

Houdini First Steps

M06 - Attributes



Agenda

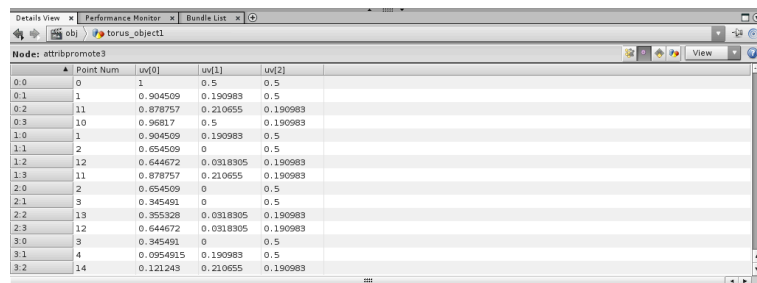
- What are Attributes
- Analyzing the four main classes of Attributes
- Understanding the Attribute Promote SOP
- Measure SOP
- Connectivity and Partition SOP
- Attribute Create
- Attribute Transfer



What are attributes - a short story

- **Attributes are pieces of data that either Houdini or you attach to geometry**
- **Imagine this - You buy a new sweater. Inside the sweater is a label that states its size and washing instructions. In this case These are attributes that come with the sweater**
 - In Houdini examples that we have done “point scale” would be an attribute that Houdini adds to points automatically
- **Now imagine this - You look on the sweater’s sleeve and there is a price tag. This is an attribute that the store added to the sweater**
 - Attributes can be added whenever it is convenient for you the user to add them. When you need some bit of information to stick around for a while add an attribute. “Point Color” is an attribute that we the user have added before in our examples.
- **Finally imagine this - You buy the sweater and tear off the price tag before wearing it. You know longer have a need for the price tag**
 - In Houdini once there is no need for the extra data we can delete it

Attribute Classes

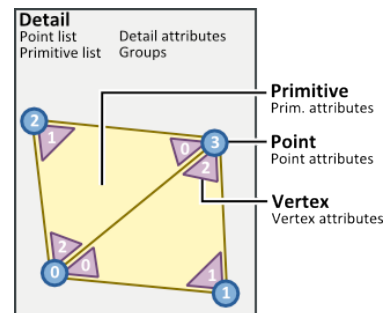
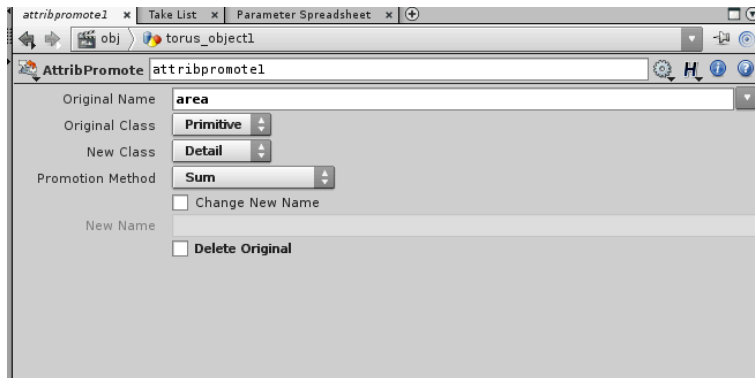


