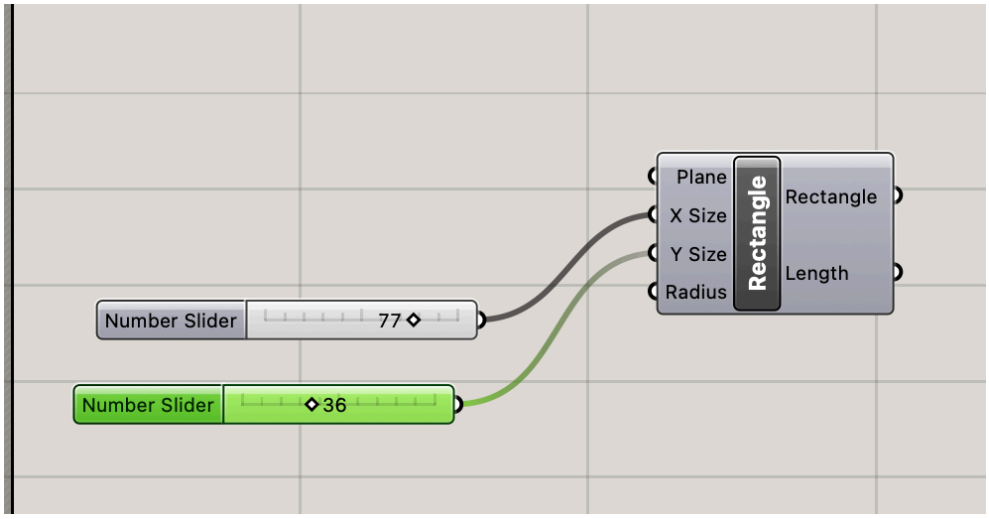
3D Printing & Parametric Design

LWHS - 2023-2024

******Submit Documentation of each tutorial on your google site, include: Screenshots of the grasshopper file & Rhino Rendering. Include one sentence about your thoughts/challenges on each tutorial ******

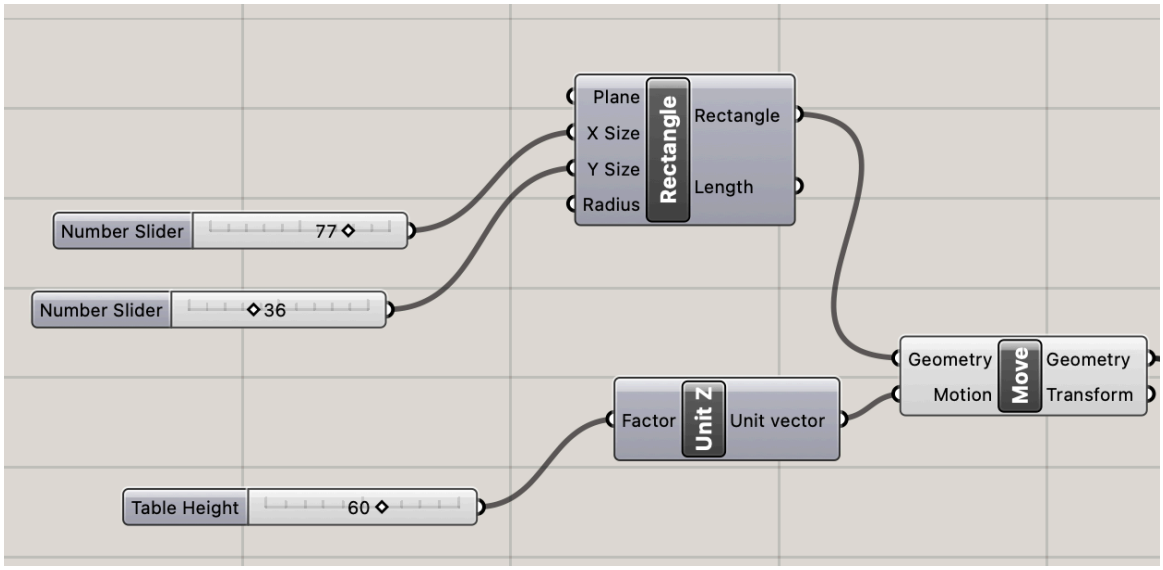
Grasshopper | Making a parametric table

1) Open a new Grasshopper file. Make sure to save it.
2) Drop in a **Rectangle component**. Use two different slicers for the X & Y size. This will be the width and length of your table.

