



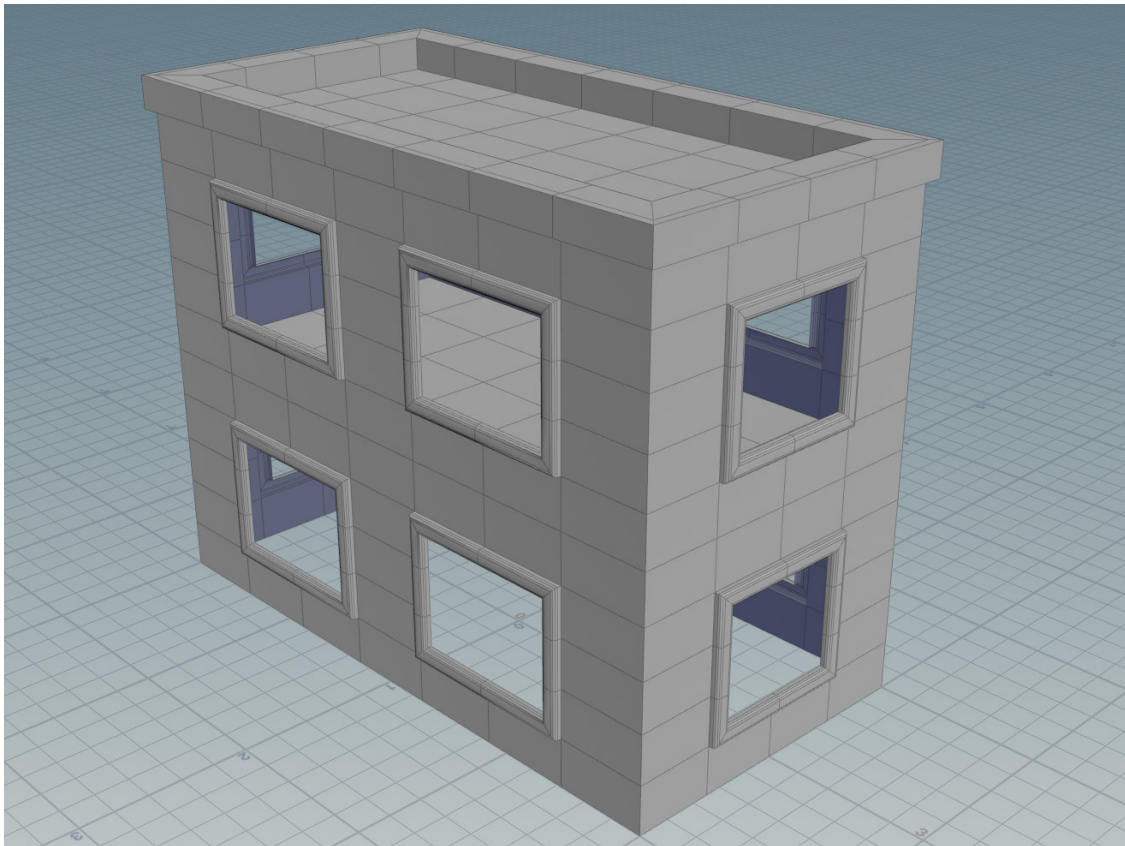
Curriculum-in-a-Box | Lesson 2 | Guided Work

MODELING A BUILDING

Students are now asked to follow-along with the teacher as they build something in Houdini. For this lesson, students will learn general modeling techniques. This specific example will build a model of a building. In order to achieve this, you will learn how to use the “Poly” tools to create things like extrusions and bevels. There will also be several different types of selections that you will use in the Scene View. These are all fundamental concepts for working with geometry in Houdini, and students will have a much deeper understanding of these concepts after this guided work exercise.

WHAT STUDENTS WILL LEARN

- How to work with the Houdini modeling tools
- How to use the PolyExtrude and PolyBevel SOPs
- How to make geometry selections in the Scene View
- How to delete geometry using the Blast SOP
- How to duplicate geometry with the Copy and Transform SOP



PART ONE

Rough Building Shape

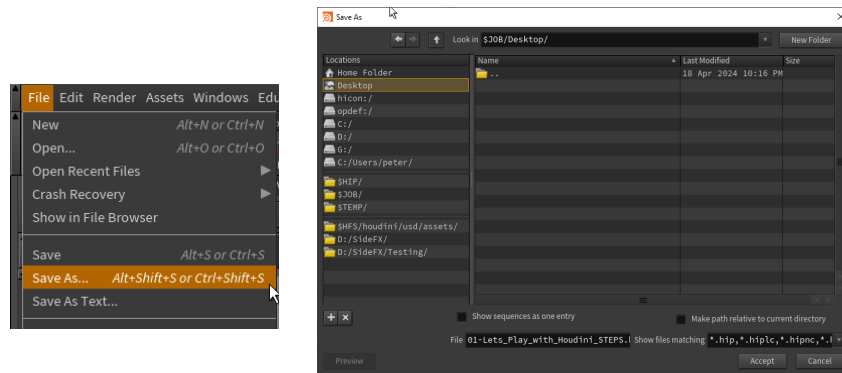
In this first section of the assignment, you will show your students how to set up their project, and begin to make the rough shape of a building.

