Lab 5: Time to Construct!

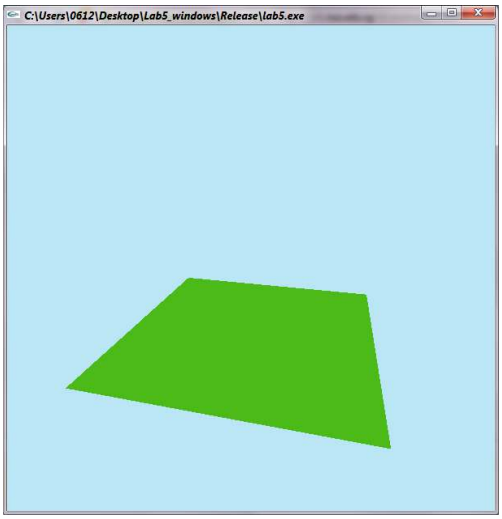


Fig 1. *Skeleton file on first load*

You are given a plot of land and freedom to build whatever you want on it, be it a house, a farm, a school, a church, a temple, a stadium, etc. However do note that as always, *your submission should not include violence, racism or pornography*.

We have provided a skeleton file that gives you your plot of land that can be viewed in 3D from any angle, and we have also included 40 texture images with the ability to add more of your own! To start building on your plot of land, please download lab5.zip from the IVLE workbin.

For a preview of how this assignment should work, look for the **"lab5sample.exe" executable file in the "textures" folder**. Your left mouse button rotates the scene, while your right mouse button zooms and can also be used to change the viewing height of the camera.

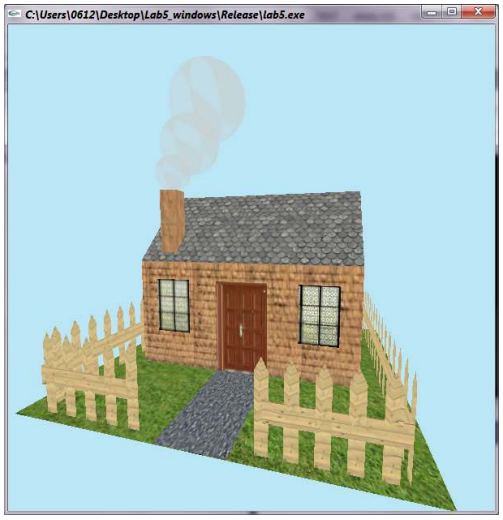


Fig 2. *Viewing a build*

Build Instructions

Once you run `lab5.exe`, you will find an empty plot of land, like in ***Fig 1*** above. The plot is a simple plane occupying the following area:

- $-5 < x < 5$
- $y = 0.02$
- $-5 < z < 5$

Use the plot as a guideline for the size of your build. While this is not a requirement, try to stay within the plot for optimal viewing. There is no height restriction. If you wish to, you may re-texture or entirely remove the ground plane.

Because this is an exercise on **texture mapping**, you are required to use make use of textures in this assignment. While not every polygon you draw needs to have a texture, use textures as much as possible.

To begin with your build, modify the `drawMyHouse()` function at the top of `main.cpp`. If you would like to create more functions to help you, please write them at the top of the file, within the commented area with the heading "You may add more functions here if you like".

The rest of `main.cpp` facilitates the loading of textures and the scene rotation capability of the program. While you are encouraged to read these parts of the code, you are not required to modify them.

Construction Materials

We have included 40 textures for you to use. A full list of these textures are included in the appendix. The texture images are pre-loaded into the program in the `init()` function. You may use any combination of texture images in your build.

```
texSet[0] = loadMyTextures("brick1.bmp");
texSet[1] = loadMyTextures("brick2.bmp");
texSet[2] = loadMyTextures("brick3.bmp");
texSet[3] = loadMyTextures("brick4.bmp");
texSet[4] = loadMyTextures("door1.bmp");
texSet[5] = loadMyTextures("door2.bmp");
...
```

To write a function that can use a texture image, your function must take in an array of type `GLuint` eg `void drawMyHouse(GLuint texSet[])`. When you call the function, pass the texture set (named `texSet`) into your function just like `drawMyHouse(texSet)`. To use a certain texture on a polygon, you first need to enable 2D textures, and to bind the desired texture (eg texture 0 in the following example).

```
glEnable( GL_TEXTURE_2D );
glBindTexture( GL_TEXTURE_2D, texSet[0] );
```

Next, define the texture coordinates for each vertex.

```
glBegin( GL_QUADS );
     glTexCoord2d(0.0,0.0); glVertex3f(-3, 0, -1.5);
     glTexCoord2d(1.0,0.0); glVertex3f(3, 0, -1.5);
     glTexCoord2d(1.0,1.0); glVertex3f(3, 3, -1.5);
     glTexCoord2d(0.0,1.0); glVertex3f(-3, 3, -1.5);
glEnd();
```

Adding Your Own Textures (Optional)

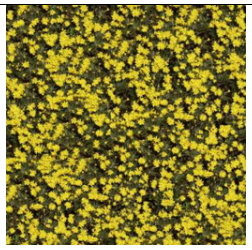
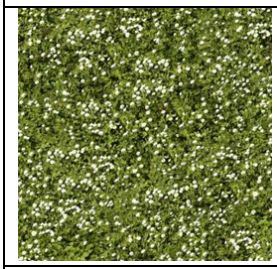
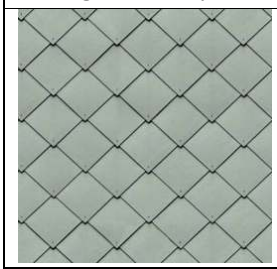
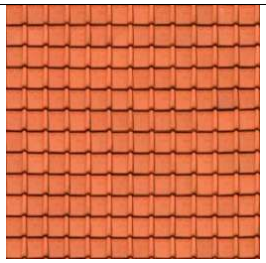
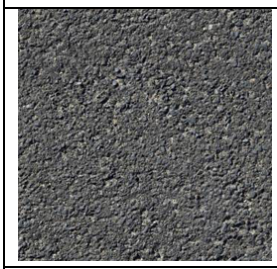
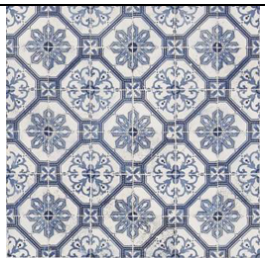
You may add your own textures to the assignment by **replacing** any of the five files with the filenames starting with "custom", in the textures/custom folder. These images are loaded into the program with the indices 40 through to 44. Note that in order to maximize compatibility, your images should be **.bmp** files, with dimensions **256x256** in **24-bit color**.

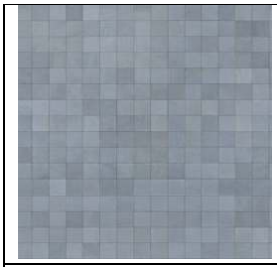
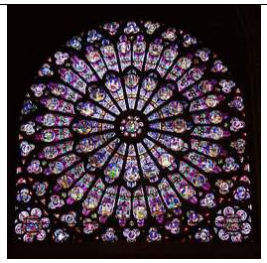
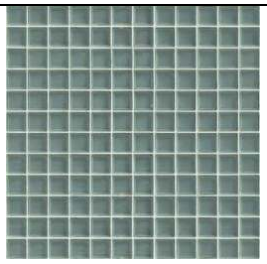
If you have added your own textures, please remember to submit them to us as well. Remember that any images you use *should not include violence, racism or pornography*.

Submission Instructions

- Write a **readme.txt** file including:
    - Your matric number — What you are drawing
    - Primitives and transformations you have used — Methods you have modified / created
    - Any other things the TA should know? — What are some cool things in your drawing
- Zip up **main.cpp**, **readme.txt**, and, if you have added any textures, the **custom** folder in the textures folder. Rename the zip file to **your student number + ".zip"** and submit it to IVLE

Appendix

				
texSet[0] brick1.bmp	**texSet[1]** brick2.bmp	**texSet[2]** brick3.bmp	**texSet[3]** brick4.bmp	**texSet[4]** door1.bmp
				
texSet[5] door2.bmp	**texSet[6]** flower1.bmp	**texSet[7]** flower2.bmp	**texSet[8]** flower3.bmp	**texSet[9]** grass1.bmp
				
texSet[10] grass2.bmp	**texSet[11]** leaves1.bmp	**texSet[12]** leaves2.bmp	**texSet[13]** roof1.bmp	**texSet[14]** roof2.bmp
				
texSet[15] roof3.bmp	**texSet[16]** roof4.bmp	**texSet[17]** roof5.bmp	**texSet[18]** roof6.bmp	**texSet[19]** stone1.bmp
				
texSet[20] stone2.bmp	**texSet[21]** tile1.bmp	**texSet[22]** tile2.bmp	**texSet[23]** tile3.bmp	**texSet[24]** tile4.bmp

				
texSet[25] tile5.bmp	**texSet[26]** tile6.bmp	**texSet[27]** window1.bmp	**texSet[28]** window2.bmp	**texSet[29]** window3.bmp
				
texSet[30] window4.bmp	**texSet[31]** window5.bmp	**texSet[32]** window6.bmp	**texSet[33]** wood1.bmp	**texSet[34]** wood2.bmp
				
texSet[35] wood3.bmp	**texSet[36]** wood4.bmp	**texSet[37]** wood5.bmp	**texSet[38]** wood6.bmp	**texSet[39]** wood7.bmp
Replace this file if you want to add a custom texture image	Replace this file if you want to add a custom texture image	Replace this file if you want to add a custom texture image	Replace this file if you want to add a custom texture image	Replace this file if you want to add a custom texture image
texSet[40] custom/custom1.bmp	**texSet[41]** custom/custom2.bmp	**texSet[42]** custom/custom3.bmp	**texSet[43]** custom/custom4.bmp	**texSet[44]** custom/custom5.bmp