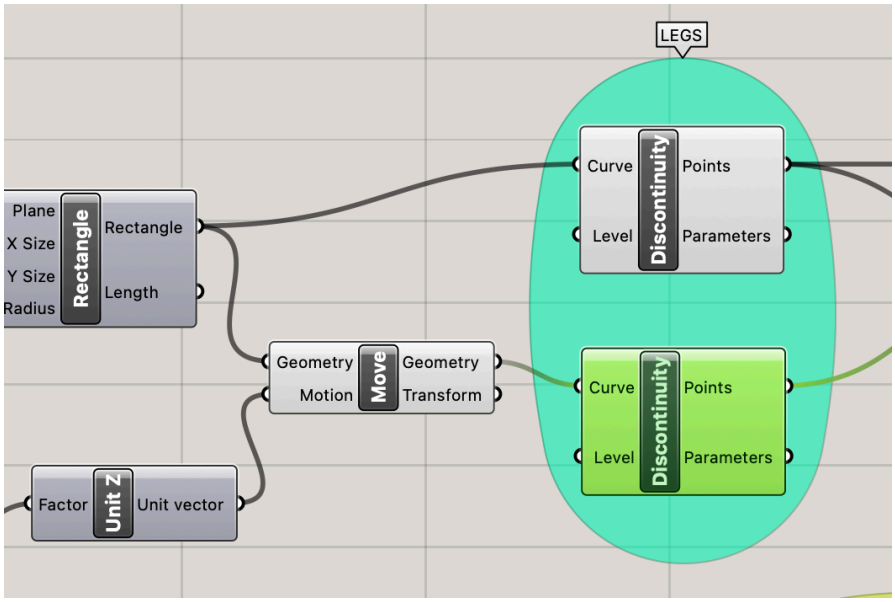


3) The previous rectangle is the base of your table. Since we need this rectangle to be the top of your table. We must move the rectangle in

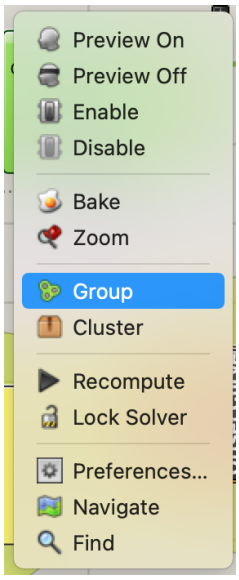
the Z-axis. Now, drop a **move component** and connect it to the Rectangle output of the rectangle component.



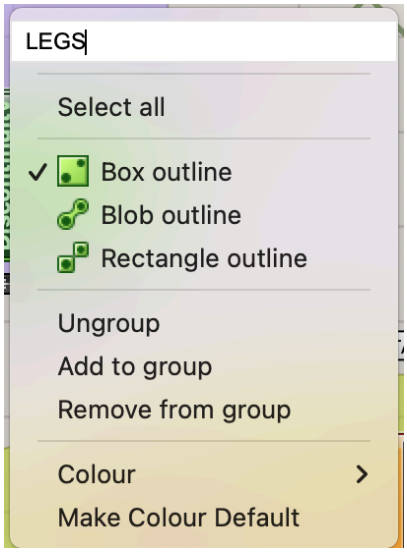
4) Drop in a **Unit Z component** to move your rectangle in the Z-axis. Give it a number slicer of 100. This is the height of your table.
5) Now, it's time to work on the legs of your table. For that we will need the vertices of your shape in this case the rectangle. To get the vertices we will use the **discontinuity component**.
6) Now drop two **discontinuity components** and connect one to the move component (your top) and one to the base (your original rectangle)



7) Let's group both discontinuity components. This will allow us to organize our script. It will also allow us to find specific parameters of our design in this case the legs of the table. To group the components select the components and double click until you get this menu. Select Group