Details View | Performance Monitor | Bundle List | torus_object1

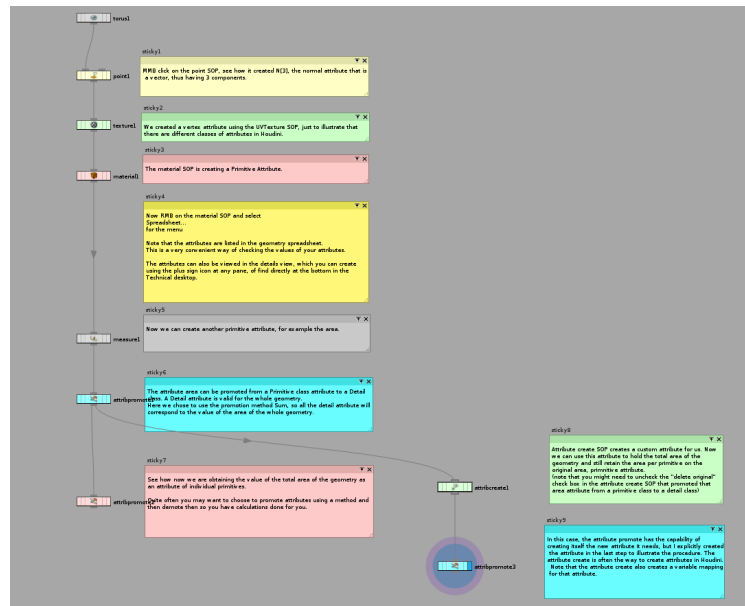
Node: attribpromote3

	Point Num	uv[0]	uv[1]	uv[2]
0.0	0	1	0.5	0.5
0.1	1	0.904509	0.190983	0.5
0.2	11	0.878757	0.210655	0.190983
0.3	10	0.96817	0.5	0.190983
1.0	1	0.904509	0.190983	0.5
1.1	2	0.654509	0	0.5
1.2	12	0.644672	0.0318305	0.190983
1.3	11	0.878757	0.210655	0.190983
2.0	2	0.654509	0	0.5
2.1	3	0.345491	0	0.5
2.2	13	0.355328	0.0318305	0.190983
2.3	12	0.644672	0.0318305	0.190983
3.0	3	0.345491	0	0.5
3.1	4	0.0954015	0.190983	0.5
3.2	14	0.121243	0.210655	0.190983

- ▶ Point - Point attributes include point scale and normal
- ▶ Vertex - Vertex attributes include uv data
- ▶ Primitive- An example of primitive attributes would be materials and area
- ▶ Detail - Detail is the whole geometry. If you want an attribute to be attached to the whole geometry then use a detail attribute.



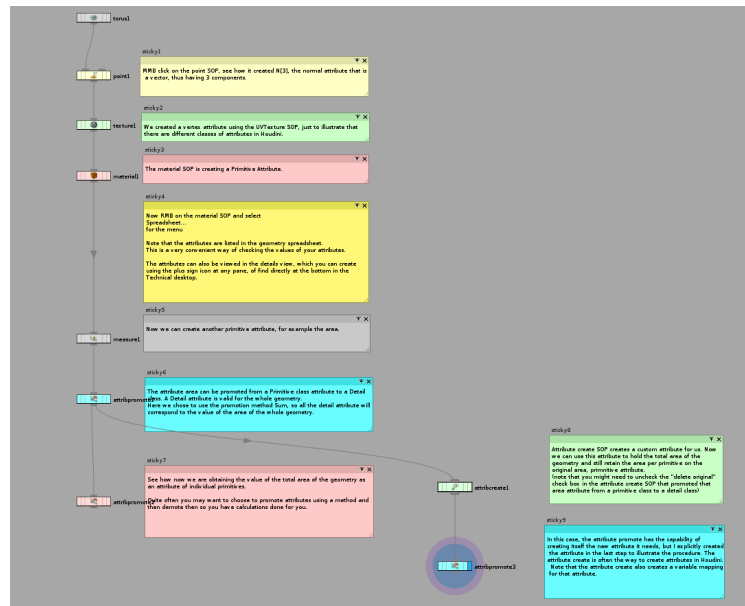
Example 1 - Playing with a Torus



Key Points

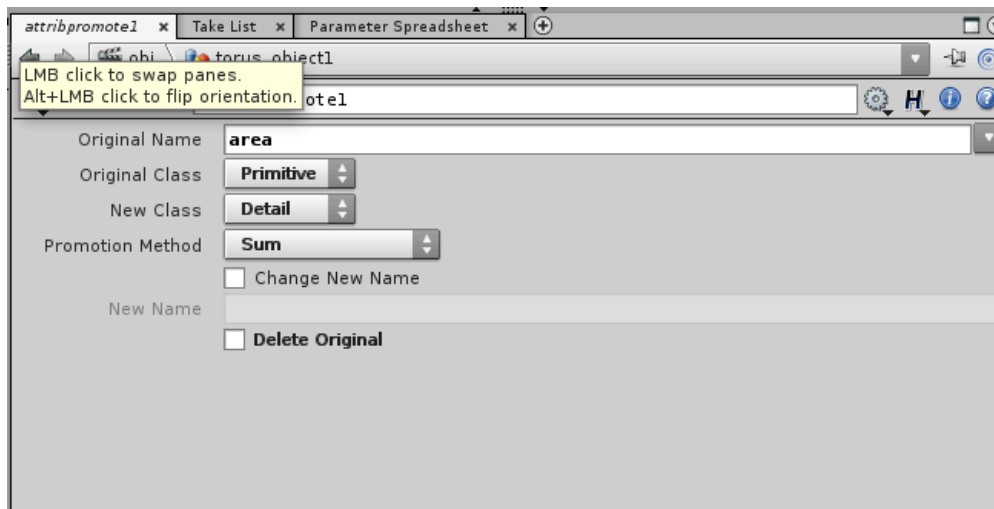
- ▶ Torus does not have normals
- ▶ Add Point SOP and then “Add Normals”
 - ▶ Middle Click on Point SOP and see a point attribute N[3] has been created
 - ▶ Open Spreadsheet and see the same
- ▶ Add a Texture SOP
 - ▶ Middle Click on Texture SOP and see vertex attribute has been created
- ▶ Add Material SOP
 - ▶ Material SOP creates a Primitive Attribute

Example 1 - Continued



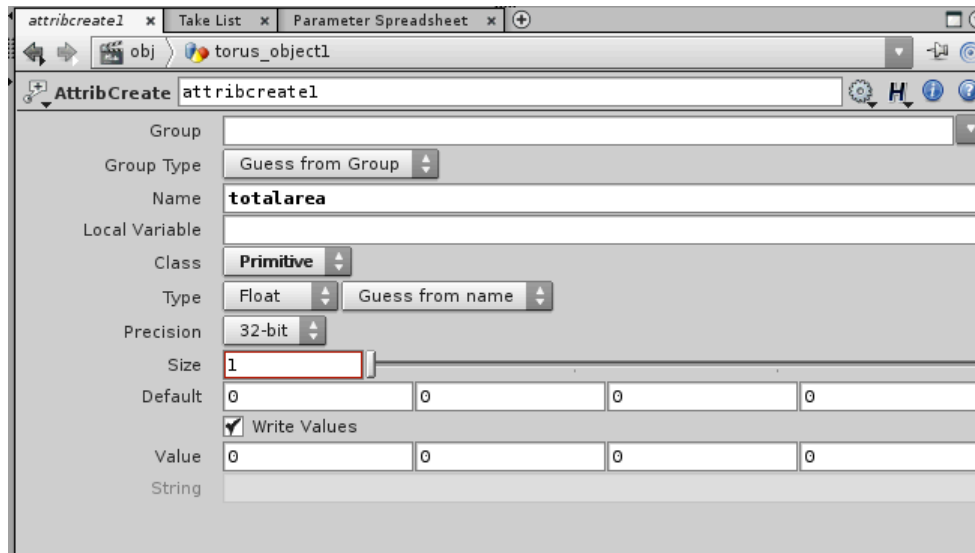
- Key Points (Continued)
 - Add a Measure SOP
 - Another Primitive SOP is created

