COMP1150/MMCC1011 Week 8 Prac

Topics covered:

- Preparing your assignment
- The ProBuilder package

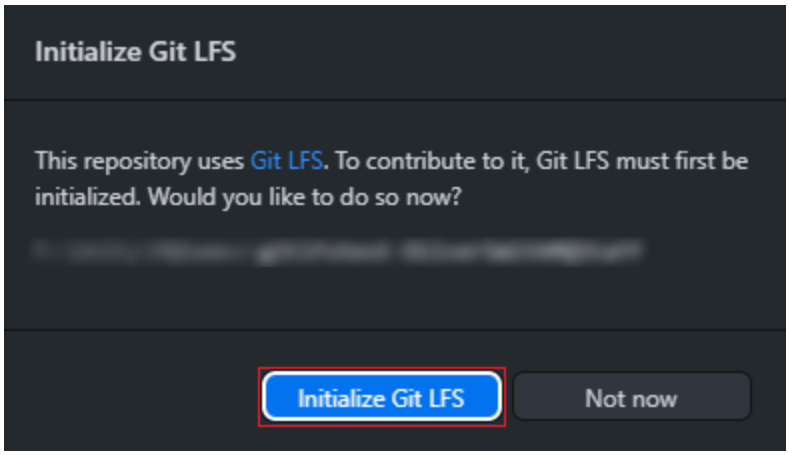
GDT Assessment Task

We'll be using the activity in this week's prac to make a start on your Game Design Task assignment (the details of which have now been released on iLearn). GitHub Classroom is being used to distribute the assignment files and collect the finished games, so you should take some time to make sure you can use this tool with confidence.

Click on the below link and select your student number to accept the assignment and setup your initial Game Design Task assignment repository. Note that the pre-requisite packages from Week 6 and 7 are included in this repository.

https://classroom.github.com/a/JBz7Hs-P

When you first clone the project onto a new device you will receive a prompt to initialise GIT LFS to handle large files in the project. Make sure you press **Initialize Git LFS** in response to this prompt or you will not be able to push changes to the project.



The large files (SpeedTree and Water .tga assets) will be shown in GitHub as a list of 'changes' on the project that you need to push back to the repository. **Enter a commit message** (e.g. 'large files') and **Commit** and **Push** these files to complete the initial clone process.

The repository also comes with a template document for the **Game Design Task Report** in the root folder, which you should edit and save there. This also needs to be submitted via the iLearn submission link as a PDF once you have finished the assignment and are ready to submit.

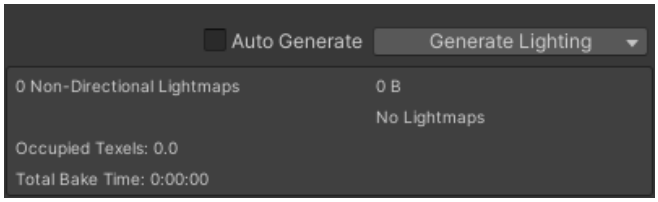
Otherwise, you should **save, commit and push your project regularly** to GitHub as you work on it over the coming weeks. These and other important instructions are included in the README file in the root folder.

Open the project in the 2021.2.9 version of Unity. The project comes with a scene called "GDT_Scene" in the Scenes folder which is where you should build your game scene for the assignment (Unity may open the project with a new scene, so **make sure you open the 'GDT_Scene'** before you start working).

Note: this week is the only week you'll be completing your prac work in the assignment repository. You'll go back to working in your personal 3D pracs repo next week and will need to separately (outside of class time) implement the features learned in the 3D pracs into the single 'GDT_Scene' within your Game Design Task repository in order to be able to submit your complete scene for this major assessment item (worth 30%).

Disable Baked Lighting

Before we get started, there's one trick that we didn't discuss in detail in the last prac. It's a good idea to disable automatic light-baking while building this week's scene (and your assignment) to make the editor more responsive. Open the Lighting Settings (**Window > Rendering > Lighting**) and make sure the **Auto Generate** checkbox at the bottom of the panel is unticked.

