

## **APCSA Project Document**

### **1. Intro**

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Period 2

Group Name - Sarahbyte (like “Terabyte” :))

Project Title- ImPACt: A Pac-(Wo)Man Inspired Game Empowering Girls Who Code

### **2. Description**

ImPACt is an action maze chase video game inspired by the classic Pac-Man, but with a feminist twist to empower girls who code—along with girls in other S.T.E.M. fields: instead of the regular Pac-Man avatar, the user is represented by a girl avatar who traverses through the maze, which represents her journey of fighting and escaping obstacles to achieve her goal of becoming a programmer; the food represents various coding achievements such as successfully completing lines of code and winning competitions; and the ghosts represent damaging negative thoughts. The game features numerous modes and levels that vary in difficulty.

The game was influenced after seeing how few girls were in our APCS class and how classic video games were generally only marketed or seen as “for boys” in the past.

#### **Functionalities:**

- **Start/Result Screen:**

The start screen allows the user to customize their avatar and select their difficulty level before pressing the button to start the game. The result screen is triggered and tells the user when they win or lose the game and their final score and time, and it also allows the user to return to the start screen and play the game again.

- **Avatar Customization:**

The start screen allows players to customize the hair and skin color of their avatar.

- **Difficulty Selection:**

The start screen allows players to choose the difficulty of the game mode. There are three modes: easy (5 lives, 2-3 ghosts, player is significantly faster than ghosts, 15% chance of a food being a power-up), normal (3 lives, 3-4 ghosts, player and ghosts are generally the same speed, 10% chance of a food being a power-up), hard (2 lives, 4-5 ghosts, player is slower than ghosts, 5% chance of a food being a power-up).

- **Random Maze:**

A random maze is generated at the start of each game and level.

- **Multiple Lives:**

When the user dies, they have multiple lives before the game is finally lost and over. When a life is lost, the progress is saved, the time is paused, all power-up effects are ended, and the avatar and ghosts are reset to their initial positions.

- **Power-Ups:**

Each food has a specific percentage chance of being a power-up. There are two possible power-ups that are chosen at random: 1- the ghosts become scared and can be eaten for 10 seconds, once eaten, they return to their initial positions in the middle of the maze and cannot move for 5 seconds and 2- there is a 2x score multiplier for 10 seconds.

Immunity cannot be stacked, if another power-up is eaten before the previous power-up time runs out, the duration will reset to 10 seconds. The score multiplier can be stacked once: if another power-up is eaten before the previous power-up time runs out, there is a 4x score multiplier. If another power-up is eaten again, the duration will reset to 10 seconds.

- **Levels:**

Once all the food in a map has been eaten, the level has been won and a new level and maze will be generated (a maximum of 3 levels). With each level, the game becomes more difficult: the ghosts become faster and at the third and final level, an additional ghost is added.

- **Stats. Bar:**

A stats. bar is available at the bottom of the maze showing how many lives are left, the score, the time, the duration of the power-ups remaining, the score-multiplier, and a progress bar of completion of the maze.