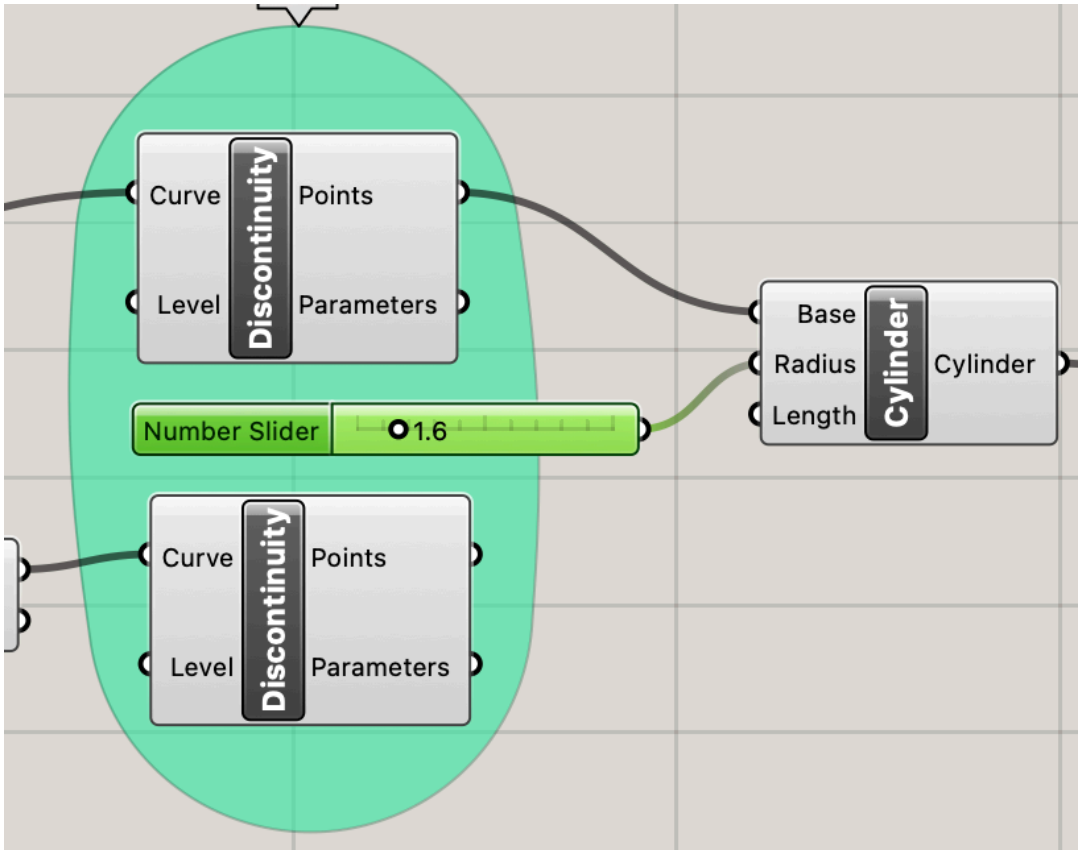


8) Now, click again on the group and you will get this menu. Here you can give a title to your group (LEGS). You can also change the visual outline of the grouping and the color.

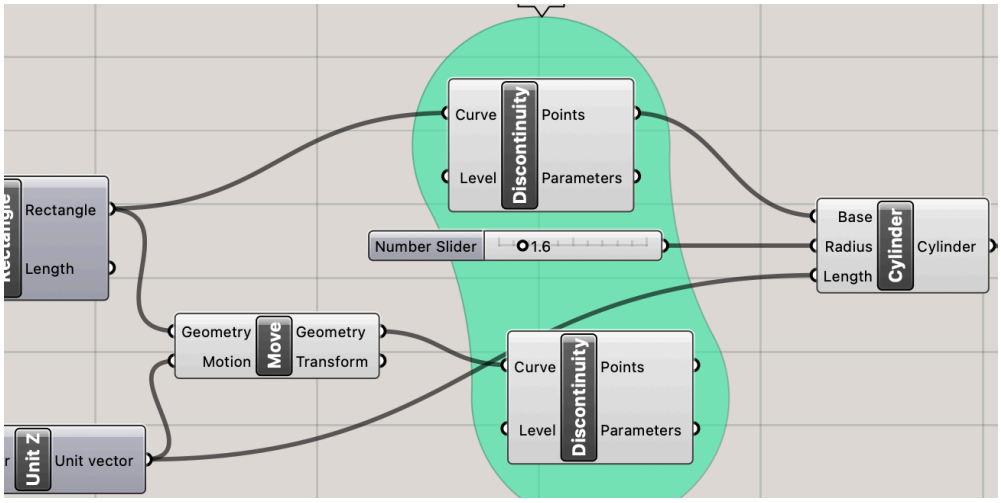


9) Now, let's make the legs of the table. Now that we have the vertices we can use them as a reference for the legs. Let's say that the legs are cylindrical. First, drop a **Cylinder Component** and connect it to