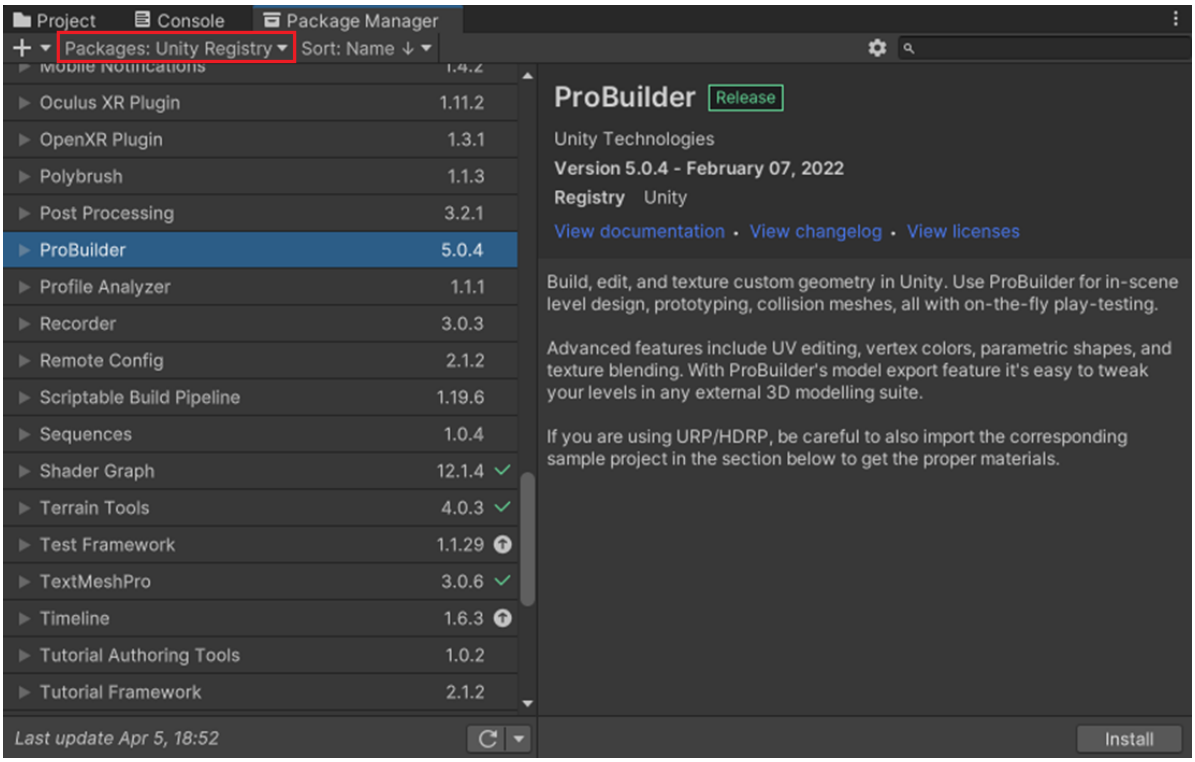


When you have finished editing the scene, you can return to this window and press the **Generate Lighting** button to manually bake the lights. This should make editing much faster. We will further explore lighting and "baking lighting" in future pracs.

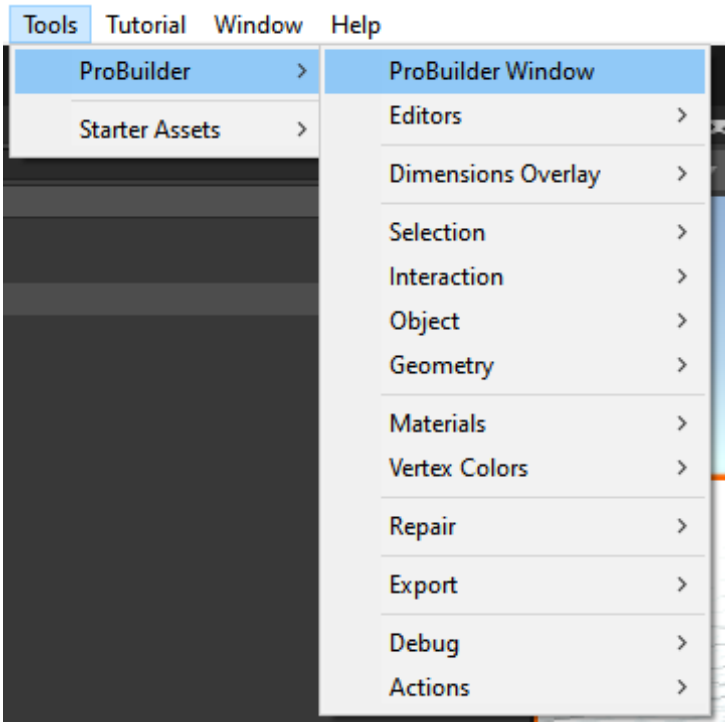
ProBuilder

ProBuilder is a free level prototyping plugin for Unity. It provides very easy-to-use tools for constructing level geometry. Building with ProBuilder is faster and easier than with the standard Unity primitives, and it can create much more interesting shapes and structures. This tutorial will only introduce you to the basic features of ProBuilder, which you will need for the assignment. You can find more documentation and other tutorials online (note: ProBuilder is often updated, so some of these resources might be out-of-date when you access them. Use your judgement and don't forget to experiment yourself).

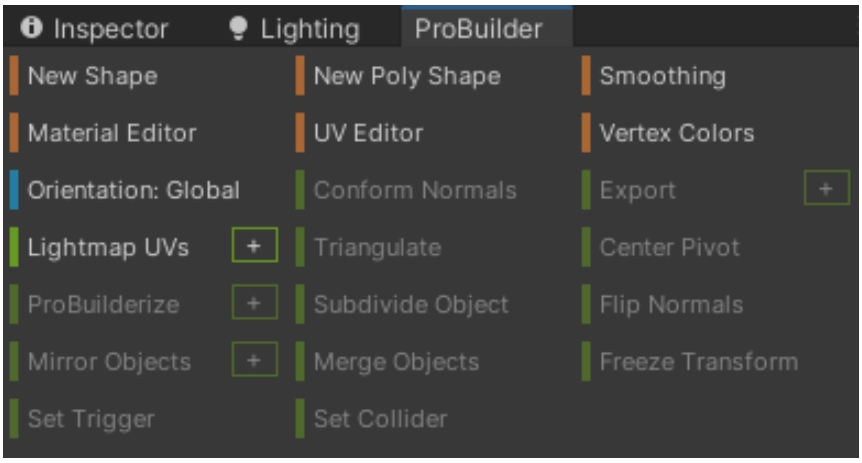
To install ProBuilder, navigate to **Windows > Package Manager >** set **Packages** to **Unity Registry.** You should be able to find **ProBuilder** by either scrolling down or typing it in the search bar up the top**.**



