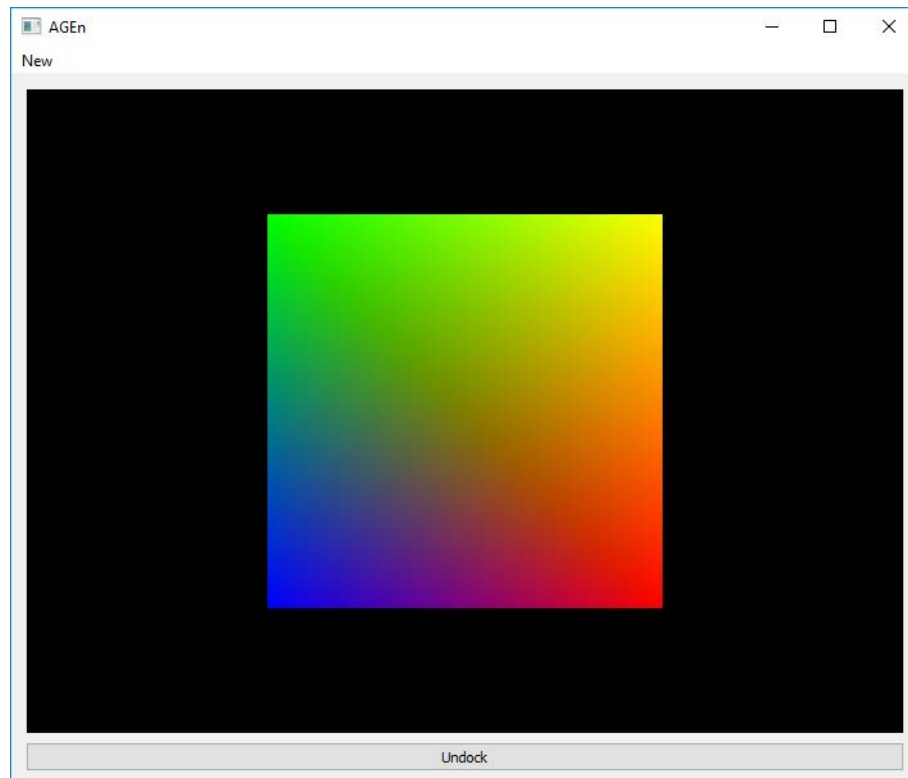


## Building the engine step by step

**Step 1.** Insert the BasicWindow with the BasicGLWidget into your engine.

**Step 2.** Implement the method `createBuffersScene()` that creates the VAO, VBOs, etc. to render a quad (size 20x20x20) centered at the point (0,0,0).



**Step 3.** Implement a static perspective camera that allows to see the whole scene without deformations occupying the major part of the viewport (use the radius of the scene's bounding box to place the camera, the near and the far planes, etc.).

A reasonable way to do this is setting the camera at  $2 * \text{radius\_scene}$  distance,  $\text{zNear} = \text{radius\_scene}$  and  $\text{zFar} = 3 * \text{radius\_scene}$ .

**Step 4.** Implement the mouse events needed to allow the user to PAN the view (vertical and horizontal) as well as rotate the scene by using the Euler's angles.

**Step 5.** Implement the wheel mouse event to allow the user to zoom in and out the view by changing the fov of the camera (min =  $15^\circ$ , max =  $175^\circ$ ).

**Step 6.** Implement a method that allows to reset the camera/view parameters.

**Step 7.** Allow the user to change the background color when the b key is pressed.

**Step 8.** Implement the mechanism to show the performance (fps) of the application when rendering the scene.