vanand and fsikram

*****SUMMARY*****

The program basically implements a 2D predator-prey simulation using derived classes and virtual functions. The program involves a simulation of a grid of n by n squares, which could be empty or occupied by an organism. All the organisms are placed in a vector in Gameboard.The two kinds of organisms are ants and doodlebugs. Only one organism takes one cell at a time and each organism performs some action for every step. The organism may never move off the edge. The actions the doodlebug performs is starving, moving, eating, and breeding. The actions the ant does is moving and breeding. The Organism class is an abstract class. The ant and doodlebug is a subclass of the Organism class. The Organism class has common virtual methods between the ant and doodlebug class that they can implement. We have a header and .cpp file for ant, doodlebug, organism, gameboard, and the main program.

Note: The move function that is called on board while we are traversing through timesteps does ALL of the following: breed for ant and doodlebug, move ant and doodlebug, and starve doodlebug.

*****HOW TO RUN IT*****

In order to run the program, first you have to compile it. In the terminal, you can type make after going to the folder. To actually run the program, you have to type in the following command line arguments. These are the file name, the grid size, the number of doodlebugs, the number of ants, the time, the seed number, and pause. You can also not enter the command line arguments because they all have a default value. The run line will look like this in the terminal:

./PA6 gridSize #doodlebugs #ants #time_steps seed pause

Note: When you pause you MUST type a letter and press enter to continue the program

*****PROBLEMS*****

We did have a few problems initially when we wanted to start. We didn't know where to start but then we read the book and talked to the TA's and professor and we got an idea of where to start. After we started, we had a problem with the header files as they were looping back to each other after running the program. We went to the TA's to discover that there is something called forward declaration. We were then able to make that part work.

******ALGORITHM******

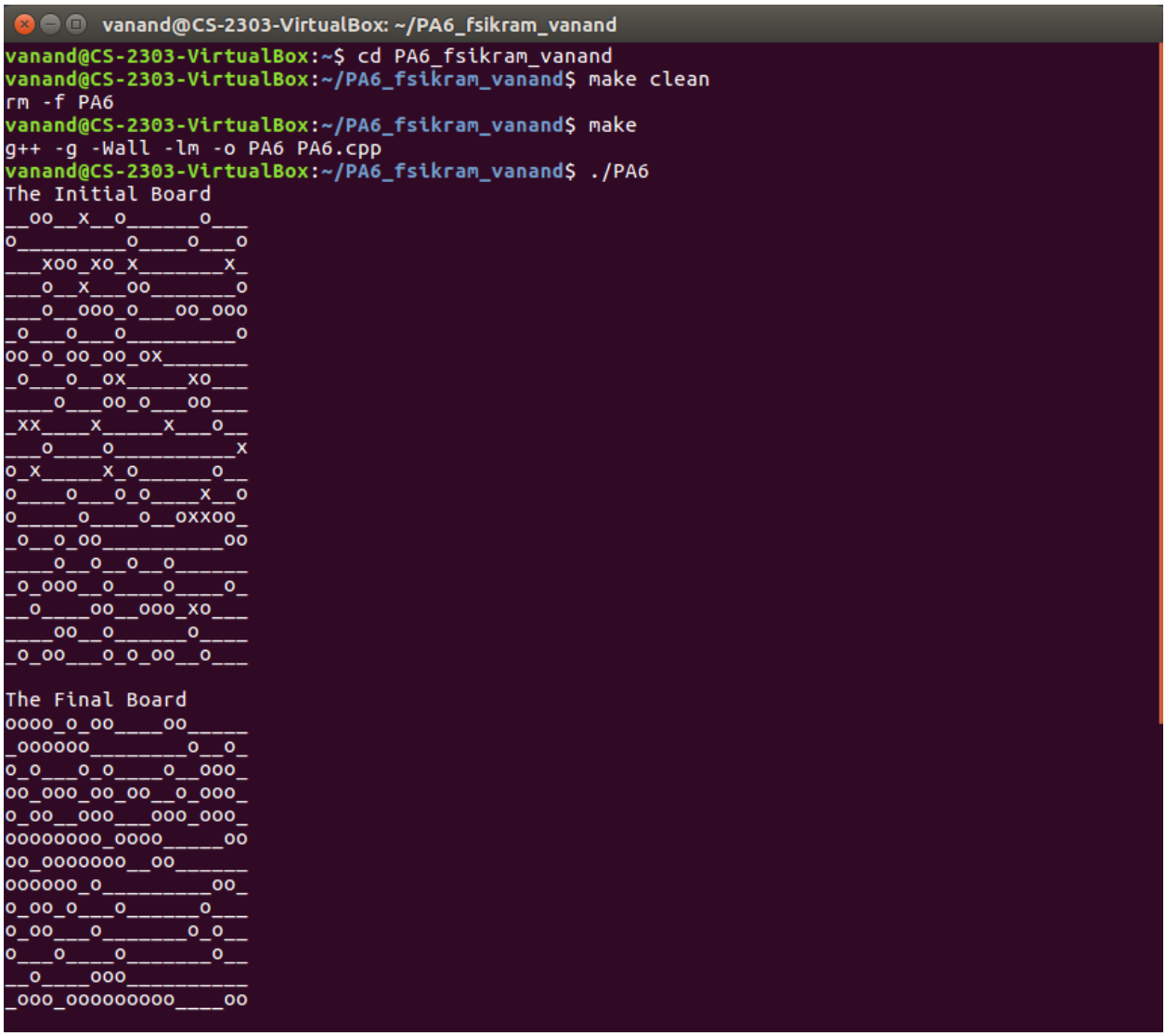
As part of our algorithm we have the interpretation of the command line arguments and the initial configuration of the board. We have a function that finds the random number. We have a function for adding ants and doodlebugs to the board and it randomly places them on the board. It creates new ants and doodlebugs. We have a min function that basically plays the simulation by calling the methods such as breed, move, starve. For move, set the direction equal to 1 for moving above, 2 for moving down, 3 for moving left and 4 for moving right. Calls the set organism and get organism function to set the organism in the board and get the organisms, respectively. For breed, create a vector to hold the spots available on board. Randomize the spot it will breed in if many adjacent cells are open. Then call helper function to determine exactly which spot. Then, if statements that tell where to put the breed and set that in place.

