

Faculty of Mathematics and Physics
Charles University in Prague
7th April 2015 / 14th April 2015



OpenGL 3.3 Unleashed!

HW for Computer Graphics

Workshop 4 – OpenGL 3.3 Tutorial – Part 4

Workshop 3

Outline

1. Workshop Terms
2. *Resources* (permanent slide)
3. Assignments



Workshop Terms

Score-based Grading

Workshop Number	Tuesdays [C.ODD]					In-time bonus
	Topic	Assignment	Scoring	Bonus deadline		
1	24.2.2015 OpenGL 3.3 Tutorial 1	Sierpinsky Triangle	4	9.3.2015 23:59	2	
		Animated S. Triangle	5	9.3.2015 23:59	2	
		Cube Madness	6	9.3.2015 23:59	2	
2	10.3.2015 OpenGL 3.3 Tutorial 2	Camera Rotation	5	23.3.2015 23:59	2	
		Standard Shading	5	23.3.2015 23:59	2	
		Light Adjustments	5	23.3.2015 23:59	2	
		Model Animation	5	23.3.2015 23:59	2	
3	24.3.2015 OpenGL 3.3 Tutorial 3	Textured Cube	5	6.3.2015 23:59	2	
		VBO Indexing	10	6.3.2015 23:59	2	
4	7.4.2015 OpenGL 3.3 Tutorial 4	Normal Mapping	5	20.4.2015 23:59	2	
		Render To Texture	10	20.4.2015 23:59	2	
5	21.4.2015					
6	5.5.2015					
7	19.5.2015					
SUM			65		22	
Total workshops	7					
Max Practice Score	87					

Check the full version [HERE!](#)

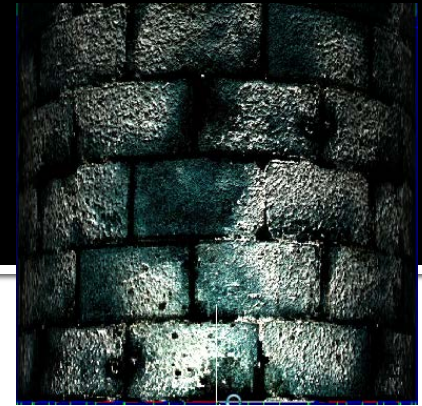
Resources

Permanent Slide

- Lectures web
 - <http://cgg.mff.cuni.cz/~pepca/lectures/npgro19.current.cz.php>
- Workshops web
 - http://pogamut.cuni.cz/pogamut-devel/doku.php?id=hardware_for_computer_graphics_2014-15_summer_term
- OpenGL 3.3 Tutorials
 - <http://www.opengl-tutorial.org/>
- OpenGL 3.3 Reference
 - <https://www.opengl.org/sdk/docs/man3/>
- GLSL 3.3 Specification
 - <https://www.opengl.org/registry/doc/GLSLangSpec.3.30.6.pdf>
- OpenGL Superbible Book
 - <http://www.openglsuperbible.com/>
 - <http://www.openglsuperbible.com/previous-editions/>

Assignment 04.1

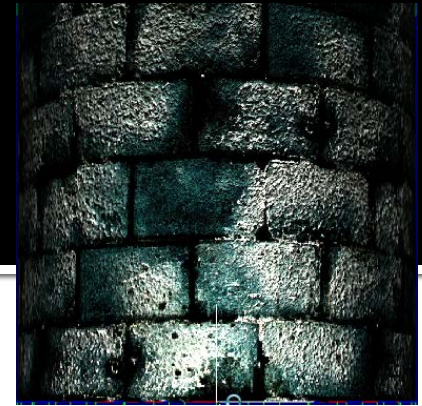
Normal Mapping



1. Follow the tutorial 13
 - <http://www.opengl-tutorial.org/>
2. Alternatively
 - <http://ogldev.atspace.co.uk/www/tutorial26/tutorial26.html>
3. Use Tutorial 13 code as your base and:
 - Check VertexShader and the computation of TBN matrix ... Every VS is computing one.
 - Provide TBN matrix computation in C++ instead of computing it inside VS
 - What is the difference for the performance?
 - 5 (+2) points

Assignment 04.1

Matrix Buffer (for mat4)



- You will need to create and fill matrix buffer

<http://www.informit.com/articles/article.aspx?p=2033340&seqNum=5>

VS:

```
// model_matrix will be used as a per-instance transformation matrix.  
// Note that a mat4 consumes 4 consecutive locations  
// so this will actually sit in locations, 3, 4, 5, and 6.  
layout (location = 3) in mat4 model_matrix;
```

C++:

```
// Likewise, we can do the same with the model matrix.  
// Note that a matrix input to the vertex shader consumes N consecutive input  
// locations, where N is the number of columns in the matrix. So...  
// we have four vertex attributes to set up.  
glBindBuffer(GL_ARRAY_BUFFER, model_matrix_buffer); // Loop over each column of the  
matrix...  
for (int i = 0; i < 4; i++) { // Set up the vertex attribute  
    glVertexAttribPointer(  
        matrix_loc + i,    // Location  
        4,  
        GL_FLOAT,  
        GL_FALSE,         // vec4  
        sizeof(mat4),     // Stride  
        (void *)(sizeof(vec4) * i)  
    ); // Start offset  
    // Enable it  
    glEnableVertexAttribArray(matrix_loc + i);  
}
```

Assignment 04.2

Render To Texture



1. Follow the tutorial 14
 - <http://www.opengl-tutorial.org/>
2. Use Tutorial 14 code as your base and:
 - Switch camera to "rotation" mode
 - Render the Suzanne from two viewpoints (use two textures for that)
 - Create own custom GFX FS (e.g. Wavy picture)
 - Output Suzanne 4x to the window (2 viewpoints x 2 GFXs)
 - 10 (+2) points

Assignment 04.x

Send me an email!

- Email: gemrot@gamedev.cuni.cz
- Subject: **HWGR – 2015 – Assignment 04.1 / 04.2**
- Content:
 - Assignment code (zipped tutorial project folder)
 - Screenshot(s)
 - *If you have trouble sending zip with "executable", just rename x.zip into x.zi_;-) to fool the almighty Google*
- Award:
 - Up to 15 (+ 4) points
 - Use correct email subject or face -2 penalty per mail!

Questions?

I sense a soul in search of answers...

- Sadly, I'm far from OpenGL-experienced-guy
- But I will try to help you with any serious problem you might encounter during the workshops so don't hesitate to contact me!
 - Jakub Gemrot
 - gemrot@gamedev.cuni.cz