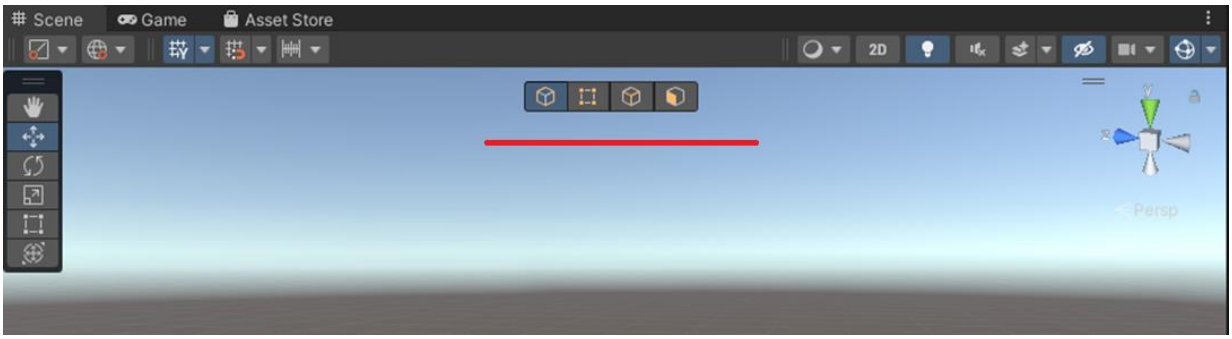
You should now see a ‘ProBuilder’ folder within your Packages folder (underneath ‘Assets’ in your Project panel sidebar). More importantly, in the **Tools** menu you should now see a new ‘ProBuilder’ menu.



Navigate to **Tools > ProBuilder > ProBuilder Window**, as shown above (if you can't find this menu option, try restarting Unity). This will open the ProBuilder panel, which we recommend docking somewhere easily accessible (e.g. next to your Inspector panel).



You should see a new toolbar appear in the middle of your Scene panel.



These four tools control the way you interact with ProBuilder object. They are:

1. **Object selection** - The standard Unity editing mode.
2. **Vertex selection** - This mode lets you select and move individual vertices (points).
3. **Edge selection** - This toggle lets you select and move edges (lines).
4. **Face selection** - This toggle lets you select and move faces (polygons).

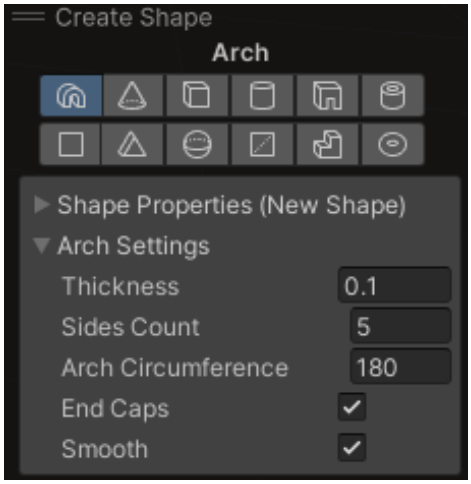
Note: there are hotkeys to switch between modes. '**G**' will swap between object mode and whichever of the other modes you used last. '**H**' will cycle through the other three modes. However, '**H**' also conflicts with another core Unity feature, which you will need to manually resolve.

Also, you can also move the location of your toolbar by navigating to the top menu bar and going to **Edit > Preferences > ProBuilder > Toolbar > Toolbar Location**. Unfortunately these locations are pre-defined, you cannot freely drag this toolbar around.

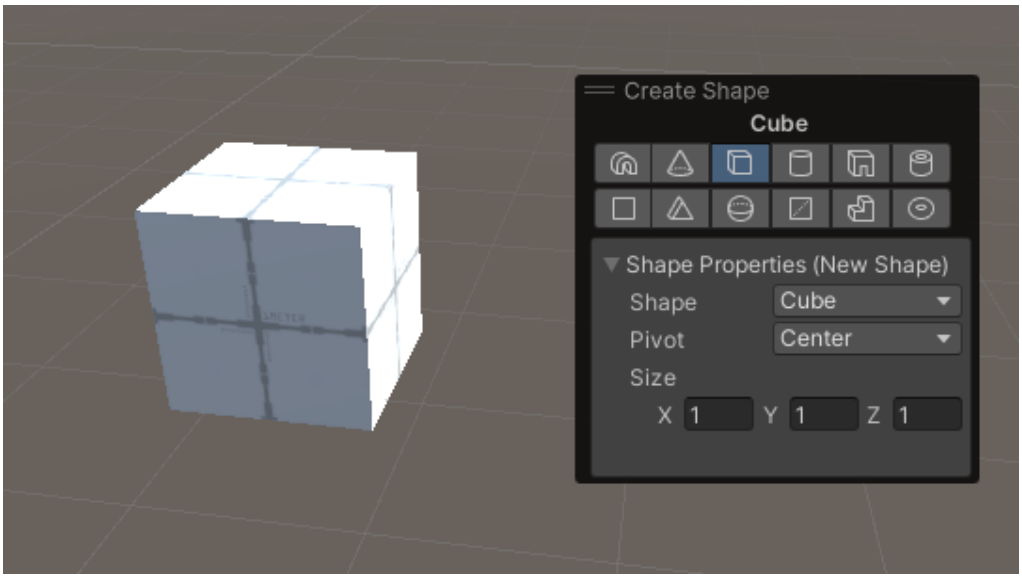
Making a Cube

ProBuilder's core feature is that it provides other basic shapes for common level architecture, including stairs, doors, pipes, etc. For now, we're going to use ProBuilder to create, and then manipulate a cube.