1. Set up your Project Directory

- **Download** the *CIB_Lesson02.zip* file and unzip it, then place it in the *documents>HoudiniProjects* directory.
- **Open** Houdini and from the **File** menu, choose **Set Project**.
- Navigate to the *CIB_Lesson02* directory and click **Accept**.

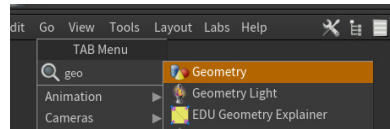
2. Save your Scene File

- From the File menu, choose **Save As**.
- Make sure you are in the *CIB_Lesson02* directory, give the **File** a name and press **Accept**.

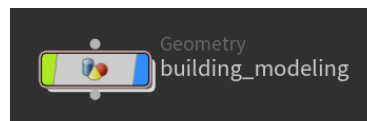


3. Set up the Geometry Network

- Press Tab in the Network view, start typing *geo* then select **Geometry**.

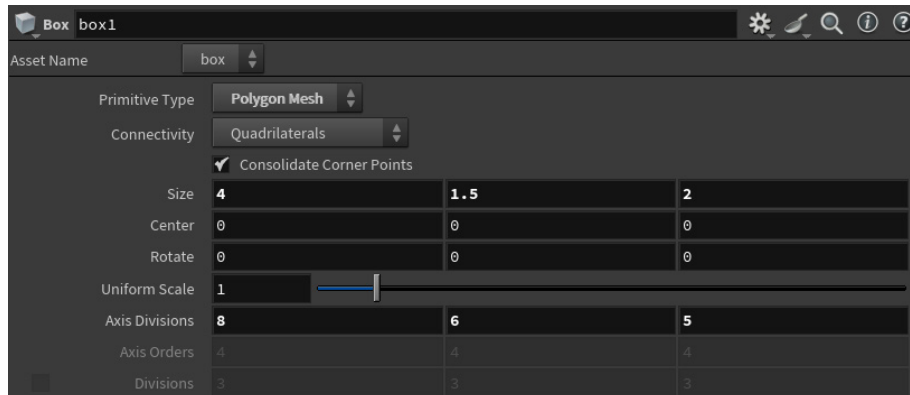


- Click in the Network View to place the node.
- Double-click the *geo1* name and change it to something like *building_modeling*.
 - This will be a container for the geometry you create.

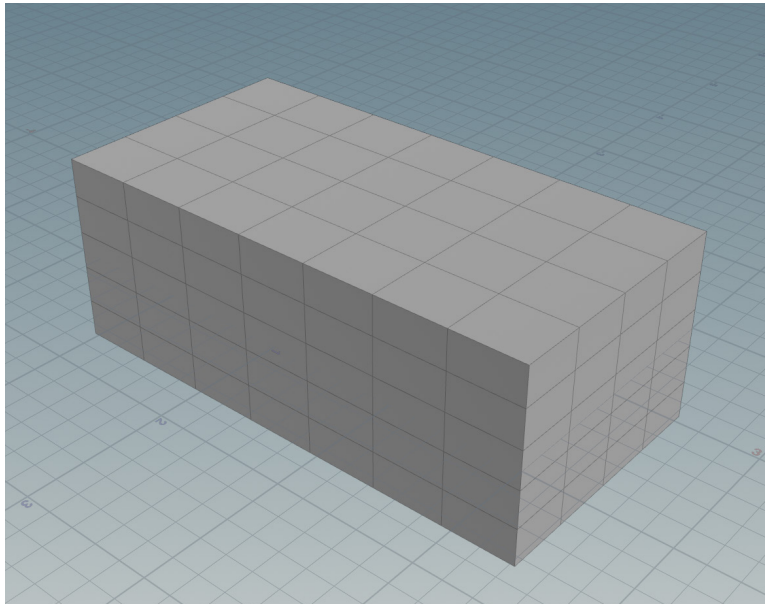


4. Add a box to the scene

- Double-click on the *building_modeling* node to dive inside of it.
- Press Tab in the Network view, type *box*, and then select **Box**.
- Click to place the node.
- In the Parameter Pane, change the **Size** to **4**, **1.5**, and **2**. Also change the **Axis Divisions** to **8**, **6**, and **5**.