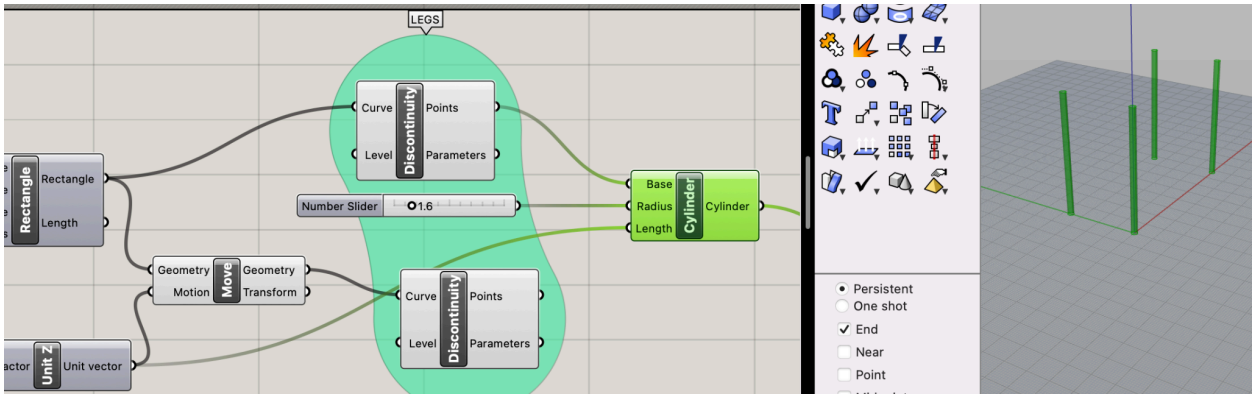
the points output of the discontinuity component. Make sure to select the discontinuity connected to our original rectangle. Give it a 10.00 number slicer with decimal points. This is the radius of your legs.



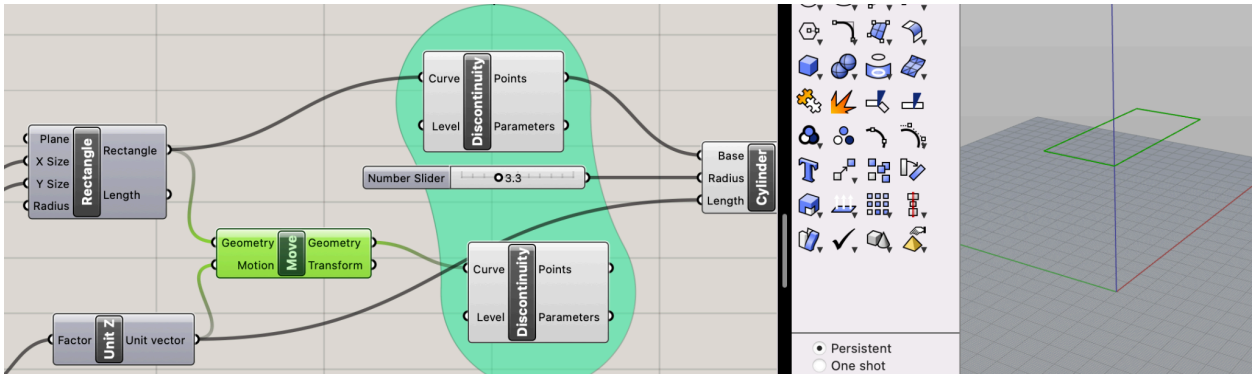
10) Now, to make sure the legs change as the height of the table changes, the Length of your cylinder must be connected to the Unit Z component.



