CS 3420 – Assignment #6
Emergent Behavior

Introduction

The concept of emergent behavior is that a simple (or complex, I suppose) set of rules lead to a global behavior not specifically defined by the simple rule set. In this program you will encode a simple set of rules to describe the behavior of a group of ants, which lead to the global behavior of randomly placed food pellets being collected into a small number of piles. This program also has you extending your experience with developing user interfaces by including the use of a third-party grid control for the display of the “ant farm.”

Assignment

Create a program that allows the user to enter the size of a 2D grid, with separate rows and column entries, a number of randomly placed food pellets, the number of ants and how many iterations the simulation is to run. The last page of this assignment shows an example of the program after a simulation. Your user interface for the inputs should be much nicer than mine! Use things like up-down numeric controls, group boxes and etc to make it look nice, I'll update mine too, but I'm trying to get this written up before class starts today.

When the simulation starts your program should do the following...

- Create a grid of the size specified by the user
- The grid must have a border, as the screen shot demonstrates
- Randomly place the number of food pellets in the grid. Don't place a pellet on a space that already has a pellet.
- Randomly place the initial ants, giving the ant an initial direction to move (east, west, north or south). Don't place an ant on a space that already has a pellet or an ant.
- The rules for ant behavior is the following...
  - If the next cell is empty (not a border, no food or other ants in it), move forward
  - If the next cell contains food and the ant does not already have a food pellet, move into the cell and pick up the food pellet.
  - If the next cell contains food and the ant already has a food pellet, drop the food pellet, back up one space and choose a new random direction to face.
  - If the cell is a border or contains another ant, choose a new random direction to face.
- Each iteration of the simulation every ant is updated.
- How about one more thing for fun (fun to Dean): When the simulation is over, count the number of food pellet piles in the grid. Provide a spot on your UI to report this result at the end of the simulation.

NOTES:

- Due: Saturday, March 10th
- Include the heading required by your section at the top of the program
- Follow the style guidelines
- Submit the entire solution directory, but not any exe or obj files, i.e. Delete the /bin and /obj directories.
- Submit through eagle.