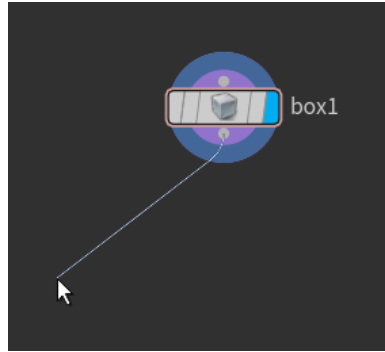


- You should now have a box that looks like this in your Scene View.

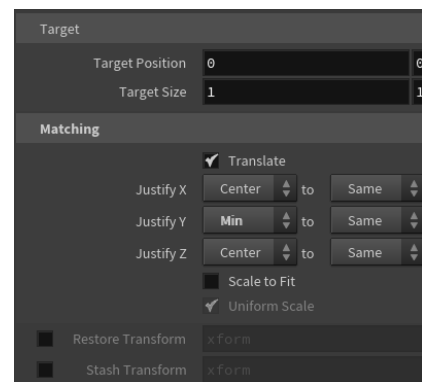
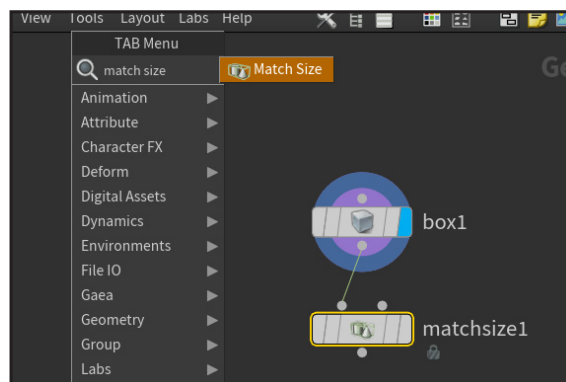


5. Center your geometry on the XZ plane

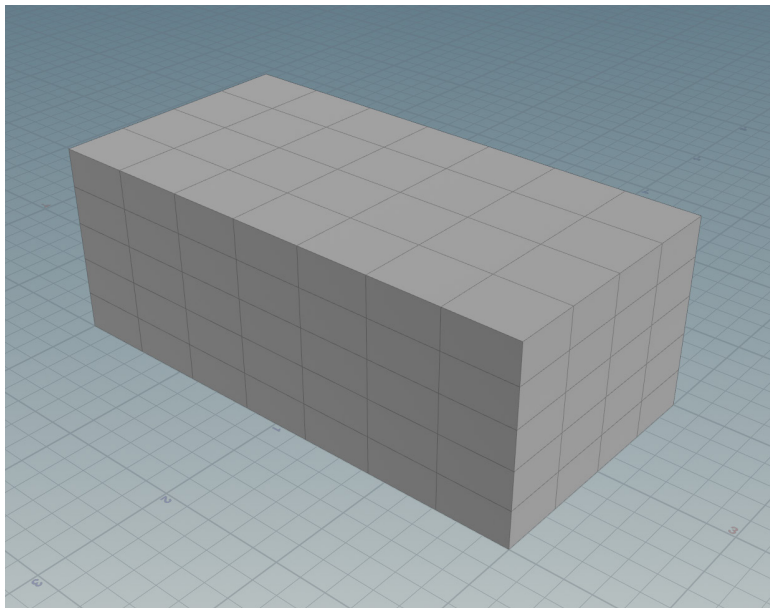
- In the Network View, click on the *Box* node's output dot.
 - You will now have a wire that follows your cursor and is connected to the output dot.



- Press **Tab** in the Network View, type **match size** and press **ENTER**.
- A new *Match Size* node will be placed in your Network View and will be connected to the *Box* node
 - You can move the new node in order to keep your network organized. You should see the node snap into alignment with the positions of the other nodes that are already in the network.
- Click the right-most section of the *Match Size* node to move the blue Display Flag.
 - This allows us to visualize what the *Match Size* node is doing. The Display Flag is a cornerstone of using Houdini because it lets you visualize the result of all nodes that were placed before the one with the Display Flag.
- If your *Match Size* node isn't selected (highlighted in yellow), click on the center of it in the Network View.
- In the Parameter Pane, change the **Justify Y** drop-down to **Min**.



-
- Your box should now be sitting on the ground plane, and centered to the origin.



