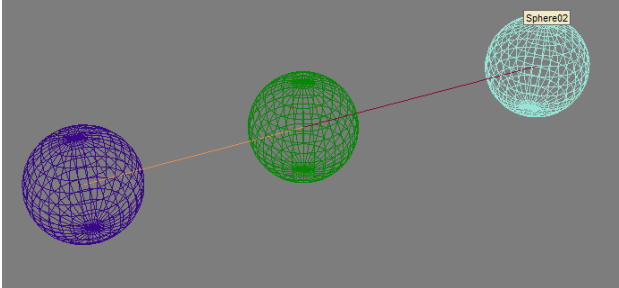Initial implementation used 3ds max and attempted to bind a set of spheres together in a simple implementation, similar to a set of cherries. The implementation used splines to bind spheres together.


The spline was converted to a reactor rope and bound at each end to a sphere, the center (green) sphere acting as a spine and was immobile. The implementation failed, the splines produced inconsistent results, they would qualify as interpenetrating with the center sphere and each other. And one cherry, generally the left, would become unbound and fly out of the visible range. While there may have been a solution in max I moved to Maya. I have a bit more knowledge of its dynamics systems so it was a smoother process.

In Maya at first I tried a rigid body approach to the grapes, but I had not completed sufficient research into the internal structure of grapes so I generated a very balloon like structure. The initial positions (left) allowed me to quickly generate a rough approximation of grapes, but it was insufficient to make then actually behave like a bunch of grapes. The radial grouping of grapes in sets of 12 was the main culprit, these fell in too uniform a manner.
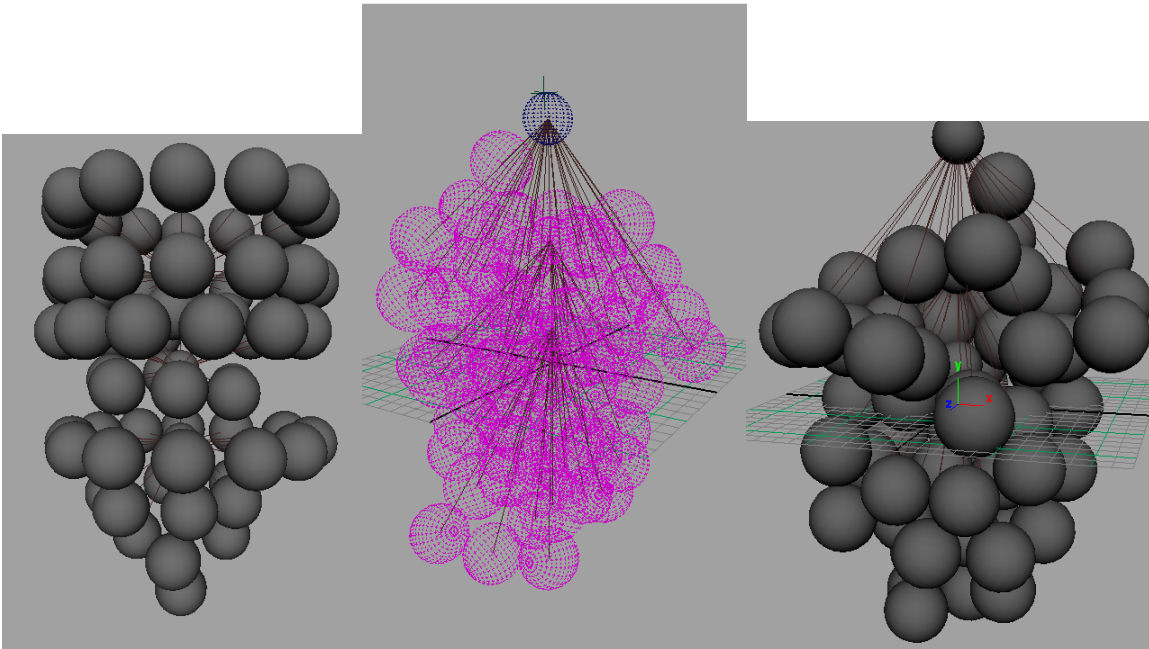
The next step in order to achieve a semi realistic set of grapes would be to purchase a bunch of grapes for observation. I picked red grapes for their lose packing along the spine and oblong shape. To approximate this I built a simple mesh for the individual grape.
