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Quarter Four Report of Progress

Much of my time during quarter four of the AOIT program was spent implementing new features into the CELL program, such as revising the program's structure to enable the existence of multiple focus cells (or entities), creating methods through which entities can reproduce, and tweaking the physical environment within which they operate. This was on par with my expectations from the end of quarter three, except that it excluded the procreation of Enemy objects because of the reduced class time available. It is my opinion that, in its final stage, the CELL program is a relatively impressive facsimile of an artificially generated environment; it contains most of the ecological elements present in real life.

The most challenging and time-consuming task in quarter four was physically removing any code in the main program pertaining to the focus cell and placing it into an entirely new Entity class. This is because the program was originally written to compute everything relative to the attributes of the focus cell—all of the values processed by the program were compared to a single center, and thus directly required its code to function. By removing the focus cell's processing from the main program, it became necessary to rewrite the enormous volume of code that previously depended on it. After much trial and error, this was completed: the starting organism was turned into a single object of the Entity class and could be replicated by calling the class' constructor method.

In the interest of designing a realistic environment, certain criteria were established that would govern the reproductive behavior of all Entity objects. Considering that Target objects act as food in that they build up the number of Particle objects in the Entity objects' membranes, it was decided that the overall size of a CELL would determine whether or not it would be able to reproduce. When an entity in the program reproduces, all of its particles are split into two separate ArrayLists that constitute the membranes of two new Entity objects. The old cell is destroyed in this process, which is similar to the biological function of cell division.

To model an appropriate environment that these Entity objects would operate in, the number of Enemy objects was made dynamic. This was necessary because, without proper regulation, the number of Entity objects would increase exponentially through their new reproductive function. In order to accomplish this, the number of Enemy objects was programmed to be equal to that of the Entity objects; coincidentally, the effectiveness of Enemy objects at hunting down entities increases with added numbers. This means that, though the number of entities and enemies are equal at all times, there is a natural carrying capacity in the program of approximately two or three entities at any given time.

This was the final element added into the CELL program—though there were many other issues that could have been addressed, such as overlapping entities, screens flickering white and same-target hunting, the program is, on the whole, a realistic representation of a biological environment. Unfortunately, because my digital portfolio was also subject to redesigning in quarter four, there was not much time to flush out the program's remaining bugs. Nevertheless, this project has been superbly challenging and very rewarding for me personally, and has proven to be an invaluable learning experience.