FACULTY
OF INFORMATION
TECHNOLOGY
CTU IN PRAGUE

Review report of a final thesis

Reviewer:	Pierre Donat-Bouillud, Ph.D.
Student:	Bc. Petr Adámek
Thesis title:	Using malware detection techniques for dependency detection of R programs
Branch / specialization:	Computer Security
Created on:	4 June 2024

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

All of the tasks defined in the assignment were successfully implemented.

2. Main written part

90/100 (A)

The thesis is well structured; the progression of chapters is logical and the text is usually pleasant to read.

The more fine-grained scale has more problems. There are a few typos and grammar errors (nothing shocking), but nominal sentences are too widespread. This results in inelegant interruptions in the reading flow. I also found pieces of text without verbs, maybe detached from the preceding sentence, sadly wondering what they are doing there. Some sentences miss words. Also, some portion of the text are too verbose but lack substance.

In the tracing implementation section, it is not totally clear what the downsides of fanotify or fakechroot are for the purposes of the R4R tracer, and there are also parts in the thesis where I would have liked to see more explanations.

A nitpick: footnote numbers are incorrectly placed and in English should be after punctuation marks, not before. On the contrary, reference numbers (citations) should be placed before punctuation marks.

3. Non-written part, attachments

92 /100 (A)

The student chose C++, which is adequate for such system programming. There were many edge-cases to deal with but the codebase looks easily extensible, using C++ metaprogramming techniques.
The code quality is good, and it is well commented and will be easy to reuse.
Currently, there are some R notebooks and other programs that can be used as manual tests, distributed along the source code. There could have been more tests, both unit tests and end-to-end tests. Indeed, it's difficult to have a good oracle to decide on the correctness of the tests results in that case, but just a automated harness could have been useful.
The performance evaluation could have been much more extensive.

4. Evaluation of results, publication outputs and awards

97 /100 (A)

I think this thesis can lead to an article in a conference about the R language. The results of the thesis will also be used as part of the R4R ERC PoC grant.

The overall evaluation

94 /100 (A)

This thesis brings a new useful tool to the R community that can be used for the reproducibility of R programs and has been successful in handling notebooks and generating Docker images to run them in with all their dependencies. This is a code base that the R4R team can easily reuse and extend for their project although it could have been more tested. The written part explains the work well but suffers from too many missing words and spelling mistakes.

Questions for the defense

- What are the challenges with testing the tool you developed? Can you give some ideas on how you could check the correctness of the tests?
- How do you handle non-local resources, for instance, a request to a URL? Will you record the URL, and will you archive the response associate to the request?

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.