

Bifrost Workshop

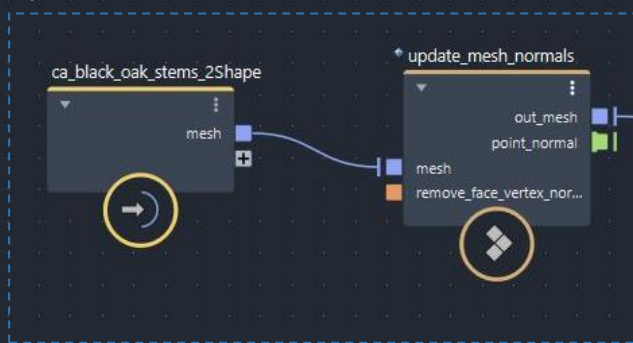
Lesson 2

Scattering and Instancing

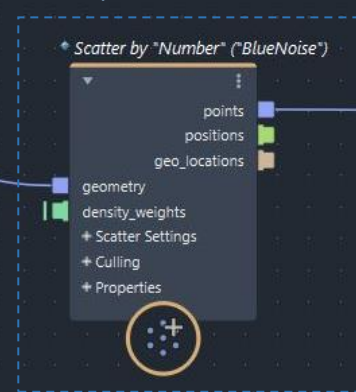


Creating Leaves

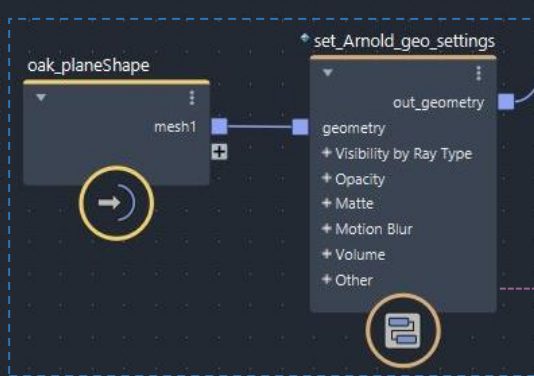
bring tree branches into Bifrost and
update the normals



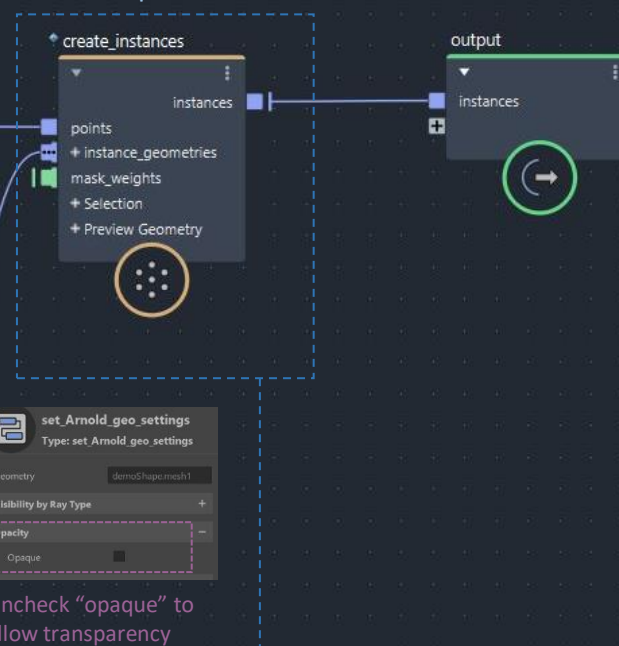
scatter points on the branches



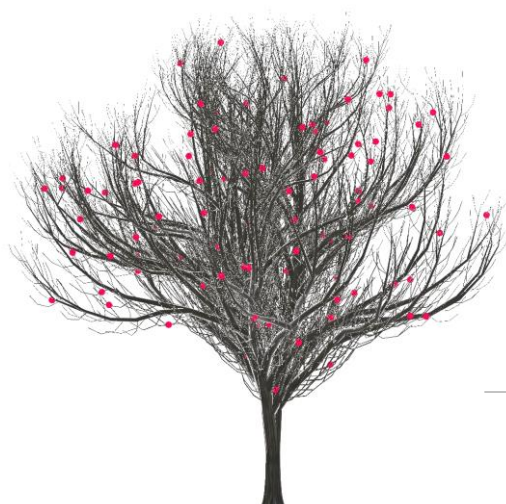
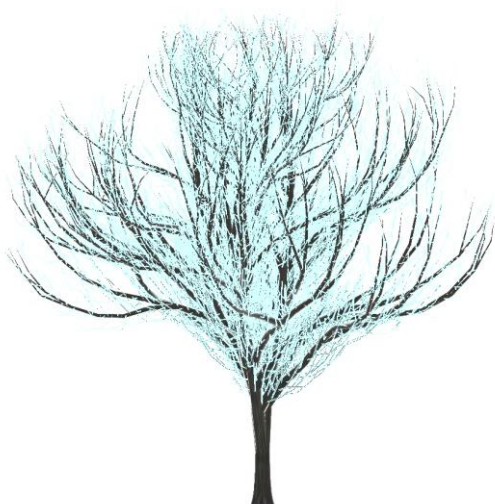
use a simple plane as the instance geometry



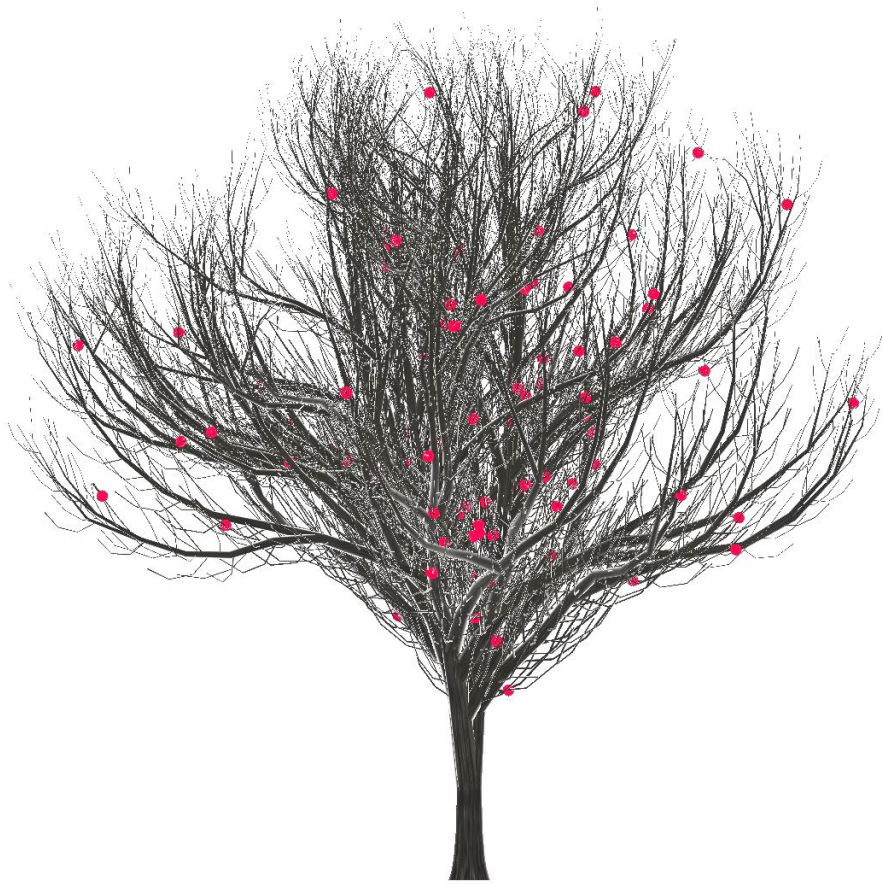
create instances at the
scattered points



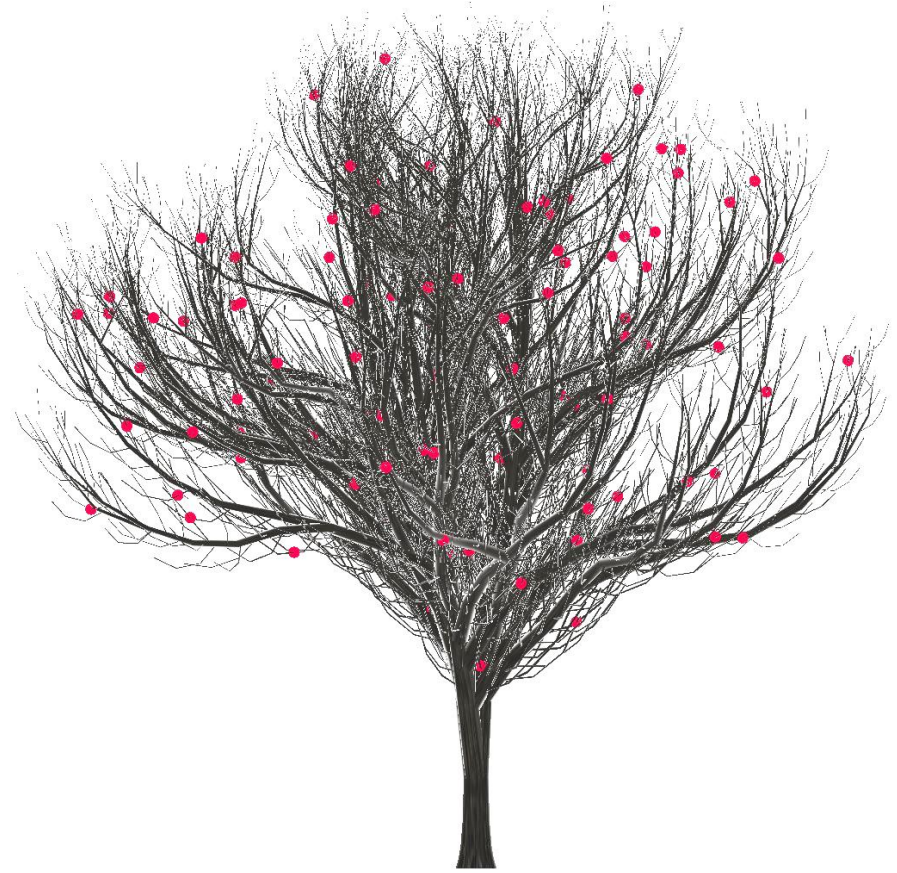
Uncheck "opaque" to
allow transparency



Scatter Modes



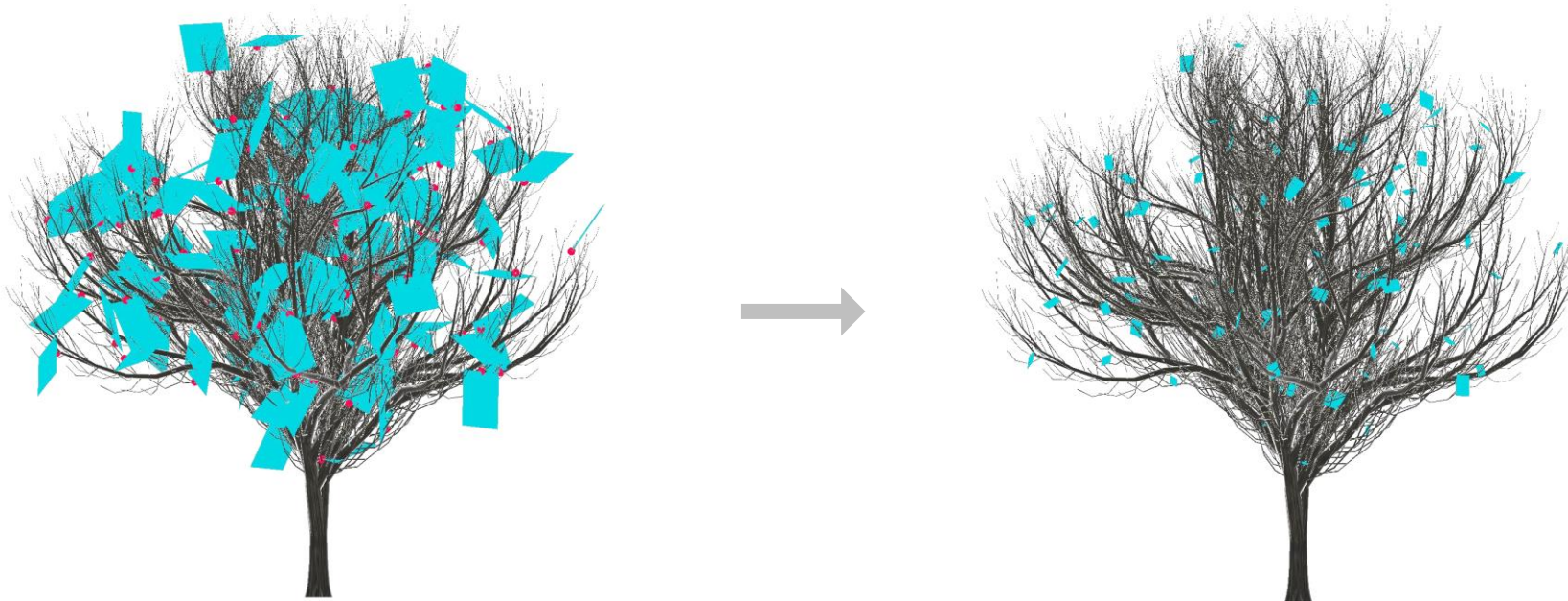
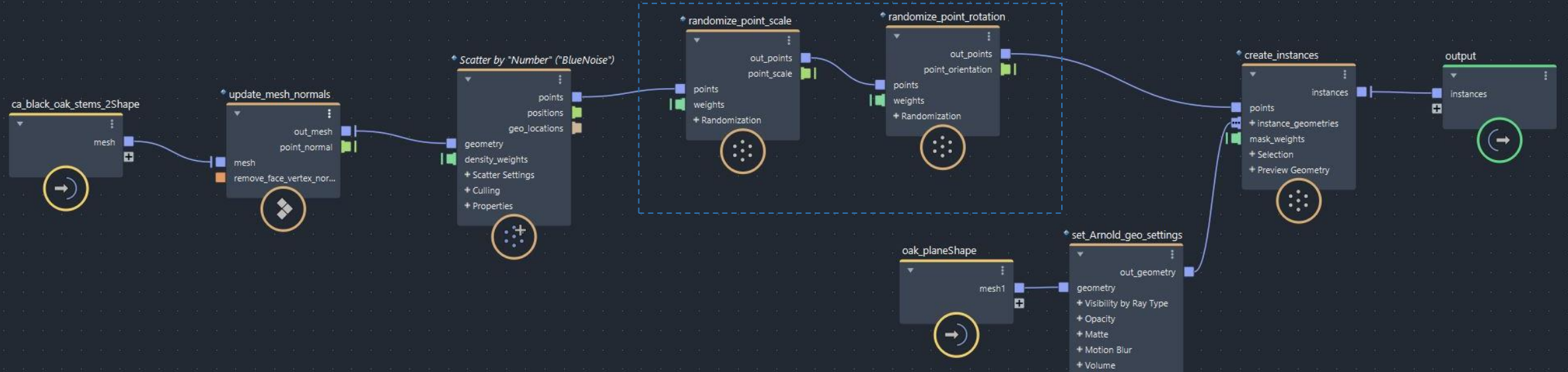
random



