# 02561 COMPUTER GRAPHICS IMM. DTU

## *Exercise 7 : Shadows and render pipeline*

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| Reading | Angel: chapter 4.4-4.7, 4.10 |
| Purpose | The purpose of the exercise is to use OpenGL to produce simple shadows using projection matrices and to get a better understanding of the output pipeline. We are only are concerned with generating the shadows – this means that using Phong lighting is an optional extension.<br><br>As a help the view direction is visualized in the upper right corner. Red = x-axis, green=y-axis and blue = z-axis. |
| Part 1<br>Shadow projection | Implement shadow projection. You can use the mouse to see the scene from different angles. Keyboard 'p' to pause the movement of the light-source and keyboard 't' to toggle shadow projection type.<br>a) Implement the function `createShadowProjectionPointLight` which should create a shadow projection matrix that projects the scene onto the plane Xw=-4 from the point light. When implemented correct you should see a shadow behind the cube.<br>b) Implement the function `createShadowProjectionDirectionalLight` which should create a shadow projection matrix that projects the scene onto the plane Xw=-4 using directional light. The light direction is here the vector from light position to origin (0,0,0).<br>c) Change the program so when pressing keyboard 'd' the shadow plane should toggle between Xw = -4 and Xw = -8.<br>d) Extend the `drawScene` function to draw 4 cubes at different locations. |
| Part 2<br>Optional | Implement Phong lighting for the geometry on the scene. |