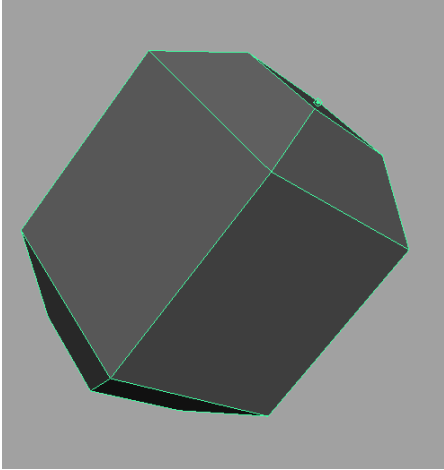

The volume and dimension were similar to a grape, the lack of radial curvature was not a concern for me initially as I intend to replace the meshes with render time grapes later for texture bakes.
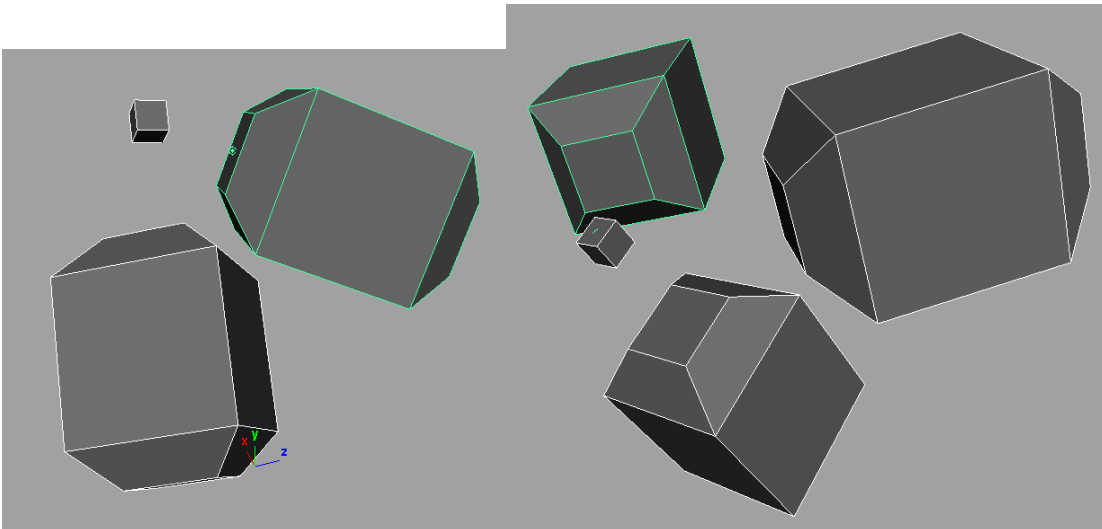

The cluster of grapes I bought had a few distinct properties, The individual grapes were connected in groups of 2 or 3 and those sub groups connected to a main spine or a branch. If the cluster connected to a branch then it was more likely they were a set of 3 and if they were a set of 2 the 3rd grape would be found along the branch.
I decided to use cubes as node points, then later I could string out the actual visual branches and structure of the bunch of grapes.
