CS5243 Assignment #2: Camera and View Frustum Culling

I. Introduction

As observed in Lab 1, some 3D meshes consist of thousands of triangles. In practical environment, not all meshes are visible at the same time. It would greatly improve the rendering speed if a simple test is used to check the visibility of a mesh in the scene before rendering it.

View frustum culling is to check whether a mesh is within the view frustum of the camera before rendering it. To further simplify the test, you just check whether the AABB of the mesh intersects the view frustum.

II. Requirements

1. Write a Camera class with methods to move (translate or rotate) the camera according to the movement of the mouse.

2. Write a Frustum class, which is to be used in the Camera class, to indicate the view frustum associated with the camera.

3. Write a method for the Frustum class to check whether an AABB is within the view frustum.

III. Advanced Option (extra-credit)

1. Implement advanced culling – please explain clearly the implementation in your report.

IV. Demonstration

1. To navigate the camera around the scene.

2. To display the scene you build in Lab 1 with view frustum culling enabled / disabled. Compare the rendering speed under these two situations.