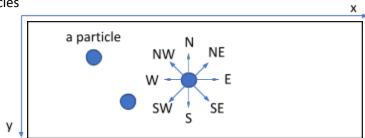
Object-Oriented Programming

Lab #2

Box of particles



Imagine that we have a box to store particles. Initially, we place randomly 3 particles in that box. After each step, these particles will move freely inside the box. If two particles collide, a new particle will be placed randomly in the box.

We want to simulate the movement particles for n steps and count the number of particles in the box.

Implement a box of particles (write a class of box, a class for particle) in such a way that

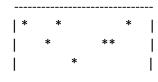
- 1. A box has a fixed size: fixed width and height (10pts)
- 2. Each particle has a position (x, y) where $0 \le x \le$ width of the box, and $0 \le y \le$ height of the box (10pts)
- 3. A particle can move in one of the directions below but cannot move out of the box (20pts).
 - + North (decreasing its y by 1),
 - + North East (decreasing its y by 1 and increasing its x by 1),
 - + East (increasing its x by 1),
 - + South East (increasing its y by 1 and increasing its x by 1)
 - + South (increasing its y by 1),
 - + South West (increasing its y by 1 and decreasing its x by 1),
 - + West (decreasing its x by 1),
 - + North West (decreasing its y by 1 and decreasing its x by 1)

Hint: declare an enum type for Direction

4. If two particles collide, a new particle will be placed randomly in the box(20pts)

and a class for simulation where for each step,

- 5. It makes all particles in the box move (5pts)
- 6. It shows the number of particles in the box (5pts)
- 7. It visualizes the box with particles inside (10pts)*



8. Search about singleton pattern and make the box as a singleton (20pts)
Reference: https://docs.oracle.com/javase/tutorial/java/javaOO/enum.html