In the ProBuilder panel, click **New Shape**. A popup 'Create Shape' panel will appear within your Scene panel, which you can reposition by dragging the handle (the = symbol) on the top left of the panel.



Select the **Cube** button (top row, third from the left), give it appropriate dimensions (e.g X:1 Y:1 Z:1), and hold **Shift + Left Click** in your scene to place your cube. Note that the 'Pivot' point for the object will be its 'Center' by default, which means its handle will appear at its centre like other Unity primitives.

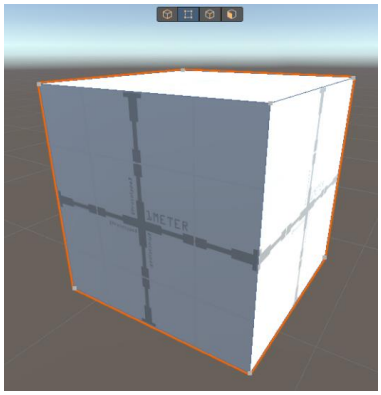


You can also create a cube by navigating to the top menu and selecting **GameObject** > **ProBuilder** > **Cube**.

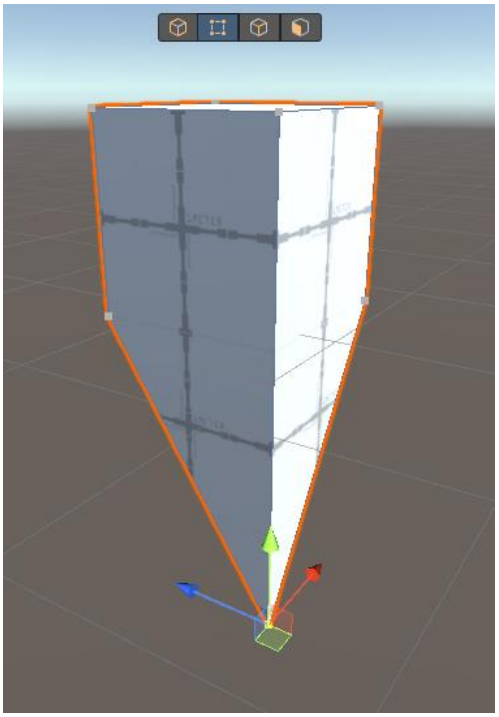
Note: ProBuilder allows you to make shapes by **Left Clicking** in your scene and dragging. Creating shapes like this allows you to scale the object while creating it, **but we do not recommend doing this until you are extremely confident with ProBuilder**. Instead, at this point, we'd prefer you to use exact measurements for your objects and structures.

Vertex Selection

Select the cube and enter **Vertex Selection** by pressing the second button in the ProBuilder Toolbar. You should see all the corners (vertices) of the cube highlighted.

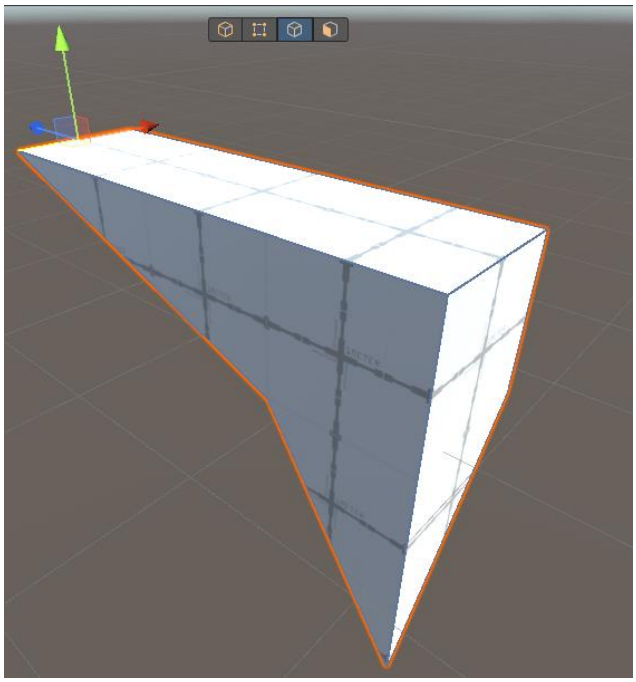


Make sure you have the standard **Move** tool also selected, then click on a vertex. You should see three axis arrows appear. Drag the vertex around to deform the cube however you please.

