

Assignment 2

In this assignment you will parallelize the raycaster from the last assignment using Cuda.

- 0.) Download the [additional files](#) and extract them into the existing folder `ex1/`.¹ Regenerate the build system if necessary.
- 1.) Implement the ray caster in Cuda to run efficiently on a Cuda device. For this you can follow the skeleton that is provided in `device_renderer.cu` (and `device_renderer.cpp`) but you are free to implement the ray caster as you see suited. Possible approaches will be discussed in the tutorial.
 - Existing classes can be modified but this should be done judiciously.
 - The code should strike a balance between efficiency on the one hand and readability, maintainability, and genericity on the other hand.
 - Document any performance optimizations you implement.
- 2.) Analysis of implementation.
 - i.) Quantitatively compare the image generated with your Cuda implementation to the one generated with the C++ threads implementation. Ensure that the images differ only by an acceptable error.
 - ii.) Generate a plot with the execution time as a function of the image resolution for the Cuda implementation and the C++ threads implementation (see Fig. 1 and Fig. 2 for an example).
 - iii.) Analyse and explain the observed performance in the plot.
 - iv.) Analyze advantages, disadvantages, and trade-offs in your code.

Please finish the implementation until the week of 16/12/2016 and sign up for a time slot to discuss your implementation.

Notes:

- Please email gpu@isg.cs.ovgu.de for bug reports or comments.

¹The files should be added in the correct place. You will be asked to overwrite existing files. Make sure you backup modified files.

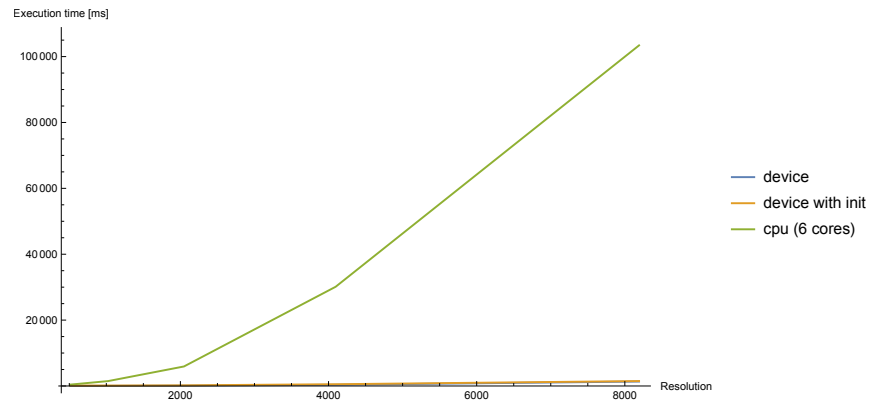


Figure 1: Execution time as a function of the image resolution (linear).

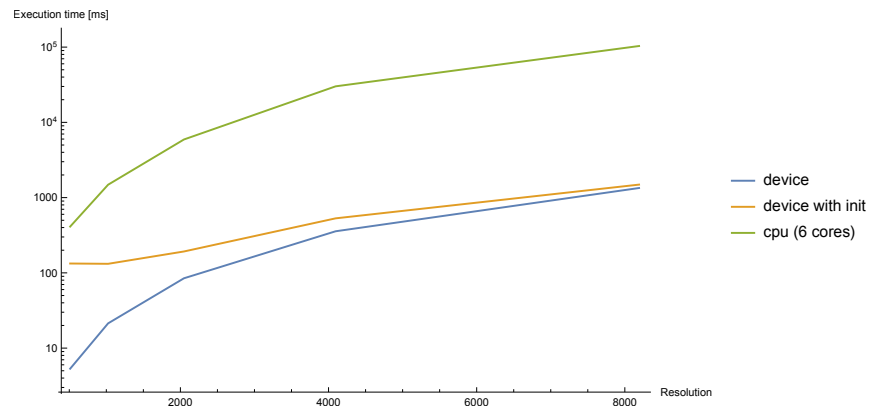


Figure 2: Execution time as a function of the image resolution (log).

- Plagiarism policy: you can discuss the assignment but everybody has to implement their own code!
- Please sign up for a time slot to discuss your current status in the week of 02/12/2016.
- Please make sure that your code compiles and executes on the machines in the lab or bring your own machine for discussing your implementation.