



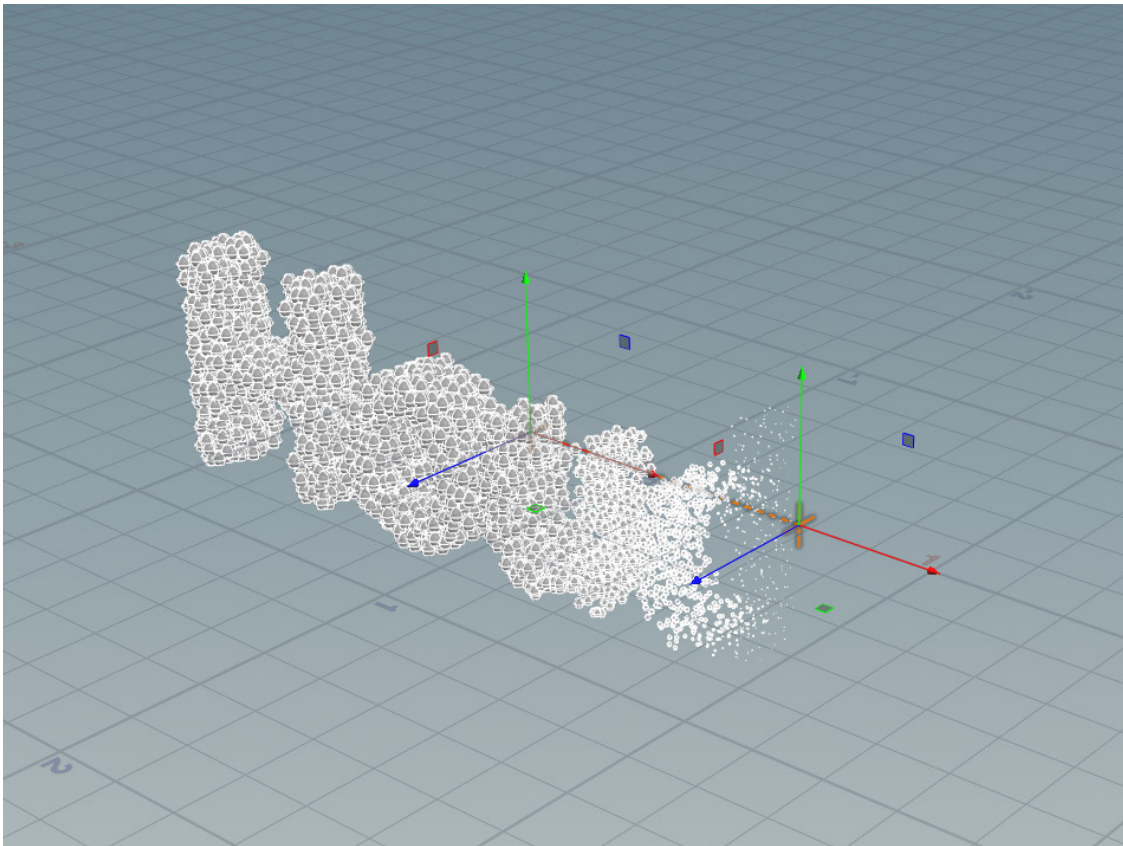
Curriculum-in-a-Box | Lesson 3 | Guided Work

SIMPLE TEXT SCATTER

Students are now asked to follow-along with the teacher as they build something in Houdini. For this lesson, students will learn how to work with attributes, and how to use those attributes to manipulate copies of geometry. This specific example will take some text, scatter spheres into it, and animate their scale along the text using attributes. In order to achieve this, you will learn how to add an attribute using the Attribute Adjust nodes. Copying geometry to points is a fundamental concept for working with geometry in Houdini, and students will have a much deeper understanding of this after completing the following exercise.

