

JUNE 29, 2018

REAL-TIME COMPUTER GRAPHICS, SUMMER 2018 ASSIGNMENT 9

Present your solution to this exercise on Thursday, July 12, 2018.

The exercises are going to take place in the CIP pool, room G40 in Mühlenpfordstraße 23. Please make sure your solutions compile and run on the CIP pool computers. Note that you need a y-number, which can be obtained at the Gauß-IT-Zentrum, to use the computers. If for some reason you are not able to attend the exercise, you may send your solution to ecg@cg.cs.tu-bs.de instead.

This exercise and the corresponding version of the framework can be found on the lectures website (<http://www.cg.cs.tu-bs.de/teaching/lectures/ss18/ecg/>).

Practical Tasks

9.1 Realtime Shadowmapping (60 Points)

In this exercise you will implement dynamic shadow mapping. Shadowmaps are often precomputed as textures. However, precomputed shadow maps do not allow for dynamic objects or lights. Using a renderpass to generate a new shadowmap for each frame lets us have the full freedom of shadow mapping.

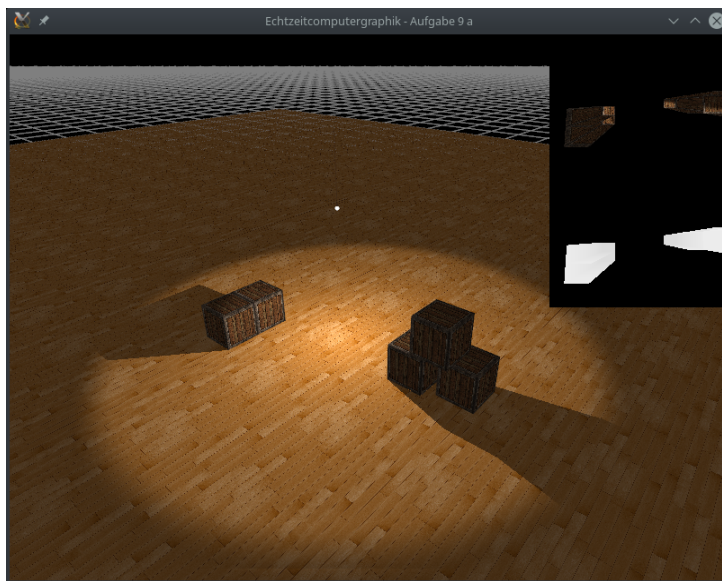


Figure 1: Dynamic shadow mapping with shaders completed (lamp is turned on using the L-key)

To compute the shadowmap, we need a renderpass with a camera in light space and add all objects that cast a shadow to its scene graph. `FixedCameraNode` sets the camera to the same transformation of another scenegraph element and is already attached to a renderpass. Completing its `render`-function

and the main method in `ecg_ex09_a.cpp` should give you a valid depth map and real scene view from the light source (visible in the overlay on the right side of the screen).

Now fill in the missing code in `simpleTextureSML` to implement the actual shadow mapping. As most of our computations take place in light space, final lighting is also computed there. For initial visual feedback, the lighting is overwritten at the end of the fragment shader. Make sure to uncomment that line in order to see your implementation. You should now see a scene with shadow mapped lighting. The lamp can be toggled using the L-key and is initially turned off.

Finally, complete the pendulum animator to get an animated light source.

Draw a schematic overview of the final scenegraph structure.

9.2 Coding (Extra credit 10 Points)

Present one of the following:

- a bug in the framework
- a helpful test case to solve an exercise
- the implementation of an additional feature
- a nice demo using the current framework

Note that a short documentation is required and code has to be handed in. Please report bugs immediately (via email) so they can be fixed as soon as possible.