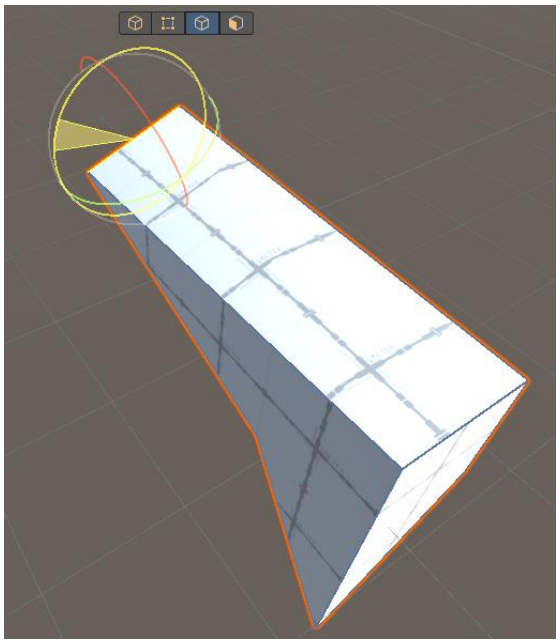


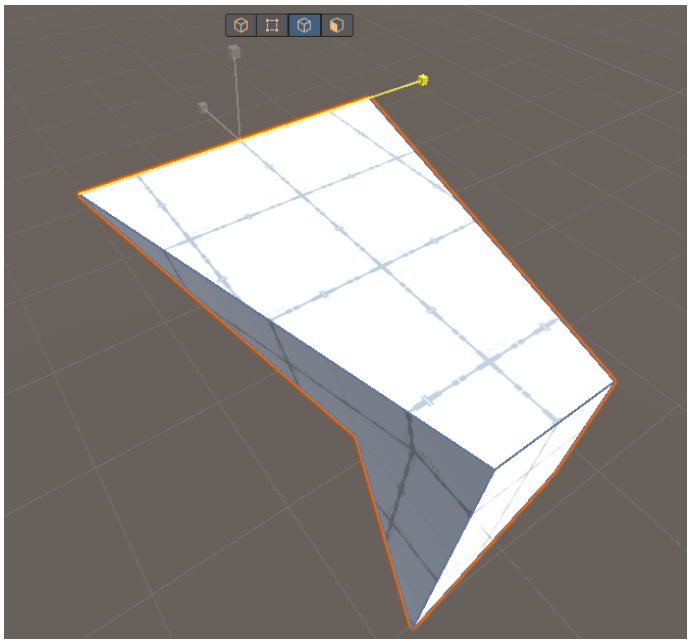
Edge Selection

Select the the third button in the ProBuilder toolbar. Selecting this enables **Edge Selection**, allowing you to select and move the edges of the cube.



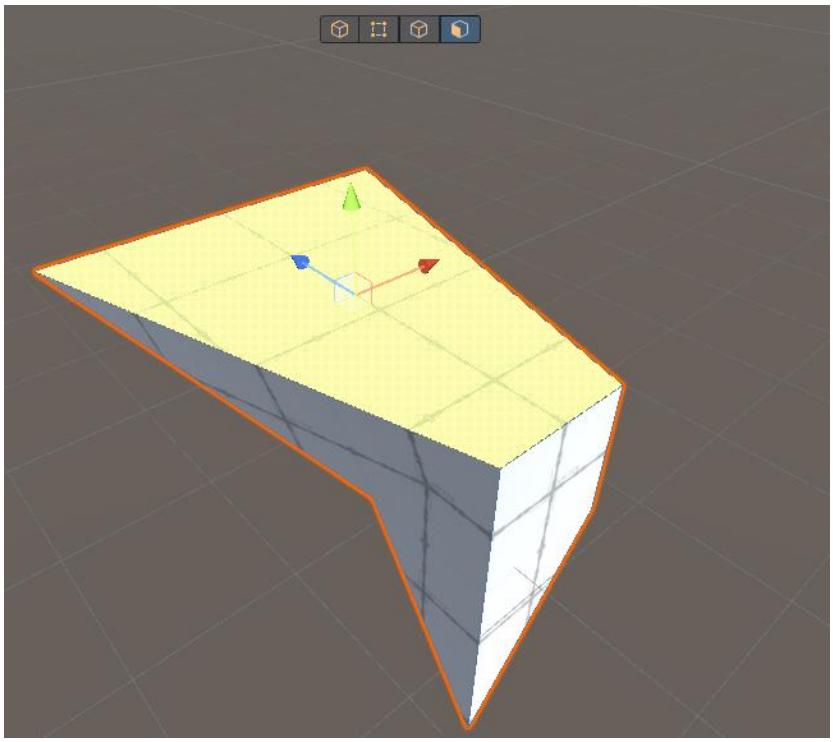
If you change from the **Move** tool to the **Rotate** or **Scale** tools, you will find you can also rotate and scale the edge.