WHAT STUDENTS WILL LEARN

- How to scatter points into the volumetric area of geometry
- How to drive the scattering with an animated attribute
- How to use the Attribute Adjust nodes
- How to use the Copy to Points SOP to copy geometry



PART ONE

Text Creation and Point Scattering

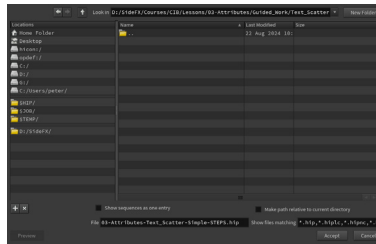
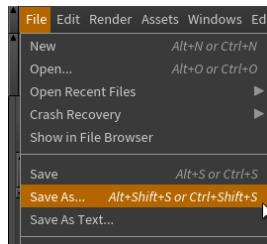
In this first section of the assignment you will show your students how to set up their project, add text to the scene, and scatter points within it. These points will be the location onto which you copy your geometry later in the lesson.

1. Set up your Project Directory

- Download the *CIB_Lesson03.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_Lesson03* directory and press **Accept**.

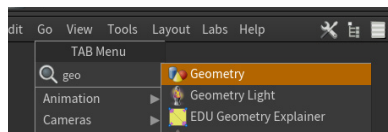
2. Save your Scene File

- From the File menu, choose **Save As**.
- Make sure you are in the *CIB_Lesson03* 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**.



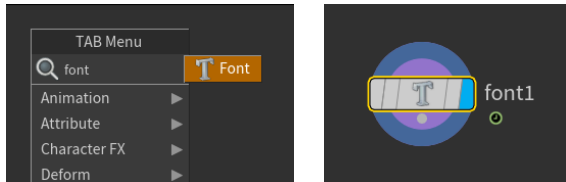
- Click in the Network View to place the node.
- Double-click the *geo1* name and change it to something like *simple_text_scatter*.
 - This will be a container for the geometry that you create.



- Double-click the *simple_text_scatter* node to dive inside.

4. Add text to the scene

- Press **Tab** in the Network View, type *font*, and press **Enter**.
- **Left-click** to place the node.

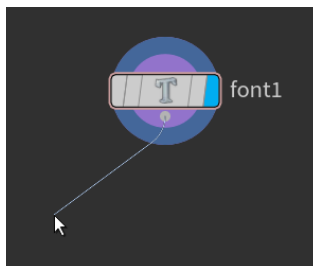


- In the Parameter Pane, change the **Text** to *Houdini*.
 - You should now see *Houdini* as 2D geometry in the Scene View.

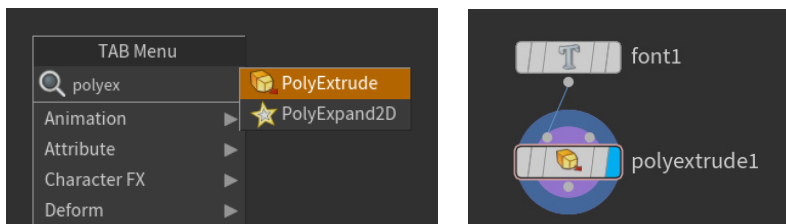


5. Extrude the text

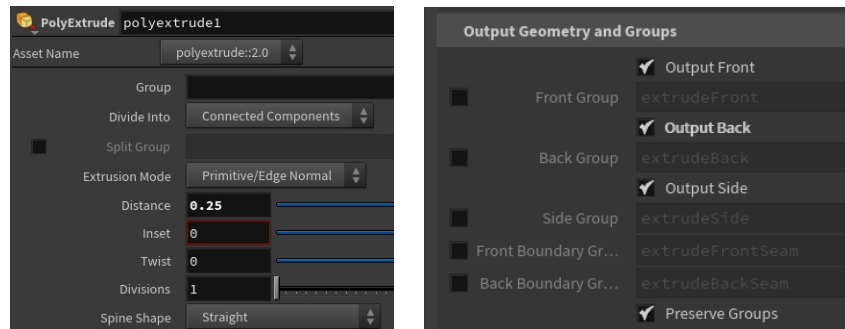
- **Left-Click** on the *Font* node's output dot.
 - You will now have a wire that follows your cursor and is connected to the output dot.



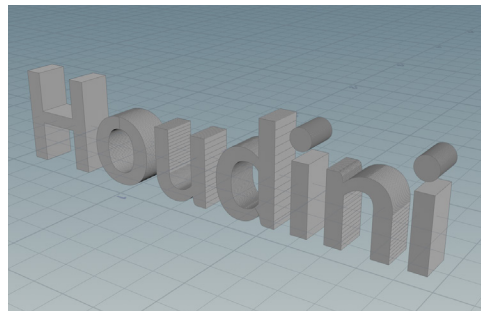
- Press **Tab** in the Network View, type *polyex*, and press **Enter**.



- A new *PolyExtrude* node will be placed in your Network View, and will be connected to the *Font* 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 *PolyExtrude* node to move the blue Display Flag.
 - This allows us to visualize what the *PolyExtrude* 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 *PolyExtrude* node isn't highlighted in yellow, click on the center of it in the Network View.
- In the Parameter Pane, change the **Distance** to **0.25**.
- Scroll down to the **Output Geometry and Groups** section, and check the box next to **Output Back**.

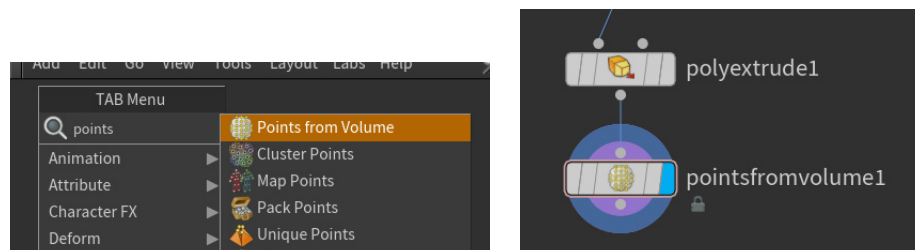


- You should now see your text as closed, 3D geometry.

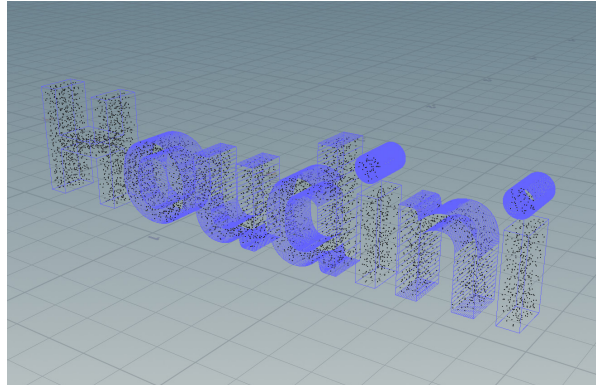
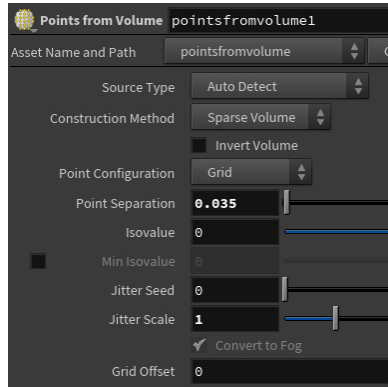


6. Fill the text's volume with points

- Click the output dot of the *polyextrude1* node.
- Press **Tab** in the Network View, type *points*, and press **Enter**.



- In the Parameter Pane, change the **Point Separation** to **0.035**, and the **Jitter Scale** to **1**.



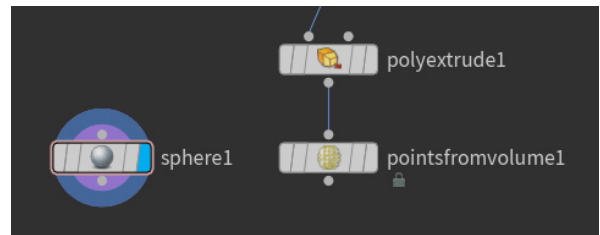
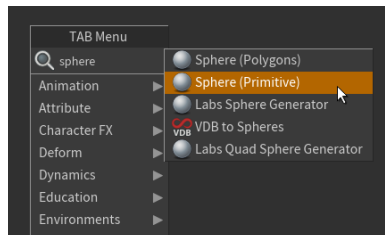
PART TWO

Copy Spheres to the Points

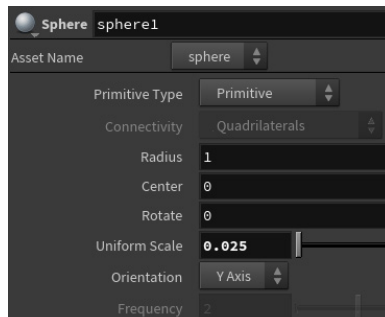
The next step in this exercise will show your students how to paint an attribute onto geometry in Houdini. The concept of writing attributes to geometry is one of the fundamental ideas of Houdini's procedural workflows. Painting these attributes will allow you to drive this proceduralism with artistic decisions.

1. Add a sphere to the scene

- Press **Tab** in the Network View, type *sphere*, and select **Sphere (Primitive)**.
- Left-click** to place the node.

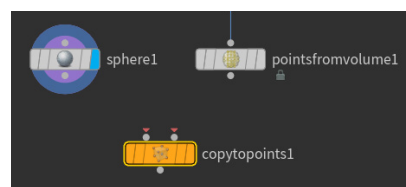
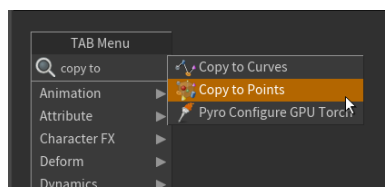


- In the Parameter Pane, change the **Uniform Scale** to **0.025**.

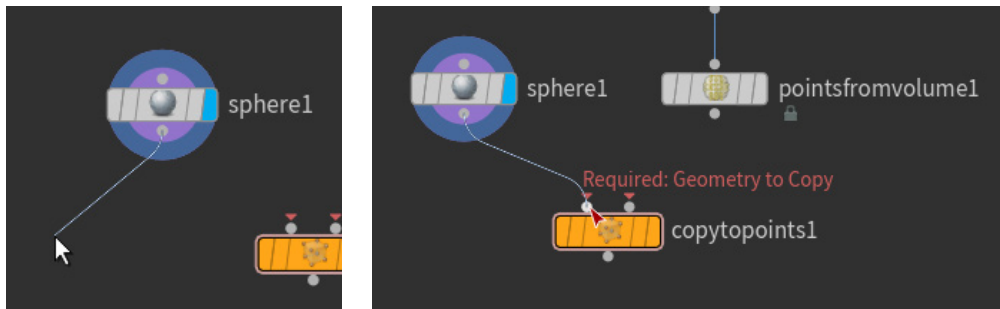


2. Copy the sphere to the points

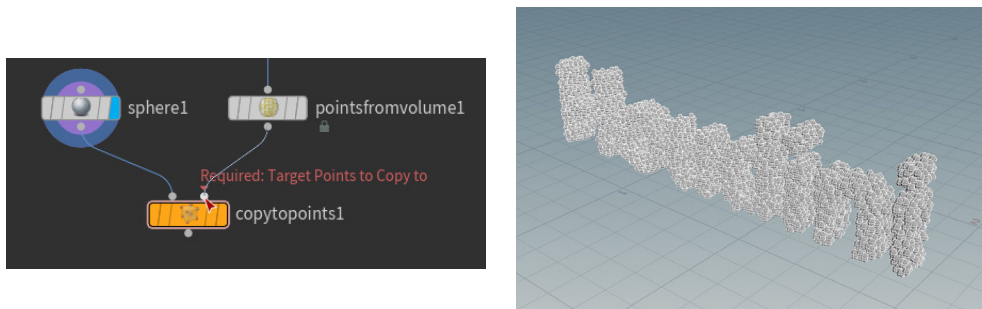
- Press **Tab** in the Network View, type *copy to*, and select **Copy to Points**.
- Left-click** to place the node.
 - Take care to select **Copy to Points**, and not **Copy to Curves**. The latter node comes first in the list, so it might be easy to select incorrectly.



- **Left-click** on the output dot from the *sphere1* node, and **Left-click** to attach the wire to the first input of the *copytopoints1* node.
 - You can see that inputs are named in the screenshot. This is especially helpful for multi-input nodes like *Copy to Points*. Here we can see that input 1 is named **Geometry to Copy**.



- Repeat the last step between the *pointsfromvolume1* node and the *copytopoints1* node's second input.
 - If we change the blue Display Flag to the *copytopoints1* node, we'll see that our primitive spheres are now copied to the points.



