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OpenGL - Sommercampus

First Day

Exercise 0: Get the skeleton-code

Download file `exercise1.cc`, create a *Makefile* with `qmake` and compile the code and run the executable.

Exercise 1: Paint a grid

Implement the methods `initializeGL()` , `resizeGL()` and `paintGL()`. In `initializeGL()` set up the paremeters with `glEnable()` and determine the backgroundcolor with `glClearColor()`. Use the method `resizeGL()` to fit the *Viewport* to the *Widget*-Geometry and determine the perspective behaviour of the window. Use `glViewport()`, `glFrustum()` and `glMatrixMode()`. In `paintGL()` clear the *ColorBuffer*, decide for a current pencolor and render the *grid*.

Exercise 2: Change the viewpoint

Modify `paintGL()` and `keyPressEvent()` such that you can manipulate the viewpoint of the model by the keyboard. Use `glTranslate()` and `glRotate()`.

Exercise 3: Using GLU

Use GLU to create simple triangulated objects. There are several methods providing easy painting of spheres, cylinders and similar things. Use for example `gluSphere()` or `gluCylinder()`. (For linking you have to add `-lGLU` as linker-option)

Exercise 4: Enable Lighting

Now we are able to turn the light on. But at first we have to enable the `GL_DEPTH_BUFFER` and make sure that everytime before painting the depthbuffer is cleared. Additionally we have to enable `GL_NORMALIZE` to automatically normalize the surface-normals created by e.g. `gluSphere()` to unit length. With `glLight()` the parameters of the light sources like position and color are set. After setting the parameters enable `GL_LIGHTING` and turn the light sources `GL_LIGHTi` on.

Exercise 5: Play with Parameters

There are a lot parameters and methods to control the rendering behaviour of the engine. Try for example `GL_LINE_SMOOTH`,`GL_BLEND` or `glShadeModel()`, `glPolygonMode()`, `glPointSize()`,`glLineWidth()`,`glLineStipple()`.