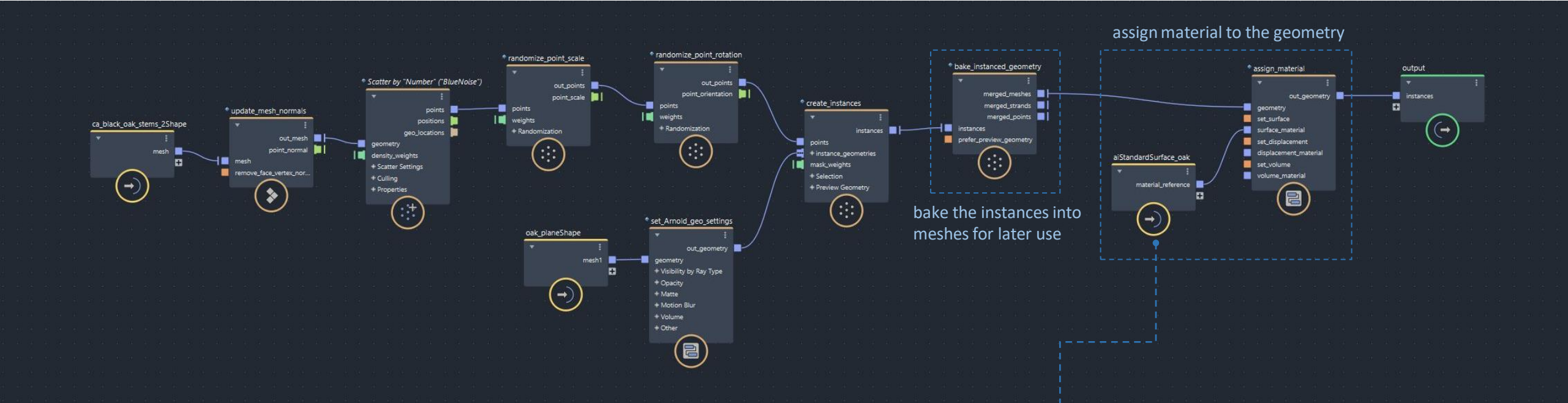
blue noise

“blue noise” gives a more even
distribution than “random”

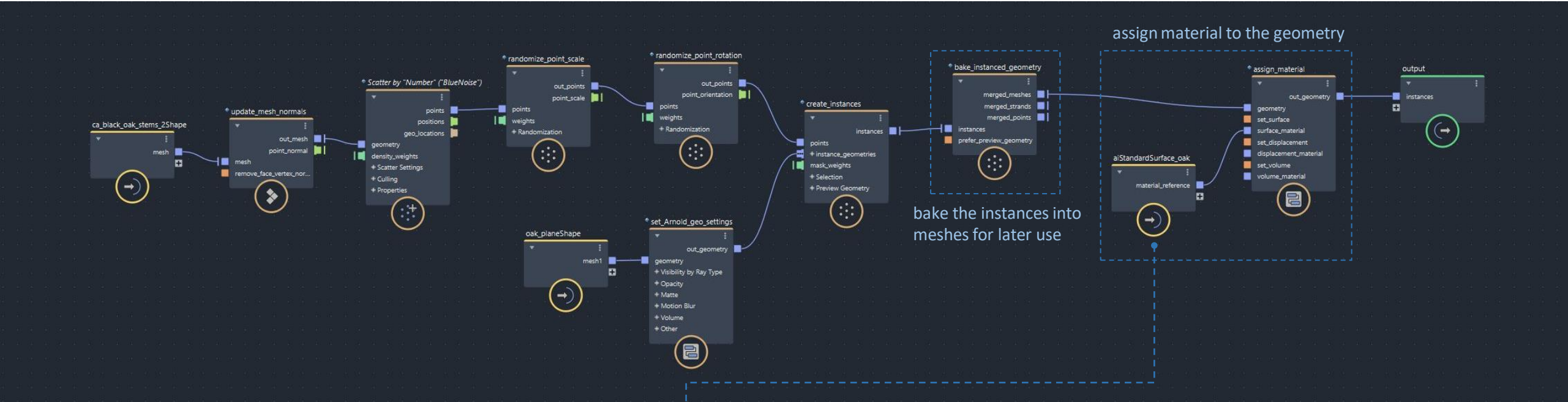
randomize point scale and randomize point rotation
are often used together to introduce variations in the
size and orientation of the instances



Assign material

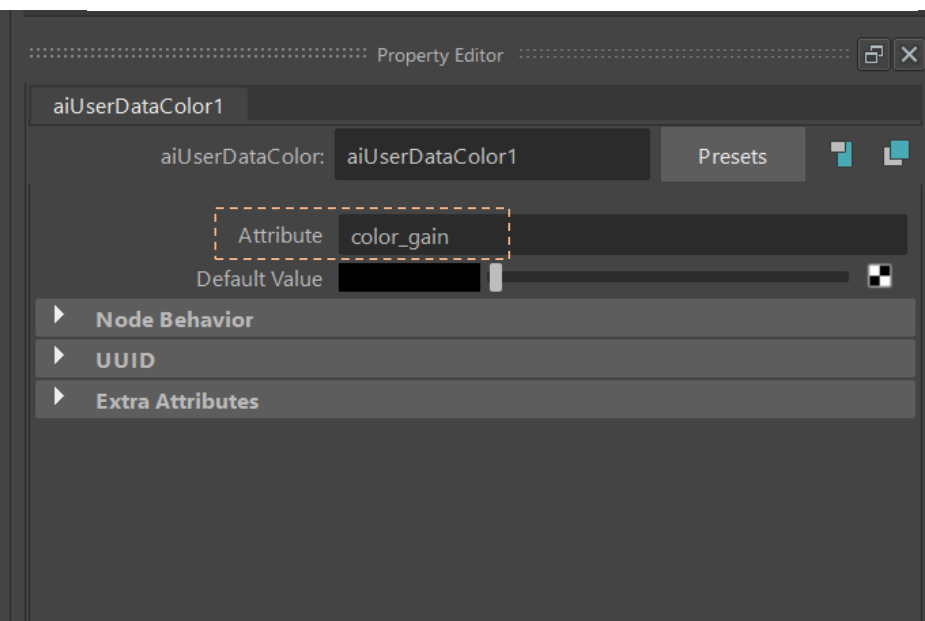
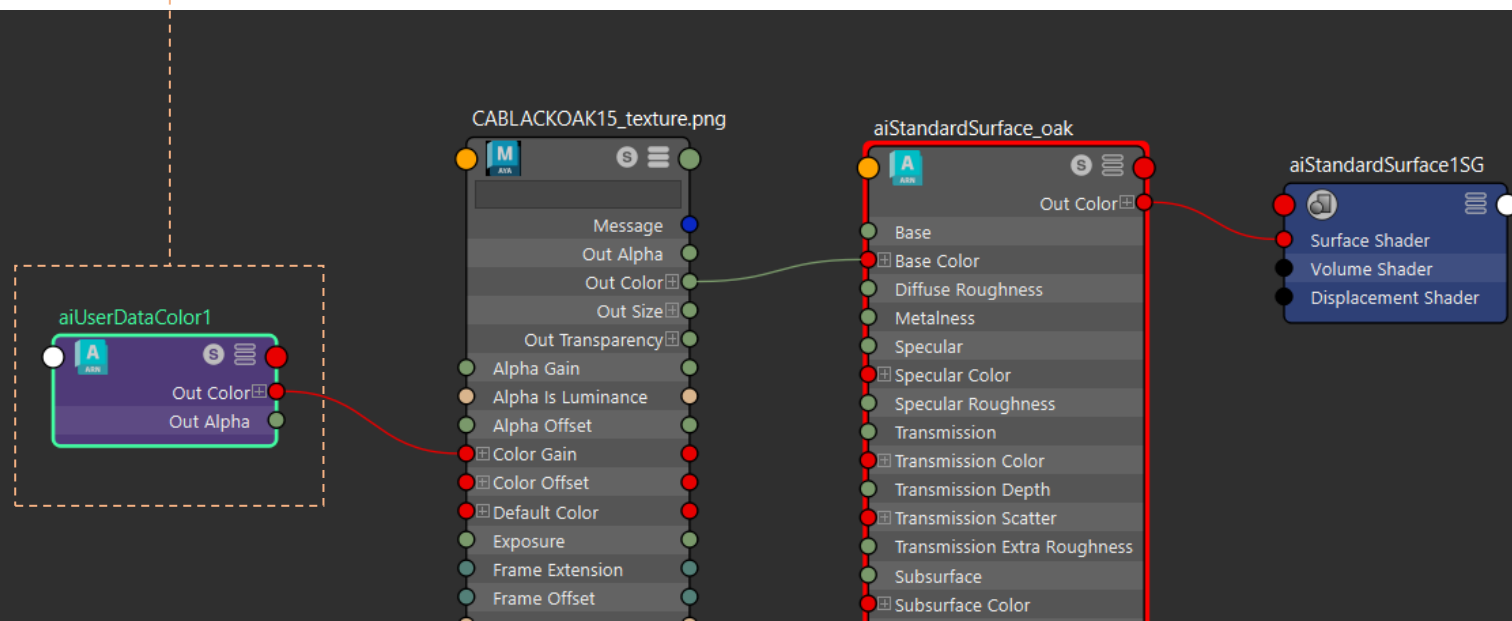
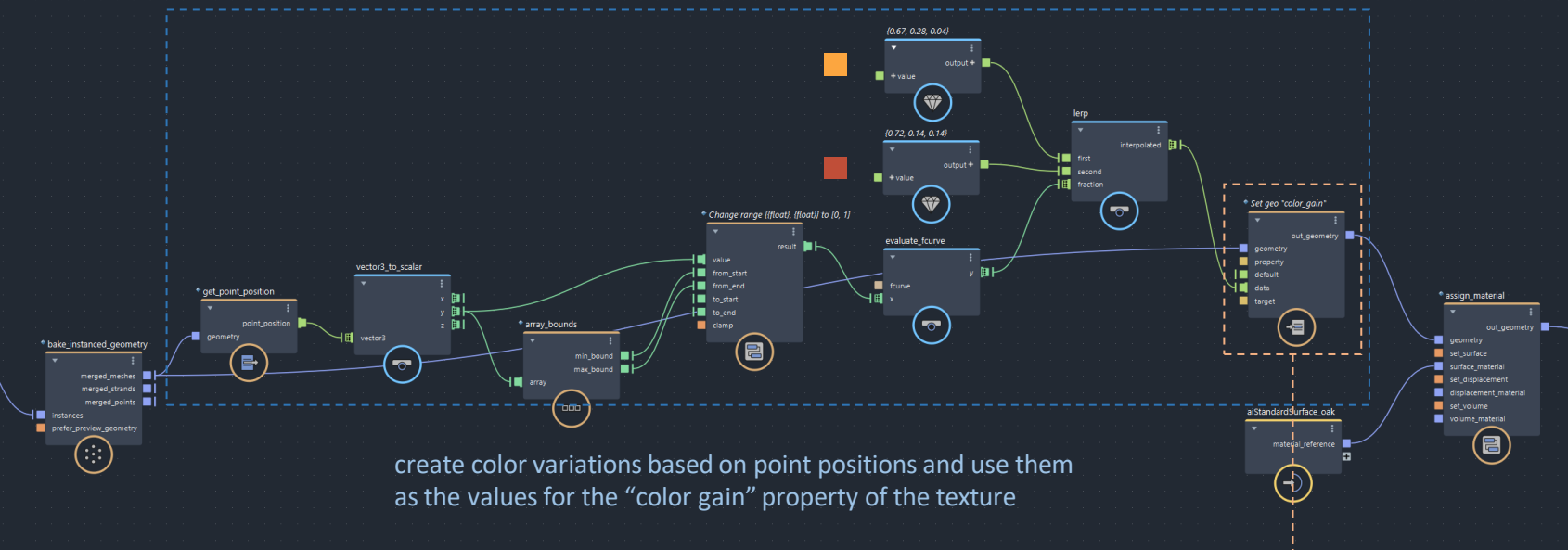