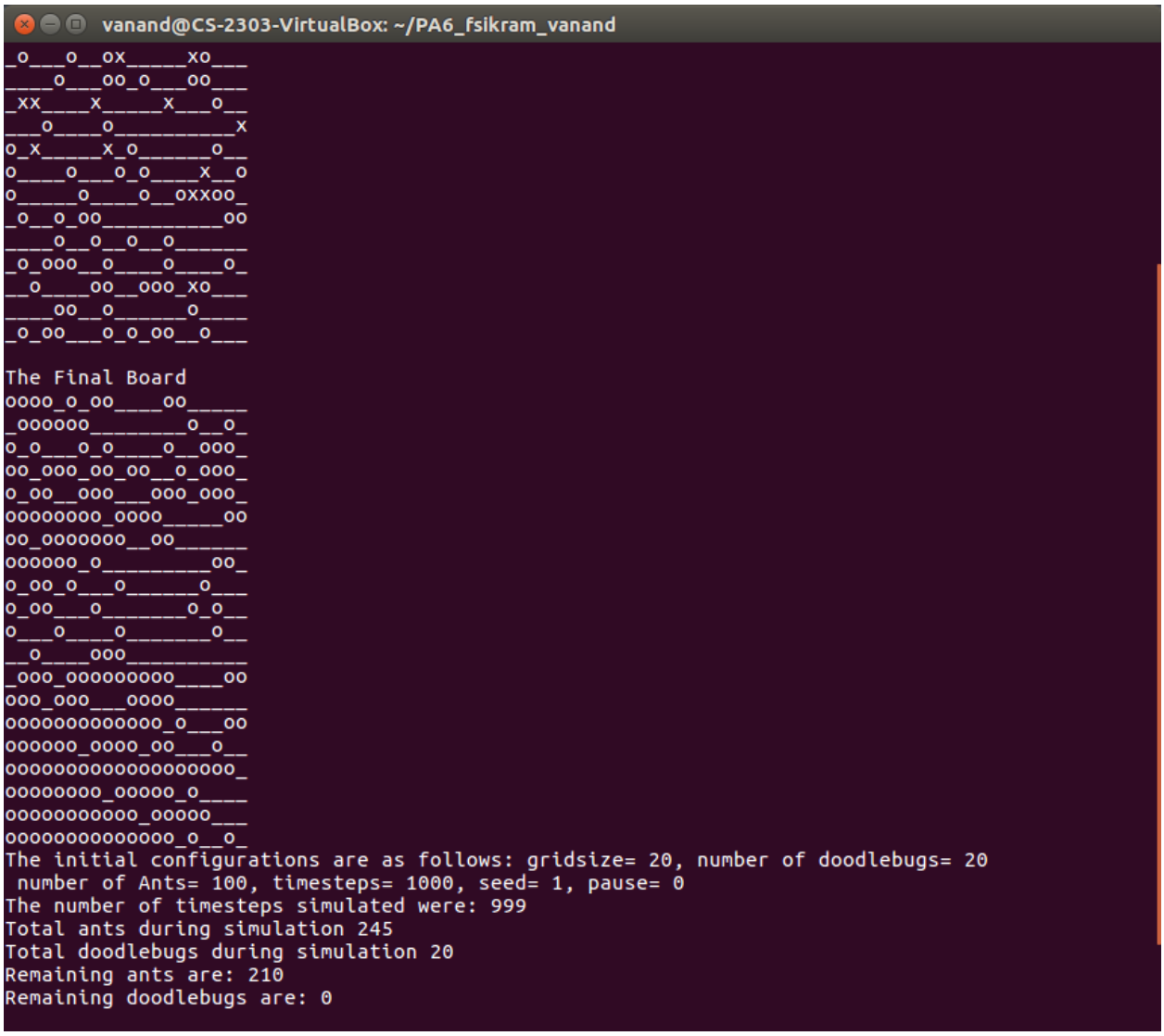
Then, reset the lifespan of the organism to start over again. Then, if statement to differentiate between an ant and a doodlebug.

*****TESTING*****
We tested all the cases that the program could encounter. The command line arguments are displayed below for each test:

*****OUTPUT*****

Test case 1: Default values

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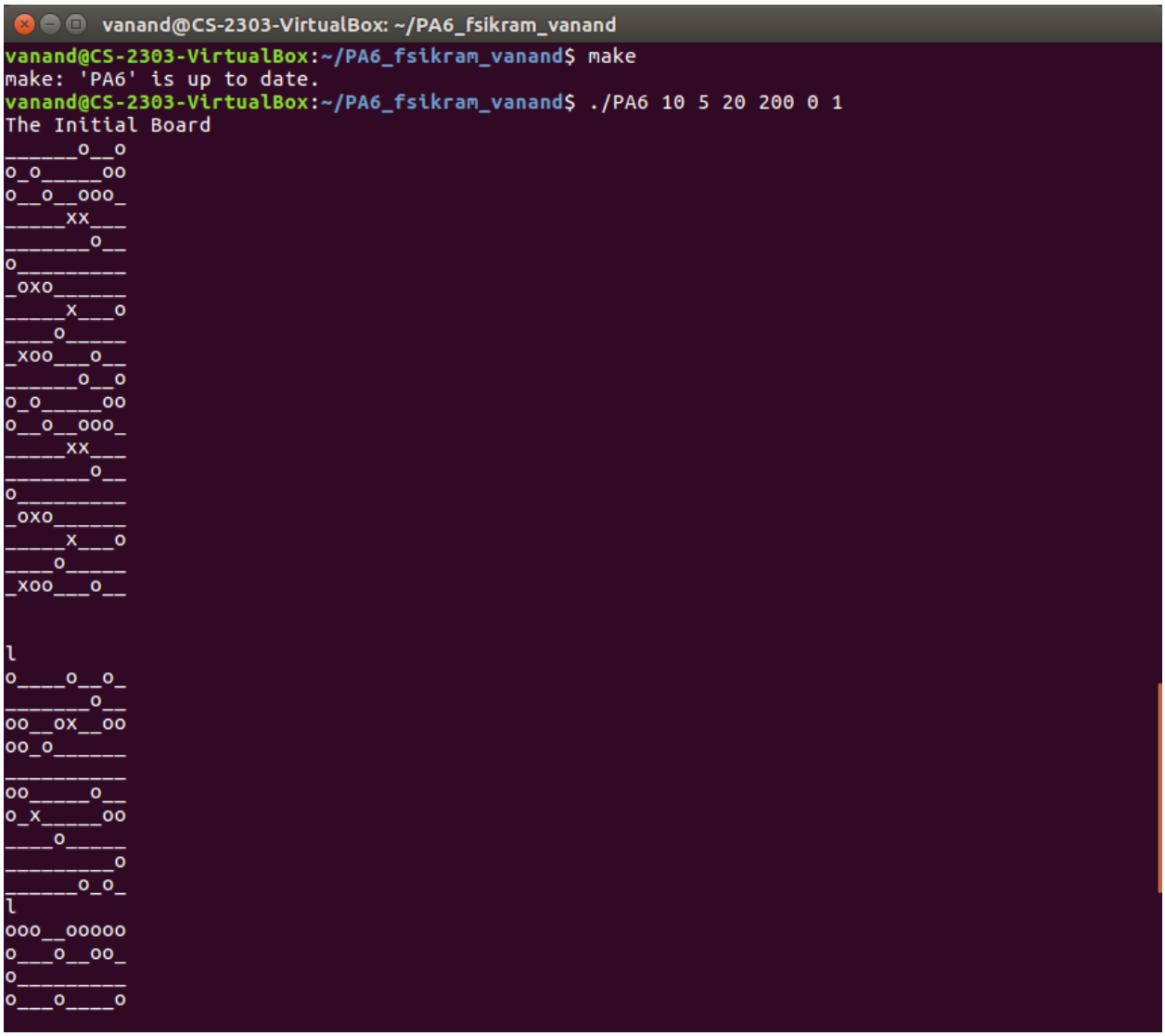
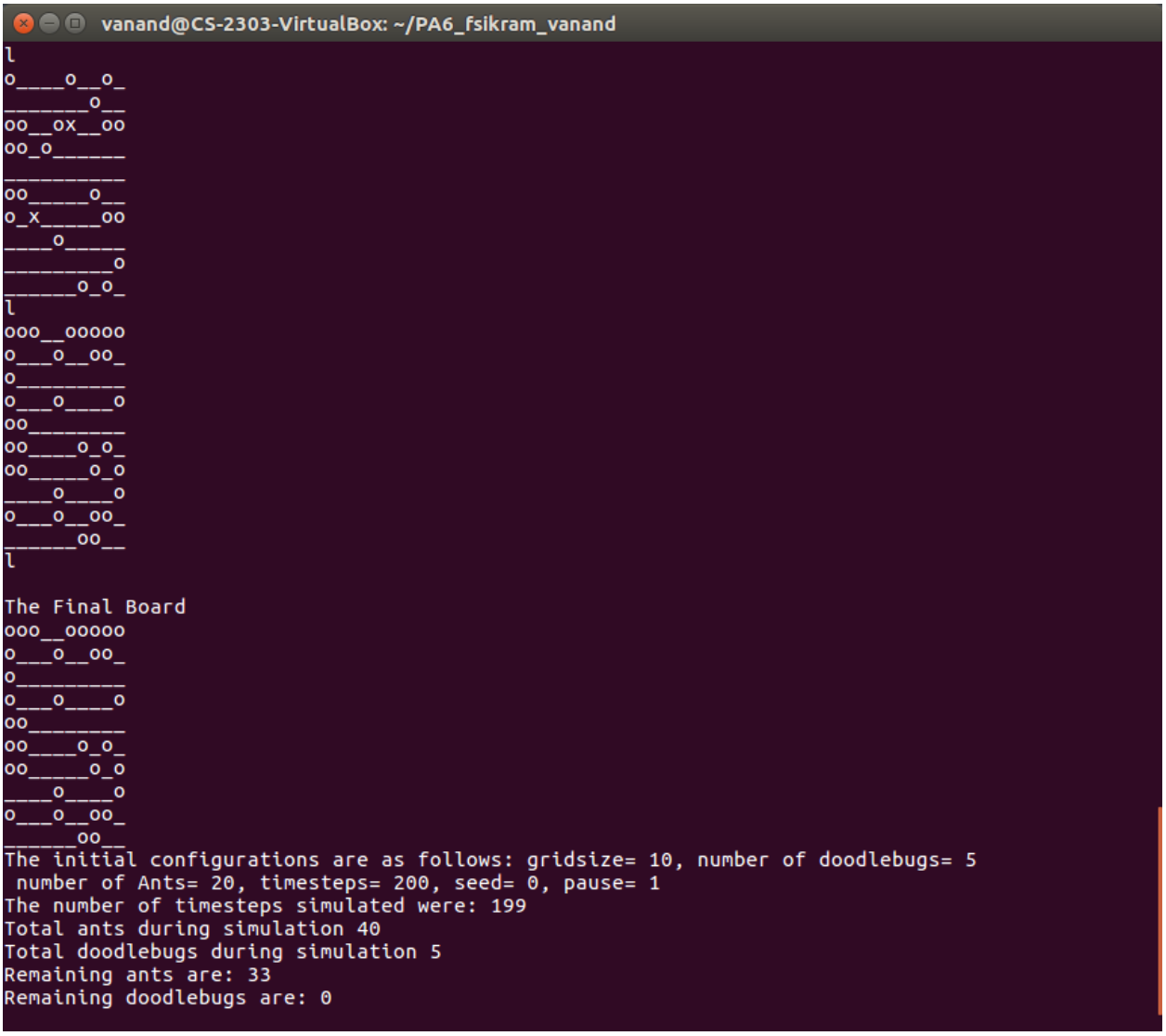
The initial configurations are as follows: gridsize= 20, number of doodlebugs= 20
 number of Ants= 100, timesteps= 1000, seed= 1, pause= 0
The number of timesteps simulated were: 999
Total ants during simulation 245
Total doodlebugs during simulation 20
Remaining ants are: 210
Remaining doodlebugs are: 0

