

I. IDENTIFICATION DATA

Thesis title:	Performance optimizations in Unity
Author's name:	Kropáč Jiří
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Computer Graphics and Interaction
Thesis reviewer:	Ing. Martin Káčerik
Reviewer's department:	Department of Computer Graphics and Interaction

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
The topic of performance optimization is complex and difficult to generalize.	

Fulfilment of assignment	fulfilled with minor objections
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
For the most part, the assignment is fulfilled, however I would appreciate deeper explanation for the optimization techniques, especially those chosen as a focus. Also, the impact on the quality of rendering is generally not considered.	

Methodology	correct
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
The chosen approach seems correct, although it is difficult to capture all the intricacies of a real game in an artificially crafted scene, likely affecting the results and conclusions. The evaluation is mostly logical, except for the Test 1, presented in Sec. 3.2.2, whose result I consider meaningless, as each compared frame is different. I would suggest a static camera.	

Technical level	C - good.
<i>Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?</i>	
Student shows a reasonable understanding of the Unity engine and the presented techniques. Sometimes it was difficult to follow the reasoning.	

Formal and language level, scope of thesis	D - satisfactory.
<i>Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?</i>	
I find the organization a bit chaotic, it is not always easy to follow the thoughts. It is difficult to distill relevant information from the presented tables with results. The level of English is generally good, with occasional grammar or stylistic mistakes. Multiple figures are not referenced in the text and tables 3.1 and 3.9 are identical.	

Selection of sources, citation correctness	D - satisfactory.
<i>Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?</i>	
Chosen sources are relevant, but they do not really reflect the claim of "popular research topic", as they lack research publications in the field. Related work is not really discussed, and most of the sources are not cited in the text.	

Additional commentary and evaluation (optional)
<i>Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.</i>

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

This thesis explores various optimization techniques available in the Unity engine, such as level of detail, visibility culling, or normal mapping. To estimate the performance impact of the chosen method, the student crafted multiple artificial scenarios of varying geometric complexity and with predefined camera paths. Based on the tests performed on various devices, the conclusion about the usability of the evaluated technique is drawn.

The body of work is mostly practical, dealing with many aspects of Unity development and with extensive evaluation. It surely helps to get familiar with the environment, but the actual results are hardly transferable to a real-world scenario. In my opinion, a more theoretic exploration of benefits and weaknesses of the optimization methods could lead to a better understanding and thus a better utilization in larger projects.

The grade that I award for the thesis is **C - good**.

Despite the shortcomings described in this review, I decided to improve previously considered D grade due to the amount of work and genuine care for the topic, displayed in the thesis.

Questions:

1. In Sec. 2.1.2 you claim that "frame time" shows, how many frames can fit in a second, which sounds literally like "frames per second" (FPS) metric. You also claim that frame time is more accurate than FPS. What is the relation of frame time and FPS? How is one more accurate than the other?
2. In Sec. 3.2.1 you claim that the demo is GPU bound, but the data presented in the tables show that the GPU times are slightly or significantly shorter than the CPU times. Can you explain this?

Date: **8.6.2023**

Signature: