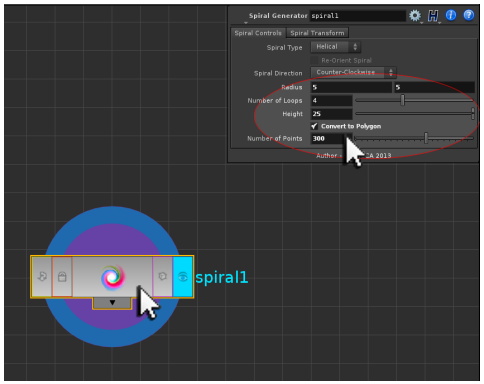
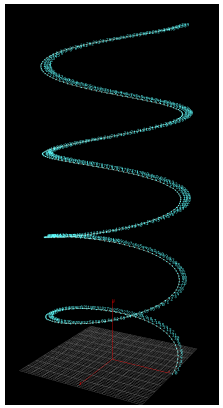
In a **new Houdini scene**, create a **Geometry Object** and inside it **replace** the **default File SOP** with a **Spiral Generator**. In the **parameters** for the **Spiral Generator** specify:

Radius	**5**	**5**
Height	**25**	
☑	**Convert to Polygon**	
Number of Points	**300**	

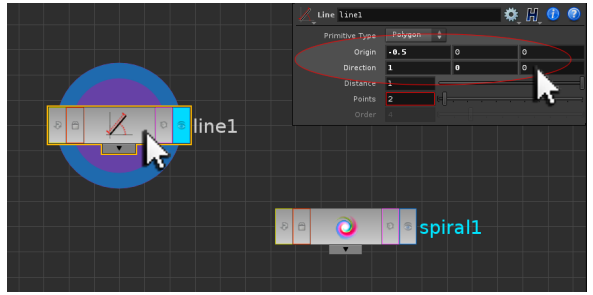
This will create a large Helical Spiral that can be used as the base geometry for a DNA model.





Alongside the Spiral Generator SOP, create a **Line SOP**. This can be used for the rungs of the DNA model. In the **parameters** for the **Line SOP** specify:

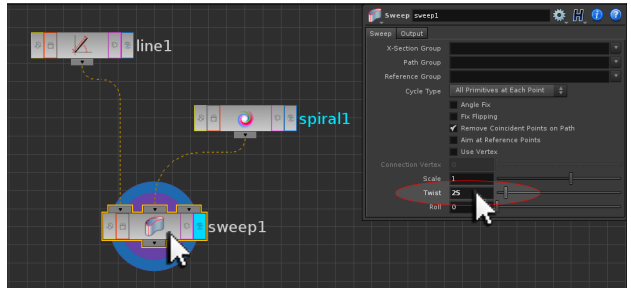
Origin	**-0.5**	**0**	**0**
Direction	**1**	**0**	**0**

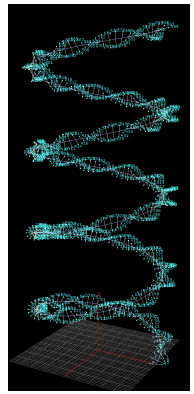


Create a **Sweep SOP**, and feed the output of the **Line SOP** as the **first input**, with the output of the **Spiral Generator SOP** as its **second input**. In the **parameters** of the **Sweep SOP** specify:

Twist	**25**

This will create the twisting DNA spiral shape.





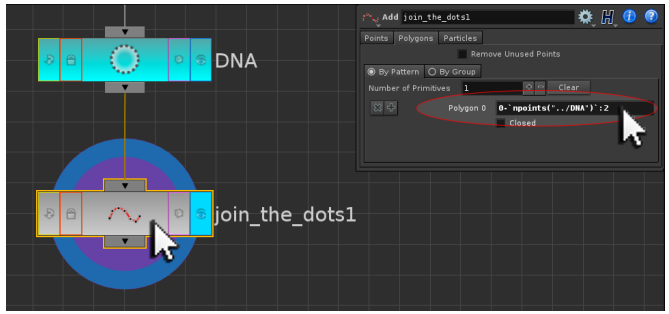
NOTE: Activating Point Display and Point Numbers can help visualize the effect.

To the output of the Sweep SOP append a **Null SOP** and rename it to **DNA**. This will act as a reference address when rebuilding this DNA base geometry into a higher-level model.