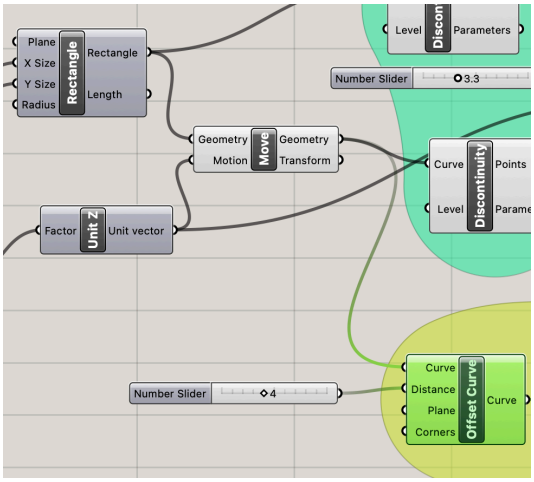
11) You should be able to see the legs of your table.



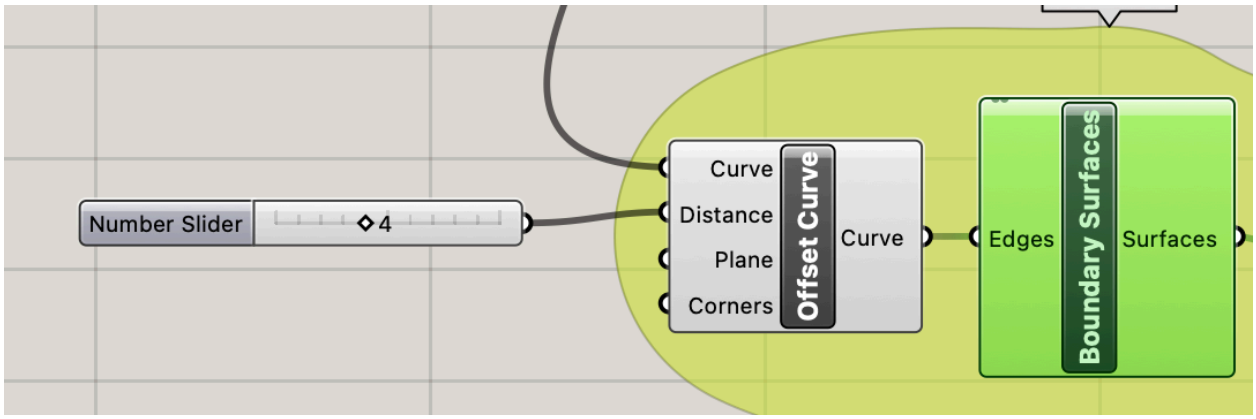
12) Now, let's work on the top of your table. For this we will need to work with the Geometry output of the move component.

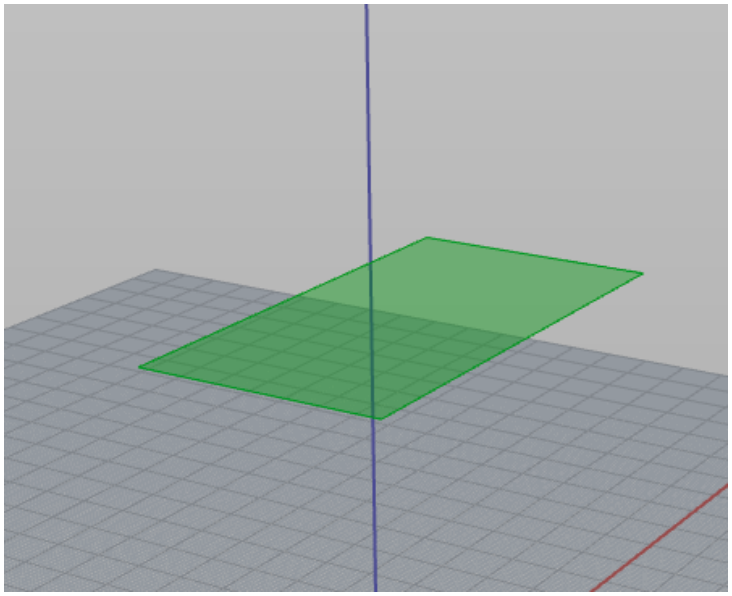


13) The first thing we will do is to create an offset of your curve using the **offset curve component.** Connect the Geometry output of the move component to the curve input of the offset curve component. Give it a number slider of 10 and connect it to distance.