- **Chaser Ghost:**

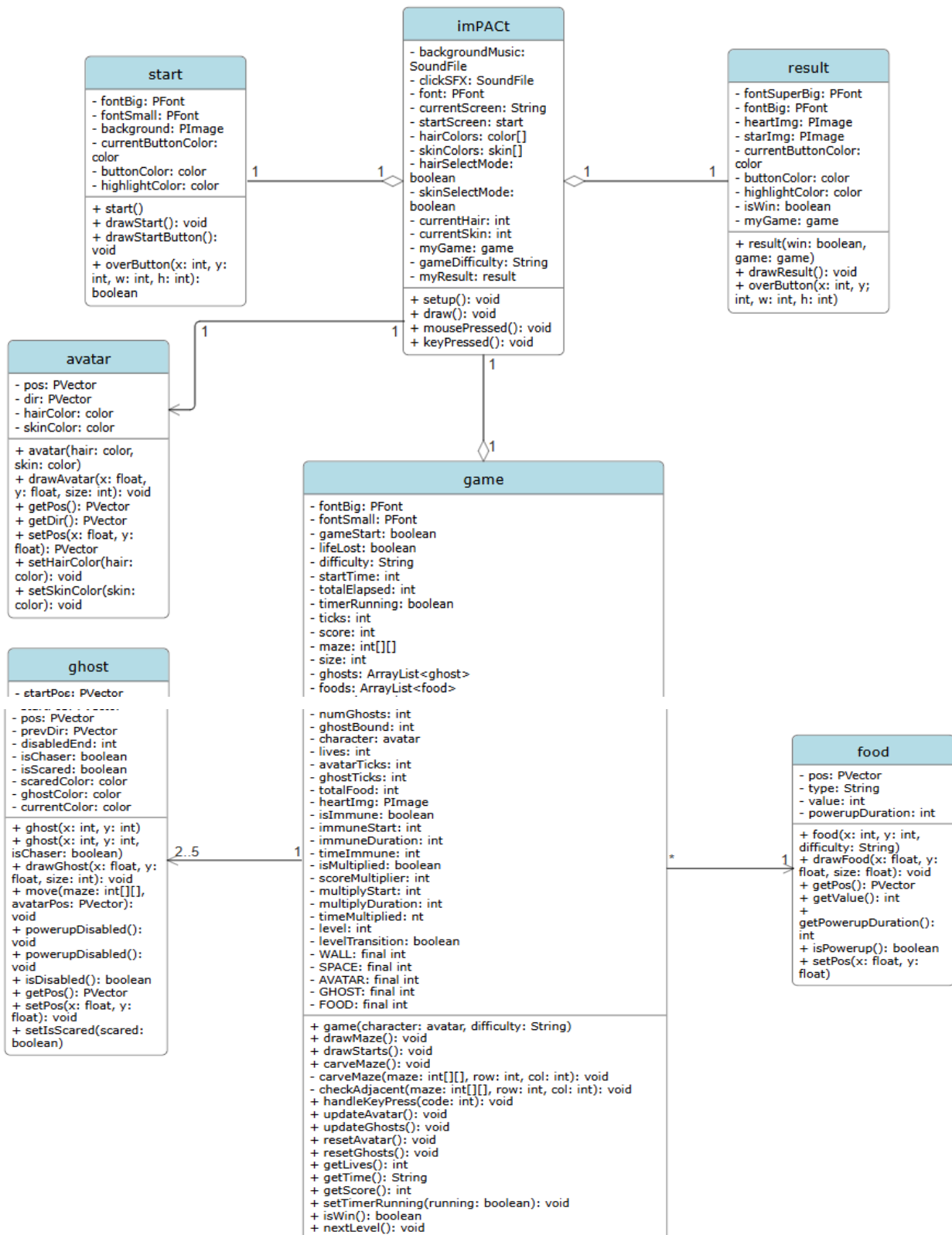
One of the ghosts specifically chases the avatar with their movement directions being ordered in favor of which one is closest to the avatar.

**Libraries:**

- **Sound by The Processing Foundation**

This library will be used to add background music and sound effects (for power-ups, winning, losing, etc,) to the game.

### **3. UML Diagram**



#### **4. How does it work?**

The objective of the game is to successfully become a programmer by passing all levels and receiving the highest score possible within the least amount of time. Similar to the original Pac-Man, to complete a level, the avatar must eat all food and increase their score through power-ups without being killed by a ghost.

When players first run the game, the game may take a while to load due to the processing of sound files. Players can use their mouse to click on the start page's button to start the game.

- To customize the avatar: press the key "h" and use arrow keys to navigate through all the hair colors; press the key "s" to choose skin color. Only one mode can be selected at one time.
- To select the difficulty: press the keys "1" for easy, "2" for normal, and "3" for hard.
- To move the avatar and change its direction in the game: use corresponding arrow keys.

Once the game is over, players can again use their mouse to click on the end page's button to restart the game.