COSC422 Advanced Computer Graphics
Programming Exercise 11
OpenMesh Mesh Viewer

This programming exercise provides an introduction to the OpenMesh library (https://www.openmesh.org/) used for loading and processing polygonal meshes. The half-edge data structure implemented in the library allows fast and efficient traversal of regions within a mesh using iterators and circulators.

MeshViewer.cpp:

The program `MeshViewer.cpp` loads a mesh model and displays it as a triangle mesh (the model is assumed to contain only triangles). The mesh is traversed using a vertex iterator to extract vertex coordinates and vertex normal vectors. These values are stored in two vertex array buffers. A face iterator is used to get references (handles) to the triangles of the mesh model, and a face-vertex iterator provides the vertices of each face and their indices. The indices are stored in an element array.

Mesh processing algorithms often require the computation of the bounding box of a three-dimensional mesh to determine the range of values of vertex coordinates. The bounding box is useful for centering and scaling mesh models of varying sizes to fit within a standard view frustum. OpenMesh provides two useful functions `minimize(point)` and `maximize(point)` that help in simplifying the code for computing the bounding box of a mesh model (see the function `getBoundingBox()`).

The displayed model can be rotated about the y-axis using the left and right arrow keys. The ‘w’ key toggles between wireframe and solid fill display modes.

The source and shader programs are included in the zip file MeshViewer.zip.

A few mesh models in OFF and OBJ formats are provided in the zip file Models.zip.