Append to the DNA **Null SOP** an **Add SOP**. Under the **Points** section of the **parameters** specify:

☑ **Delete Geometry But Keep The Points**

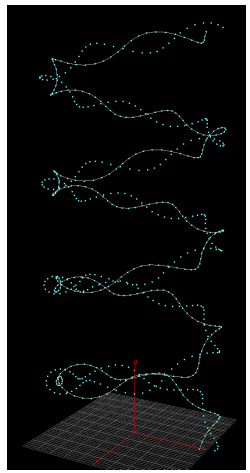
This will remove all of the geometry aside from the point data.



Under the **Polygons > By Pattern** section of the **Add SOP** specify in the **parameters**:

Polygon 0 **0-`npoints("../DNA")`:2**

This will draw a line from point 0 through to the final point of the DNA Model, whilst omitting every second point.



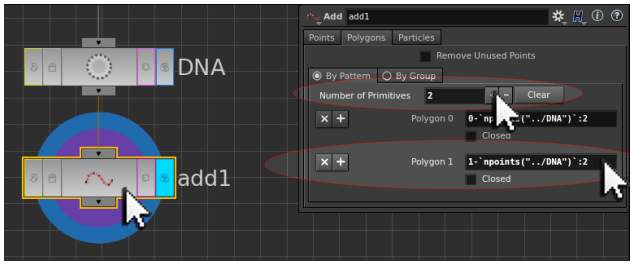
NOTE: A full syntax list for the Add SOP can be found in its Help Card.

NOTE: The **npoints() function** will automatically return the total number of points from any node being referenced inside it. As this expression is being created in a text field, it **must be surrounded by back-ticks** (`) in order for it to be evaluated as an expression rather than as text.

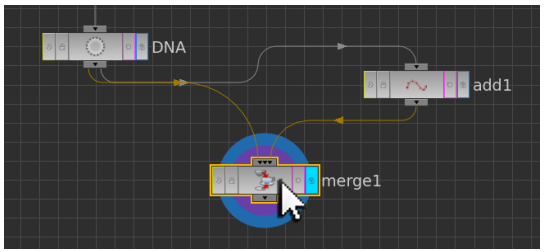
NOTE: The **Polygon 0 expression** could be replaced by **0-600:2**, which would create an identical effect. This however is hard coding into the Add SOP to draw a line between points 0-600 omitting every second point. This means that if the number of points created by the Spiral Generator were to change, this value of 600 would also need adjusting accordingly. The npoints() expression however keeps everything procedural so if the number of points created by the Spiral Generator were to change, nothing would break.

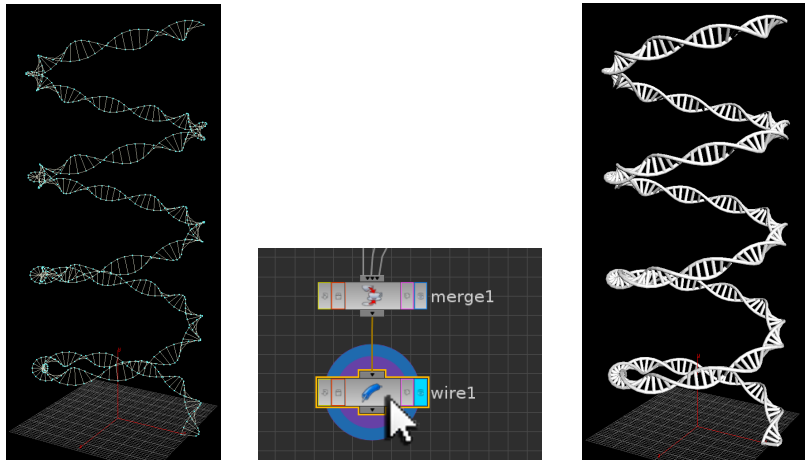
In the **parameters** of the **Add SOP**, **increase** the **Number of Primitives value** to **2**, and **specify**:

Polygon 1 **1-`npoints("../DNA")`:2**



This will draw a line between the other set of points of the DNA base geometry. The **outputs** of the **DNA Null SOP** and the **Add SOP** can then be merged together using a **Merge SOP**.





As a final step, the output of the Merge SOP can be fed into a Wireframe SOP to build geometry along all of the merged DNA construction lines. **See file H14_procedural_DNA.hipnc**

FURTHER DEVELOPMENT

This network can be collapsed into a Digital Asset in its own right, and core parameters of the DNA network can be ported to the top level of the DNA Digital Asset for the end user.

A Switch SOP can also be used to switch between the Merge SOP and the Wireframe SOP if the wireframed geometry becomes too heavy for the viewer.