

Assignment One

Metaverse For One

Introduction

The metaverse is the new hot thing, which is the motivation for this assignment. This won't be a full blown metaverse implementation with all the bells and whistles. Instead, it will be a 3D environment that you will be able to move around. The three learning objectives for this assignment are:

- Develop your skills on modeling individual objects.
- Develop techniques for combining individual models to produce an interesting 3D environment.
- Explore techniques for navigating in virtual environments.

This assignment is divided into three parts based on these learning objectives.

Individual Objects (3 marks)

An interesting environment has a variety of objects. For this assignment we don't need a lot of objects, but there needs to be some variety. The objects are divided into two groups. The first group consists of at least 4 object that you have downloaded from the Internet in the form of OBJ files. Feel free to use the bunny as one of these objects. Use your Google skills to find interesting models. They don't need to be complicated; you find simpler objects to be easier to work with. There are a number of sites on the Internet that have free OBJ models, don't pay for them. The second group consists of at least 1 object that you have created in your program. Again, this doesn't need to be overly complicated. An example of this is a pine or evergreen tree that can be constructed from one of more cones.

Environment Design (3 marks)

Now that you have your set of objects think about how you will combine them. You should start with a ground plane. This can be as simple as a square or rectangle constructed from 2 triangles. You then place your objects on the ground plane. You can have multiple copies of each object based on masters and instances. Think about the data structures you will use to represent and display your environment. There is no single correct solution here, but you will find that some techniques will be easier to work with and implement. You want a data structure that will make it easy to construct and modify your environment.

Navigation in Virtual Environments (3 marks)

Finally, you need to be able to move around your environment. To make things simple assume that the user is on the ground, so they are only really moving in 2D. Assuming that the z direction is up, the user will only be moving in x and y. The navigation controls should allow the user to turn left or right. They can also move backwards and forwards in the direction that

they are looking. You can use the keyboard to control navigation. Select a key for each of the 4 possible motions and decode it the key callback.

Report (1 mark)

Provide a written report describing your program and the important design decisions that you made. For example, describe the data structure that you used for the environment and the reasons why you chose that structure. Produce a zip file that contains your report, your program code, shaders, and anything else required to build your program.