CSCI 4110U – Assignment 3

Rhys Agombar – 100515147

To load the monkey object, I used a function that constructed a structure named 'Master', which contained the object's VAO, it's number of indices, and it's vbuffer location. This simplified the draw calls, as I was then able to simply draw the same object multiple times by referencing the structure an translating it to where I wanted it to be. For the ground, I did the same thing with one difference: I loaded all the positions where the vertices had a y value of greater than 0 into an array. This array would track the positions of all the obstacles in the scene and be used for doing collision avoidance.

In order to make the monkeys move, I used a function called processMovement() to calculate the forces acting upon them, and adjust their velocities accordingly. To make the monkeys avoid obstacles, I had each of the items in the obstacles array project acceleration away from them, such that when a monkey got to within a certain distance, they slowly pushed away (and were pushed very strongly when right beside the object, so that they would not collide). The dot product of the monkey's velocity and the acceleration vector was taken and used to reduce the force if the monkey was traveling parallel (or nearly parallel) to the surface. To avoid the monkeys of its own tribe, I had each monkey project a small force against its peers. The force was small, so as to not prevent them from clustering up, but large enough to prevent any collisions. In order to make the two tribes avoid each other, I had each blue member project a force on each red member and vise versa. This prevented the two tribes from coming into contact and always keeping a buffer distance between them. To make sure the monkeys were moving to their destination, I added an attractor to the two left corners of the map and had them pull the monkeys of their respective colours towards them.

Each of these forces was multiplied by a constant to indicate their importance (obviously collisions was large, avoiding the opposing tribe was also large, and the attractors were relatively small, since they could be ignored for a short period of time to avoid an obstacle). Once this was calculated, the forces were added together, normalized, and then multiplied by a scale value to make them move at a speed appropriate to the map's size. This was then added to the respective monkey's velocity. If the monkey exceeded it's set max speed, it's velocity was normalized and then multiplied by the max value to get it's new speed.

The camera is controlled by the wasd keys, and the zoom is controlled by the q and e keys.

Errors:

Sometimes the monkeys *almost* get stuck, and seem to pause in their movements, but due to the complex nature of the scene, the momentary pause is always resolved by the movements of one of the other members.