FACULTY OF INFORMATION TECHNOLOGY CTU IN PRAGUE

# Review report of a final thesis

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| **Student:** | Bc. Lukáš Turčan |
| **Reviewer:** | Mgr. Rudolf Bohumil Blažek, Ph.D. |
| **Thesis title:** | LLVM Obfuscator Based on Virtual Machines with Custom Opcodes and String Encryption |
| **Branch of the study:** | Computer Security |

**Date:** 7. 6. 2019

| *Evaluation criterion:* | *The evaluation scale: 1 to 4.* |
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| **1. Fulfilment of the assignment** | ***1 = assignment fulfilled,***<br>*2 = assignment fulfilled with minor objections,*<br>*3 = assignment fulfilled with major objections,*<br>*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 thesis fulfills all requirements of the assignment.

| *Evaluation criterion:* | *The evaluation scale: 0 to 100 points (grade A to F).* |
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| **2. Main written part** | *90 (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:*
The written part of the thesis is adequate for a master-level diploma thesis. All its parts are informative and well balanced. It has a good logical structure and does not contain any serious factual errors nor imprecise statements. The list of references could be richer, but is satisfactory.

| *Evaluation criterion:* | *The evaluation scale: 0 to 100 points (grade A to F).* |
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| **3. Non-written part, attachments** | *95 (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 provided prototype software is functional and usable.

| *Evaluation criterion:* | *The evaluation scale: 0 to 100 points (grade A to F).* |
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| **4. Evaluation of results, publication outputs and awards** | *95 (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:*
The thesis contains an adequate analysis of code obfuscation techniques. It includes a functional prototype of the implemented methods. Its results are usable in practice and useful for further research by future students.

| *Evaluation criterion:* | *No evaluation scale.* |
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| **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:*

Can you please explain in more detail the issue of logging error messages and the process of debugging obfuscated code?

| *Evaluation criterion:* | *The evaluation scale: 0 to 100 points (grade A to F).* |
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| **6. The overall evaluation** | *93 (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:*

The issue of high-quality code obfuscation is very important in order to protect the privacy and data security for software users. Especially in the era of using platforms that make it easy to reverse engineer applications, for example in smart devices like TVs, phones, and IoT devices. This thesis addresses these important issues well and contributes thus to the community.

Signature of the reviewer: