Project 2

Description

Implementing trackball interface

Setting up the viewing transform

Notes on rendering the mesh

A short note on illumination formula

By the nature of graphics pipeline, for the simple rendering you'll be implementing in project 2,
the fragment shader will generally be unaware whether the corresponding 3D point is in shadow or not. In particular, this could lead to negative dot products dot(N,L) or dot(N,H) popping up in some places. This can lead to multiple problems (e.g. when raising dot(N,H) to a fractional power -- nspec does not have to be an integer!, or simply the problem of negative contributions to intensity from the diffuse or specular term, which does not make sense). To avoid the problem,
map all negative values to zero. In other words, replace dot(N,L) with max(dot(N,L),0.0) and dot(N,H) with max(dot(N,H),0.0) in your GLSL implementation of the Phong's formula. Note that pow(.,.) function is also provided in GLSL.

Sample OpenGL code

This is linux code that should run on the lab (let me know asap if there are any problems).
For best look, run in the ubuntu2D environment (the other one has vsync issues, so the frame rate is rather crazy). Also, your priority should be to understant the source file viewer.c, which you'll be editing when you implement the project. Don't worry about the other files.

A minor bug in buffer.c affecting buffers with entries of type GLubyte was fixed on 9/23. The only change made was to the file buffer.c (the new version is enclosed below). After another change made on 9/26 to files program.c and program.h, the code prints just one warning about a missing uniform per program object, to make it easier to find compiler/linker warnings in the terminal.

If you want to try to run it on your machine, you need the following:

- a graphics card and OpenGL drivers that support OpenGL 4 and a tiny bit of OpenGL 4.2

- freeglut or glut. Most linux distributions provide a package ready to use; you also need freeglut-devel.

- glew library from glew.sourceforge.net (also here, most linux distributions have a package ready)

- glm library, glm.g-truc.net; this is a header-only library, so it is trivial to install

It should not be very hard to set things up on a Windows machine - see link below.

Setting up OpenGL in visual studio

I have not done that, but here it is if you'd like to give it a try.

Input files (various sizes)

Attached Files: 📄 inputs.tar.bz2 (13.123 MB)

Bunnies with different sizes and centers of bounding boxes

Attached Files: May be 📄 bunnes.tgz (3.645 MB) useful for debugging the transformations (all bunnies should look the same in your viewer)

Sample images

Links

You can find links to manual pages, tutorials etc. here.

DON'T OVERUSE. The sample code and other things posted here should provide most of the information you need.

Stray mouse button up events

Here is a problem that might come up for some of you. You are selecting a menu item and your object moves (rotates) slightly, or just disappears. The reason for this might be `stray' mouse button up event that does not have a corresponding mouse button down event. It arises when you release the mouse button after selecting a menu entry. The solution is to detect and ignore

these stray events. For example, define a global boolean MouseDown variable, that is initialized to false and set to false whenever mouse button goes up or true if it goes down. Then, when you get mouse button up event, just ignore it if MouseDown is false.

Bounding box information
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al.t
Bounding Box:
  [-2.712310 2.712310] x [-2.946080 2.946080] x [-1.111950 1.111950]
----
ant.t
Bounding Box:
  [-204.448000 204.448000] x [-365.261000 365.261000] x [-118.131000 118.131000]
----
ballJoint.t
Bounding Box:
  [-0.042998 0.042998] x [-0.024495 0.024495] x [-0.049472 0.049472]
----
bunny2.t
Bounding Box:
  [-0.094690 0.061009] x [0.032987 0.187321] x [-0.061874 0.058800]
----
cow2.t
Bounding Box:
  [-5.197870 5.203529] x [-3.189538 3.191740] x [-1.671744 1.686290]
----
cow4.t
Bounding Box:
  [-5.192757 5.201827] x [-3.185681 3.190745] x [-1.665383 1.678785]
----
cow8.t
Bounding Box:
  [-5.191314 5.201307] x [-3.185196 3.190578] x [-1.664023 1.677933]
----
cow.t
Bounding Box:
  [-5.221960 5.221960] x [-3.198380 3.198380] x [-1.701410 1.701410]
----
dinosaur.t
Bounding Box:
  [-0.019422 0.019422] x [-0.057948 0.057948] x [-0.049007 0.049007]
----
f-16.t
Bounding Box:
  [-3.961560 3.961560] x [-1.833660 1.833660] x [-5.878070 5.878070]
----
feline2.t
Bounding Box:
  [-0.767000 0.527900] x [-0.375400 0.173000] x [-2.061000 -0.801500]
----
floppy.t
Bounding Box:
  [-113.843000 114.059000] x [-159.389000 159.410000] x [-137.223000 135.744000]
----
happy.t

Bounding Box:
  [-0.046100 0.035222] x [0.049757 0.247780] x [-0.047399 0.034019]
----
horse2.t
Bounding Box:
  [-0.042003 0.042003] x [-0.091671 0.091671] x [-0.076418 0.076418]
----
isis.t
Bounding Box:
  [-0.044114 0.044114] x [-0.031222 0.031222] x [-0.149474 0.149474]
----
pawn.t
Bounding Box:
  [-276.016000 276.016000] x [-523.000000 523.000000] x [-276.016000 276.016000]
----
pig.t
Bounding Box:
  [-2.608690 2.608690] x [-1.464360 1.464360] x [-0.914483 0.914483]
----
santa.t
Bounding Box:
  [-0.047637 0.047637] x [-0.040260 0.040260] x [-0.042844 0.042844]
----
shark.t
Bounding Box:
  [-75.035000 75.035000] x [-31.044500 31.044500] x [-19.319200 19.319200]
----
toilet.t
Bounding Box:
  [-84.242600 76.659700] x [-85.324600 90.438100] x [0.000000 267.286000]
----
vase.t
Bounding Box:
  [-0.056148 0.056148] x [-0.058867 0.058867] x [-0.103459 0.103459]
----
venus.t
Bounding Box:
  [-65.405100 65.405100] x [-133.350000 133.350000] x [-47.500100 47.500100]
----
whale.t
Bounding Box:
  [-4.373970 5.510000] x [-9.388810 9.106300] x [-4.206560 4.031760]