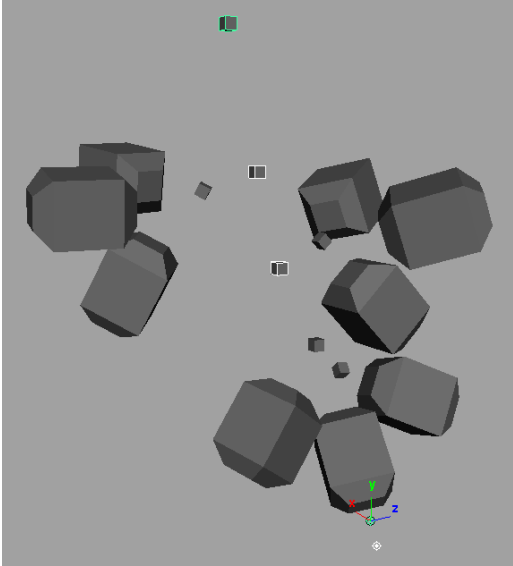
For the first pass I used a few grapes similar to the lowest end of a bunch. The selected grapes are the main spine with the one in green as a passive object to dangle them from. The lowest grapes are a demonstration of the 2/1 structure described above, with the other two sub-clusters setup as sets of 3.
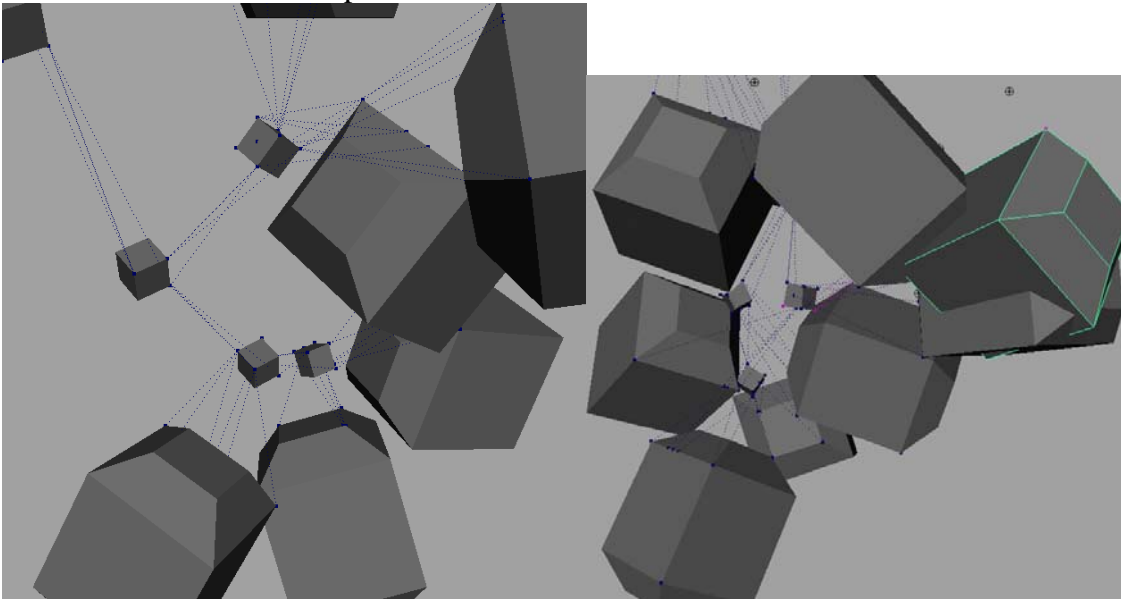

Initially this iteration of the simulation was attempted using nCloth and nConstraints, the simulation was slow and occasionally the tension would cause the cube-nodes to deform. The setup time of point-point constraints was high, and only promised to grow with an increased number of grapes. Aside from high simulation time the frequency of interpenetration was very high which was unacceptable, if I was willing to accept interpenetration then I would of placed the grapes manually.