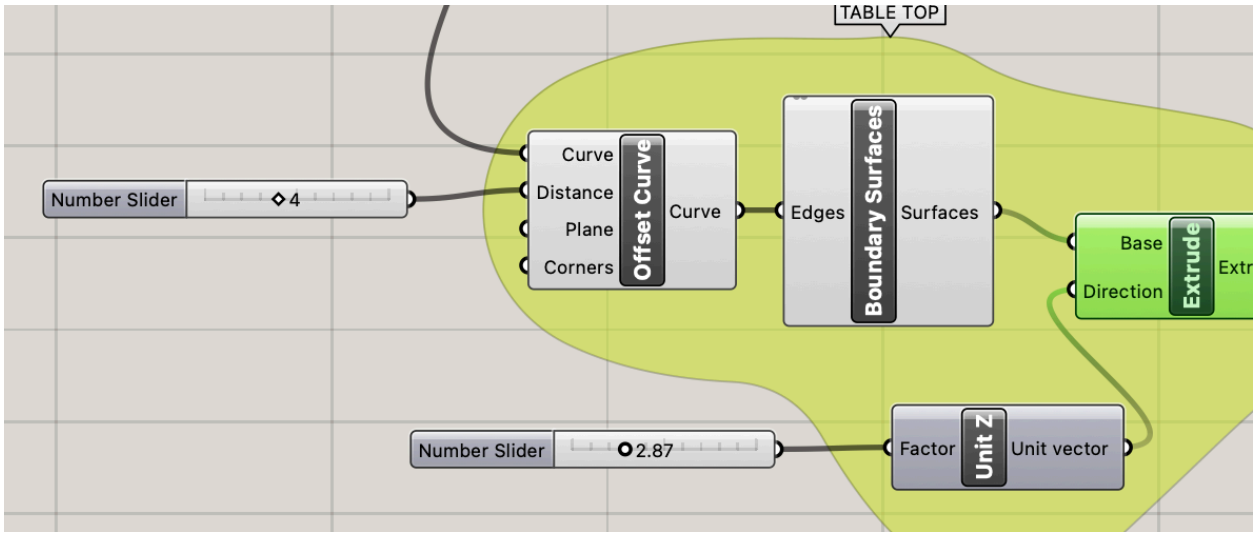


14) Now, let's make this offset into a surface by using the **Boundary Surface component.** Drop in a **Boundary Surface component** and connect it to the Curve input of the Offset curve component.