Assign material

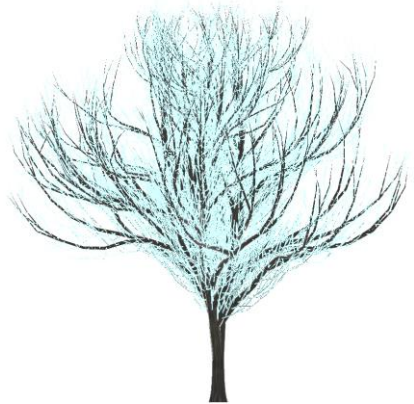
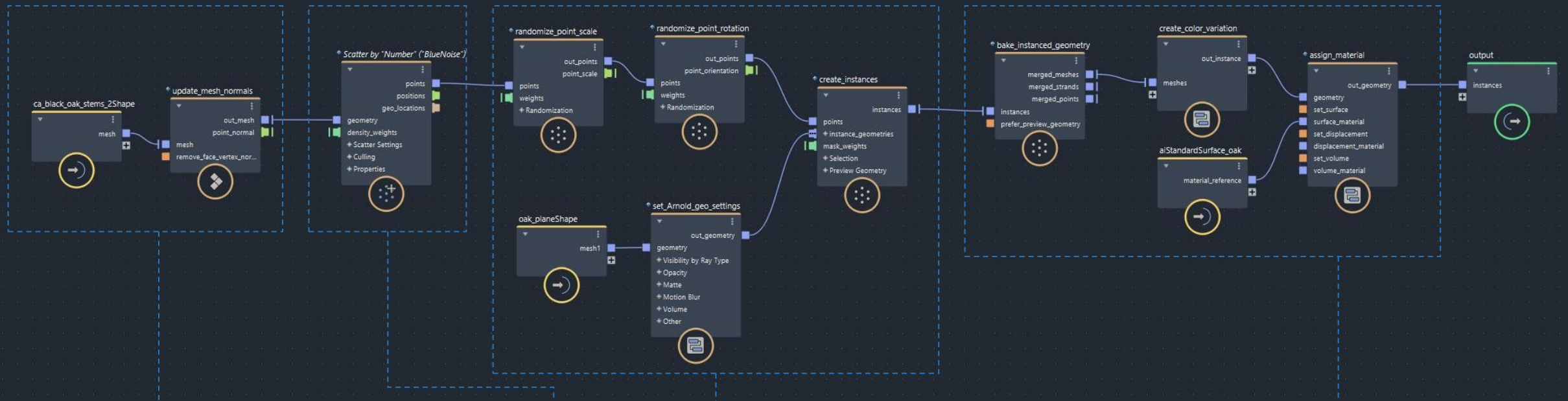


Hypershade

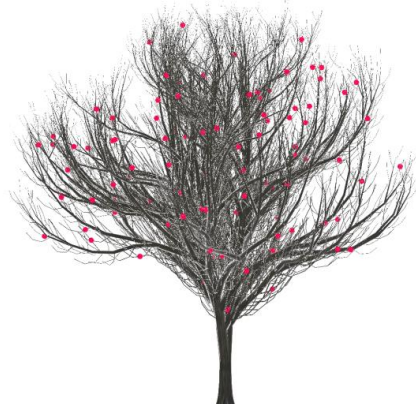
rendered image



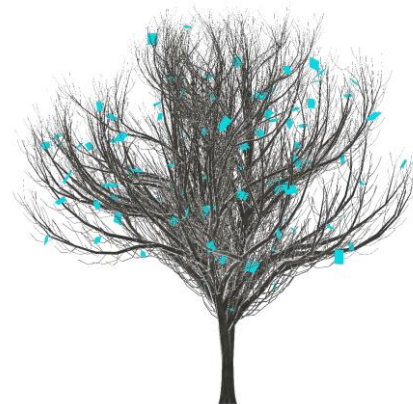
Summary



base geometry



scatter points



create instances

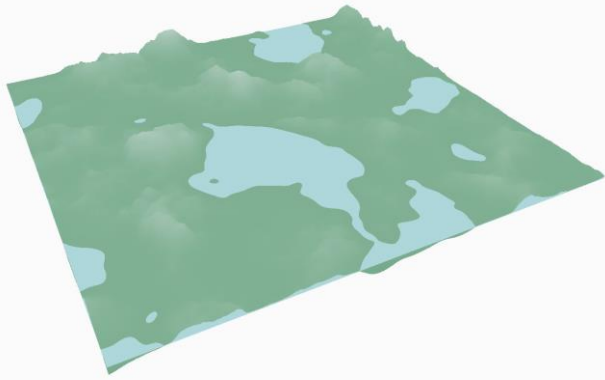


assign colors/material

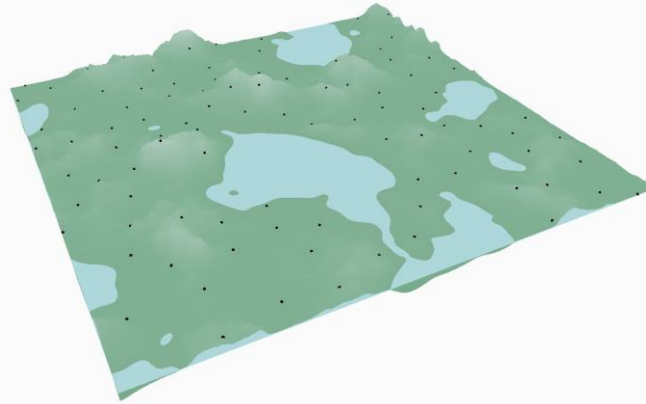


Simply change the base geometry and materials to create different types of trees

Creating an Autumn Forest



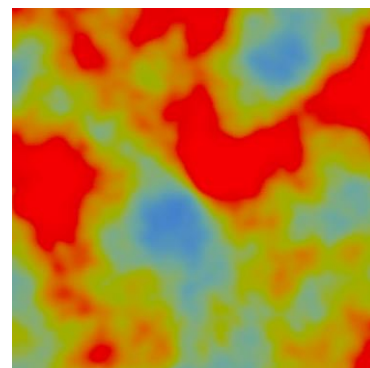
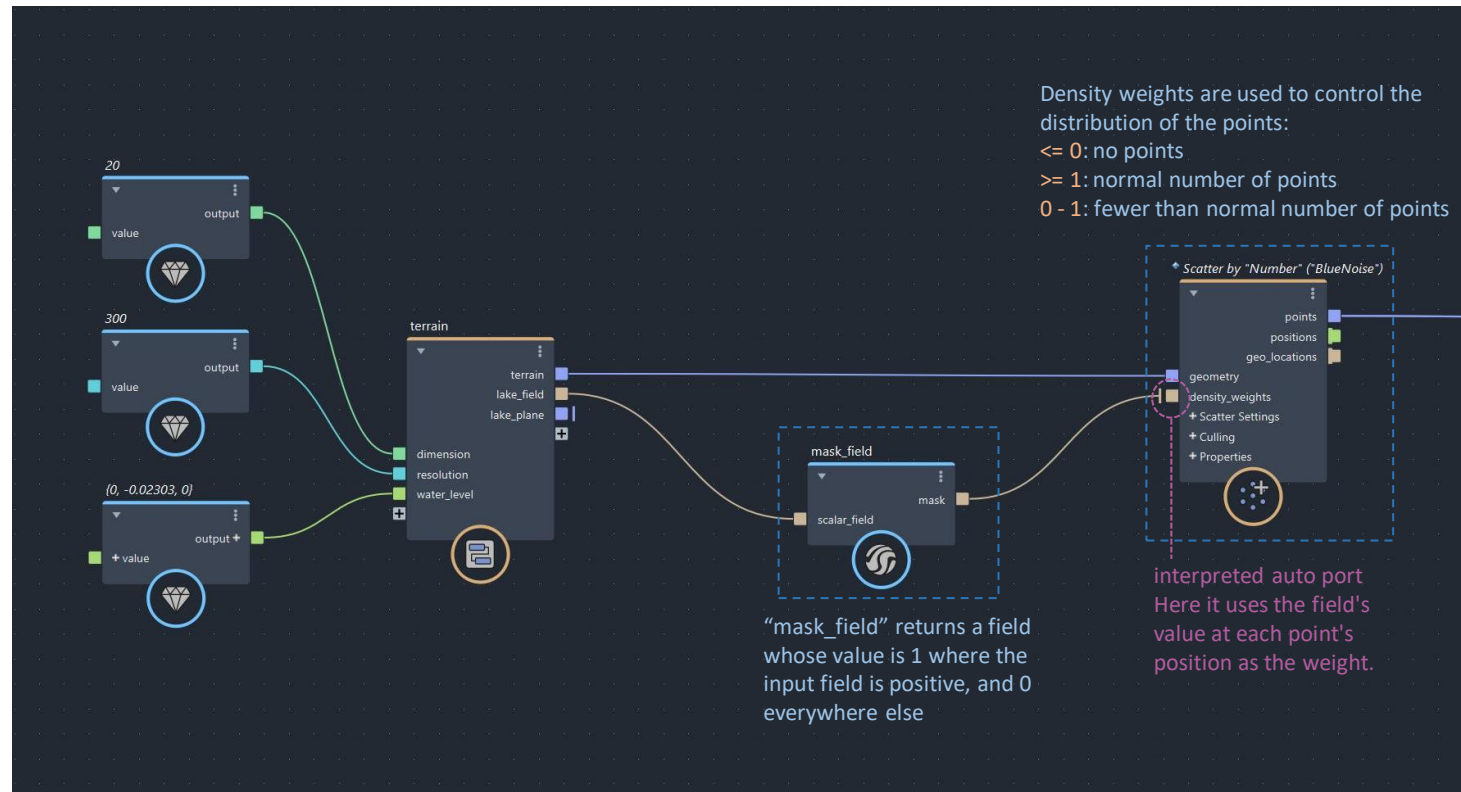
terrain as the base geometry



scatter points in the land area



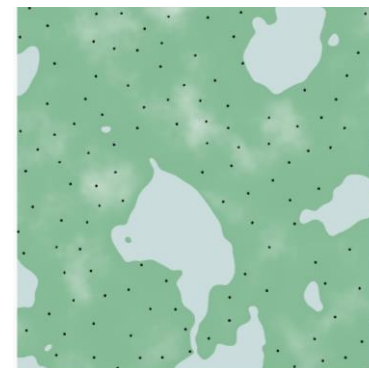
create instances of trees



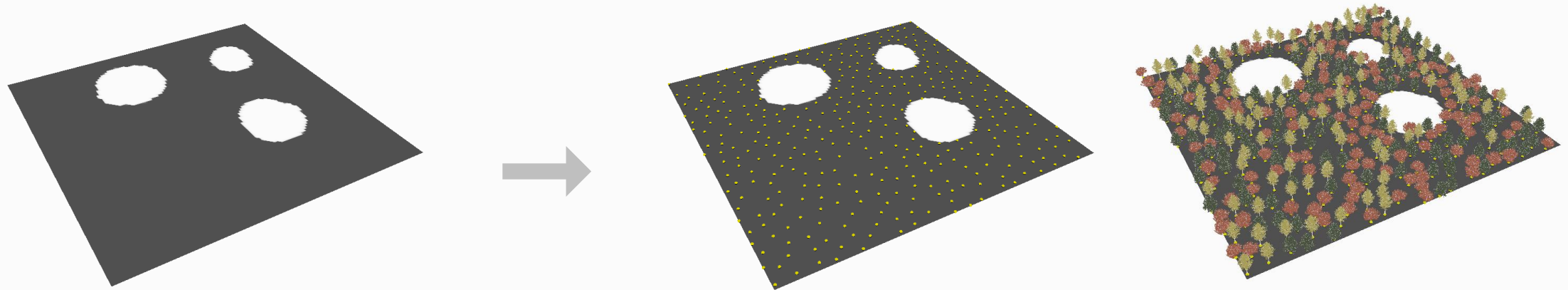
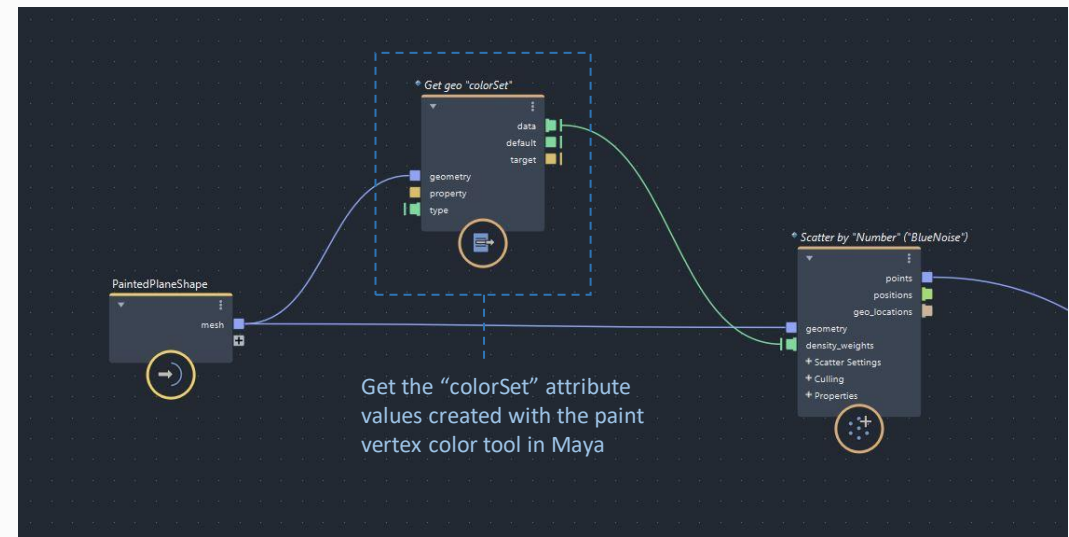
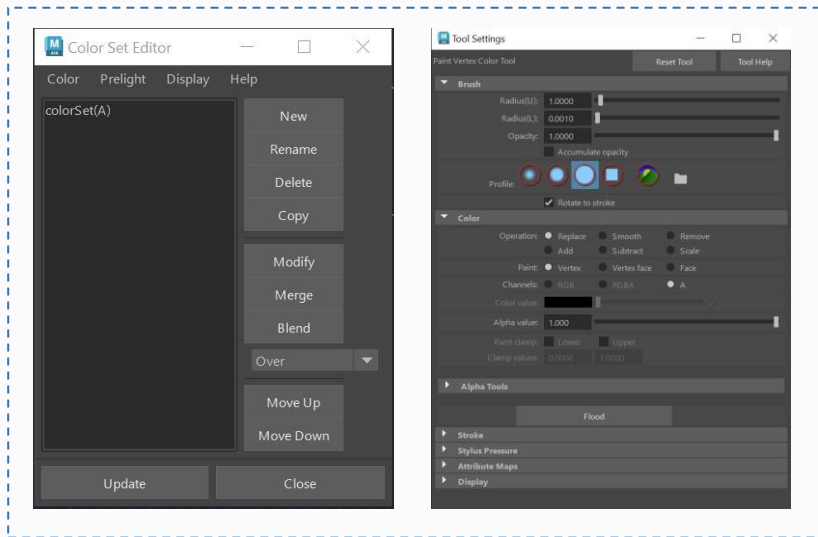
field for the lakes



mask field



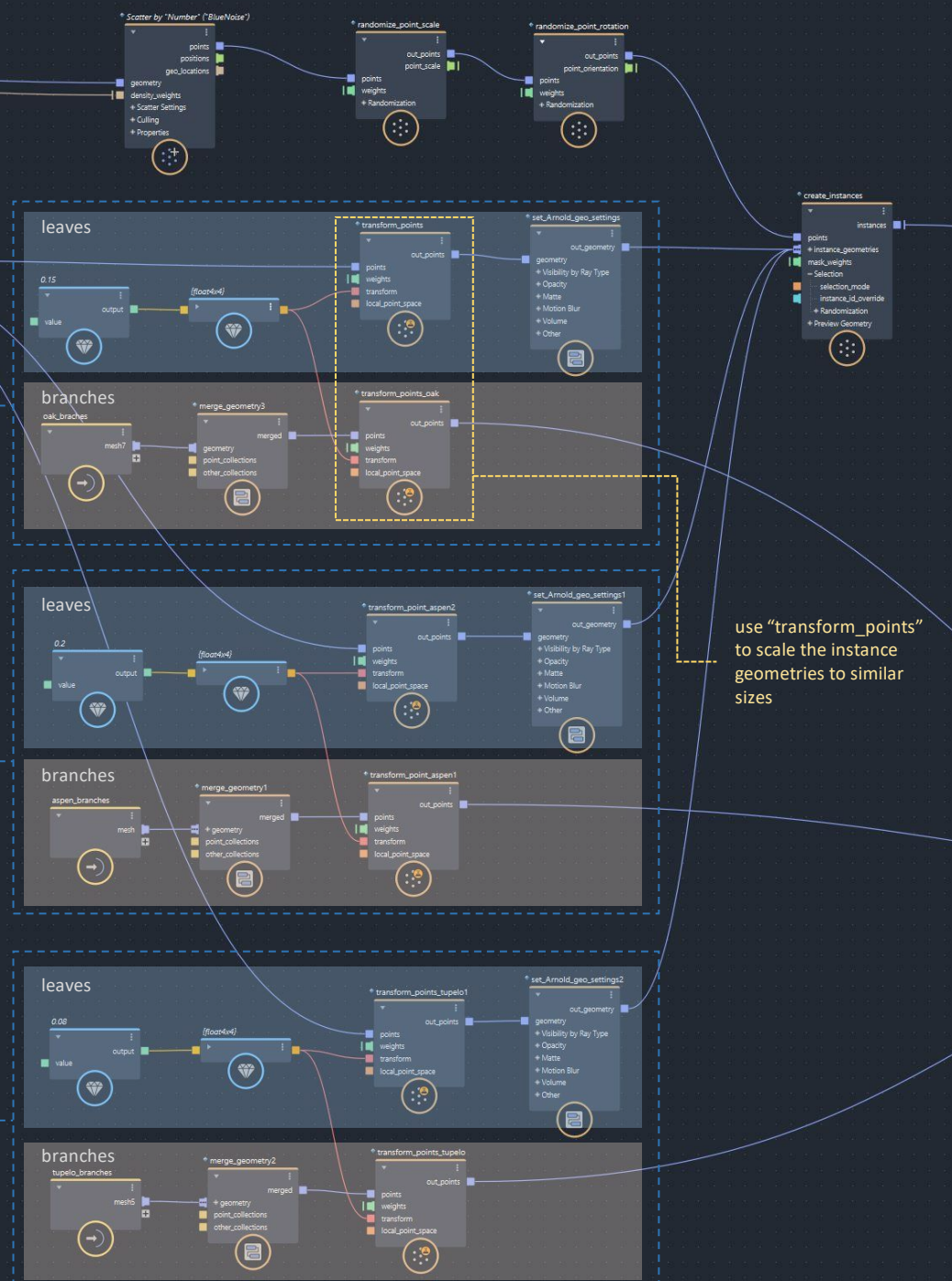
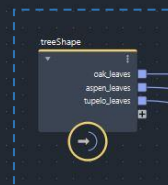
points in land area only



Vertex colors painted in Maya can also be used as density weights for scattering points



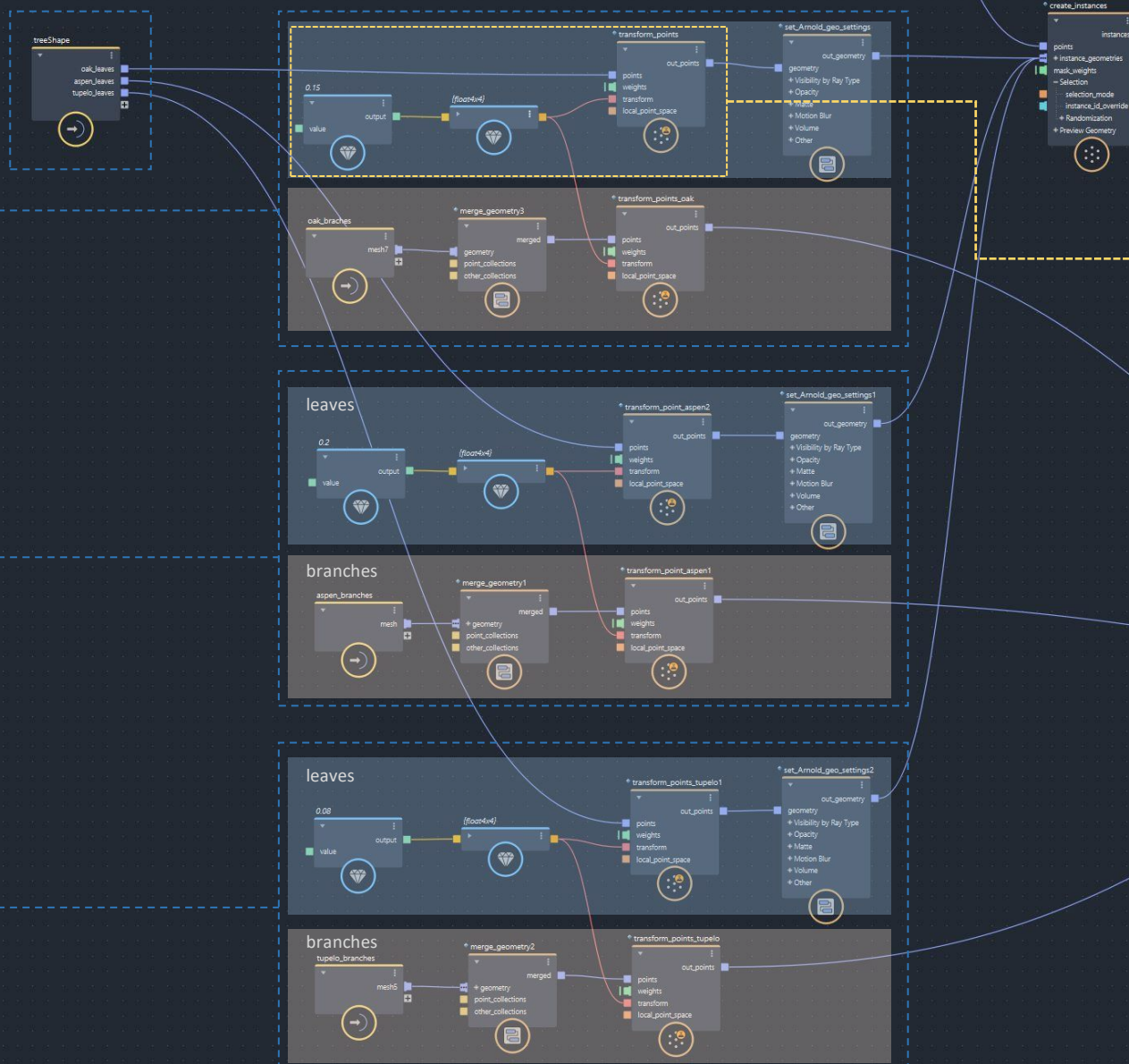
outputs from the graph
that creates the trees



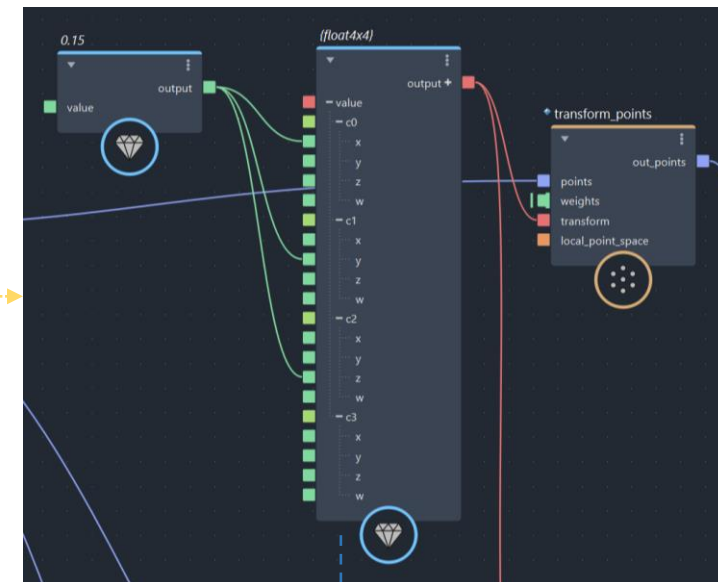
use "transform_points"
to scale the instance
geometries to similar
sizes



outputs from the graph
that creates the trees



Use a value node to create a
4x4 transformation matrix



Transformation matrix

0.15	0	0	0
0	0.15	0	0
0	0	0.15	0
0	0	0	1

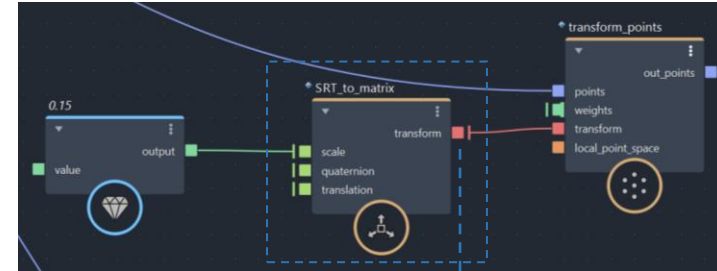
This matrix will scale the
geometry by 0.15 uniformly
along x, y and z axis



outputs from the graph
that creates the trees



Alternatively, one can use “SRT_to_matrix” to generate the transformation matrix through providing the scale, rotation and translation



