

rm-rf (Nadine Jackson, Raunak Chowdhury, Tabassum Fabiha)  
APCS2 pd2  
Project Proposal  
26-05-2018

Project Idea: We will be simulating the final level of Plants vs Zombies 1. The conventional PvZ games allow you to expand your garden-army of plants with sun; however, in the Zomboss boss fight (the final boss), there is no sun. Instead, plants are automatically generated for you. See the screenshot for an example:



Our project is an emulation of the boss fight above. The goal of the player is to strategically place his or her plants such that none of the zombies or their weapons come into contact with the house. However, there will be some changes made: the actual level will take place in the Garden setpiece (which is flat with grass), there will be no pots, and there will be no advanced phases (ie. the phase where the Zomboss AoE attacks some of your plants by throwing a van on top of them).

#### Backend:

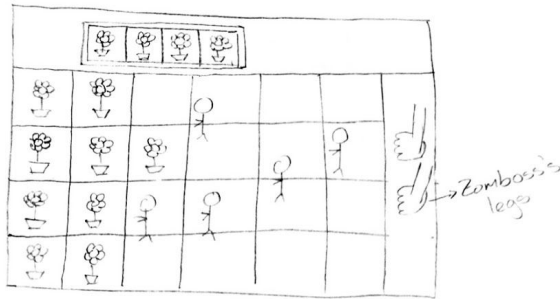
- This will include two data structures we learned this year.
  - Heaps
    - To randomly generate zombies and plants, we will be using two minHeaps. At every attempt at generation, the relevant heap will be consulted. Each heap will store the different class types of plants and zombies that could be generated.
    - The heap's root will be the simplest type of zombie/plant there is (Zombie/Peashooter); the stronger plants and zombies (like Gargantuars and Winter Melons) will be located at the lower levels of the tree.
    - To select the plant/zombie for generation, the algorithm will be as follows:
      - Start at the top of the heap.

- Based on RNG, either select the plant/zombie you are on or go down into the left or right subtree. Keep going down until there are no subtrees or the current plant/zombie is selected.
      - Note: these heaps are meant to be perfect heaps. Exact plant types and zombie types TBD (see the tentative list below)
    - Queues
      - See that feeder belt with the plants? We will simulate that with a Queue. We are still unsure of how to do the animation; however, the MVP will be that the card simply appears in the Queue (ie. no sliding along; it'll just pop into existence)
    - Each ADT will be taken by one developer.
  - The placement of the plants will be determined via a matrix.
  - Zombies will move in fixed lanes.
  - There will be two inheritance trees: Plants and Zombies.
    - Plants
      - Peashooter
      - Wal-Nut
      - Melon-Pult
      - Winter Melon
      - Repeater
      - Jalapeño
      - Ice Shroom
      - Cherry Bomb
    - Zombies
      - Regular Zombie
      - Cone Zombie
      - Bucket Zombie
      - Football Zombie
      - Gargantuar (+ Imp)
  - Shovels will be used to remove plants.
  - Music: We are using the Minim package to play an MP3 file of the Zomboss music. As of 5/26, we have a working program that plays back music.

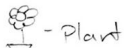
#### UI:

- It will be similar to the screenshot above. See the below image for an example:

## Visuals

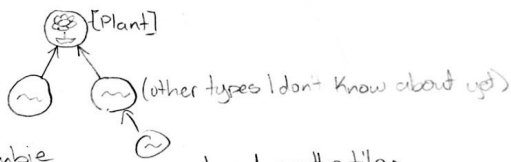


- \* produces the plants used for fighting
- \* you can only pick up the left-most plant
- \* randomness



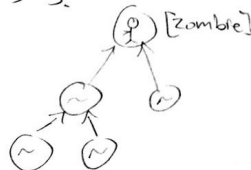
- Plant

- \* can only be placed centered on the square tiles
- \* hierarchy system:



- Zombie

- \* don't have to be centered on the tiles
- \* walk forward
- \* popped out of a randomly generated minHeap
- \* hierarchy system:



- The boss will have two phases, and alternate between them. He can be damaged in both phases.
  - Phase A: Only feet are shown, spawns zombies in random lanes
  - Phase B: Head is shown, spits out fire or ice balls, and sometimes a Gargantuar

## UX:

- The challenges here are that there will be no lawn mowers and that the user must follow the rules of the Queue (ie. place the first plant down before the next)
- Possible concerns:
  - Clunky animation
  - Zombies not eating plants correctly
  - Transition between boss phases