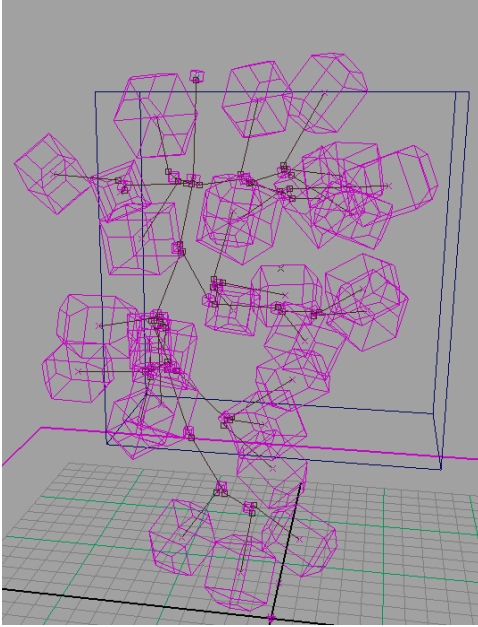
Decided to switch back to simple dynamics from nucleus dynamics, I was unconcerned with object deformation and more interested in accurate positioning. The setup became a rigid body bound to node with a pin constrain to allow free rotation and motion at a fixed distance.


This setup allowed for quick simulation at less than a second per frame and had minimal chance of interpenetrations. The resulting shape was close to the reference grapes and could be easily enhanced by finished art. In order to create the larger clusters of grapes I had initially envisioned a way to quickly iterate over the simulation was needed.
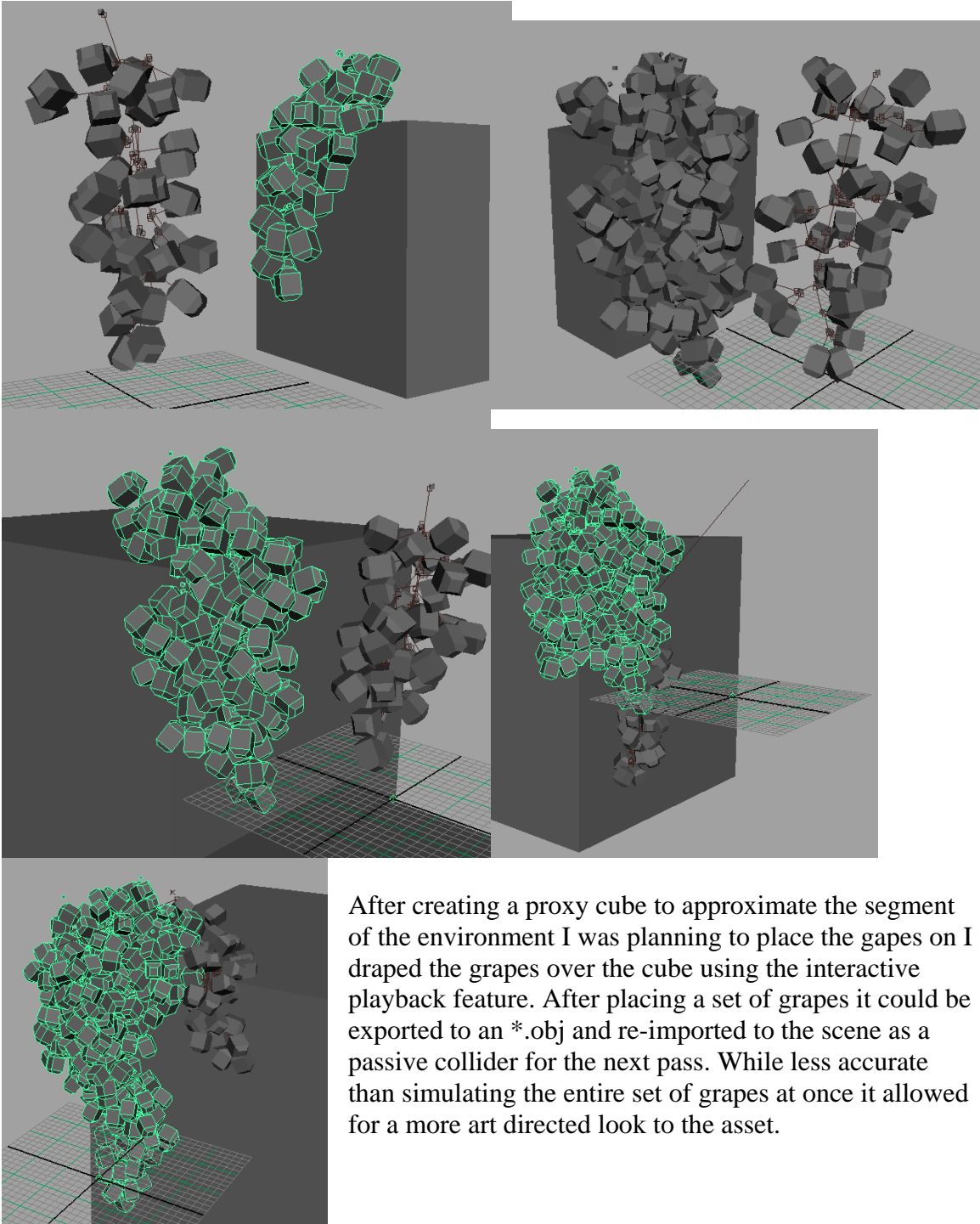
After creating a proxy cube to approximate the segment of the environment I was planning to place the gapes on I draped the grapes over the cube using the interactive playback feature. After placing a set of grapes it could be exported to an *.obj and re-imported to the scene as a passive collider for the next pass. While less accurate than simulating the entire set of grapes at once it allowed for a more art directed look to the asset.

Adding leaves;
To add leaves to the grapes I needed to ensure that they had all the details I wanted while not requiring me to model and sculpt each one individually. To help with this I used the option to import illustrator paths into Maya and crazy bump.
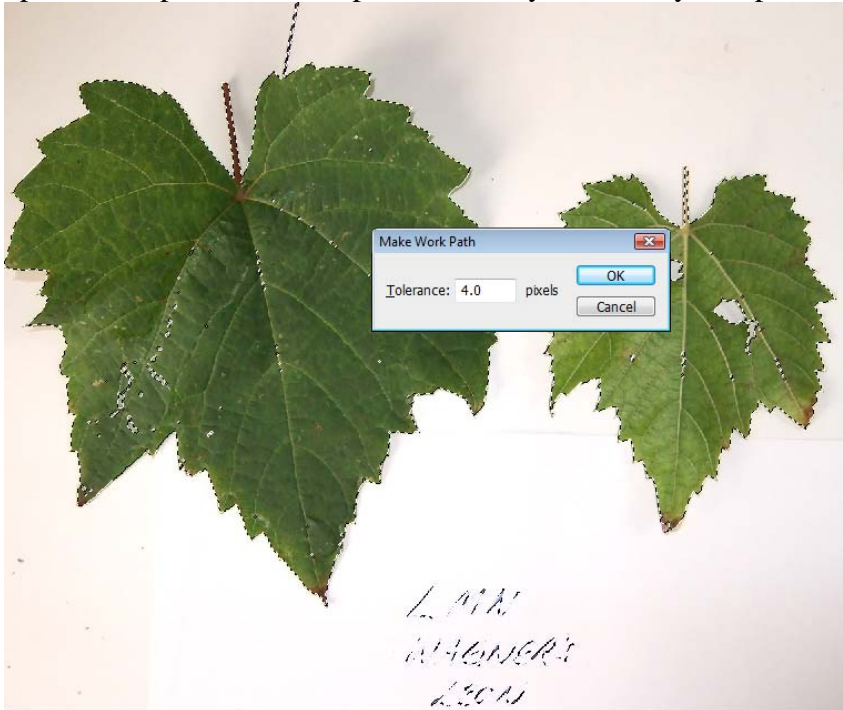
To generate the outlines I used Photoshop's selection to path tool and exported the result out as an *.ai file. I imported the path into Maya and used it to trim a NURBs plane.