SRT_to_matrix

Type: SRT_to_matrix

Scale

value17.output

Quaternion

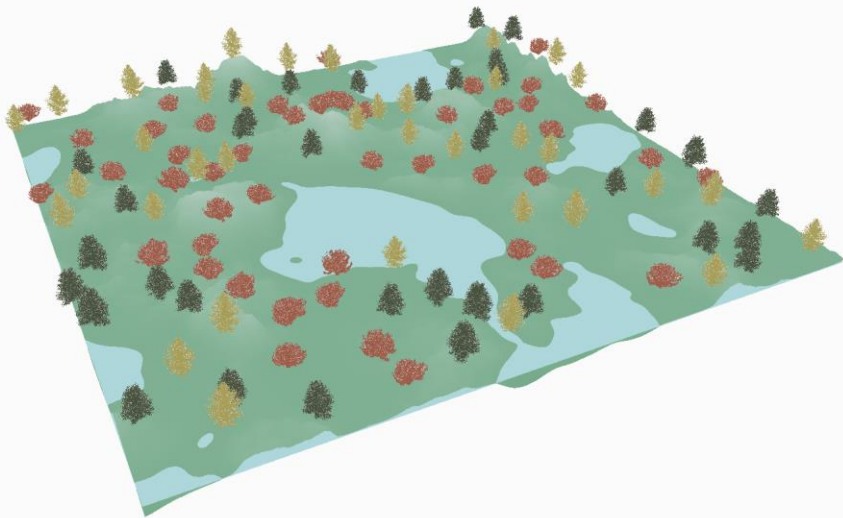
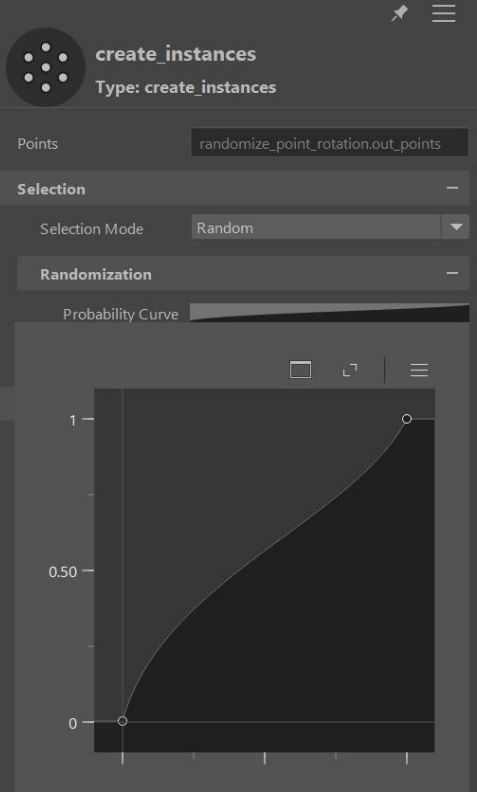
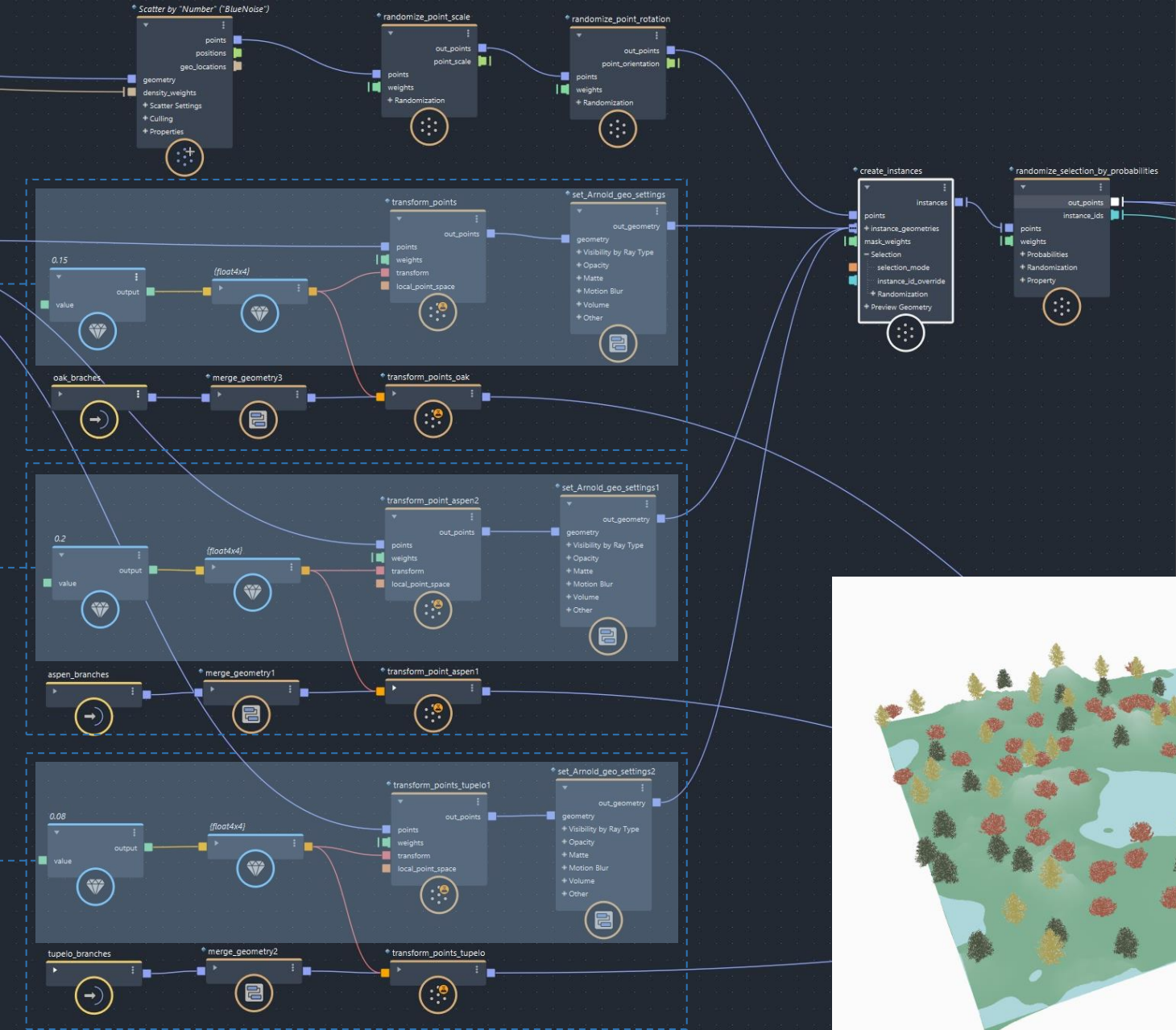
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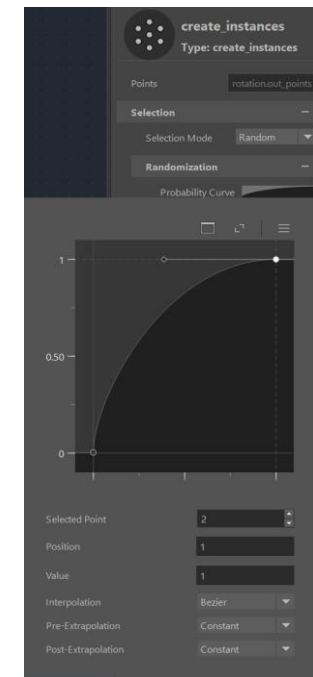
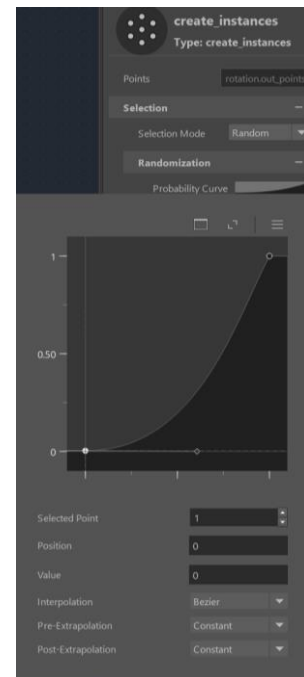
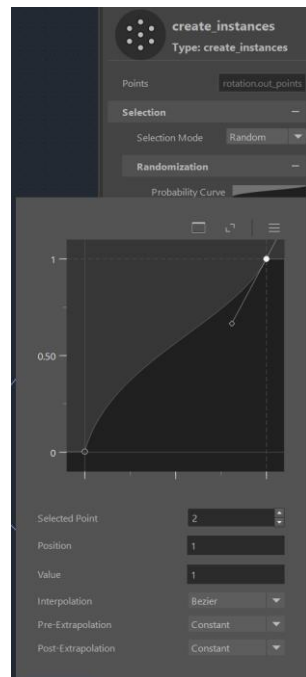
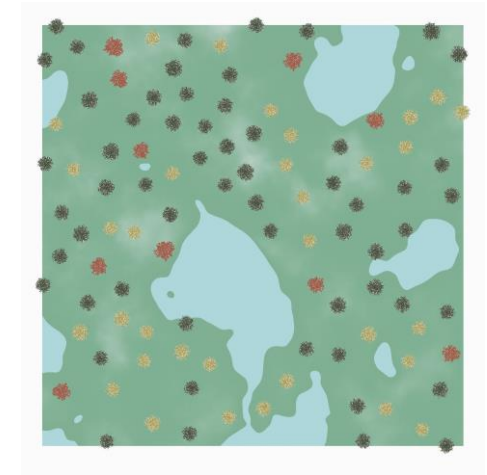
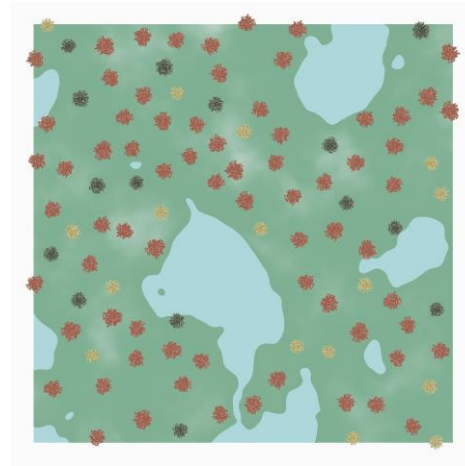
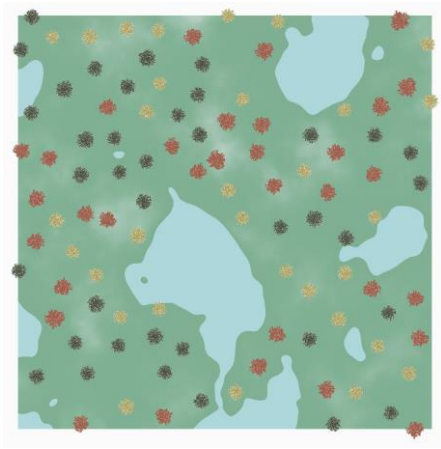
Translation

000

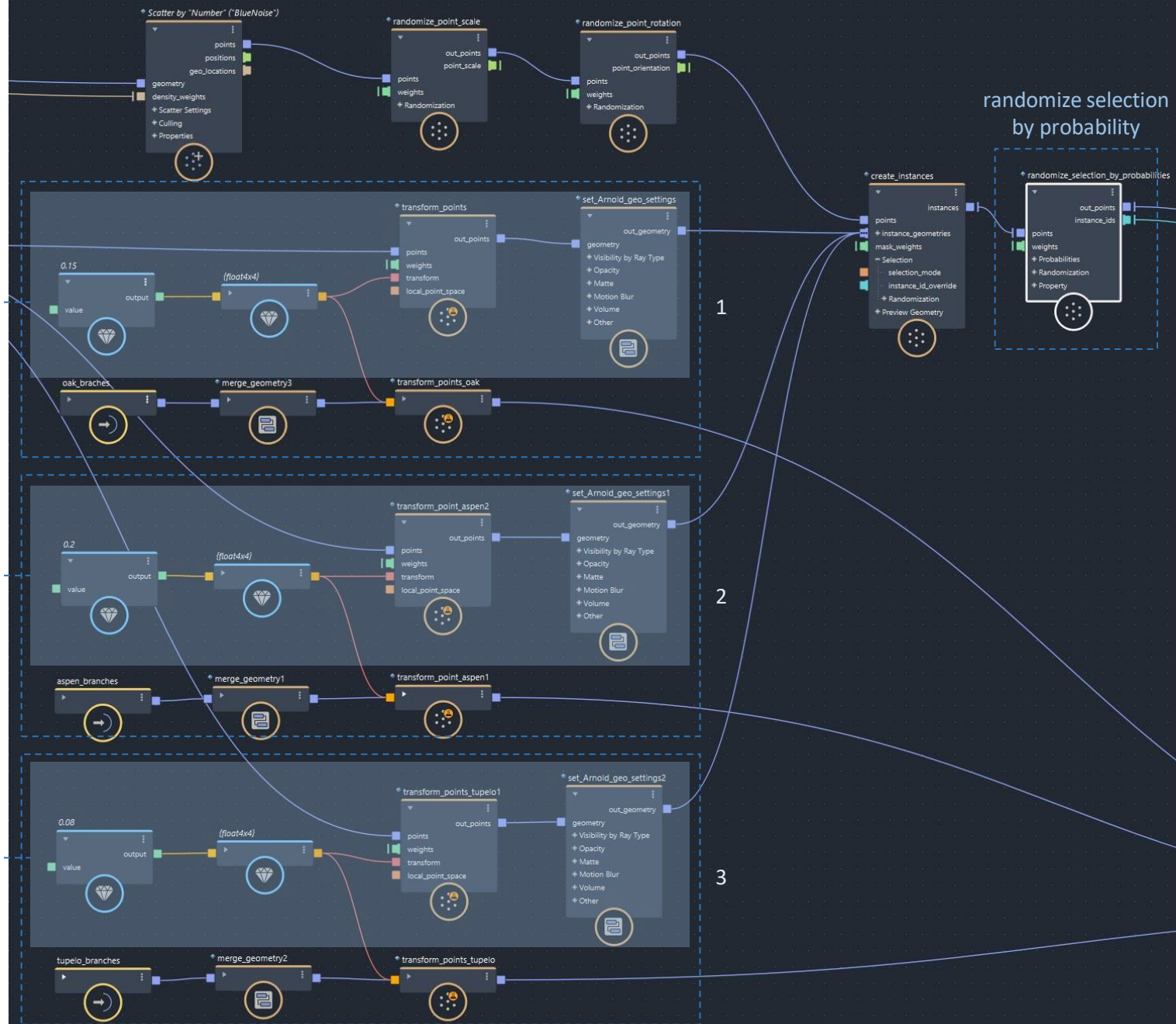
0.15	0	0	0
0	0.15	0	0
0	0	0.15	0
0	0	0	1

