

Procedural Building Tool Breakdown

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Houdini Version: 17.0.352

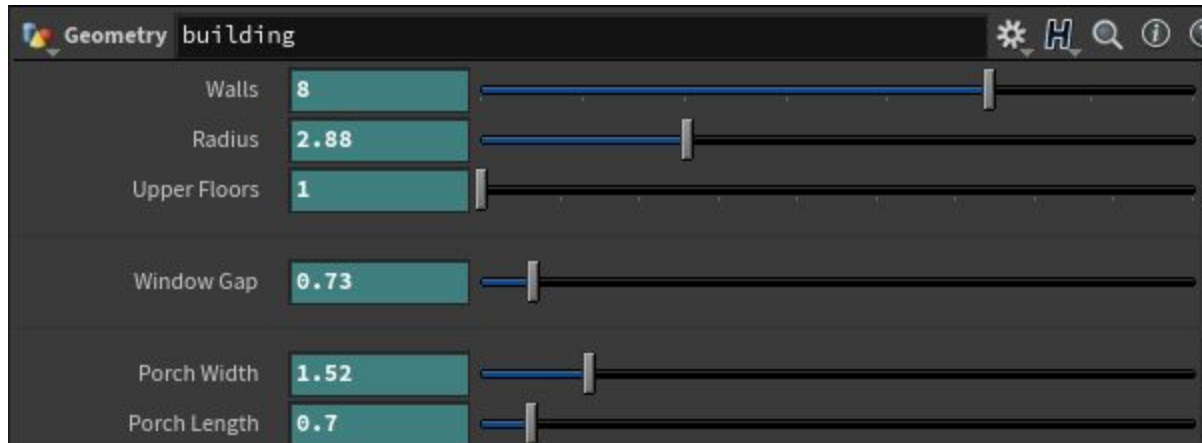
Important statistics:

Average render time: 22 min/frame (1280x720, 3x3 pixel samples, 6 min/13 max rays, 3 diffuse samples, 0.001 noise level).

Number of lights in scene: 2

Complexity of geometry (approximate): 2,000 polygons

User Guide:



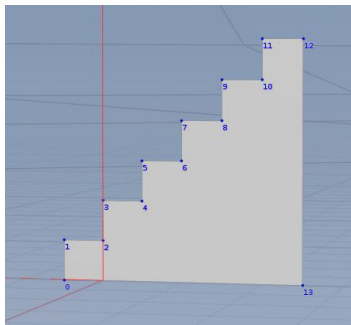
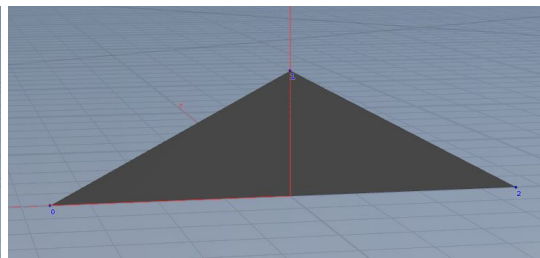
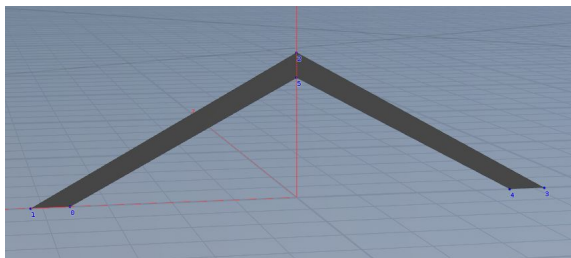
- The **Walls** parameter controls the number of sides that has the building.
- Since this building was originally an octagon, the parameters of width and depth are controlled by the **Radius** since the polygon used to make the basic structure of the building is a tube.
- The height of the building can be changed with the **Upper Floors** parameters. It controls the number of floors on top of the first one. The default and minimum value is 1.
- The **Window Gap** parameter controls the gap between windows and consequently the number of window on each side of the building.
- The **Porch Width** parameter controls the width of the porch.
- The **Porch Length** parameter controls the length of the porch.
- The **Window Size** parameter is an invisible parameter. It is hidden because it's only use was to facilitate the copy of the windows onto the walls. Having access to the parameter and changing it would distort the size of the windows making the proportions wrong

Breakdown:

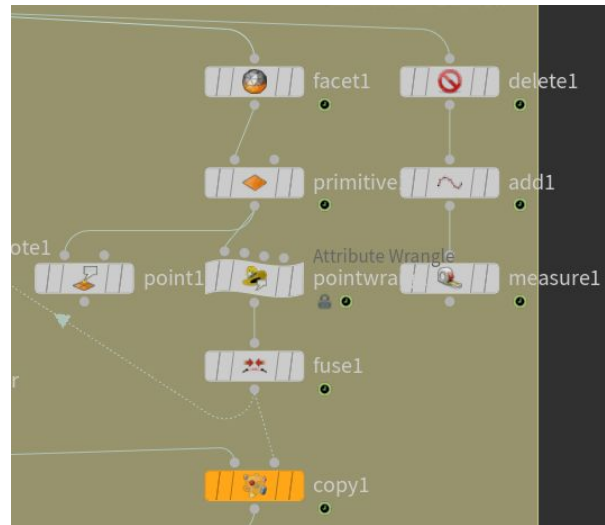
The node graph starts creating the elements of the bottom of the building and continues to the ones on the top. The nodes that make up each floor/part of the building are color coded and have a sticky node next to them stating what part of the building the color represents.

- To make the base and the pillars of the porch I used two copy nodes with expressions both on the copy number and the translate z.
 - Copy number = **size z of the base / ((pillar diameter = pillar radius*2) + gap)**
 - Translate Z = **size z of the base - (pillar diameter - gap) / (\$NCY-1) * \$CY - (.5 * size z of the base) + (.5 * pillar diameter)**
- To create the stairs and the roof of the porch I used add nodes to create the points that make up the shape of each element. An extrude node is used after to create volume out of the shape.

In the stairs case, a copy node was used to copy the step created with the add node to create the whole staircase. Another add node was used to create the corner and fuse was also used to get rid of duplicate points due to the copy of steps.



- The process of copying the windows onto the walls is long but effective. First you delete all the points but two of the tube and the with and add line and a measure node you get the length of each wall. A facet node is used to uniques the points, the primitive node is used to scaled down the tube to 0 to get the points of each side in the middle of each side. Point wrangle and point later store the normals for later use. Fuse is then used to fuse together the points in the middle of each side into one. The copy node, copies the windows into the points. Expressions in the copy node ensures that the number of windows on each side accounts for the length of the wall and the gap between windows.



- To be able to change the number of sides of the building I had to make the roof also able to change. To do that I used group nodes. I grouped the top points of the top tube that makes up the building and the bottom points of the tube at the bottom of the small chimney-like structure. Then I used group promote to make each group of points a group of edges. Lastly I used the poly bridge node to create a bridge between the edges of each group to form the roof. Both tube shave the same number of sides, which is controlled by the **Walls** parameter.

