**This lab is worth 5% of your final AI4Games grade.**

**Due date October 6th 5pm**

**Lab 4**

On blackboard you will find a VS project called Flock.

The project implements a flocking algorithm as covered in the lecture notes.

Download and review this project to become familiar with the main components:

* Game
* Flock
* Boid

When you run the program, it draws 100 characters (triangles) on the screen and starts the flocking algorithm.

To do:

1. Modify the code so that only 10 characters are produced and see how the flock moves.

* The flock just moves in one direction they are all together and don’t split up or collide with each other

1. Modify the code so that 150, 200, 250 characters are produced and see how the program reacts.

* The more boids, the slower the program runs. The flocks get much, much bigger

1. Pressing the right-hand mouse introduces a predator. Observe how the flock respond. Check to see how this is implemented in the code.

* When the predator is spawned, the flock scatters and runs away from the predator

1. Can you improve the code so that the flocking runs more fluidly at higher numbers of boids?

* I started by making a grid and the grid is drawn on the map. You can do this using spatial partition. So dividing the world into a grid and only checking the boids that are in the same grid. This would help the performance (press G to enable/disable)
* I added a clock in the flock function. So all the calculations are done every 0.05 seconds, this might make the flocking slightly less smooth but it helps performance
* I also made the boids spawn in random locations because when they all spawn on top of each other it makes the game very slow

1. I have written the shell of a swarm() method as part of the boid class, called via the flock.swarming() method. When the user presses the Space Bar the flock behaviour toggles between **flocking** and **swarming**. Fill in the rest of the boid.swarm() method to implement the Lenard-Jones potential function.
2. 
3. Show me when it is done.