Scattering the leaves





The composition of the forest can be changed through modifying the probability curve.



randomize_selection_by_prob

Type: randomize_selection_by_prob

Points: create_instances.instances

Probabilities	
1	Probability 0 1
2	Probability 1 1
3	Probability 2 1
	Probability 3 0
	Probability 4 0
	Probability 5 0
	Probability 6 0
	Probability 7 0

Randomization

Seed: 1

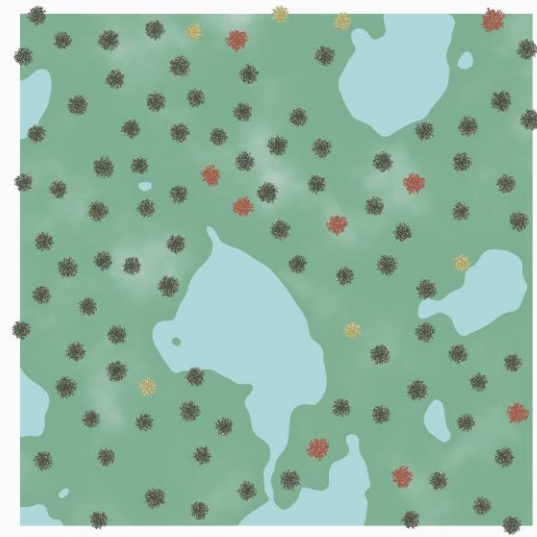
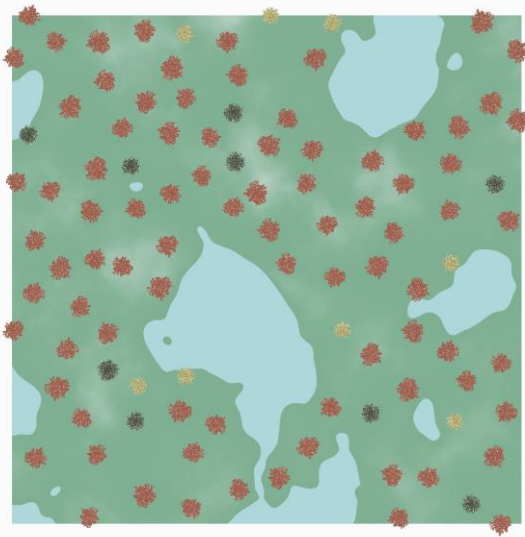
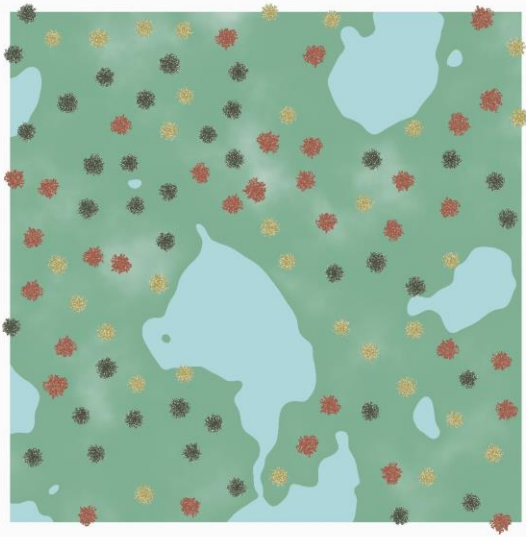
Property

Property: point_instance_id

Component: point_component

The composition of the forest can also be modulated using the node "randomize selection by probabilities". Higher probability means more likelihood of the shape being instantiated.

This node also returns the **point instance id**, which will be used to match the tree trunks/branches to the leaves



randomize_selection_by_probabilities
Type: randomize_selection_by_probabilities

Points: create_instances.instances

Probabilities

Probability 0	1
Probability 1	1
Probability 2	1
Probability 3	0
Probability 4	0
Probability 5	0
Probability 6	0
Probability 7	0

Randomization

Seed: 1

Property

Property	point_instance_id
Component	point_component

randomize_selection_by_probabilities
Type: randomize_selection_by_probabilities

Points: create_instances.instances

Probabilities

Probability 0	8
Probability 1	0.5
Probability 2	0.5
Probability 3	0
Probability 4	0
Probability 5	0
Probability 6	0
Probability 7	0

Randomization

Seed: 1

Property

Property	point_instance_id
Component	point_component

randomize_selection_by_probabilities
Type: randomize_selection_by_probabilities

Points: create_instances.instances

Probabilities

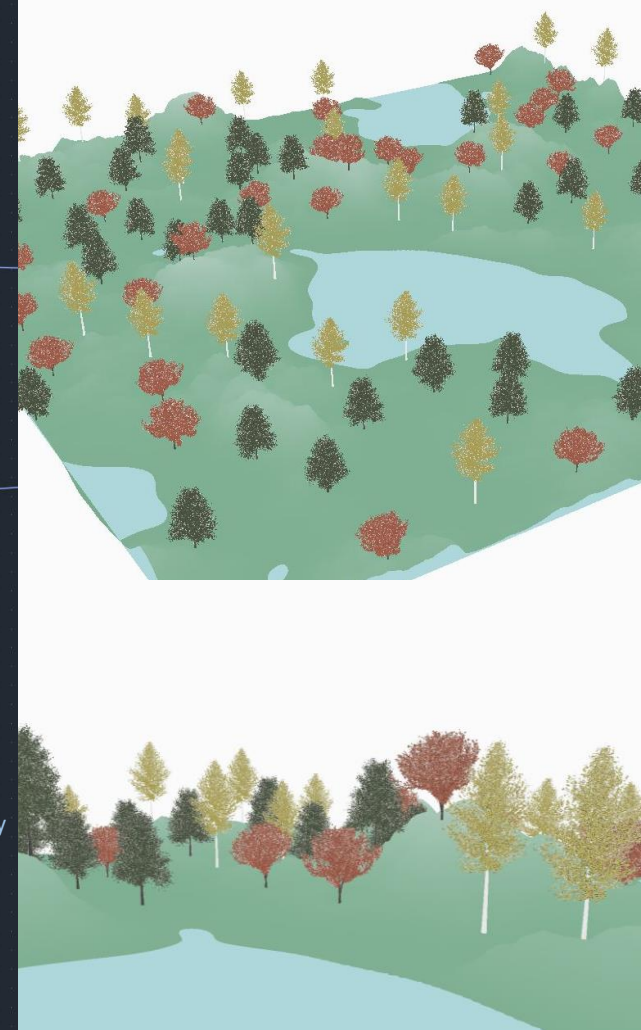
Probability 0	1
Probability 1	0.5
Probability 2	10
Probability 3	0
Probability 4	0
Probability 5	0
Probability 6	0
Probability 7	0

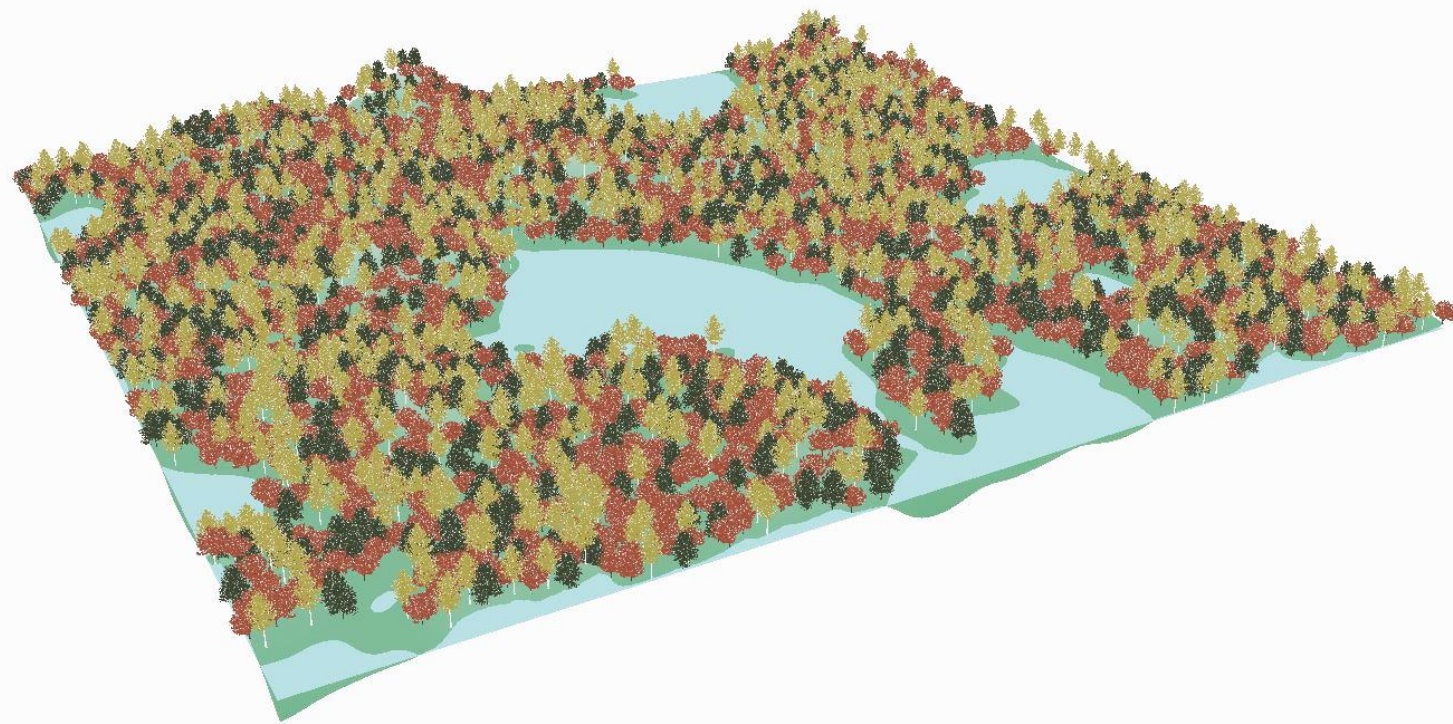
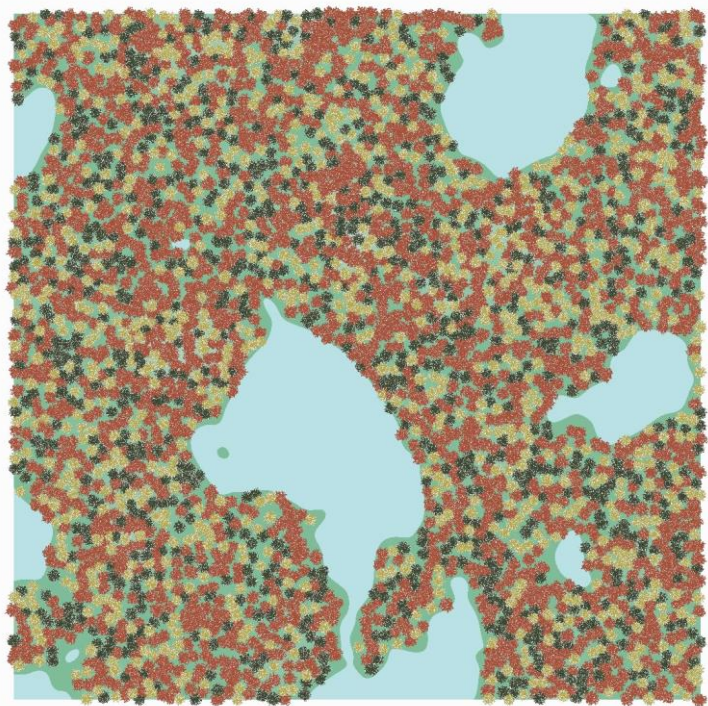
Randomization