Test Case 2: Doodlebug is less than Ant

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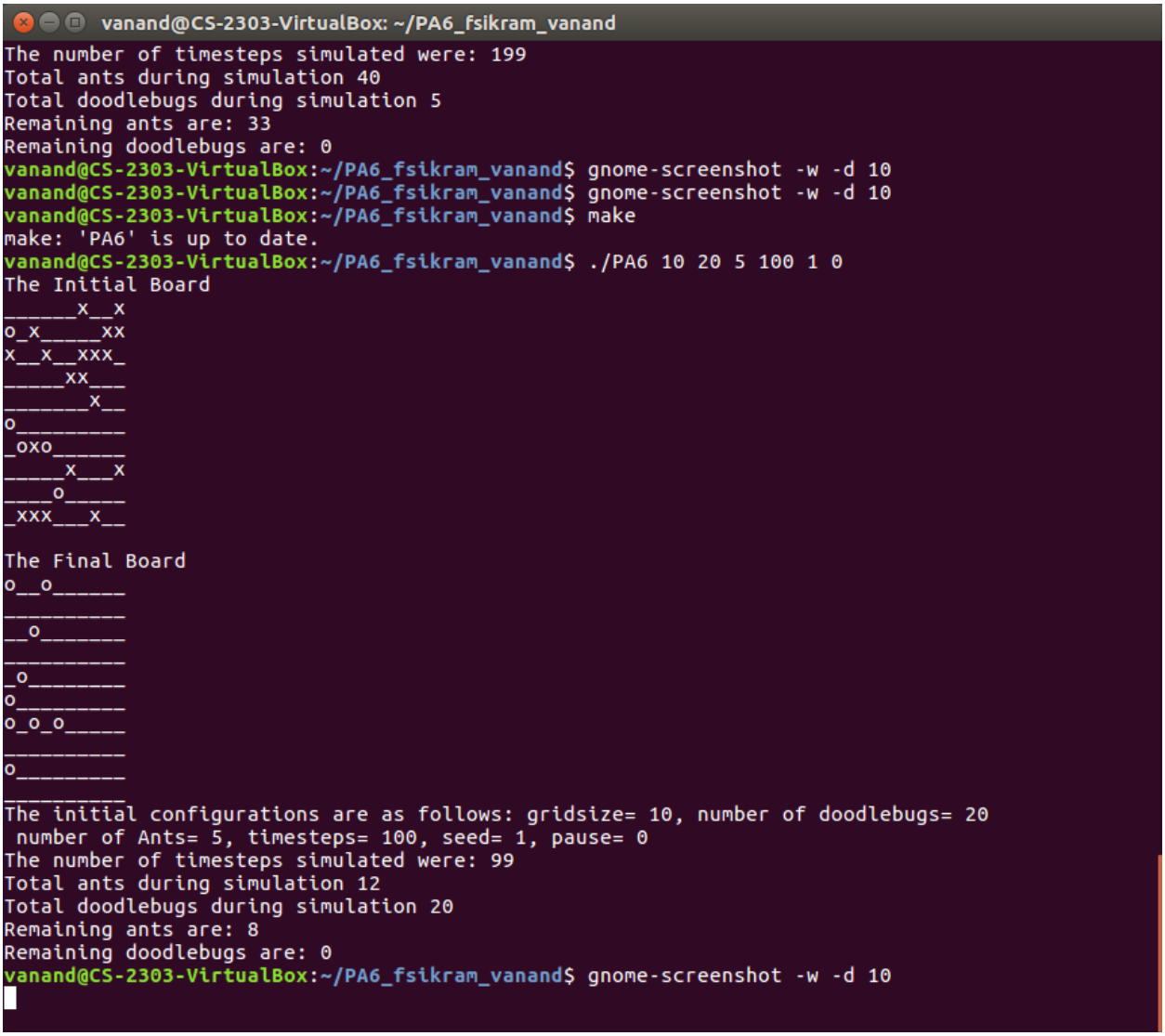
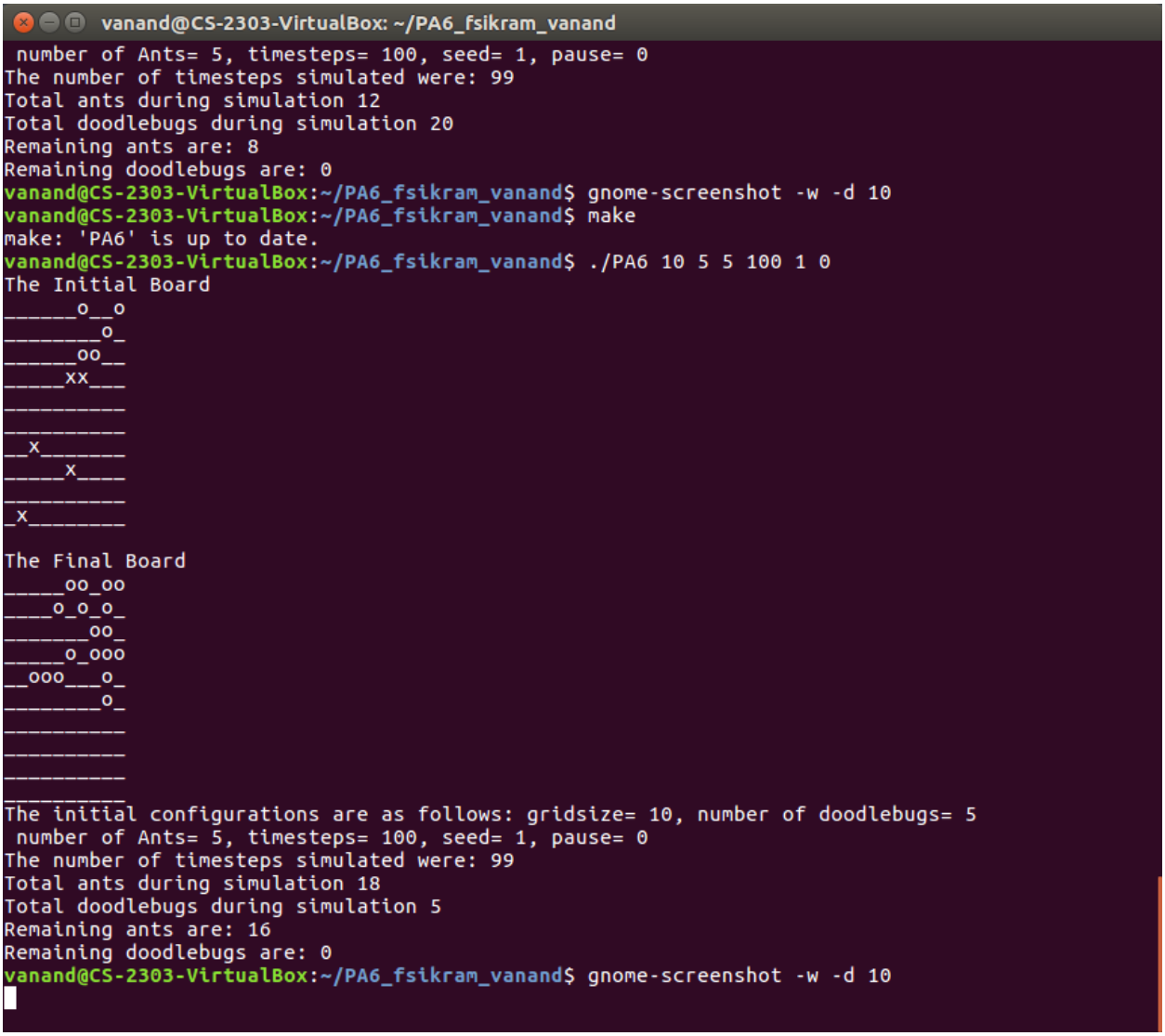
The initial configurations are as follows: gridsize= 10, number of doodlebugs= 5
number of Ants= 20, timesteps= 200, seed= 0, pause= 1
The number of timesteps simulated were: 199
Total ants during simulation 40
Total doodlebugs during simulation 5
Remaining ants are: 33
Remaining doodlebugs are: 0