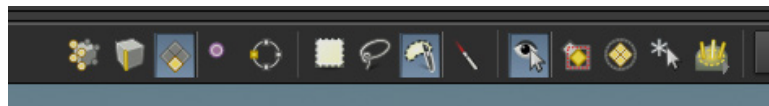
PART TWO

Make Windows for the Building

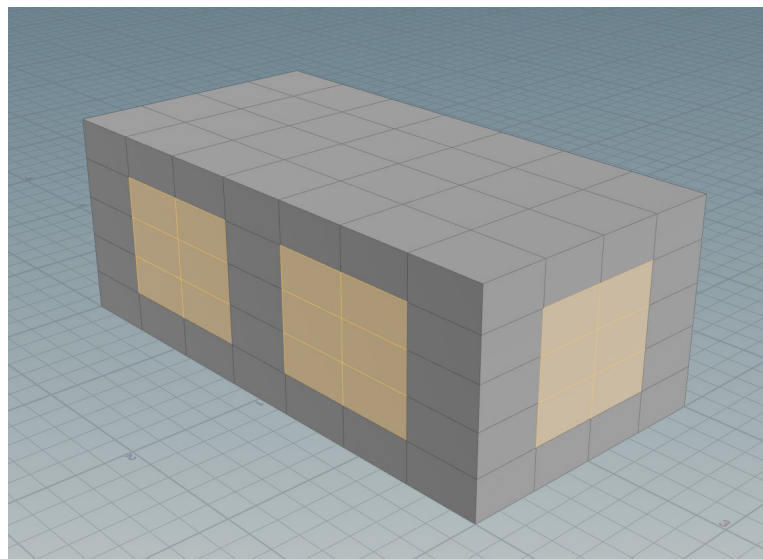
The next step in this exercise will be for your students to model some window details to begin to give your simple box shape the look of a building. You'll first start by blasting polys to make holes for the windows. Then, you will use the PolyExtrude and PolyBevel nodes to shape the frames around the window openings.

1. Inset polygons to prepare to make windows

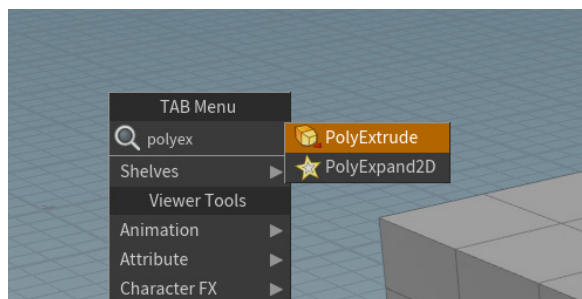
- Press **S** and **4** in the Scene View to enter the polygon selection mode.
- In the controls above the Scene View, click the **Brush Select** button and the **Select Visible Geometry Only** button.



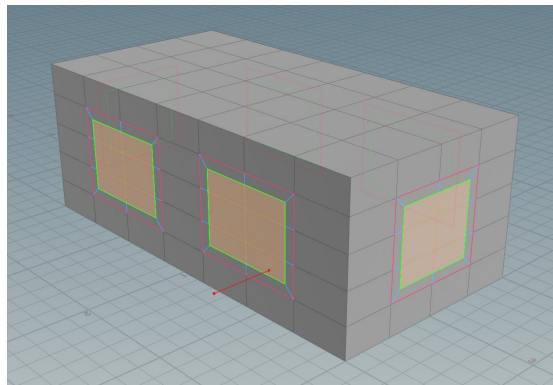
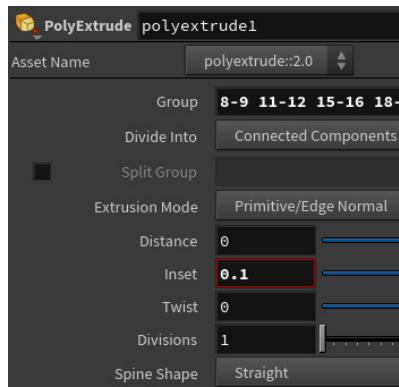
- Use the Brush Selection in the Scene View to select the polygon pattern below on both sides of the box. Make sure to hold **Shift** to select multiple groups of polygons.



- Press **TAB** in the Scene View, type *polyex*, and press **Enter**.

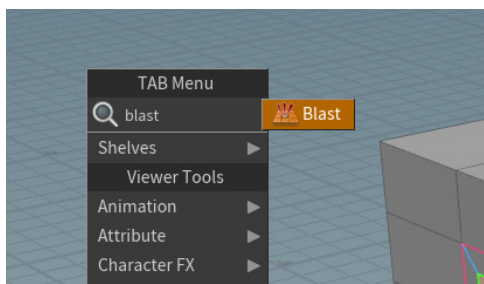


- This will add a *PolyExtrude* node and add the selected polygons to the **PolyExtrude's Group** parameter field.
- In the Parameter Pane, change the **Inset** to **0.1**.

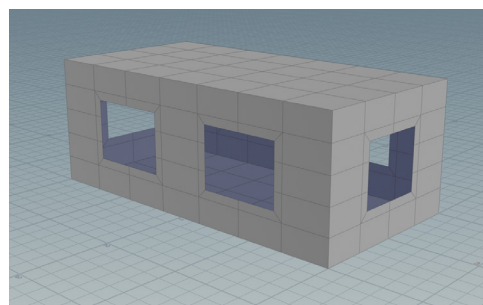
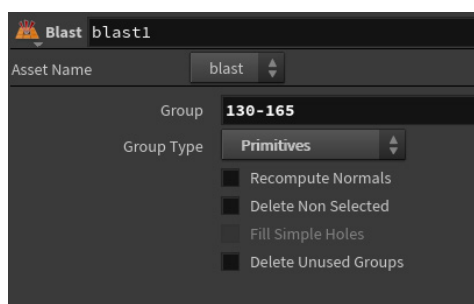


2. Remove polygons to make a window opening

- Press **Tab** in the Scene View, type *blast*, and press **Enter**.