Seed: 1

Property

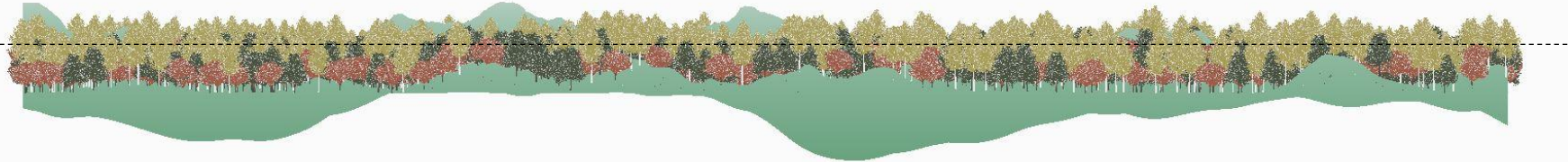
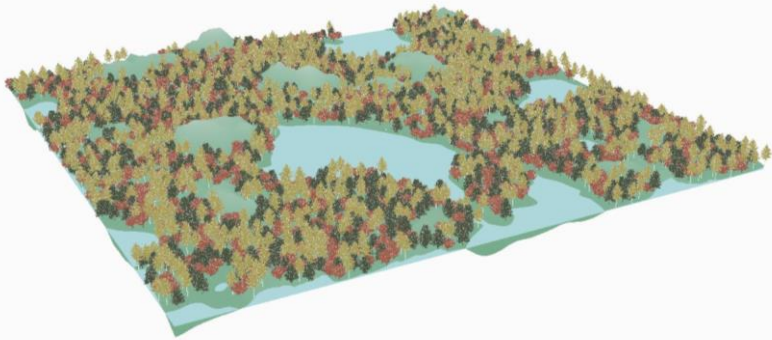
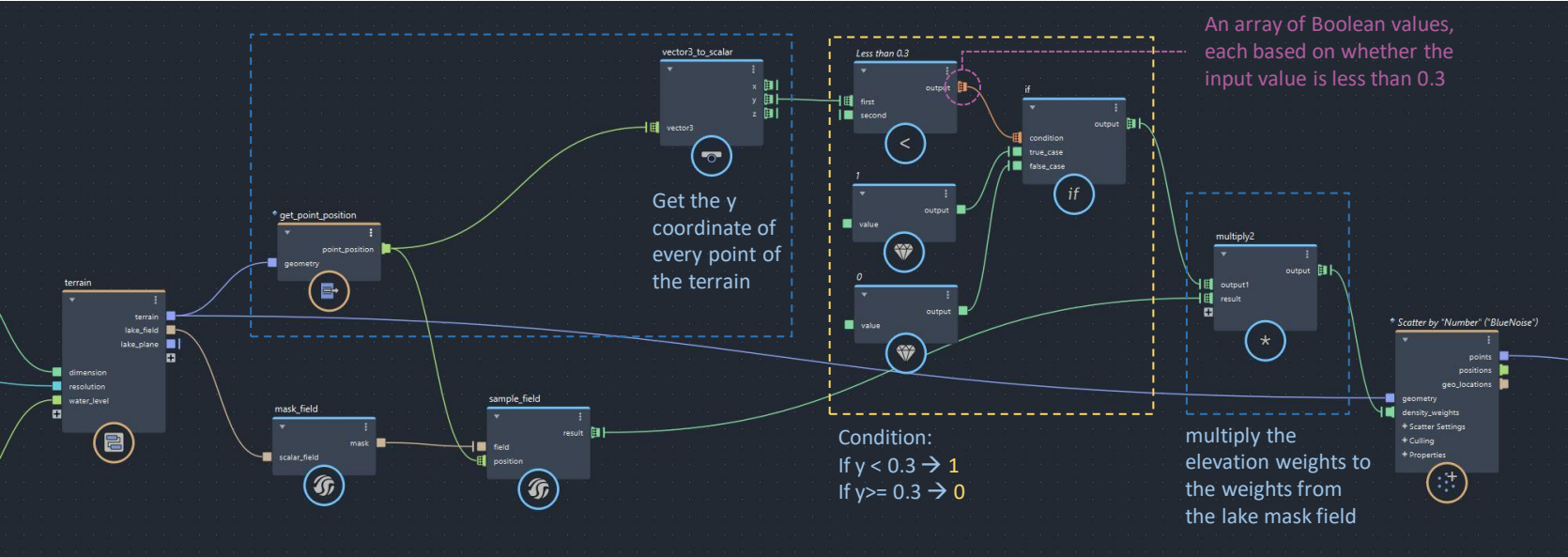
Property	point_instance_id
Component	point_component



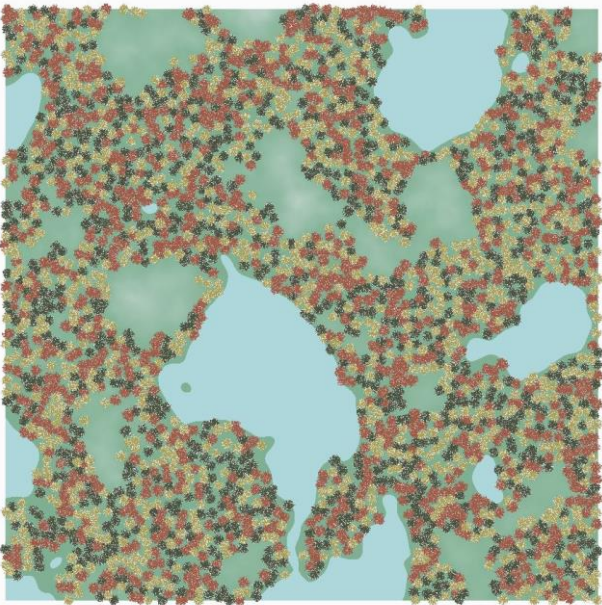


Increase the number of points and adjust the point sizes

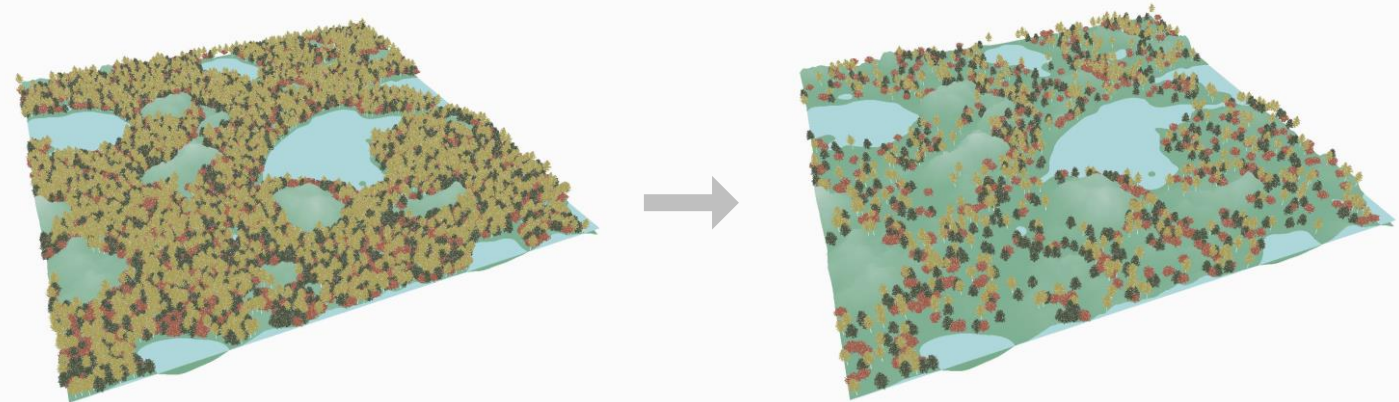
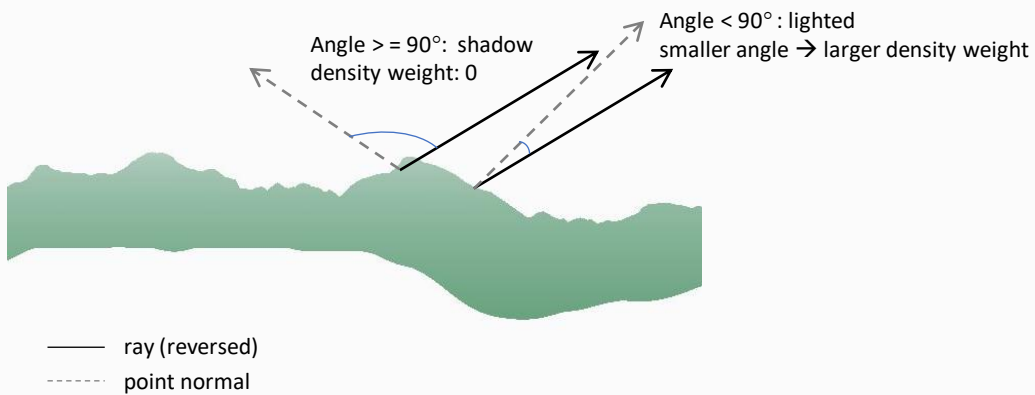
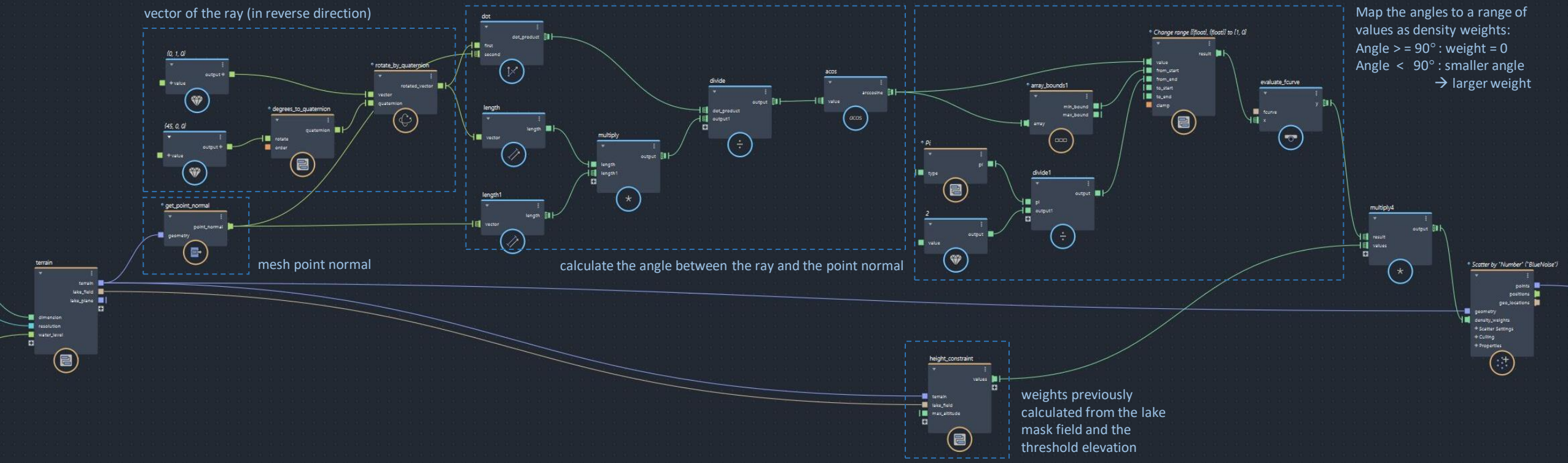
Density weights based on elevation



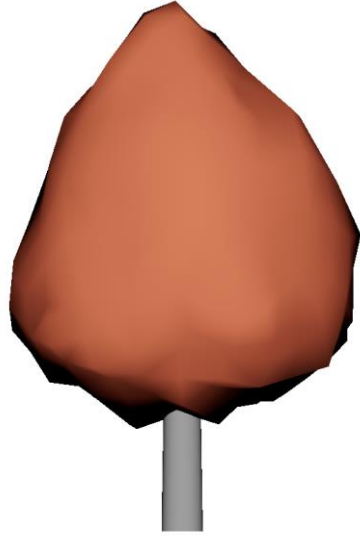
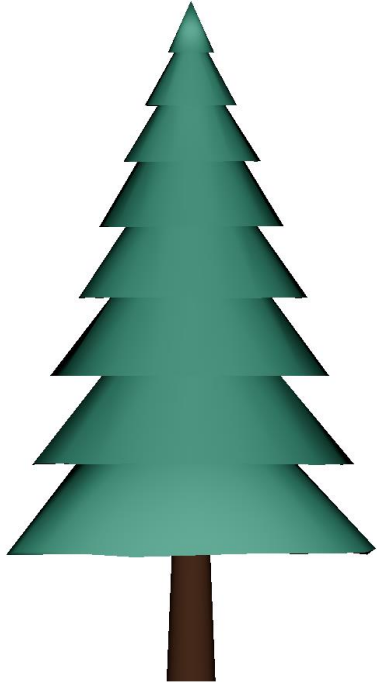
remove points above the threshold elevation

