

# Geometry

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## 1. Introduction

This tutorial introduces how you can add your own geometry to the framework and your game.

## 2. Adding new Geometry to your File Store

Download the accompanying file '**Intergalactic\_Spaceship.zip**' and unzip it into a convenient area on your file store.

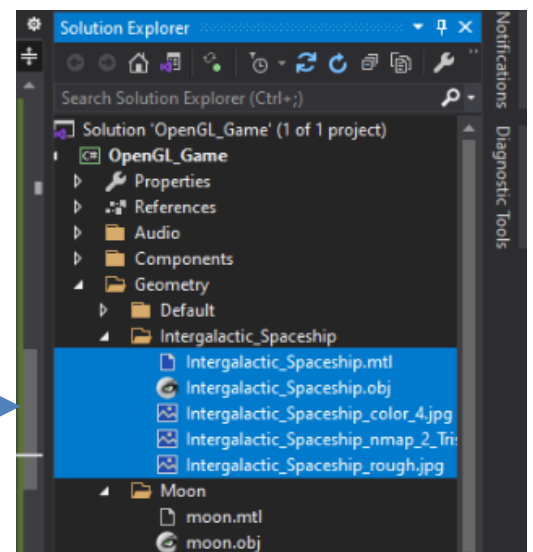
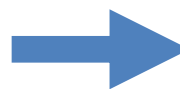
Move the '**Intergalactic\_Spaceship**' folder (and its contents) to the **Geometry** folder of your game on your file store.

## 3. Adding your Geometry to your Visual Studio Project

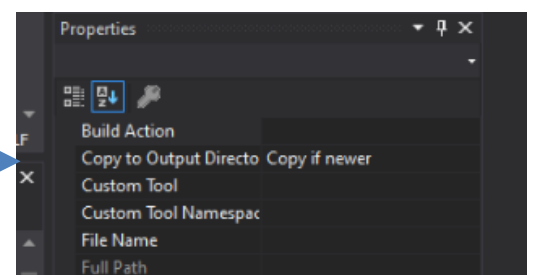
Open your previous game code project (if it is not already open) in Visual Studio. The folder should now be visible along with the contents.

If the folder is not in Visual Studio, then add the actual '**Intergalactic\_Spaceship**' folder from the **Geometry** folder of your game on your file store to the **Geometry** folder in Visual Studio. This can be done by dragging it or adding it by the menus.

In Visual Studio, select all of the new files.



In the properties window, change the **Copy to Output Directory** to **Copy if newer**.



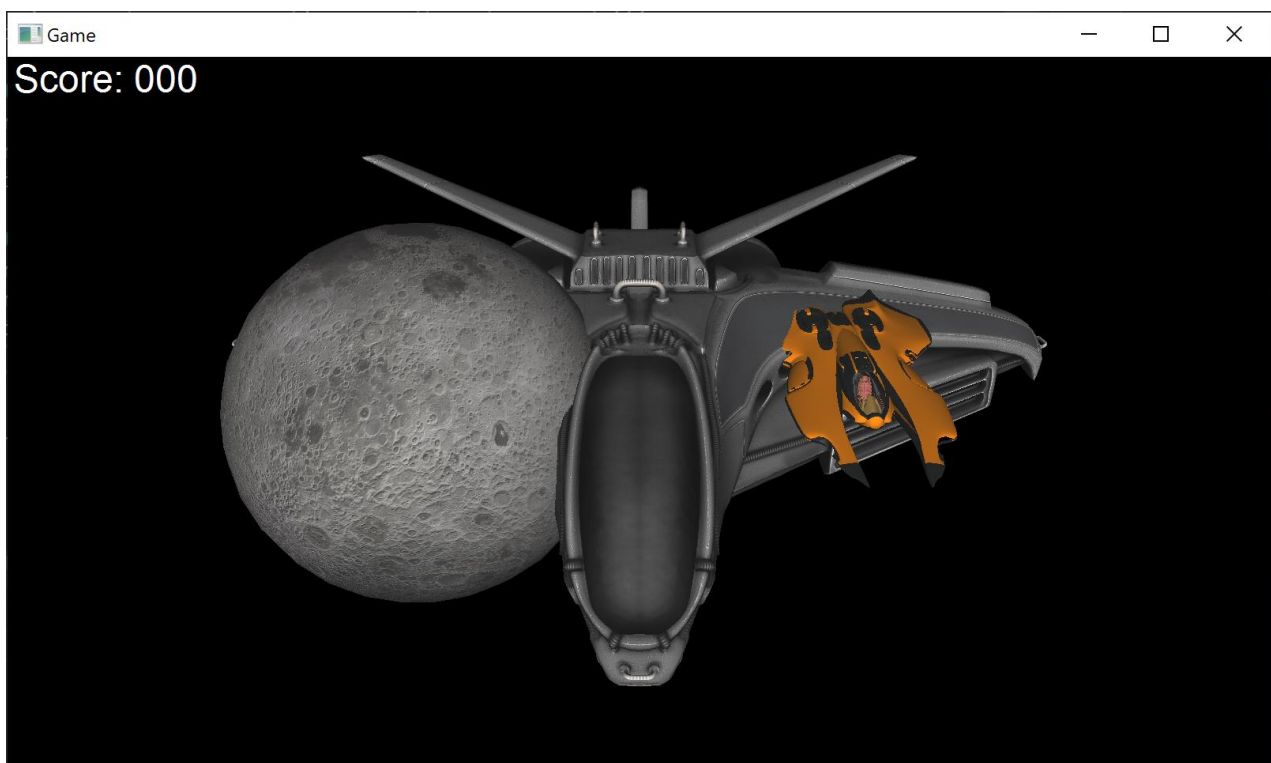
This makes Visual Studio copy our resources to the build folder so that our game can find them.

