HPC Project 2 Milestone 2 Report

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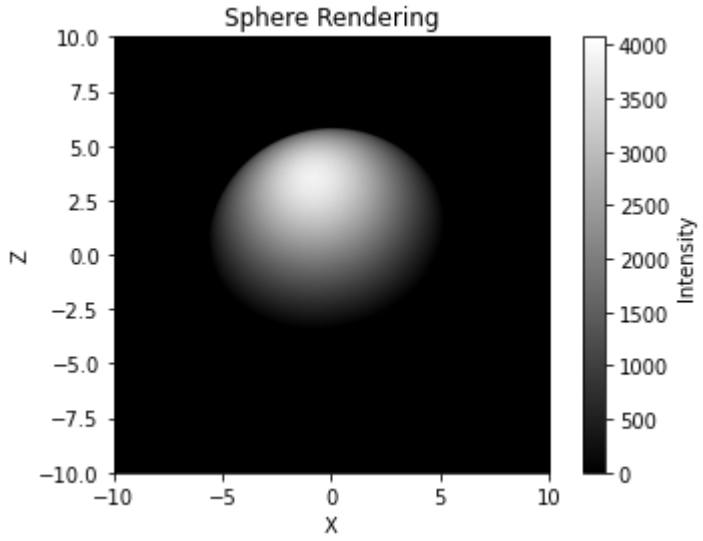
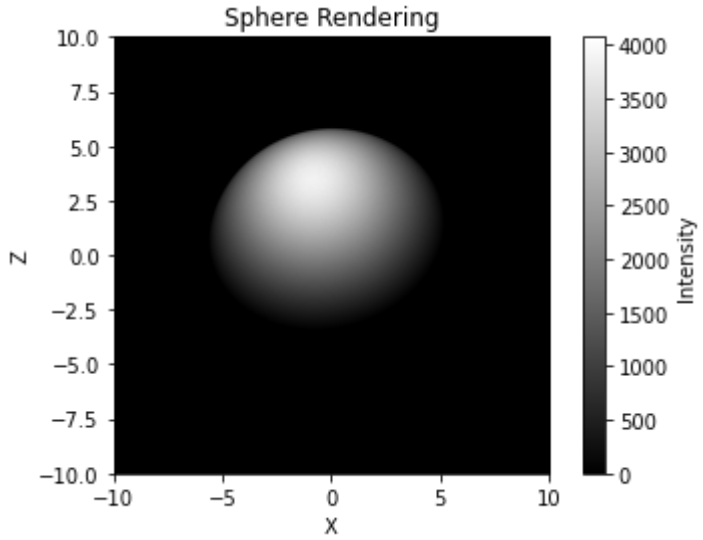
Introduction

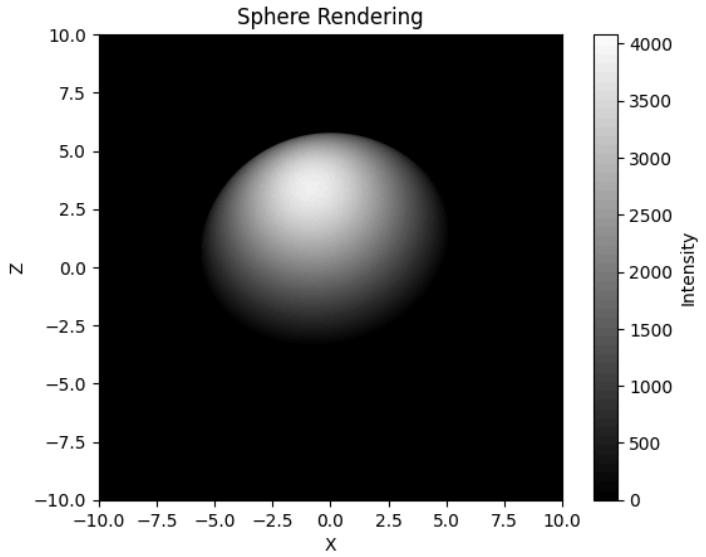
My algorithmic approach was to generate a ray, if it matched the requirements, it was processed as mentioned in Milestone 1 and counted as one of the billion rays. To map it on GPU, I didn't think of anything different from a multicore solution. Each thread will do some amount of processing. Since the GPU can have many more threads than a multicore CPU, each GPU thread will process a lot less than a multicore CPU thread. As you can see below, the code outputs the correct image regardless of the method chosen to get it.



1) CUDA Solution by running 1000 threads and 1000 blocks



2) Multicore CPU solution running 16 threads



3) Serial solution for the benchmark problem

Performance

The table below mentions the fastest times for serial, multicore, and GPU-based solutions. I should also mention that the fastest 16-thread multicore solution took 28.369 seconds

Method	Time taken (seconds)
Serial	322.754
Multicore CPU (48 threads)	12.386
GPU	1.474