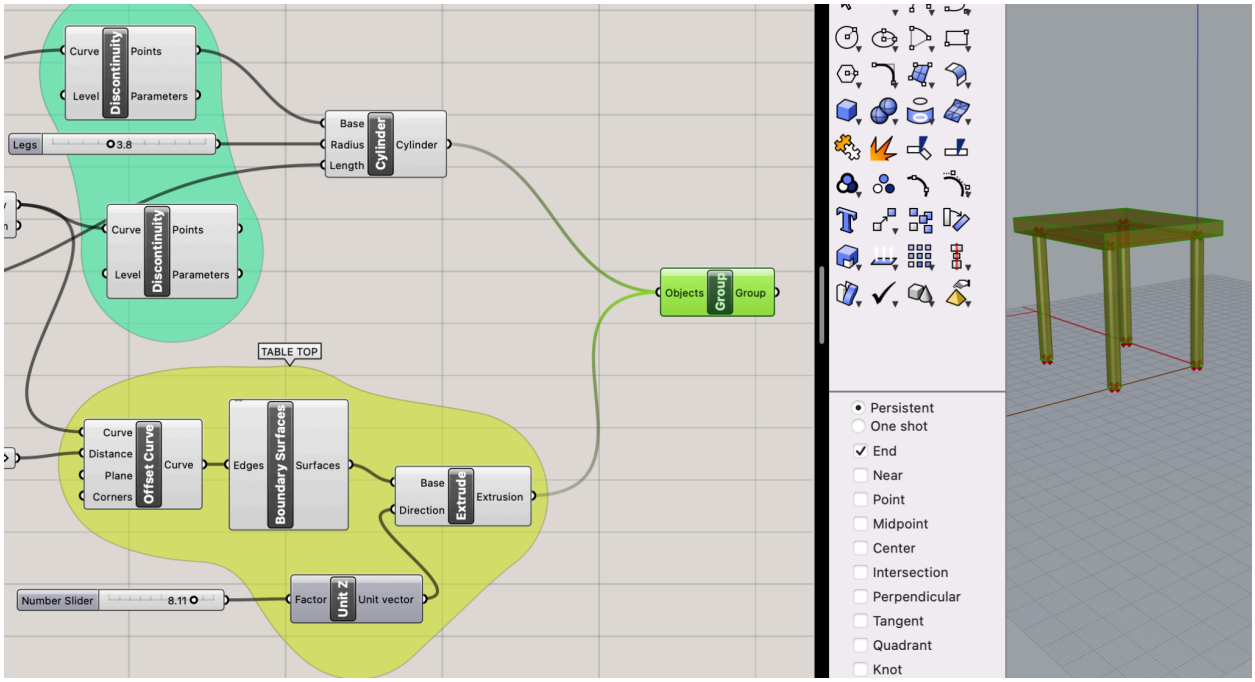


15) Now, let's give thickness to the table top by using the Extrude component. Drop in an Extrude Component and connect it to the surface output of the Boundary Surface Component.



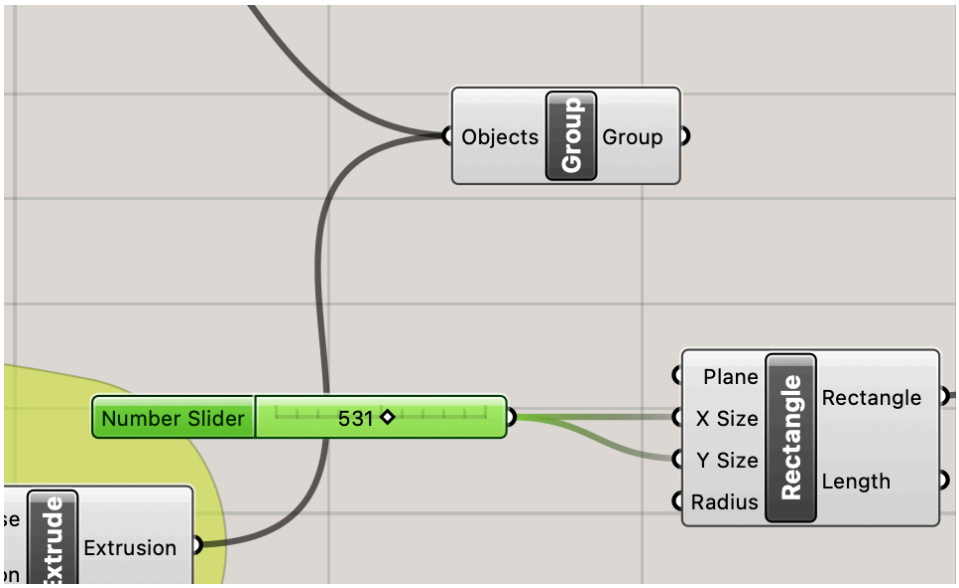
16) Drop in a Unit z Component and a number slicer of 10.00. Connect the number slider to the Unit Z component and connect the unit Z component to the direction input of the extrude component.

17) Let's group everything together by using the component Group.