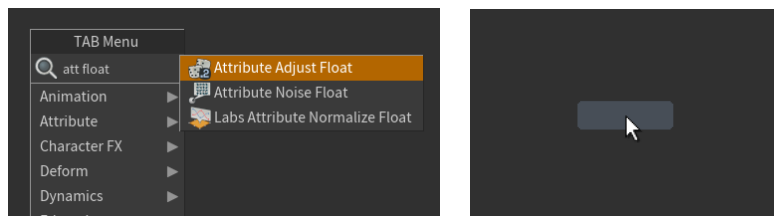
PART THREE

Create and Animate a *pscale* Attribute

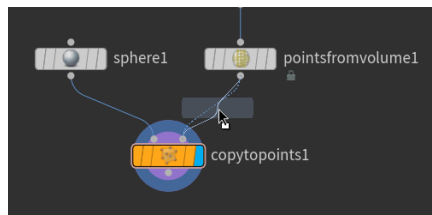
In this final part of this exercise, you will guide your students through adding and animating a *pscale* attribute. You will do this by using one of the *Attribute Adjust* nodes. This node will let you animate a linear falloff over the text that we created in the earlier parts of the exercise. Adjusting the *pscale* attribute will make the spheres scale-up over time. Keyframing the creation of attributes is a procedural way to create animation.

1. Add a *pscale* attribute to your points

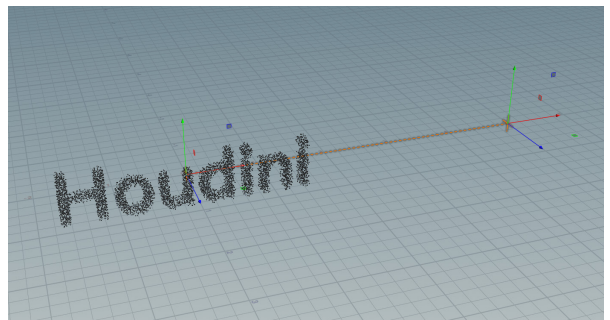
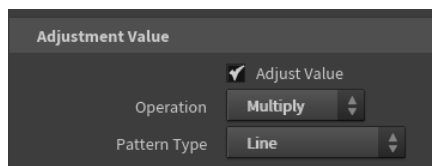
- Press **Tab** in the Network View, type *att float*, and press **Enter**.
 - You will now have a ghost node attached to your cursor.



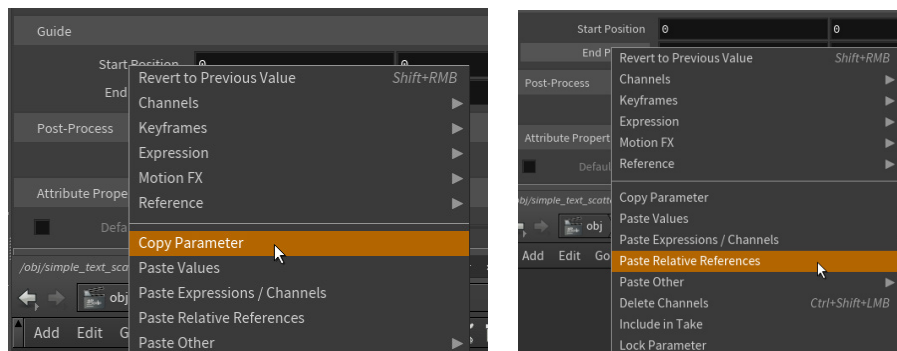
- Move the cursor between the *pointsfromvolume1* node and the *copytopoints1*, and **Left-click** to place the node.



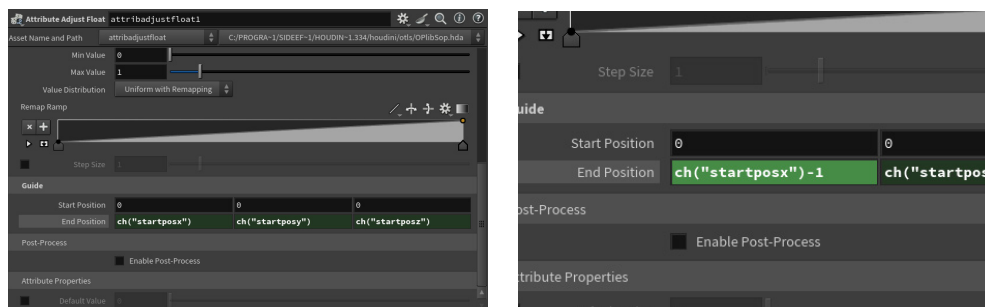
- In the Parameter Pane, scroll down to the **Adjustment Value** section. There, change the **Operation** to **Multiply** and the **Pattern Type** to **Line**.