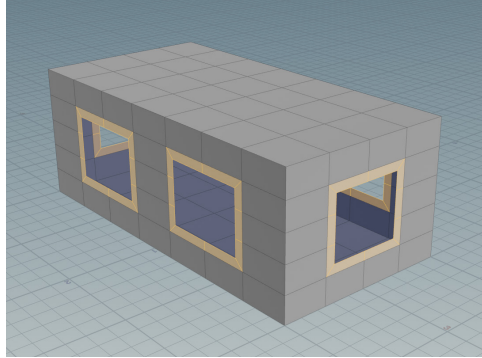


- This will add a *Blast* node and add the selected polygons to the *Blast's Group* parameter field, and set the **Group Type** to **Primitives**.

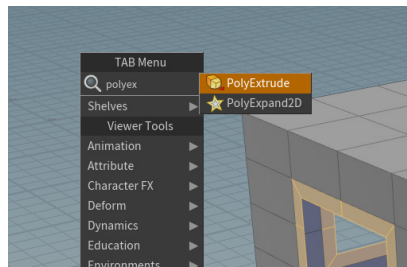


3. Extrude the frames around the window openings

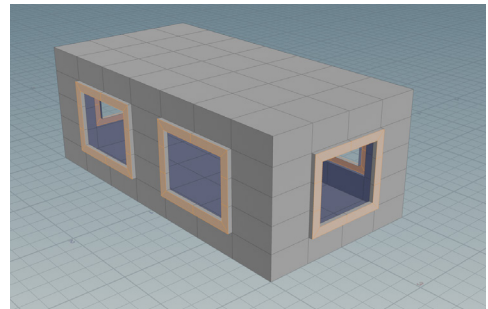
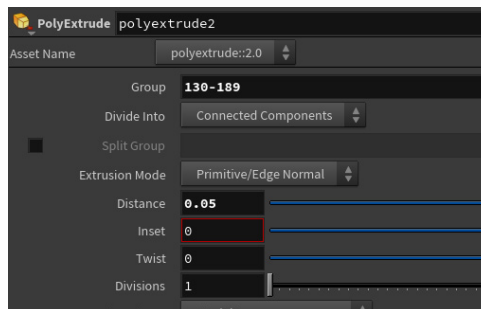
- Press **S** and **4** in the Scene View to enter the polygon selection mode.
- Hold **Shift + A**, and then **Middle-click** while dragging your mouse over the polygons that frame the window opening. A loop of polygons around the window should appear. Each time you select a new loop, you will need to press **Shift+A** to add it to the current selection.



- Press **Tab** in the Scene View, type *polyex*, and press **Enter**.



- In the Parameter Pane, change the **Distance** to **0.05**.

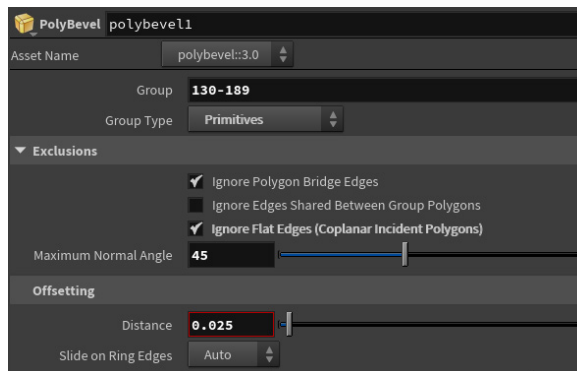


4. Bevel the window frame

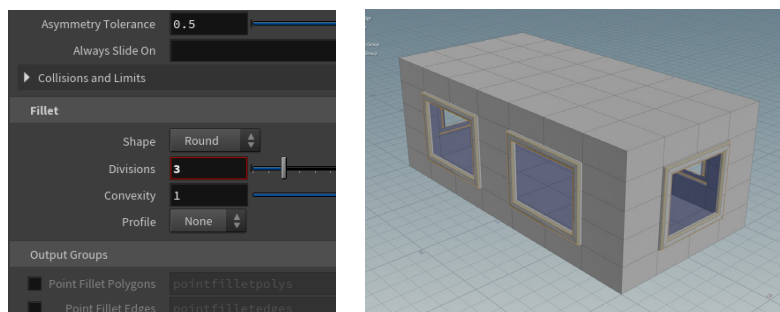
- Press **Tab** in the Scene View, type *polybev*, and press **Enter**.