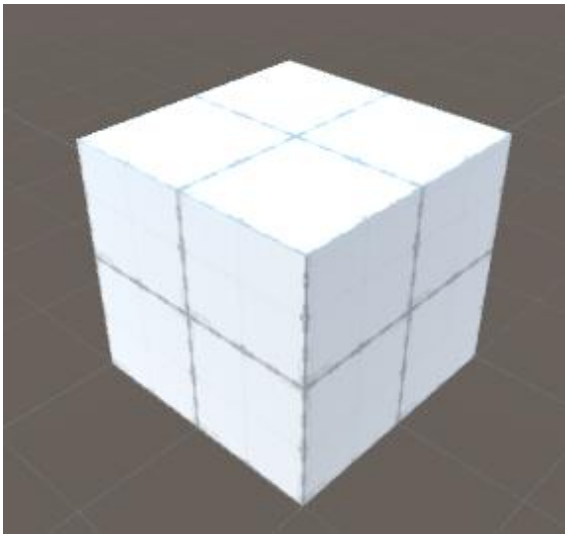
Face Mode

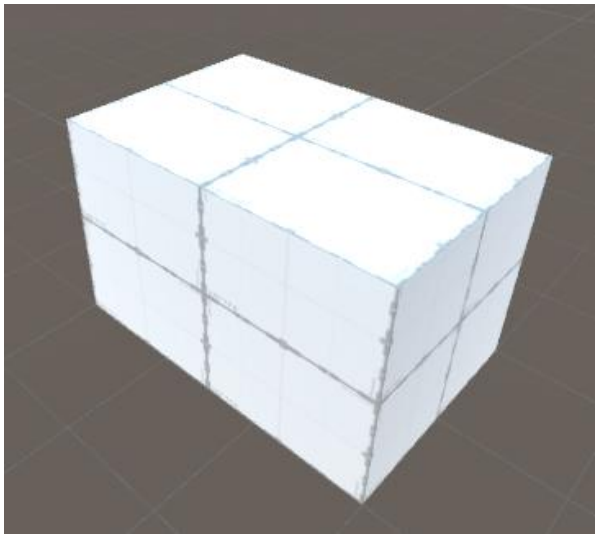
Clicking the right-most button in the ProBuilder toolbar enables **Face Selection**, allowing you to move, scale, or rotate entire faces of the cube at once.



Textures

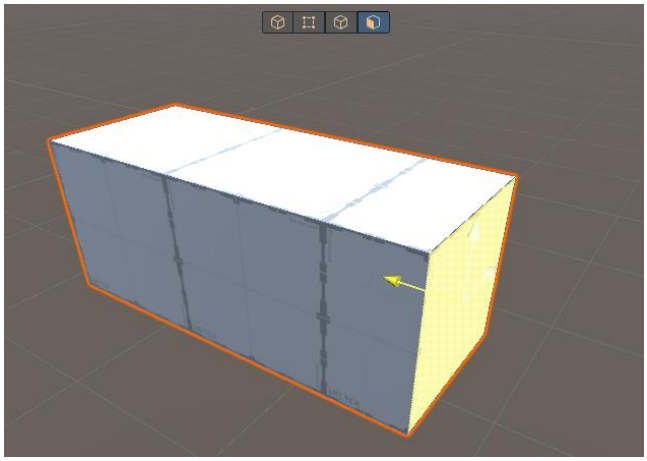
One advantage of using ProBuilder over the standard Unity primitives is the way it handles textures. If you create a cube in Unity with a texture and then scale it using the Transform component, the texture stretches.





However, if you reshape a ProBuilder cube with one of the geometry editing tools, then the texture adjusts accordingly, without stretching. Try it out. Make a new cube (either through the top-menu, or by using the **New Shape** menu, and setting **Pivot** to be **First Corner**), then in **Face Selection** mode, move a face in one direction (e.g. along the Z axis, using the blue handle).

Also, moving a face while **snapping (Holding Shift)** is a good way to make sure your ProBuilder objects are in exact measurements. For example, the cube pictured below is exactly 2.5 units long thanks to snapping.