## 4. Adding the New Object to Your Game

Open the GameScene and add a new Entity called “**Intergalactic\_Spaceship**” as follows:

```
newEntity = new Entity("Intergalactic_Spaceship");
newEntity.AddComponent(new ComponentPosition(0.0f, 0.0f, 0.0f));
newEntity.AddComponent(new ComponentGeometry(
    "Geometry/Intergalactic_Spaceship/Intergalactic_Spaceship.obj"));
entityManager.AddEntity(newEntity);
```

Build and run your game and you should now be using the new geometry as below.



## 5. OBJ Loading

OBJ is a 3D file format that is a simple text-based file. Therefore, it can be opened in any text reader (e.g. notepad)

New objects can be found on the internet or can be created by 3D object creation tools.

The OBJ parser code in our framework has been modified from the CjClutter.ObjLoader.Loader code that was developed by chrisjansson and available at <https://github.com/chrisjansson/ObjLoader>.

### IMPORTANT NOTES ON CURRENT OBJ COMPATIBILITY

- An OBJ **MUST** be defined as either **ALL triangle** or **ALL quads** - it **cannot** contain a mixture of the two. When converting **always use triangles**.
- An OBJ **CAN** have **OBJ Objects**, but an OBJ **CANNOT** have **OBJ Groups**.
- Make sure that all assets named in the **OBJ** and **MTL** files are changed so that they do not include folder paths (see existing OBJ and MTL files as examples).

## 6. OBJ Editing

You will notice that the new **Intergalactic\_Spaceship** is much larger than the Moon and the other spaceship, therefore we need to reduce its size.

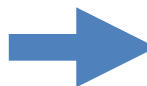
OBJ files can be edited using most 3D editing software tools. Blender is very good (and free) so this section will guide you to editing the model in Blender and then export it in the correct format for our OBJ Loader. Download [Blender here](#).

Open Blender. Delete the default cube. Import the new **Intergalactic\_Spaceship.obj** into Blender.

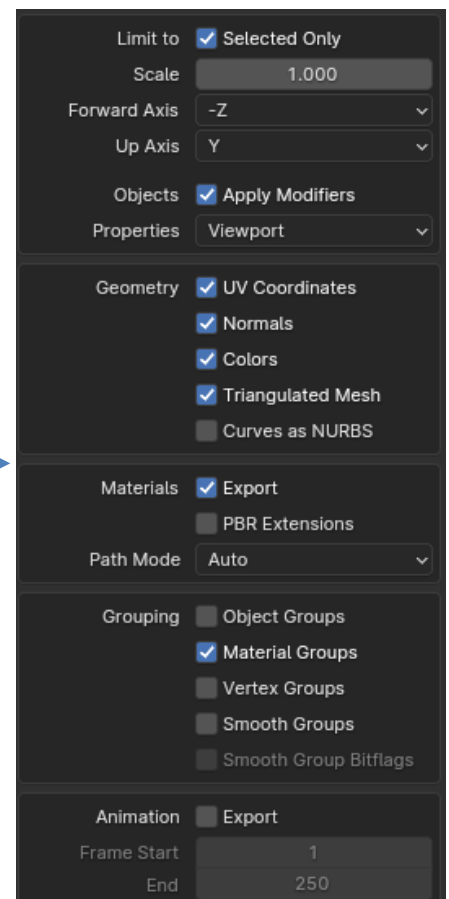
Select Scale and move the mouse until the object is much smaller then click the left mouse button.