- In the Parameter Pane, open the **Exclusions** section with the triangle twirl-down.
- Click the check box next to **Ignore Flat Edges**, and set the **Maximum Normal Angle** to 45.

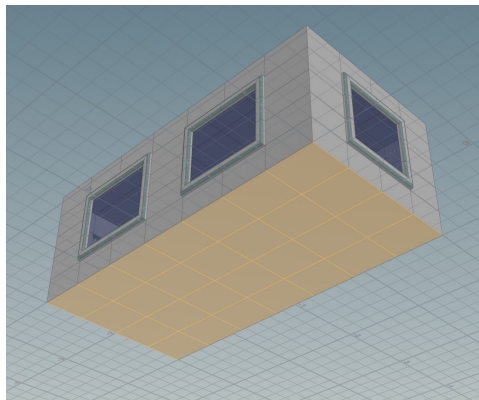


- In the **Offset** section, set the **Distance** to 0.025.
- In the **Fillet** section, change the **Divisions** to 3.

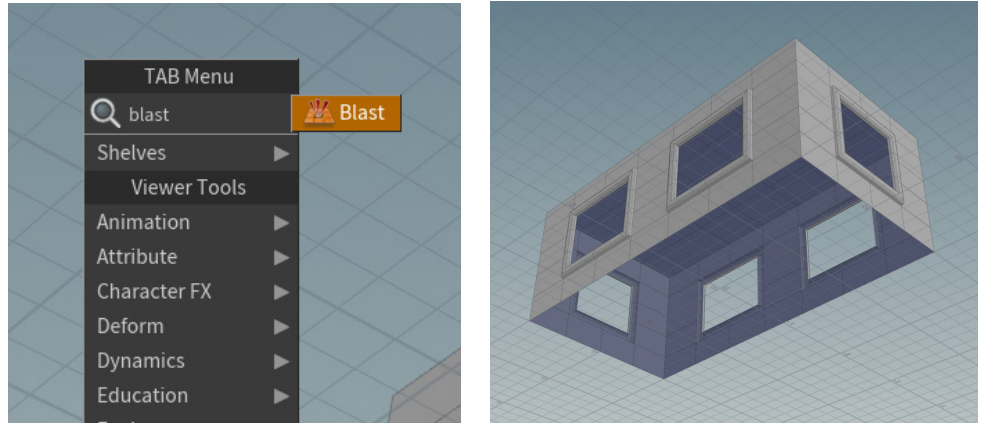


5. Remove the floor of the building

- Press **S** and **4** in the Scene View to enter the polygon selection mode.
- **Left-click** and drag over the polygons to select all of the polygons on the bottom of the building.



- Press **Tab** in the Scene View, type *blast*, and press **Enter**.



- This should remove all of the polygons at the bottom of the building. This is being done so that we can stack copies of this geometry on top of itself without having overlapping geometry for the floor/ceiling.

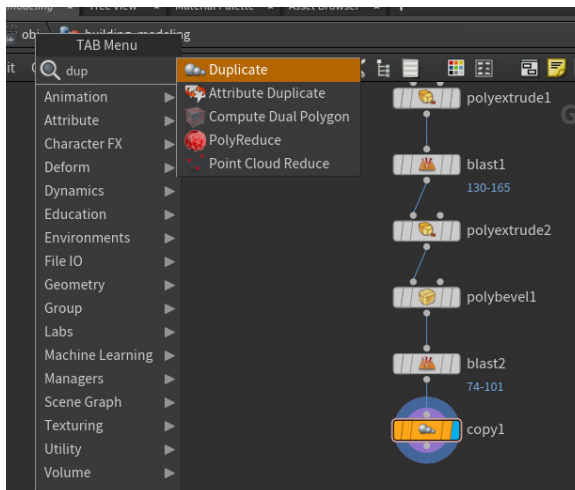
PART THREE

Make More Floors for the Building

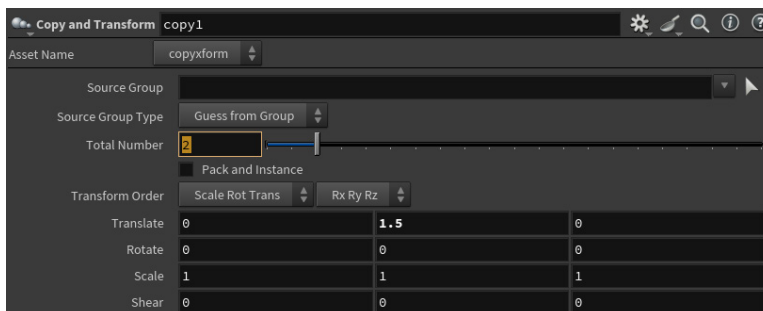
For this last part of this exploration, you will add more floors to the building. You will guide your students through the procedural nature of copying geometry with Houdini. In this example you will only add one extra floor, but you could change this to make a taller tower. To finish this section, you will add a roof edge to give the building a more finished look.

