Computer Science Department
CPSC 453
Second Programming Assignment
3D Viewer
Due Date: November 5, 2003
Total Marks: 140

Program Specifications

Write a program with the following specifications:

1. Read and draw a 3D mesh in "obj" format in a suitable view port on the display.
2. Perform affine transformations on the mesh. This includes translation, scaling, and all three rotations around the main axes of the objects.
3. Provides the user with the option of changing the view specification (locations and directions) and the type of the projection (perspective or parallel).
4. Provides resizable program window and view port.

This program must also have user-friendly interaction including mouse, keyboard, and menu.

Upon loading the mesh should appear centered in the middle of and scaled to the size of the view port.

Similarly to the last assignment a document must be produced that outlines the algorithms, data structures, and design decisions used.

Marking

Parser
16 pts - correctly creates vertices and faces in an efficient manner.
4 pts - correctly handles groups, comments, and blank lines.
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20 pts in total for the parser

Rendering
15 pts - object is rendered as a wireframe (lines of the face edges) or solid (filled polygons) by opengl in an efficient manner & object looks "good".
15 pts - object is illuminated by using simple opengl shading and lighting model normals are defined by the face's cross product.
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30 pts in total for rendering

Affine Transformations
6 (4+2) pts - translation works + ui for translation is well thought out.
6 (4+2) pts - scaling works + ui for scaling is well thought out.

13 (9+4) pts - rotations around all three axes work + ui for rotating is well thought out.
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25 pts in total for affine transformations

View Changes
13(8+5) pts - view location can be changed and ui for location is well thought out.
13(8+5) pts - view direction can be changed and ui for direction is well thought out.
4 pts - type of projection can be changed.
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30 pts for view specification

Documentation + user manual
35 pts

Total - 140 pts

Bonus
-15 pts for using your own transformations as opposed to the opengl transformations.
-15 pts for using your own viewing system as opposed to opengl view systems.
-10 for any extra features (editing tools, group selection and handling tool, …)

The .obj Format:

- comment
g <group name> - group
v <float> <float> <float> - vertex
vn <float> <float> <float> - vertex normal
vt <float> <float> - vertex texture
f <int> <int> . . . - a face of the mesh
s <int> - mesh smoothness
usemtl - indication to user material from mtl file
mtlib - specifies location of material file

For this assignment you are expected to ignore everything but groups, faces, and vertices. When writing your parser simply ignore the lines containing vertex normals, vertex textures, and material data if it is present.

Important Notes:

the vertex indices begin at 1 rather than 0.
faces have indices to three or more vertices.