When you are happy with the size select **File -> Export -> Wavefront (OBJ)**

In the Export OBJ properties select the following:

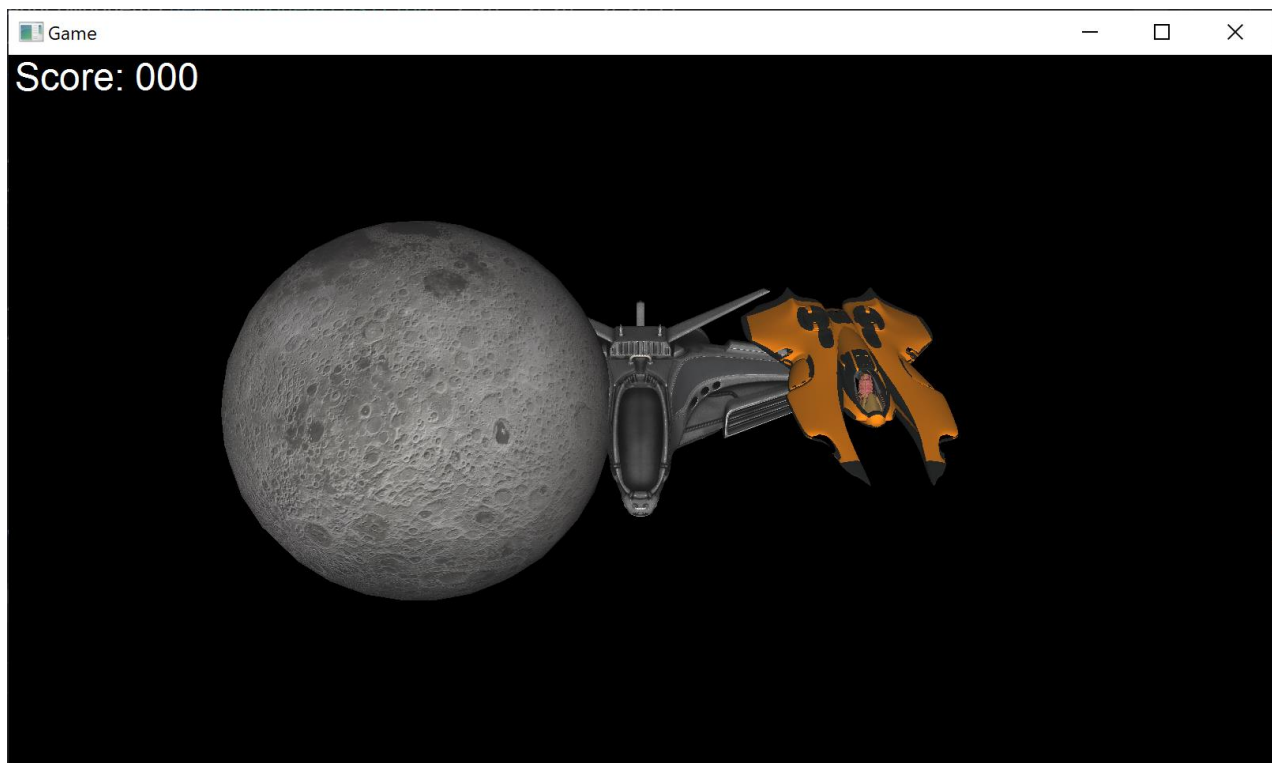


- **Limit to: Selected Only**
- **Objects: Apply Modifiers**
- **Geometry: UV Coordinates**
- **Geometry: Normals**
- **Geometry: Colors**
- **Geometry: Triangulated Mesh**
- **Materials: Export**
- **Grouping: Material Groups**



Set the output directory to where you loaded the geometry from. Give the file the same name, i.e. **Intergalactic\_Spaceship.obj** and select **Export OBJ**.

Run your game and you should now have something like the following:



If you find that the object is not displaying, it is most probably that the textures and/or mtl file cannot be found. Alternatively try the following:

Open the new **Intergalactic\_Spaceship.obj** file in WordPad (notepad may display incorrectly) and change the **mtllib** to:

```
mtllib Intergalactic_Spaceship.mtl
```

This change of directory will allow our OBJ Loader to find the material file for our 3D object. Save the **Intergalactic\_Spaceship.obj** file.

## *7. Exercises*

Please attempt these exercises, but if you get stuck or you are confused then ask for help during the scheduled lab times.

1. Watch the Blender tutorials linked from the module Canvas home page. You may also want to search and/or search good Blender tutorials and share them with the rest of the class via the Discussion section on Canvas and/or in the General channel on Teams.
2. Edit the other models in Blender until you are happy that you can get the modified objects into your game.
3. Find a free 3D object (<https://free3d.com/> is good) and export an OBJ from Blender that you can use in your game. Note that you can import most 3D object files and then you can export them as OBJ from Blender.