3D Model Viewer – Requirements

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# Introduction

## Scope of Product

Design and build an interactive 3D model viewer, capable of displaying and manipulating geometry in 3D space.

The application will be built with C# using the .NET framework for the Windows platform. If necessary, C or C++ interfaces or bindings may be used if the need arises.

OpenGL 4.0 is the minimum target API level. Pre-built 3D rendering modules and engines are not considered as part of the scope of this project. All elements of the OpenGL 4.0 or higher shall be available for use within the project.

This project is targeted at the Windows platform. Other platforms are not considered as part of the scope of this project.

The application will run as a standalone application. The application will not be interacting with any other applications nor require any other applications. The interface of the application will be graphical based.

## Definitions

OpenGL – OpenGL is an application programming interface for rendering 3D graphics.

OpenTK – OpenTK is a low-level C# library that wraps OpenGL.

GUI – Graphical user interface

U/V – denotes the axes of the 2D texture.

## References

# General Description

## Product Perspective

The 3D model object viewer application is being built to display and manipulate 3D models. The product was selected based on the area of expertise of the members of the project. The team members have a considerable amount of experience in the realm of digital graphics processing. This project will allow the team to showcase their previously acquired skills and build a functioning 3D model viewer.

## Product Functions

The application will be separated into three main modules, the graphical user interface, the 3D model file parser/loader and the renderer. The interface will facilitate the selection of 3D object files and GUI objects that will manipulate the 3D object. The file parser/loader will take in file information from the GUI, parse the data from the file and load it into memory. Control will then be passed to the renderer to manipulate and display the 3D model in the content window.

## User Characteristics

The target user of this application is a digital graphics enthusiast. The application will display 3D models stored in files that they either created or found on the Internet and view them in a Windows application. The application will then allow for the manipulation of the 3D object. The user can edit their files in a separate editor and view the results of their modifications in the 3D model viewer.

## General Constraints

The application will only support one 3D object file format. This is due to the time constraint and limited man power available to this project. It will also not be able to perform animations. It will not modify the geometry, texture coordinates, textures. It will not export the 3D model to alternate file formats or save back to its original format. The 3D model viewer is just that, a 3D model viewer.

## Assumptions and Dependencies

The application will require the installation of Windows .NET framework 5.0 and OpenTK library.

# Specific Requirements

## Graphical User Interface

1. Controls perform as intended i.e. close will close program, rotate button will rotate image and open will allow selection 3D model file.
2. Select and load 3D objects.
3. Display 3D objects.
4. Display to log what events have occurred in the application

## File Parse and Loader

1. Mesh data structure
2. Texture data structure
3. Read in contents of 3D object file.
4. Convert file into model data structure.

## 3D Object Renderer

1. Render Mesh
2. Transform 3D object, i.e. rotate, scale and translate
3. Lighting of 3D object, i.e. lighting/shading for all geometry
4. Basic use of shaders to improve quality/performance