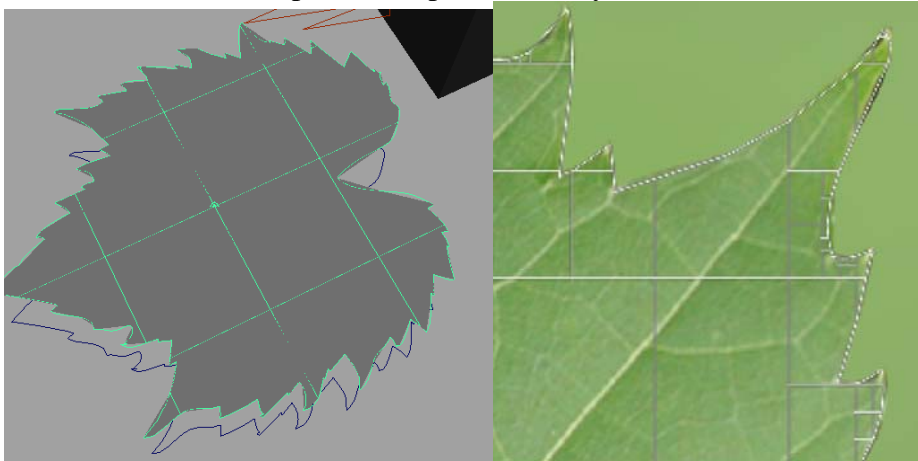

I then took the resulting NURB object and converted it to polygons so I could export the UV map. Which I opened in Photoshop to line up the source leaf image; which I matted on a neutral background before exporting the photo sourced leaf for Crazybump.
After applying the maps in Maya I realized that the NURBs to polygon leaf was too high poly and un-optimized for game work so I worked with xNormal to see if it was possible to bake the detail down to a lower poly object.
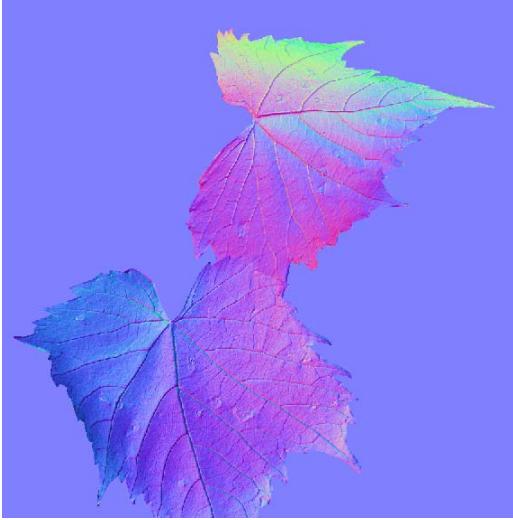
The test render of the normals maps held the majority of the detail of the source leaves. This allowed me to focus the remainder of my time into building the high poly for the grapes rather than develop a new method for creating the leaves.

Crazybump textured grape leaves
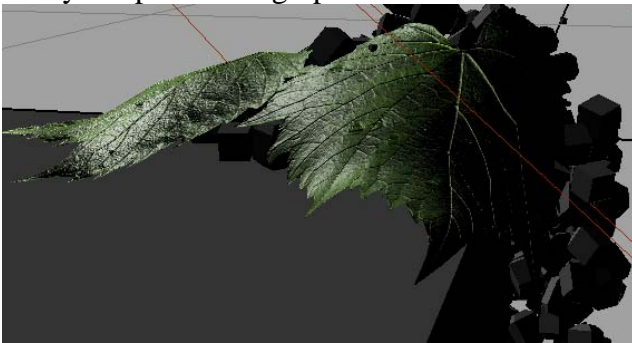
Leaves baked to a plane through xNormal.