1. Duplicate your current geometry

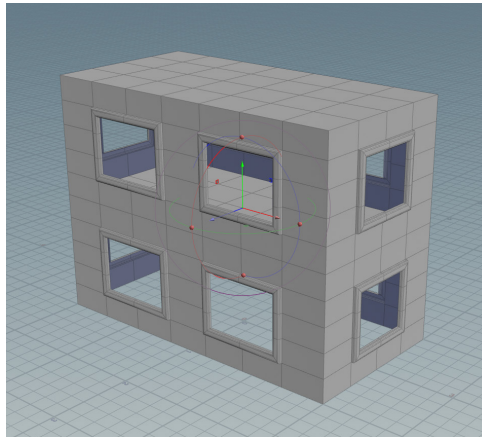
- In the Network View, click the output dot of your *blast2* node.
- Press **Tab**, type *dup*, and press **Enter**.



- In the Parameter Pane, change **Translate** to **0, 1.5, and 0**.

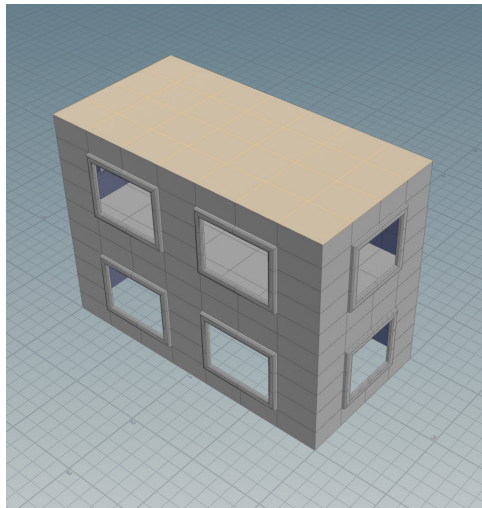


- The **Total Number** is how many copies of the floor you will have. I will leave mine at **2**, but you could make more if you'd like.

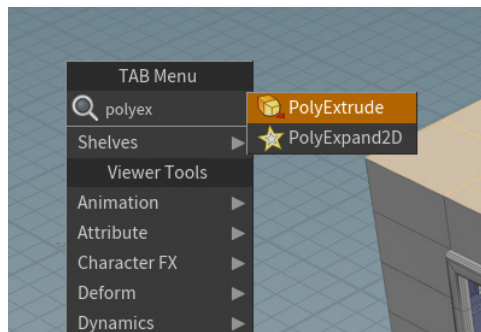


2. Inset the roof polygons

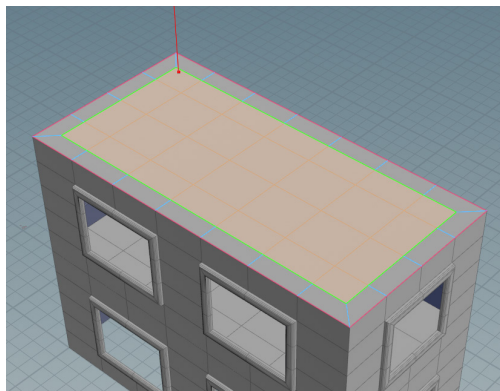
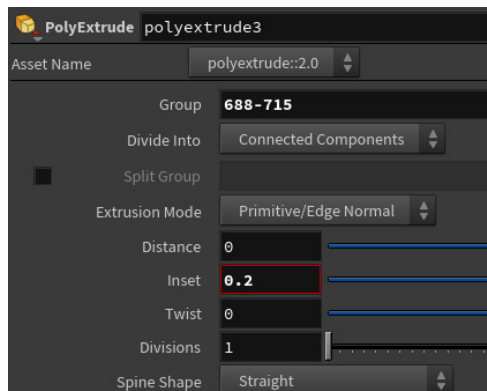
- Press **S** and **4** in the Scene View to enter the polygon selection mode.
- **Left-click** and drag over the polygons to select all of the polygons on the top of the building.



- Press **Tab** in the Scene View, type *polyex*, and press **Enter**.

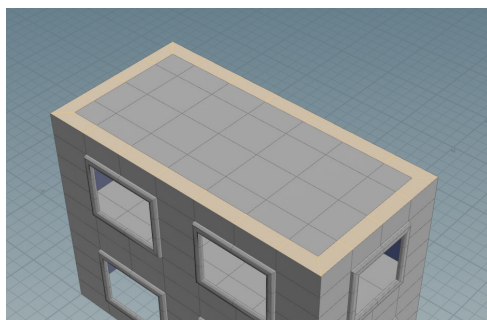


- In the Parameter Pane, change **Inset** to **0.2**.

