**Assignment 2 by 160050064 and 160050090**

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All Primitives like ellipsoids (sphere is a special case of cones), cones (cylinder is a special case of cones), cuboids, discs and quads are implemented in primitive.cpp and primitive.hpp

All the above mentioned primitives are rendered using GL_TRIANGLES.

Hierarchical modelling is implemented in hierarchy_node.cpp and hierarchy_node.hpp

The main code is implemented in model.cpp and model.hpp

All the key bindings are implemented in gl_framework.cpp and gl_framework.hpp


**Control of Units**

-   The default model selected is the humanoid clown.

"M"     choose the model by typing the input in terminal.
        Model 1 is the humanoid clown, Model 2 is the box, Model 3 is R2D2

"C"     choose the limb to rotate by typing in the terminal

"R"     rotate the selected limb about z axis

"Y"     rotate the selected limb about z axis

"T"     rotate the selected limb about x axis

"G"     rotate the selected limb about x axis

"F"     rotate the selected limb about y axis

"H"     rotate the selected limb about y axis


To rotate about the centroids choose the respective center limb.

Center limbs:

Model1    Torso
Model2    There is only one limb and it is selected always
Model3    Torso

**Hierarchy Tree for Model 1**

Key for body parts:

| | |
|---|---|
| 0 | LowerTorso |
| 1 | UpperTorso |
| 2 | Neck |
| 3 | Head |
| 4 | RShoulder |
| 5 | LShoulder |
| 6 | RUpperArm |
| 7 | LUpperArm |
| 8 | RElbow |
| 9 | LElbow |
| 10 | RLowerArm |
| 11 | LLowerArm |
| 12 | Hip |
| 13 | RLegShoulder |
| 14 | LLegShoulder |
| 15 | RUpperLeg |
| 16 | LUpperLeg |
| 17 | RKnee |
| 18 | LKnee |
| 19 | RLowerLeg |
| 20 | LLowerLeg |

| Parent | Child |
|---|---|
| NULL | 0 |
| 0 | 1 |
| 0 | 2 |
| 2 | 3 |
| 0 | 4 |
| 0 | 5 |
| 4 | 6 |
| 5 | 7 |
| 6 | 8 |
| 7 | 9 |
| 8 | 10 |

| | |
|---|---|
| 9 | 11 |
| 0 | 12 |
| 12 | 13 |
| 12 | 14 |
| 13 | 15 |
| 14 | 16 |
| 15 | 17 |
| 16 | 18 |
| 17 | 19 |
| 18 | 20 |

**Hierarchy Tree for Model 3**

Key for body parts:

| | |
|---|---|
| 0 | Torso |
| 1 | Head |
| 2 | Bottom Leg |
| 3 | Bottom Feet |
| 4 | RShoulder |
| 5 | LShoulder |
| 6 | RArm |
| 7 | LArm |
| 8 | RHand |
| 9 | LHand |
| 10 | RArm-Disc |
| 11 | LArm-Disc |
| 12 | Torso-Bottom-Disk |
| 13 | Eye-Scanner |
| 14 | Eye-Scanner-Disc |

| Parent | Child |
|---|---|
| NULL | 0 |
| 0 | 1 |
| 0 | 2 |
| 2 | 3 |
| 0 | 4 |
| 0 | 5 |
| 4 | 6 |
| 5 | 7 |
| 6 | 8 |

| | |
|---|---|
| 7 | 9 |
| 4 | 10 |
| 5 | 11 |
| 0 | 12 |
| 1 | 13 |
| 13 | 14 |