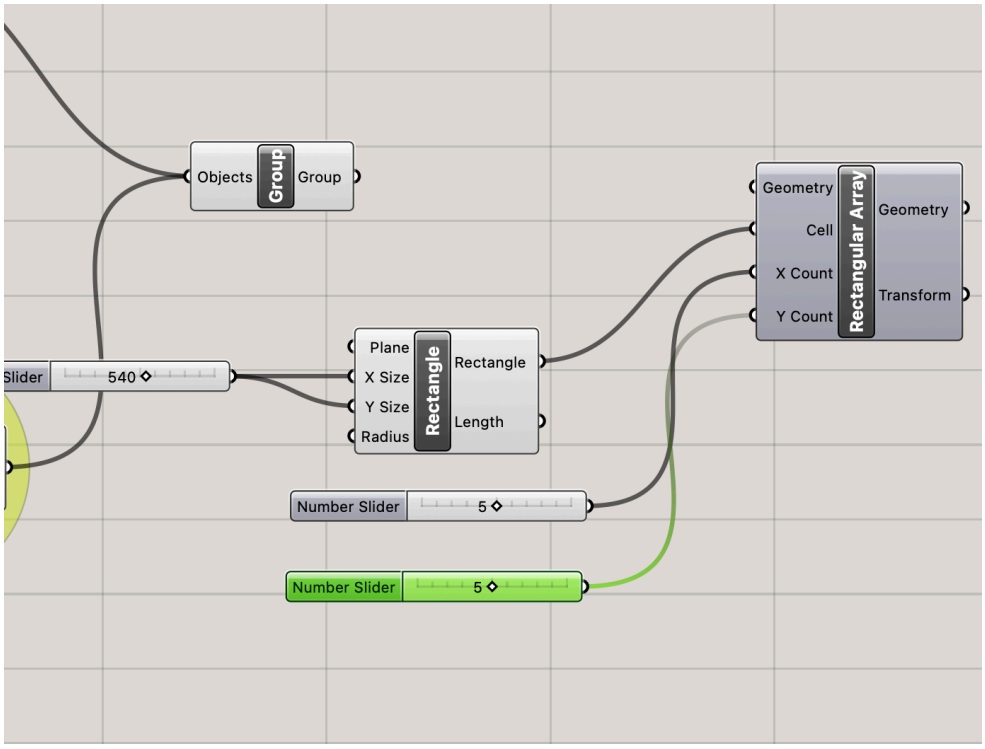


18) You can use the different sliders to create multiple tables of different heights, widths and lengths.

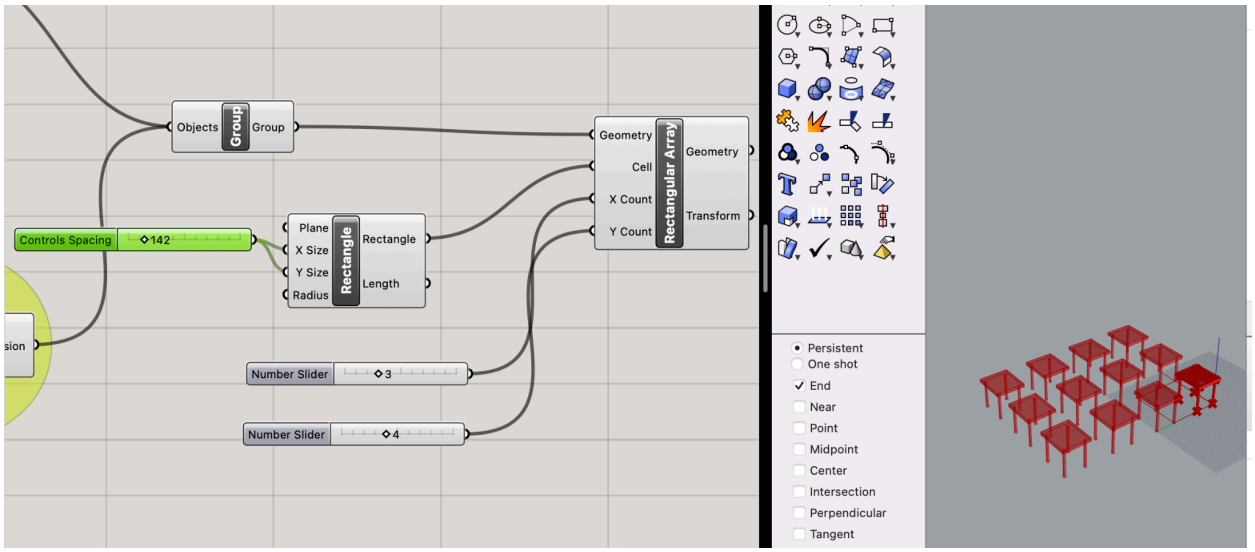
19) Let's say you want to create a bunch of tables for a restaurant. We will use the following script to do so. Drop a rectangle component. Give it a number slider of 1000. Connect the slider to both X & Y size.



20) Now drop in a **rectangular array component.** Connect the rectangle output of your rectangle component to the cell input of the rectangular array. Drop in two number sliders and connect one to the X count and one to the Y count.



21) Now connect the output from the group component to the Geometry input of the Rectangular Array component.



22) The rectangle slider controls the spacing between each table. The X & Y sliders from the rectangular array controls how many rows of tables on each axis.

Now create two designs of your own using different table shapes and/or leg shapes. Be ready to share them during next class.

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