Week 2: Scattering.

**Motivation:**  
The joy of proceduralism.

**Learning Objective:**  
Methodology of: point/geo properties, instances, point id, USD   
Concepts of: orientation, size, scale, id

**Schedule:**

Part 1:

* What is scattering and how does Bifrost do it?
* Building the tree. Using the resources supplied, scatter points on the branches of the first tree.
* Explaining as we go:
  + Amount mode
  + Scatter mode
  + Go through the rest of the options for a quick explanation
* Instancing. Getting leaves on the tree. This is a basic instancing setup – basically just points and planes. The more advanced stuff comes later.
  + Instancing – the art of scattering objects on points
  + Instances are **always** points until baked
  + Rotation and Scale are carried by the points
* Making textures visible on the new leaf planes – this will involve a quick explanation of VP2.0 and “alpha cutting” – it’s also a good example of using something faster but lower-resolution to build a thing.
* Quick Arnold overview re: rendering – this can be very brief for game design students as we will be covering it in more depth in week 6.

**Break: 10m**

Part 2:

* The Forest.
  + Using the terrain the students made last week, we’re going to load in and scatter a low-res version of the three trees to make a forest suitable for a low-end game. This is going to introduce them to both scattering and instancing in an asset destined for use in an engine.
  + Bring in the crown meshes and scatter them – this will be setting up an example of the set\_instance\_geometry node later on for the trunks.
  + Introduce and explain the randomize\_selection\_by\_probability node and explain how that works in terms of probability of which shape is chosen
  + Introduce and explain the selector\_instance and set\_instance\_geometry compounds as the method of adding the trunks to the trees to facilitate procedural change of separate instanced objects.

**Break: 10m**

Part 3:

**Advanced Scattering:** Demonstrate (using the advanced file) very basic clumping by using a custom property to manipulate the instance\_ids.

* **Output.** Demonstrate the two kinds of game engine output – FBX and USD.
  + **FBX:** 
    - Explain baking of instances to the students. Stress that instances literally don’t exist as meshes without baking.
    - Combine all scatters and meshes.
    - Demonstrate Create\_Maya\_Mesh from output back into Maya, show the node editor connections, explain this system.
    - Export selection to FBX, load into the game engine
  + **USD:** 
    - Explain that baking isn’t needed for a USD output
    - Show the USD output compound and explain that we won’t be going through how the USD process is built until week 8/9
    - Invite the students to open and look through the usd output compound if they wish to get some ideas.
    - Explain how USD can be used in a game engine for Vertex Colour, Vertex Animation and generating collision meshes.
* Quickly recap today’s lesson, have a Q&A session with the class. Let them know that next week we will be looking at strands.