DV2575 Project-2: Ray Tracing

In this project you will build a GPGPU based ray tracer. Ray tracing is often used to render realistic images where rendering time is less important. By using current generation of GPGPU hardware it is possible to perform ray tracing in real time.

In the books "GPU Pro 3" and "GPU Pro 4" there are two chapters named "Interactive Ray Tracing Using the Compute Shader in DirectX 11" and "Bit-Trail Traversal for Stackless LBVH on DirectCompute", that covers the main activities for a GPGPU based implementation. It is highly recommended that you read the chapters before you start to write any code!
The project is graded with the grades G-U. You work alone or in pairs and you may use any GPGPU API you like

The project is divided into five iterations, where each has to be finished and approved before you are allowed to go ahead with the upcoming iteration.

Template code
There is a template code on the course web page that you can use as a starting point. The code sets up the Direct3D 11.0 system and fills the back-buffer using a compute shader program.

Iterations
- Generate primary rays from a camera position and orientation.
- Support diffuse lighting with light attenuation.
- Support multiple ray traces/bounces.
- Support ray tracing of one triangle mesh
- Performance analysis showing how the following factors affect the performance:
    - Number of threads per thread group.
    - Screen resolution.
    - Trace depth.
    - Number of light sources.
    - Number of triangles.
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Final report
The project solution shall finally be documented in an academic written report. You have to cover and explain each implementation step and the performance analysis in a well structured and understandable way.

Questions?
Feel free to ask Yong Yao (in person, will not answer by e-mail!). Lars Lundberg will answer questions regarding the course in general.
Good Luck!