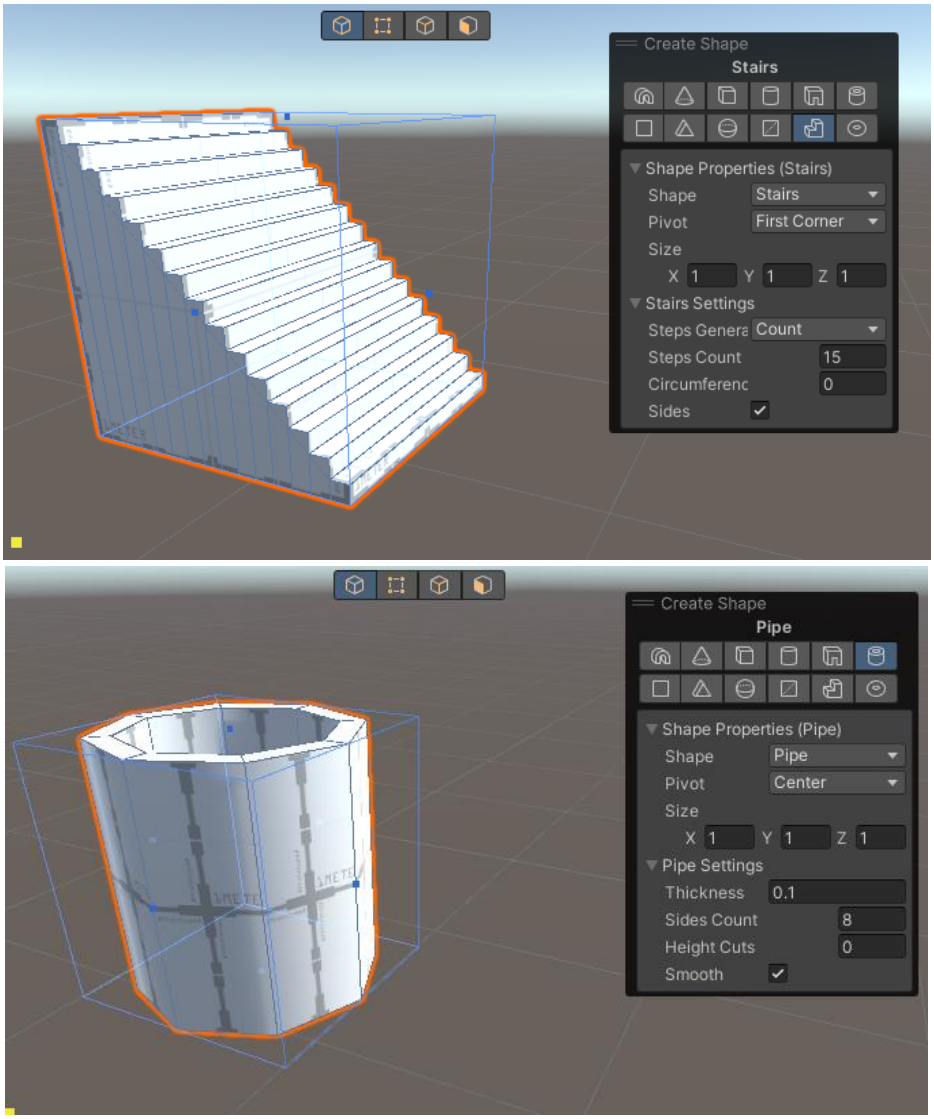


This allows you to create complicated structures without worrying about your textures warping, which makes building a **lot** easier than using primitives.

Note: Unfortunately, ProBuilder objects tend to reset to default materials if you edit the object. This doesn't seem to happen if you drag the material directly onto the object in the scene view. However, doing so can have unintended side-effects. Our advice is to just re-apply materials through the inspector when necessary.

Other shapes

Have a play around with the settings for some of the other shapes that you can create using ProBuilder. For example, the 'Stairs' shape has a slider for the number of steps and the 'Pipe' shape allows you to edit the number of sides.

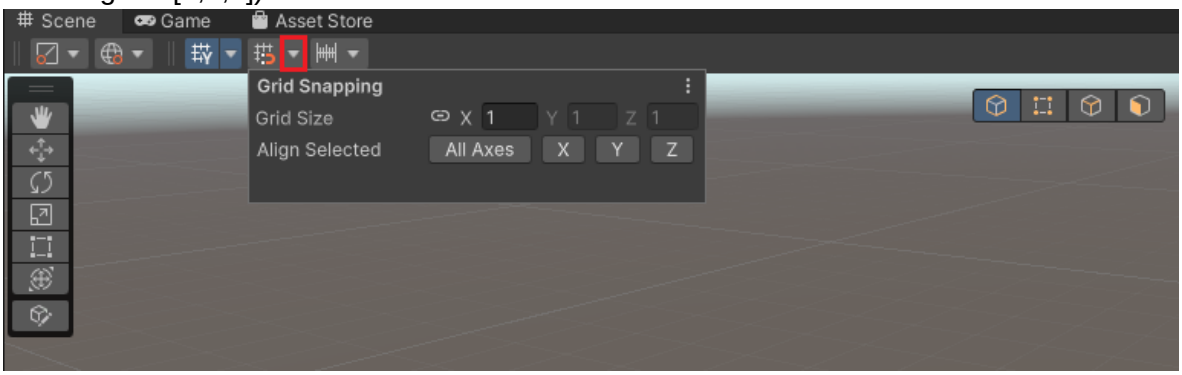


Grid Snapping

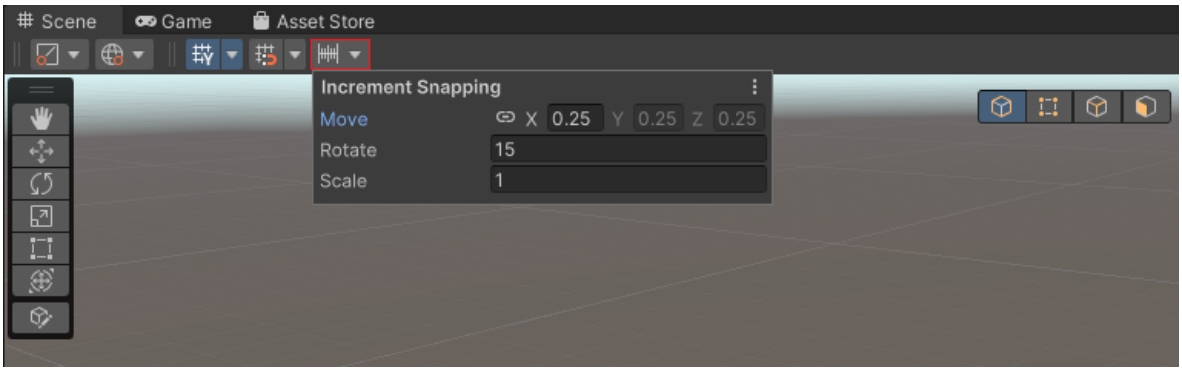
When building levels, it is important to make sure your pieces line up properly. One way to do this is to use 'Grid Snapping'. Select the **Grid Snapping** dropdown button, in your Scene panel, and set the **Move** value under Increment Snap to a small and reliable value (such as 0.5 or 0.25). Clicking the button next to the dropdown will toggle **Grid Snapping** on and off. Note that you can click the chain icon next to the **Grid Size** field to unlink the X, Y and Z axes. This will allow you to assign different snap movement values to the different axes. If this button is greyed out, try setting your **Tool Handle Rotation** to **Global** (Next to Grid Visibility)

Objects that were placed before you changed grid snapping rules can also be adjusted all at once. To do this, select several objects in your scene and then click an **Align Selected** button (either **All Axes**, **X**, **Y** or **Z**) to force the selected objects to adhere to your Grid Snapping rules (e.g. if an object is at [1.1, 1.1, 1.1], clicking the **All Axes** button will force its transform position

to change to [1,1,1])



Don’t forget that you can also change your default snap increments via the ‘Increment Snapping’ popup in the Scene panel. As well as increments for movement, you can also set rotation and scale increments.