- Scroll down more and find the **Guide** section. Here, **Right-click** on the **Start Position** text, and select **Copy Parameter**.
- **Right-click** on the **End Position** text, and select **Paste Relative References**.

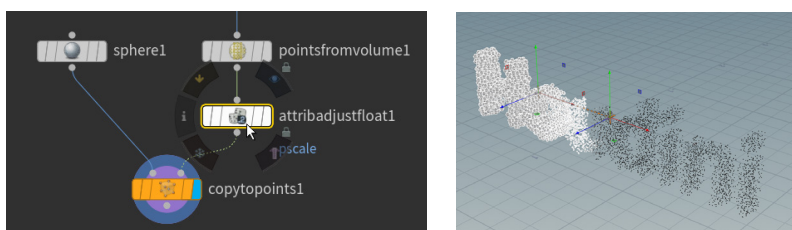


- You should now see some code copied into the **End Position** boxes, and the background color should be green.
- **Left-click** inside the first box at the end of the text, and change it to `ch("startposx")-1`.

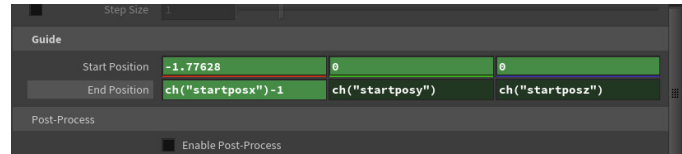
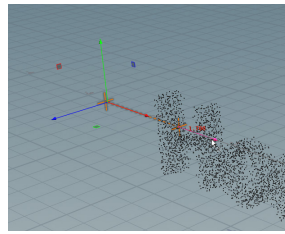


2. Animate the attribute via the Scene View

- **Left-click** the middle of the *attribadjustfloat1* node in order to select it.
- Hover over the Scene View and press **Enter**.



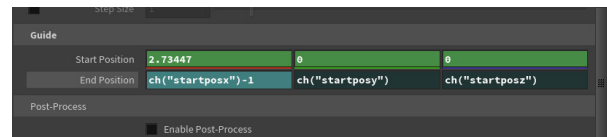
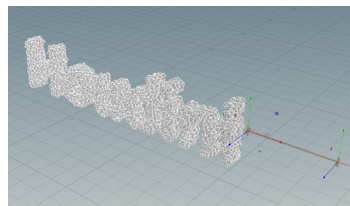
- **Left-click** and **drag** on the red arrow of the right handle, and **drag** it to the left until you don't see any spheres, and see only points.
- In the Parameter Pane, **Alt + Left-click** on the **Start Position** text. This will turn green to indicate that a keyframe has been added.



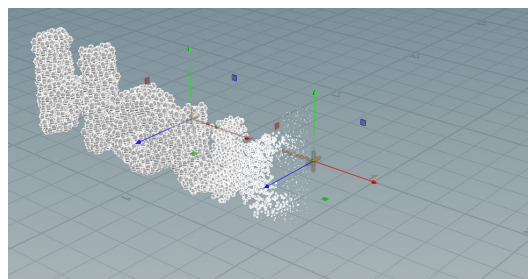
- Go down to Houdini's timeline, and change the current frame to **120**.



- **Left-click** and **drag** on the red arrow of the right handle, but this time drag the handle to the right until the spheres are all full-sized.
- In the Parameter Pane, **Alt + Left-click** on the **Start Position** text in order to make a second keyframe.



- **Click** on the current frame handle in the timeline, and move it back and forth to see the result of our attribute animation.



CONGRATULATIONS

You have now completed your text scattering exercise. This has taken you through a project that began with text geometry, and then you scattered points into the 3D volume of the text, copied primitive spheres onto the points, and finally added an animated attribute that scaled the spheres over time.