

Comp380

Programming Assignment #7

Due: June-10 (before 11:59pm)

Difficulty: easy

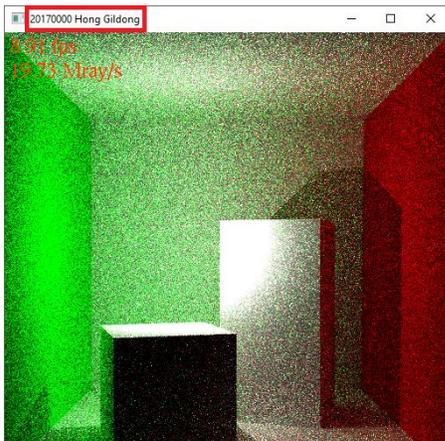
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Objective: Ray tracing method is another archetype of rendering techniques. It is very simple and elegant in its theoretical foundation, yet yields a superior photorealistic quality of rendered image. There are lots of frameworks that can assist you. Let's scratch the surface of such ray tracers by your hand, and see how it looks.

Developing environment: In this PA, we do not have any dev. env. restrictions. However, your CPU must support running Embree, the ray tracing engine developed by Intel corporation. A x86-64 compatible CPU would be enough for your assignment.

Requirements:

- 1) Download the source code of Embree (<https://embree.github.io/downloads.html>)
- 2) Read the README file carefully. Try to build and install it on your system.
- 3) Run the tutorial called "pathtracer".
- 4) Modify the source code of the "pathtracer" so that the title of the window has your student ID and name. (10 pts)
- 5) Question: Why is it slow? Justify your answers using your knowledge on ray tracing. (10 pts)
- 6) Question: Why does it seem noisy at the beginning? Why does it change as time goes? (10 pts)
- 7) Question: Can you pick up any kind of the visual effects which seems hard to implement with rasterization methods? (10 pts)



(Req. 4) Your student ID and name must be present on the title window.
(Req. 6) Also it seems noisy at the beginning.



(Req. 6) As time goes, the quality of an image should increase.

Tips:

- 1) Embree is distributed under CMake package. Refer to the following article to use CMake. <http://preshing.com/20170511/how-to-build-a-cmake-based-project/>
- 2) Embree has a lot of required and optional dependencies. Read the README carefully to acquire or disable them (*Chapter 3. Compiling Embree*). As of Embree 2.16.0, you are required to setup CMake for the following dependencies:
 - a. Intel Thread Building Block (<https://www.threadingbuildingblocks.org/>)
Either install it, or set CMake variable called "EMBREE_TASKING_SYSTEM" from "TBB" to "INTERNAL".
 - b. Intel SPMD Program Compiler (<https://ispc.github.io/>)
Either install it, or set CMake variable called "EMBREE_ISPC_SUPPORT" from "yes" to "no".
- 3) For the performance, we recommend you to compile it on 64-bit Release build. It is not a mandatory requirement.

Deliveries:

- 1) A report (*.pdf) that has the following contents:
 - a. Some screenshots of your modified "pathtracer" application. (Req. 4 and 6)
 - b. Your answers for the Req. 5, 6 and 7 mentioned above.
- 2) Submit your work in KLMS.

Policies:

- 1) Everyone must turn in their own assignment. You can collaborate with others, but any work that you turn in should be your own.