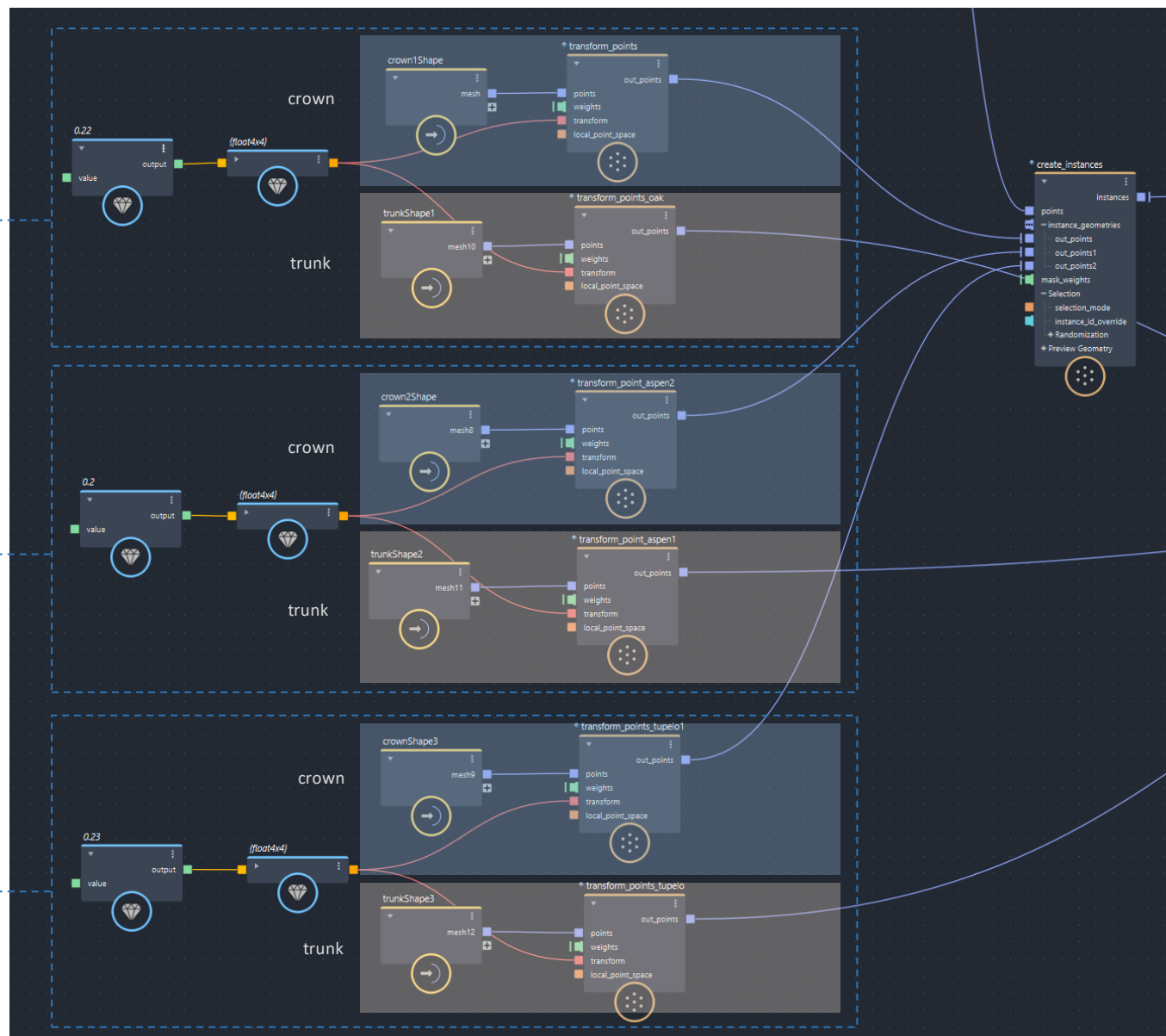
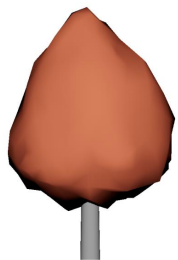
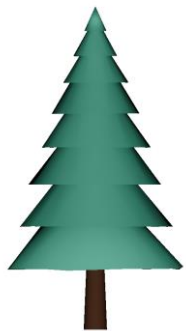


Density weights based on sunlight

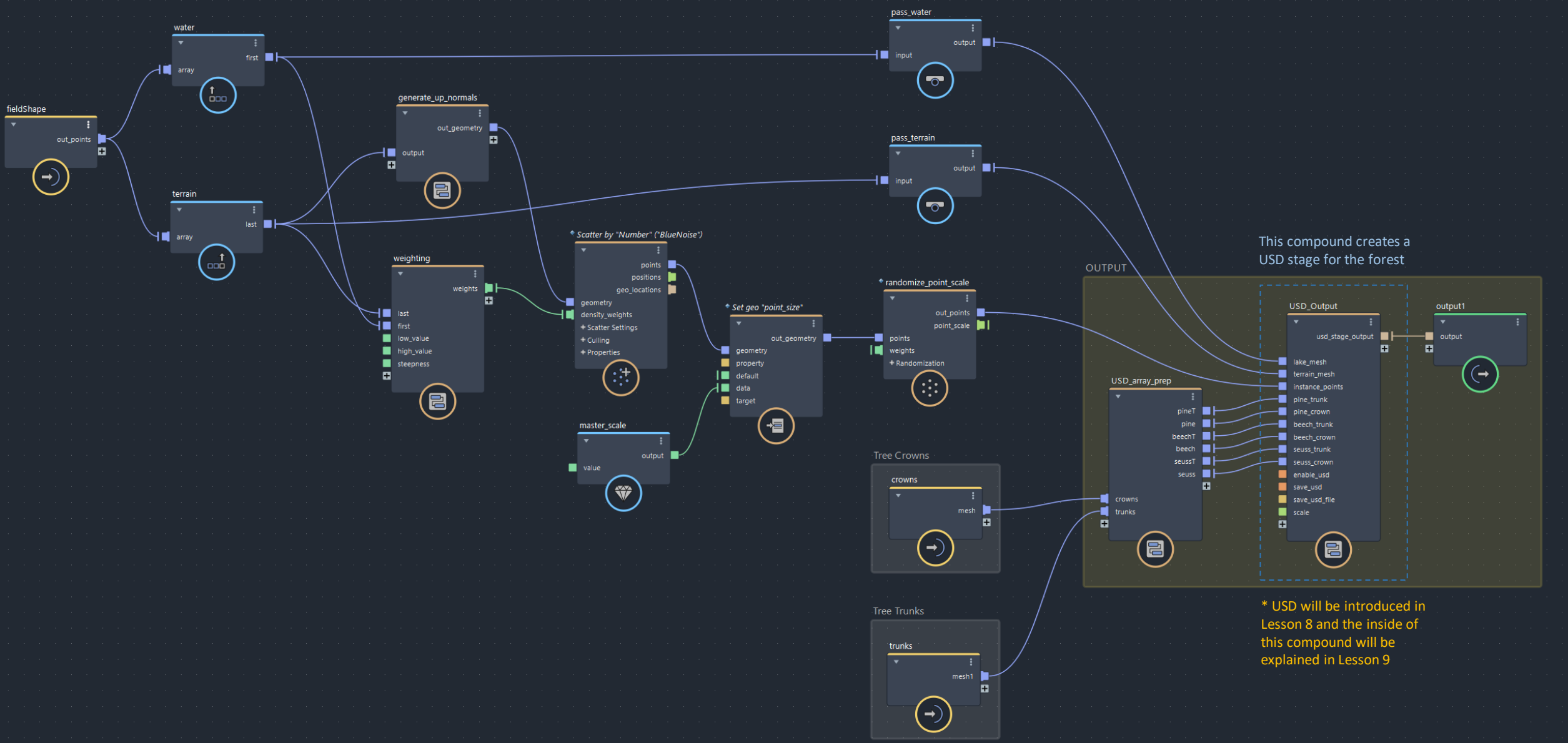


Low-poly Forest for Game Developers

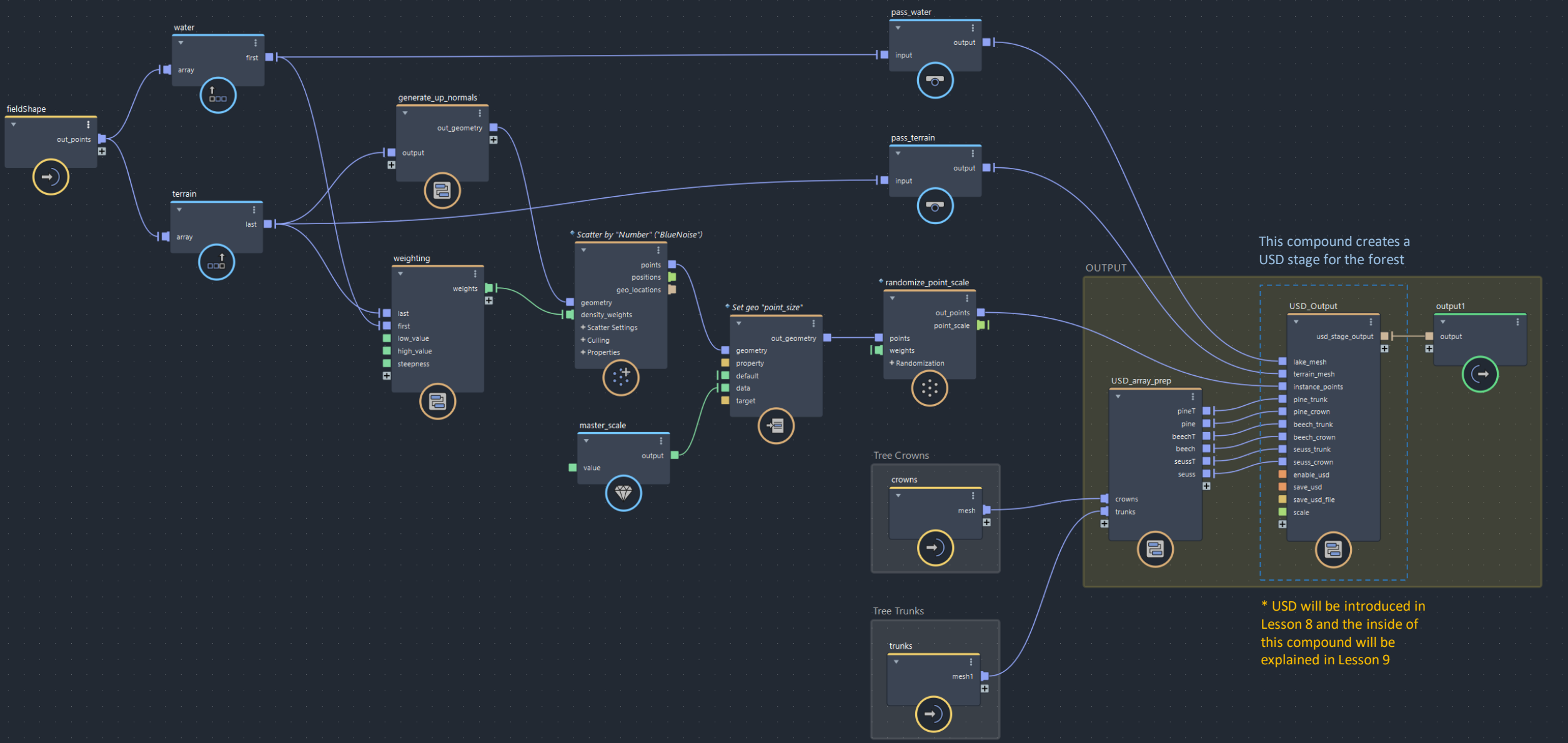




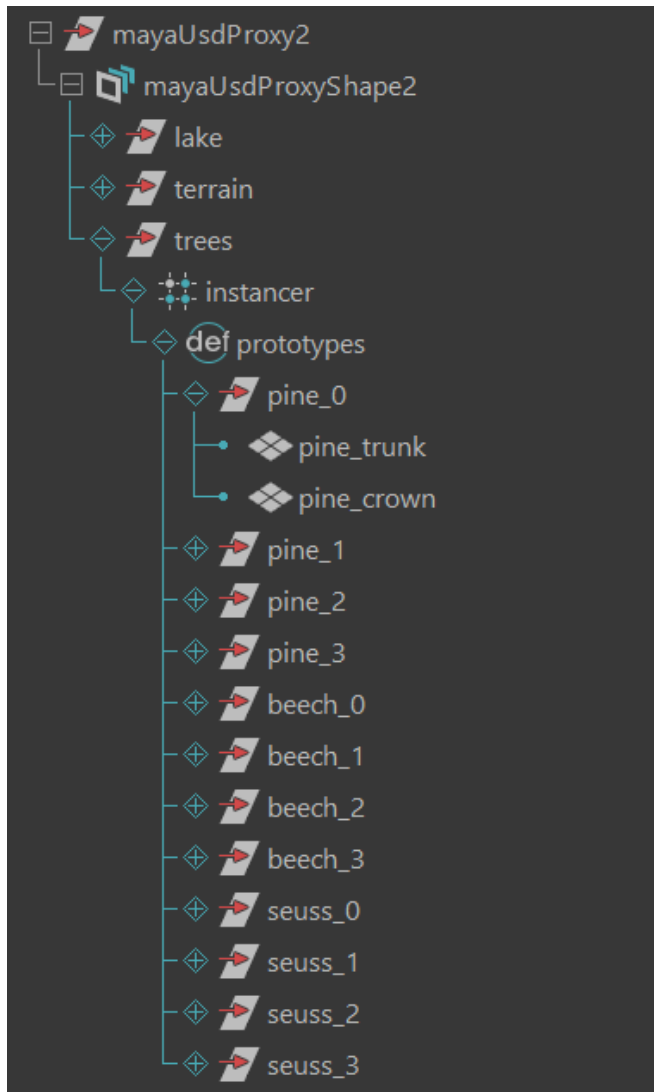
Create a USD stage for later use in Unreal



Create a USD stage for later use in Unreal



Maya Outliner



Unreal Engine