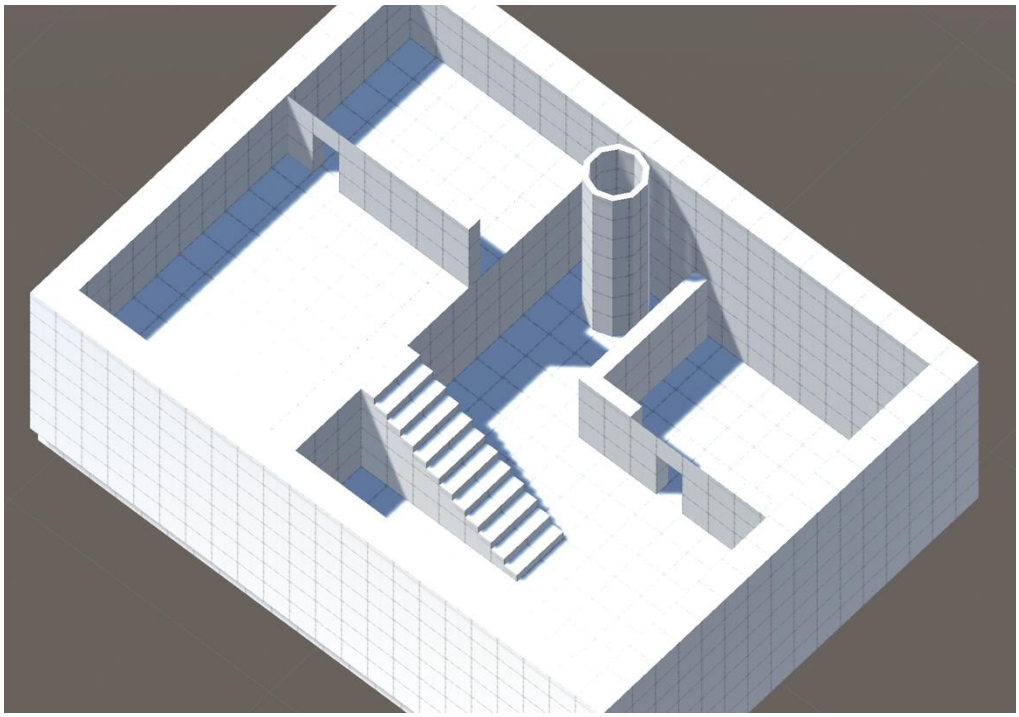


Create a new cube and move it with the Move tool while holding down the **Ctrl/Cmd**. Your object will move according to the snap increments set. The same rules can be applied for the ProBuilder selection modes. Say you want to make a wall 3m high. Create a cube, select the top face within face mode and drag it up while holding down **Ctrl/Cmd**. You will find it is much easier to reliably modify your objects using these snapping tools.

Make a Structure

Use ProBuilder to make a building or semi-complex structure of your own design. Note that the first-person controller ‘Player’ prefab has already been placed in the GDT_Scene (and is also available at **Assets > Starter Assets > FirstPersonController > Prefabs** if you accidentally delete it), so make sure you move it into your structure and regularly check the dimensions and accessibility of your design as you go.

If you are struggling with inspiration, try and recreate something similar to the picture below. **Build to a scale of 1 unit = 1m.** Some other ideas for structures include a bowling alley, a park gazebo, a farm house, a space station, a suspension bridge, an underground base, etc. If you want the building to be accessible in your Game Design Task scene remember it will also need to have an entrance/exit that the player can walk through.



When you're done, go to the Lighting panel and press **Generate Lighting** to re-bake your lighting.

Reminder: Save, Commit and Push to GitHub

Planning Your Game Design Task Scene

Use any remaining prac time to do some further grey-boxing of the scene for your assignment, consider your overall theme and research assets that you might want to add to the scene, or ask your tutor questions about the assignment. Consider building some terrain with the Terrain editor or importing your terrain from your 3D pracs repo from the previous prac, or you might like to consider building additional architectural features for your scene with ProBuilder. You could also try adding some materials to your new structure.

We'll return to working in your 'COMP1150 3D Pracs' GitHub repository from next week and for the remainder of the prac exercises. It will be up to you to set aside time to return to your assignment repository and continue to update your scene to meet the assignment requirements. Don't forget to save, commit and push your Game Design Task assessment repository regularly as you continue to integrate more features learned in your other practical work over the coming weeks.

Reminder: Save, Commit and Push to GitHub

Show your demonstrator

To demonstrate your understanding of this week's content to your prac demonstrator you might show:

- The structure you built
- Experiments with the ProBuilder tools
- Additional features of your scene
- That you understand how to use snapping for precise construction and alignment
- Your assignment repository