Attribute Promote



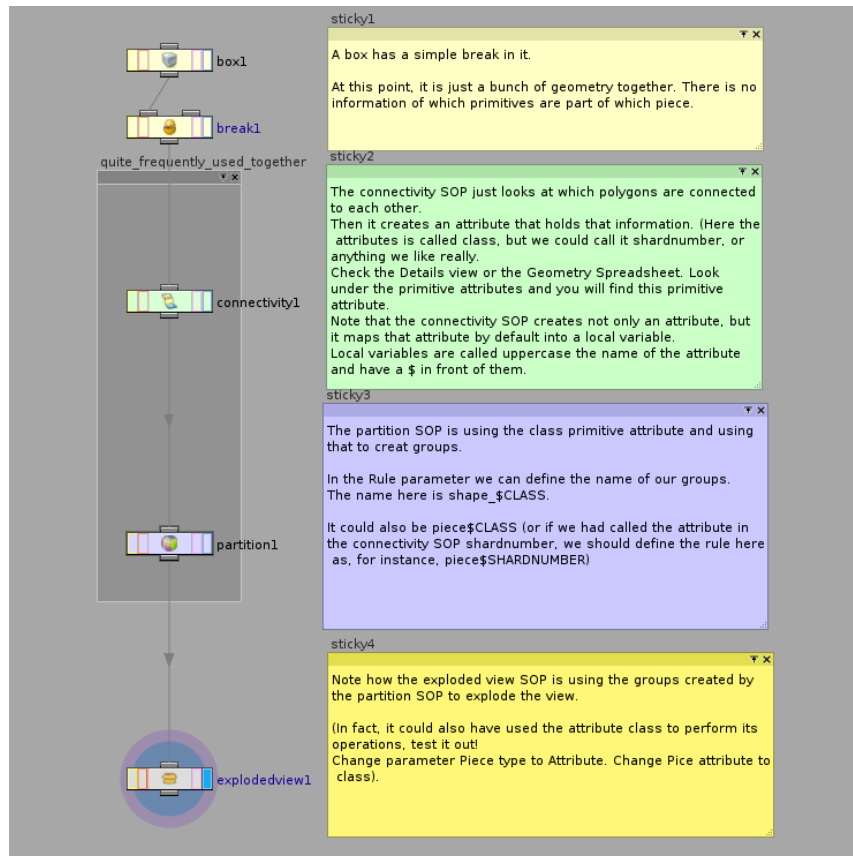
- ▶ Attribute Promote - Promotes or demotes attributes from one geometry level to another
- ▶ e.g., - Promote the “area” which is a Primitive SOP to a Detail SOP
- ▶

Attribute Create



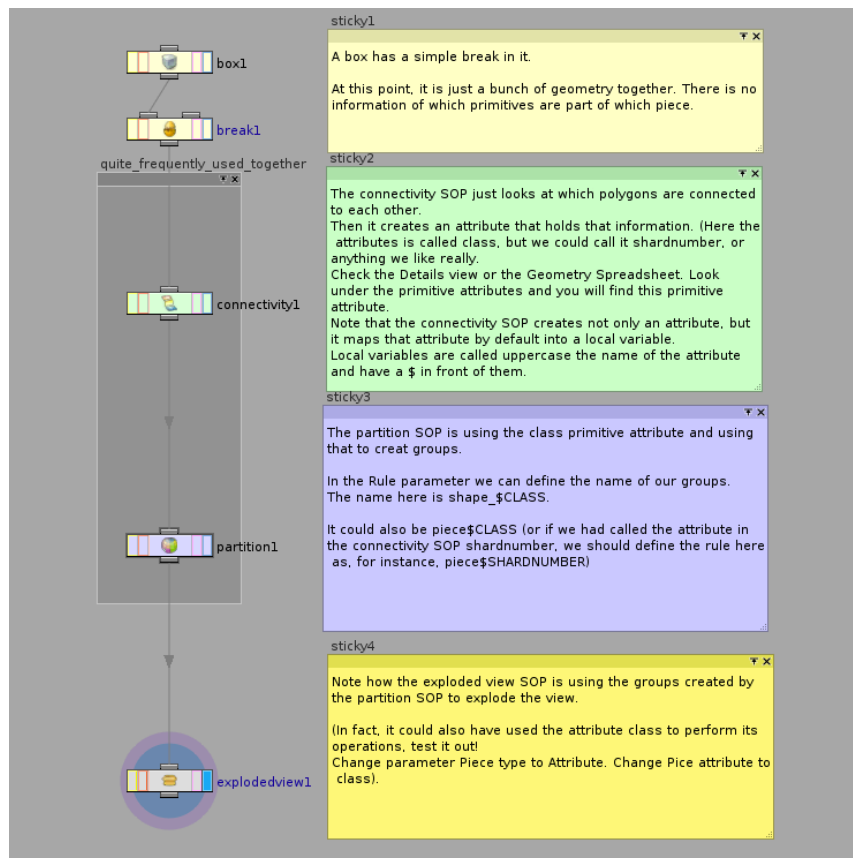
- ▶ Attribute Create - Adds or Edits User Defined Attributes
 - ▶ The attribute can be a float, integer, vector, or string type. If the local variable name is not specified, the attribute name (all uppercased) will be used.

Example 2 - Attributes to Create Groups



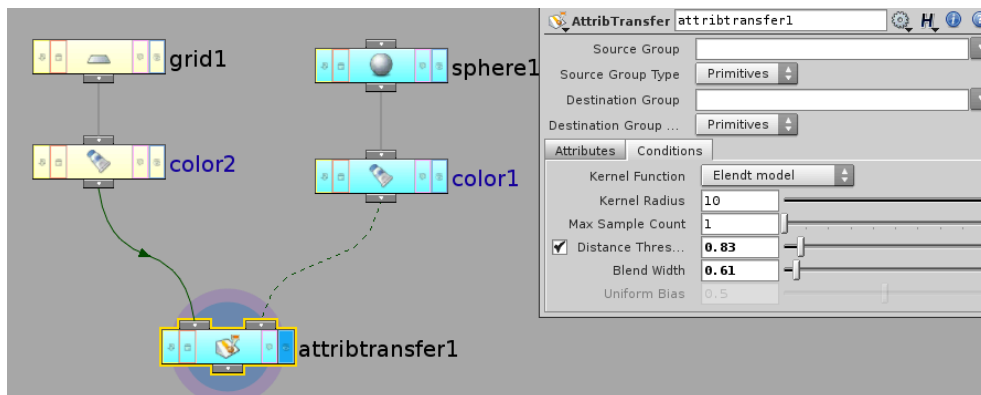
- ▶ Box with a BREAK SOP attached
- ▶ Breaks the input geometry using the specified cutting shape.
- ▶ CONNECTIVITY SOP
 - ▶ Creates an attribute with a unique value for each set of connected primitives or points.

Example 2 - Continued



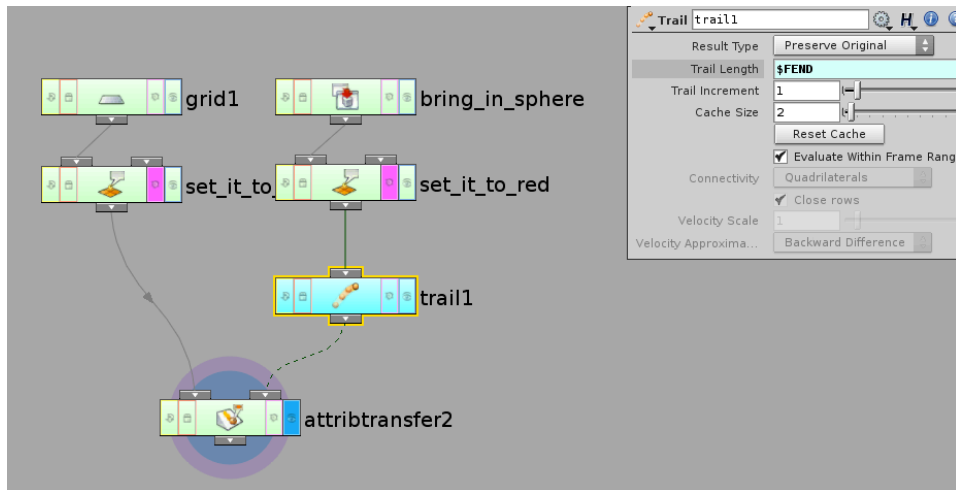
- PARTITION SOP
 - Places points and primitives into groups based on a user-supplied rule.
 - The Partition SOP places points and primitives into groups based on a user-supplied rule. For example, in order to put each point in its own group named pt_pointnumber, enter the rule pt_\$PT.
- EXPLODED SOP
 - Pushes geometry out from the center to create an exploded view.

Example 3 - Attribute Transfer



- ▶ Attribute Transfer
 - ▶ Transfers vertex, point, primitive, and/or detail attributes between two models.
 - ▶ Attribute transfer works by proximity. It transfers attributes from one piece of geometry to the closest points on a different piece of geometry, so you can copy the attributes from one model to another even if they have completely different topologies.

Example 04 - Attribute Transfer 2



Trail SOP

- ▶ Creates trails behind points.
- ▶ The Trail op takes an input op and makes a trail of each point of the input op over the past several frames, and connects the trails in different ways. It will generate trails of any input geometry, whether it is a cube translating, a deforming surface, or particles. This is useful for multi-frame ghosting effects and temporal modeling.