**Lab 2: Bee Simulator**

David Schulz, Nicholas Johnson

A screenshot of a social media post

Description automatically generated**Reverse-Engineered Diagram**

**Significant Changes**

The Flower class no longer directly deals with its EnergyLevel object. Instead, the entity class handles all of the changes in energy level because it can see all of the different types of entities and interact with all of their energy levels. The Garden class now has a list of Entities with a list of Bees in it. This is because all of the entities had to be iterated through to assign random positions to each. It also allowed us to iterate through the bees to make each one tick, as well as making it easy to add more bees if ever desired. The Entity class is no longer abstract because it actually handles a large portion of the functionality.

**Who Implemented What?**

David implemented Bee, NormalBee, RandomBee, Flower, and part of Garden, so functionality involving tick handling, both of the bees’ movements, half of the collision checking, and what happened with energy levels whenever collisions happened. Nick implemented Entity, Location, EnergyLevel, and the rest of Garden, so functionality involving rendering everything on the GUI, the other half of the collision checking, bee death, and more tick handling.

**Screenshots**

The following four images show the regular bee (right) going to the good flower, getting energy from it, going to the bad flower, losing energy from it, and then approaching the good one again.

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The following two images show both bees running out of energy and dying. **A picture containing screenshot

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Finally, the following two images show the bees before and after colliding into each other, after the random movement bee had already hit the good flower. A screenshot of a cell phone

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**Known Problems**

It’s not exactly a huge problem, but it is possible for the two flowers’ positions to be close enough that they overlap each other. When that happens, the normal bee only goes between 2 positions after hitting the first flower. Also, it is possible for the two bees to collide two or more ticks in a row because they’re still within collision distance, causing them to lose energy multiple times for what is technically one collision. Lastly, as you can see from the last two screenshots, if a bee’s energy is above the bar’s max value, it will extend past the limit.