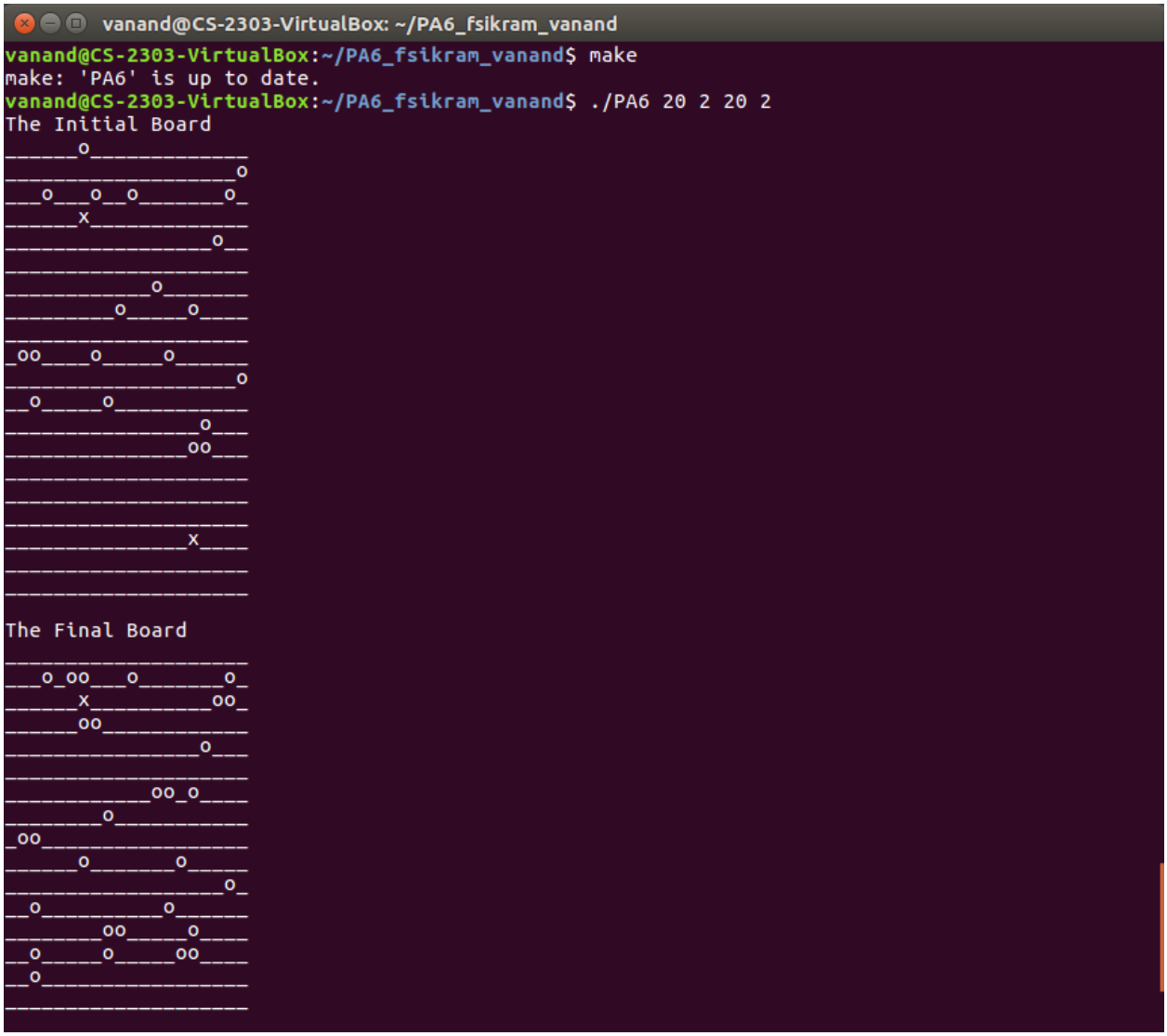
Test Case 3: Doodlebug is more than Ant

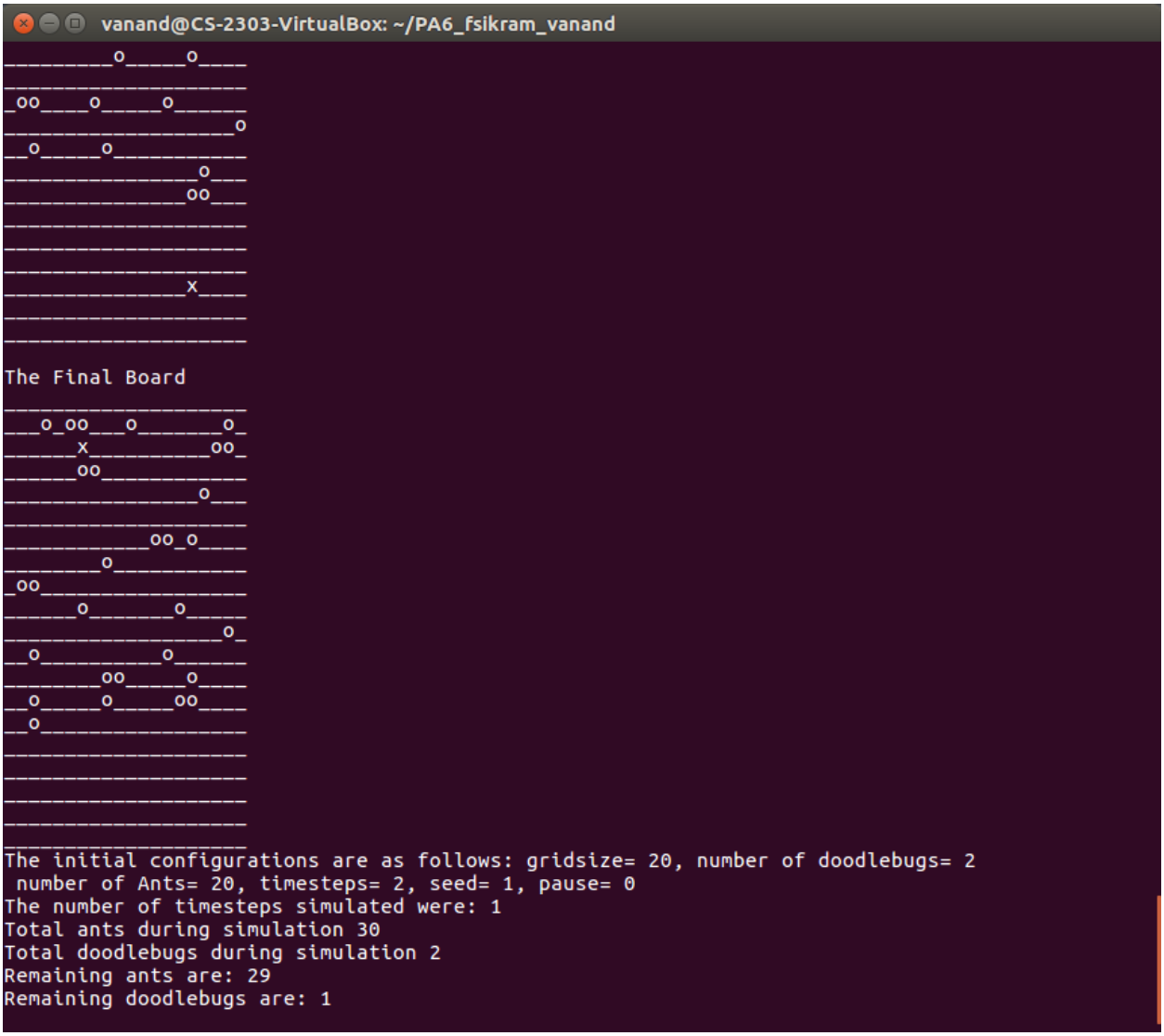


Test Case 4: Same amount of doodlebug and ant



Test Case 5: One step




vanand@CS-2303-VirtualBox: ~/PA6_fsikram_vanand
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The initial configurations are as follows: gridsize= 20, number of doodlebugs= 2
number of Ants= 20, timesteps= 2, seed= 1, pause= 0
The number of timesteps simulated were: 1
Total ants during simulation 30
Total doodlebugs during simulation 2
Remaining ants are: 29
Remaining doodlebugs are: 1