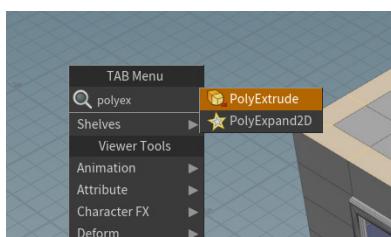


3. Extrude the roof edge upwards

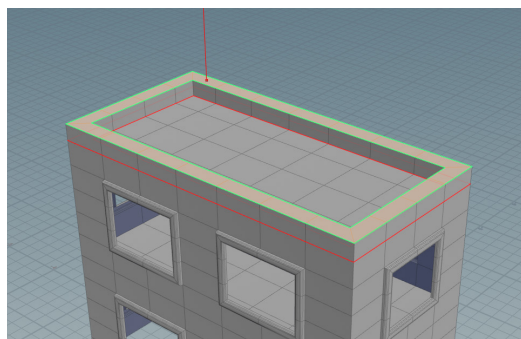
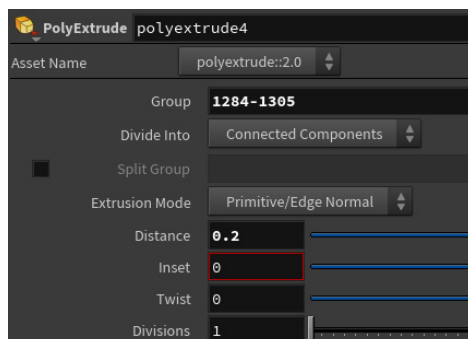
- Press **S** and **4** in the Scene View to enter the polygon selection mode.
- **Hold A**, and then **Middle-click** while dragging your mouse over the polygons that frame the roof. A loop of polygons around the roof should appear.



- Press **Tab** in the Scene View, type *polyex*, and press **Enter**.

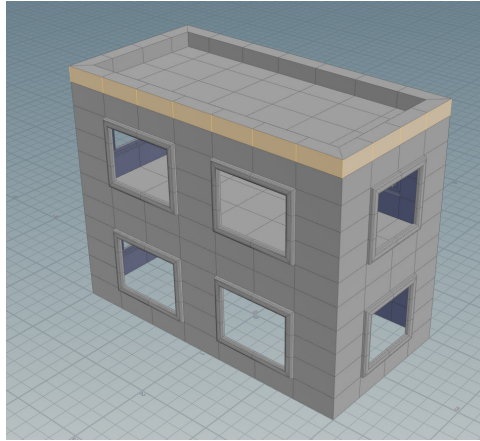


- In the Parameter Pane, change the **Distance** to **0.2**.

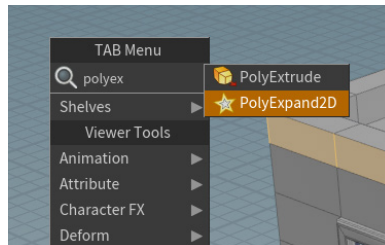


4. Extrude the roof edge outwards

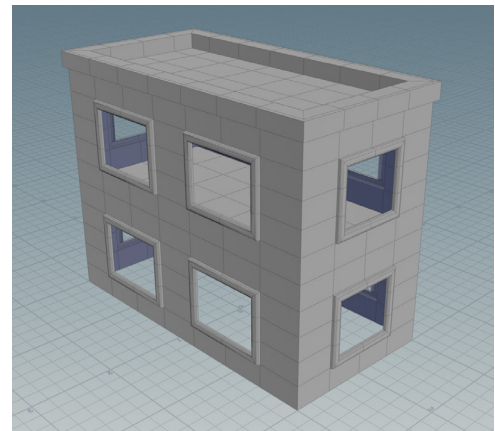
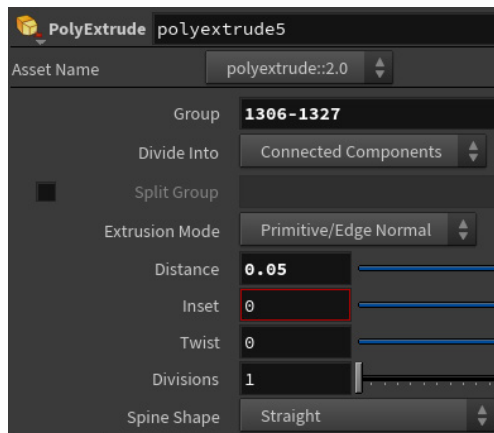
- Press **S** and **4** in the Scene View to enter the polygon selection mode.
- Hold A**, and then **Middle-click** while dragging your mouse over the top row of polygons along the side of the building. A loop of polygons around the building should appear.



- Press **Tab** in the Scene View, type *polyex*, and press **Enter**.



- In the Parameter Pane, change **Distance** to **0.05**.



CONGRATULATIONS

You have now completed your Building Modeling exercise. This has taken you through a project that began with a simple polygon box, and you have created a building out of it by mainly using the PolyExtrude and PolyBevel tools.