EXERCISES 3, 4 and ASSIGMENT 1

Exercise 3: April 6th

Exercise 4: April 13rd

Assignment 1: April 20th

For assignment 1, you will implement the techniques of Distribution Ray Tracing covered in theoretical classes. Students will also extend their ray tracing application by using both BVH and a Grid acceleration structures. This Assignment weights 40% of the final grade.

Assignment 1 will build on top of exercises 2, 3 and 4. Students' progress in those Exercises will be monitored in three laboratory classes. The goals for each of the exercises are described below.

ASSIGNMENT 1

The students will be evaluated by their implementations regarding:

- **T. Whitted Ray-Tracer (7 pts)**
  - Local color component (Blinn-Phong model illumination) (1 pt)
  - Multiple source lights (0.5 pts)
  - Hard Shadows (1 pt)
  - Global color component by implementing the mirror reflection (0.5 pts) and refraction with Schlick approximation of Fresnel Equations for dieletric materials (1.5 pts)
  - Ray intersections with spheres (0.5 pts), triangles (1 pt) and axis-aligned boxes (1 pt)

- **Stochastic sampling techniques (6.5 pts)**
  - **Anti-aliasing** with the jittered method (1 pts)
  - **Soft shadows** using an area of light with a set of N light source points (without antialiasing) and the random method (with antialiasing) (3 pts)
  - **Depth of field** effect where the lens is simulated by a random distribution of N samples on a unit disk (2.5 pts)

- **Acceleration structure (5 pts)**
  - Uniform Grid integration (2 pts).
  - Bounding Volume Hierarchy (BVH) (3pts)

- Other techniques or functionalities (**extra**) like fuzzy reflections or motion blur effect (**1.5 pts)**

The application should allow the activation and deactivation of the acceleration structures in order to compare rendering performance.

Students may create **P3F scenes** (or other formats) that clearly demonstrate and leverage all previous techniques.

EXERCISE 3

In Exercise 3, students will extend their ray tracing code by implementing the anti-aliasing technique based on the jittered technique, Soft Shadows and the Depth-of-field.

EXERCISE 4

In Exercise 4, students should end the previous tasks, integrate the uniform grid-based acceleration structure provided by the teacher and start to build the Bounding Volume Hierarchy (BVH) acceleration structure.

Lab Submission

Submit in the **Fenix** system your source code (.C and .h), and/or Makefile (if you have any) and a readme file specifying what are being submitted and how to compile and link your program.
All the files should be zipped in a file called Assignment 1.
Do not submit any executable files. We will use some sample P3F models to test your program.

ATTENTION: A **report with 6 pages** at maximum and a **short Making-Off Video** should be delivered by email until Tuesday 27th.

Late Penalty
You should submit your solution on time. Being late for one checkpoint could affect the time left for you to complete subsequent labs. The Assignment 1 is due at the above specified due data, and there is a 20% penalty each day for up to 40%. After that, you get zero.

Grading Criteria
Grading of the labs will be based on the following:

- 90%: Correctness, adherence to assignment specification and to the topics from the theoretical classes. Part of it will be checked on discussion and the demo provided by the Groups in the lab class regarding the checkpoint 1.
- 10%: Report, Video and readability, structure of code, use of comments, adherence to lab procedures (submitting, naming conventions, etc.)

Don't copy labs. Discussion of lab assignments is allowed and encouraged. However, you need to complete the lab all by yourself. Labs which are too similar will be properly handled by the teaching members of the discipline.