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CS 488 Assignment 2

Manual

The view volume is set to clip first to the near and far planes, then it projects onto the near plane and clips to the remaining four planes. The function “clipLine” clips a line to a plane (which is represented as a point and a normal vector). This function is called repeatedly from paintGL.

No matrices are stored in Viewer.cpp because I store them in other classes. Instead there is a class called “Movable” to represent a movable object, such as the camera or a model. There are additional classes called “Model” to represent a model (with additional functionality to scale) and “ViewPoint” to represent the view point (camera).

The class “Movable” contains one matrix that is the total transformations applied to the object so far. An additional transformation T is applied to this matrix M by multiplying M on the right by T . This is equivalent to “undoing” M , applying T then “reapplying” M (note that $MTM^{-1}M = MT$).

The ViewPoint internally stores the camera matrix – how to transform the camera from the origin to where it should be. This includes a reflection and, by default, a rotation by π . The View matrix is then computed from the camera matrix by inverting it.

The two gnomons and the box are each represented as a model (3 total models). This is to easily separate scaling out from the box and box gnomon, and to provide a common interface for drawing all of them.

One face of the box is drawn in cyan, to help the viewer maintain proper perspective on it. Additionally, the box gnomon is drawn in yellow to differentiate it from the world gnomon, which is drawn in red, blue and green.

Depth Checking

No depth checking was implemented, and lines are always drawn in the same order. As such, certain lines may appear to be “in front” of others, even when they are not. The box is drawn first, then the box gnomon, then the world gnomon, so the world gnomon will always appear “closest”.

Despite this confusion, the different colours were kept because they are beneficial in identifying the different objects.

Assumptions

It is assumed that this program will be run on Ubuntu 14.04 with Qt version 5.2.1.

sum is: /usr/bin/sum

2015-06-02 16:51 Checksum for A2 for wmcDonald on gl11 Page 1

A2:

total 1996

| | | | | | | | | | |
|-----------|------------|---|-----------|-----------|---------|-----|----|-------|------------------|
| 71800380 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 13880 | Jun | 2 | 16:51 | screenshot01.png |
| 31987201 | drwxrwx--- | 2 | wmcDonald | cs488 | 4096 | Jun | 2 | 16:48 | src/ |
| 71800397 | drwxrwx--- | 4 | wmcDonald | cs488 | 4096 | Jun | 2 | 16:40 | ./ |
| 71800381 | -rwxr-xr-- | 1 | wmcDonald | wmcDonald | 402 | Jun | 2 | 16:40 | README* |
| 99057873 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 84 | Jun | 2 | 16:39 | shader.vert |
| 124975199 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 118 | Jun | 2 | 16:39 | shader.frag |
| 116475613 | -rwxr-xr-x | 1 | wmcDonald | wmcDonald | 1986612 | Jun | 2 | 16:39 | a2* |
| 129680451 | drwxrwx--- | 7 | wmcDonald | cs488 | 4096 | May | 20 | 08:40 | ./ |
| 71800398 | drwxrwx--- | 2 | wmcDonald | cs488 | 4096 | May | 6 | 11:55 | data/ |

A2/src:

total 180

| | | | | | | | | | |
|-----------|------------|---|-----------|-----------|-------|-----|---|-------|---------------|
| 25703360 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 84 | Jun | 2 | 16:48 | shader.vert |
| 31987201 | drwxrwx--- | 2 | wmcDonald | cs488 | 4096 | Jun | 2 | 16:48 | ./ |
| 25703359 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 118 | Jun | 2 | 16:48 | shader.frag |
| 71800397 | drwxrwx--- | 4 | wmcDonald | cs488 | 4096 | Jun | 2 | 16:40 | ./ |
| 25703358 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 307 | Jun | 2 | 16:39 | xform.hpp |
| 25703357 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 1177 | Jun | 2 | 16:39 | xform.cpp |
| 25703356 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 213 | Jun | 2 | 16:39 | ViewPoint.hpp |
| 99057886 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 472 | Jun | 2 | 16:39 | ViewPoint.cpp |
| 99057879 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 4024 | Jun | 2 | 16:39 | Viewer.hpp |
| 99057874 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 12340 | Jun | 2 | 16:39 | Viewer.cpp |
| 124975198 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 335 | Jun | 2 | 16:39 | Movable.hpp |
| 124975197 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 825 | Jun | 2 | 16:39 | Movable.cpp |
| 124975196 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 508 | Jun | 2 | 16:39 | Model.hpp |
| 116475621 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 563 | Jun | 2 | 16:39 | Model.cpp |
| 116475620 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 75544 | Jun | 2 | 16:39 | Makefile |
| 116475619 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 549 | Jun | 2 | 16:39 | main.cpp |
| 116475618 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 973 | Jun | 2 | 16:39 | AppWindow.hpp |
| 116475617 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 3745 | Jun | 2 | 16:39 | AppWindow.cpp |
| 116475616 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 10113 | Jun | 2 | 16:39 | algebra.hpp |
| 116475615 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 3346 | Jun | 2 | 16:39 | algebra.cpp |
| 116475614 | -rw-r--r-- | 1 | wmcDonald | wmcDonald | 540 | Jun | 2 | 16:39 | a2.pro |

A2/data:

total 8

| | | | | | | | | | |
|----------|------------|---|-----------|-------|------|-----|---|-------|----|
| 71800397 | drwxrwx--- | 4 | wmcDonald | cs488 | 4096 | Jun | 2 | 16:40 | ./ |
| 71800398 | drwxrwx--- | 2 | wmcDonald | cs488 | 4096 | May | 6 | 11:55 | ./ |

A2

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|-------|-------|------|
| A2/a2 | 42280 | 1941 |
|-------|-------|------|

A2/data

| | | |
|---------------------|-------|----|
| A2/README | 19105 | 1 |
| A2/screenshot01.png | 28680 | 14 |
| A2/shader.frag | 23161 | 1 |
| A2/shader.vert | 10278 | 1 |

A2/src

| | | |
|----------------------|-------|----|
| A2/src/a2.pro | 50085 | 1 |
| A2/src/algebra.cpp | 53552 | 4 |
| A2/src/algebra.hpp | 55500 | 10 |
| A2/src/AppWindow.cpp | 36382 | 4 |
| A2/src/AppWindow.hpp | 29667 | 1 |
| A2/src/main.cpp | 41289 | 1 |
| A2/src/Makefile | 33390 | 74 |

| | | |
|----------------------|-------|----|
| A2/src/Model.cpp | 03052 | 1 |
| A2/src/Model.hpp | 37247 | 1 |
| A2/src/Movable.cpp | 45835 | 1 |
| A2/src/Movable.hpp | 50411 | 1 |
| A2/src/shader.frag | 23161 | 1 |
| A2/src/shader.vert | 10278 | 1 |
| A2/src/Viewer.cpp | 15511 | 13 |
| A2/src/Viewer.hpp | 62677 | 4 |
| A2/src/ViewPoint.cpp | 07135 | 1 |
| A2/src/ViewPoint.hpp | 34724 | 1 |
| A2/src/xform.cpp | 62304 | 2 |
| A2/src/xform.hpp | 18932 | 1 |