or fine tuning of the real-world optimizers for more apples to apples comparison.

3. Non-written part, attachments

95 /100 (A)

I am greatly satisfied with the non-written part. Michal did great job in implementing the advanced techniques used in compiler's backend in the "toy" settings. The code reads well and significantly lowers the barriers for understanding for compiler course students.

4. Evaluation of results, publication outputs and awards

100 /100 (A)

The thesis is not aimed at direct research, rather it complements the existing set of tooling developed for the NI-GEN course in presenting an easy to understand. As such it is a great addition to the materials and will be put to use.

5. Activity of the student

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

Michal had a hard time of managing a lot of things in his last year (being a single TA of a very resource intensive Ni-RUN course), but he did manage to prioritize and schedule them in a way that was not detrimental to either.

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

There is not much I can say here - Michal was extremely self-reliant and he is quite skilled at independent work.

The overall evaluation

95 /100 (A)

I am extremely pleased with this thesis outcome. A very hard topic has been described and implemented in great breadth as well as depth. Although the written part can be shortened for better impact at its intended audience, it forms a very complex and detailed document of its own right and quality and will be used as preliminary reading for more advanced course projects in the future.

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.