FACULTY OF INFORMATION TECHNOLOGY CTU IN PRAGUE

Review report of a final thesis

Student:	Bc. Alan Dragomirecký
Reviewer:	Ing. Tomáš Zahradnický, Ph.D.
Thesis title:	Swift for Embedded Systems
Branch of the study:	System Programming

Date: 2. 6. 2019

Evaluation criterion:	*The evaluation scale: 1 to 4.*
1. Fulfilment of the assignment	***1 = assignment fulfilled,*** *2 = assignment fulfilled with minor objections,* *3 = assignment fulfilled with major objections,* *4 = assignment not fulfilled*

Criteria description:
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.

Comments:
The student has acquainted himself with the Swift language and the LLVM framework. Based on that, he has brought the Swift compiler toolchain onto a bare-metal HW platform and successfully tested it. I consider the assignment fulfilled.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
2. Main written part	*95 (A)*

Criteria description:
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. 26/2017, 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.

Comments:
Structure of the thesis is standard and I have no objections; size of the thesis meets criteria laid upon a diploma thesis.

Language of the thesis is excellent. I found only a couple of typos and few occurrences of improperly written units such as Mhz instead of MHz.

Typography of the thesis is excellent. I only noticed few words running out of the page mirror.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
3. Non-written part, attachments	*100 (A)*

Criteria description:
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.

Comments:
The embedded SD card contains the source code and the diploma thesis. The source code is also present in a Git repository and can be used to build the entire compiler toolchain for the selected embedded microcontroller.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
4. Evaluation of results, publication outputs and awards	*100 (A)*

Criteria description:
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.

Comments:

Bringing Swift to the embedded world is a very interesting idea. Not only because Switft is popular but also because it is not limited by the Global Interpreter Lock (GIL) as is the Python programming language. The GIL problem does not concern as soon as there is no concurrency, but it is not uncommon that there are several cores available. It would be interesting to further strip down the Swift core library, if at all possible.

Evaluation criterion: *No evaluation scale.*

5. Questions for the defence

Criteria description:
Formulate questions that the student should answer during the Presentation and defence of the FT in front of the SFE Committee (use a bullet list).

Questions:

1. libAtomic and threading are not present on the selected architecture. Which changes would be necessary to run on a multi-core processor? Would OS be really necessary in order to implement a multithreaded program?

2. Table on page 48 indicates that a C program is slower that a program written in Swift. That is something unexpected. What were the default optimization flags for both programs? Have you tried to compare the LLVM internal representation of the program rather than its run time?

Evaluation criterion: *The evaluation scale: 0 to 100 points (grade A to F).*

6. The overall evaluation

98 (A)

Criteria description:
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.

Comments:

I hereby do recommend the diploma thesis of Mr. Bc. Alan Dragomirecký for defense and grade it with A (excellent).

I also state that there must have been a significant amount of work beyond the thesis. For this, I also do recommend the examination committee to consider recommendation for an excellent thesis dean's award.

Signature of the reviewer: