Zombie WarFrame Game

OOP PROJECT

Object Oriented Programming (CS1004) – SPRING 2024
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INSTRUCTIONS:

1. **Plagiarism in the course project will result in an F grade in the course. Plagiarism is strongly forbidden and will be very strongly punished. If we find that you have copied from someone else or someone else has copied from you (with or without your knowledge) both of you will be punished. You will be awarded (straight zero in the project — which can eventually result in your failure) and appropriate action as recommended by the Disciplinary Committee (DC can even award a straight F in the subject) will be taken.**
2. This is a **Group** project, and only **groups of 2** are allowed. Cross-section groups are not permitted for 23rd batch students; however, for 22nd or 21st batch students, they can form cross-section groups. Making an individual project is **NOT allowed**, and there will be a deduction of marks if anyone chooses to do an individual project.
3. Divide and conquer: you are recommended to divide the task in manageable subtasks. We recommend completing the drawing and design (i.e., number of classes and their relationships) phase as quickly as possible and then focus on the intelligence phase.
4. Before writing even one line of code, you must design your final project. This process will require you to break down and outline your program into classes, design your data structure(s), clarify the major functionality of your program, and pseudocode important methods. After designing your program, you will find that writing the program is a much simpler process.
5. No Marks will be given if you do not submit your class diagram and if you do not use the object oriented design principles you have learned during the course.
6. Imagination Powers: Use your imaginative powers to make this as interesting and appealing as you can think of. An excellent solution can get you bonus marks.
7. Use proper naming convention to name the file containing source code. Failure to submit according to the above format would result in the deduction of 10% marks. E.g., ***i23xxxx_project.cpp***, replace i23xxxx with your roll number.

8. Follow the given instructions to the letter, failing to do so will result in a zero.

9. The implementation of the project needs to be **done from scratch**. The only purpose of using the sfml library is to assist in functionality that could not be implemented at this stage such as drawing shapes, using colors, and assisting in beautifying the graphics. It should not be used to implement project features such as rotation, movement, and tilting which could be easily implemented using the coordinate system. The **use of vectors is strictly prohibited** in the project.

Zombie WarFrame Game

ZombieWarFrame Storyline:

In the peaceful world of Verdantia, a terrible invasion occurred. Extraterrestrial zombies attacked, threatening all life. The inhabitants panicked, but the sentient plants of Verdantia fought back. They used their natural powers to defend their home. In a desperate move, the Elderwood, the oldest of them all, unleashed a powerful wave that banished the zombies and saved Verdantia. Though wounded, the planet survived, thanks to its brave plant guardians.

Zombie Warframe Gameplay:

"Zombie WarFrame" is a popular tower defense video game where players defend their suburban home from invading zombies. The game features a gridded lawn, with the player's house situated on the left side. Players strategically place various types of plants on individual squares of the grid, each offering unique defensive abilities such as shooting projectiles, exploding, or blocking zombies. Different types of zombies exhibit distinct behaviors and vulnerabilities to specific plants; for instance, the Balloon Zombie can float over plants but can be popped by the Cactus. Throughout the game, players must collect sunlight, the in-game currency, either by clicking on sun icons or using sun-generating plants like Sunflowers. Sun is used to purchase and place plants, with each plant requiring a specific amount of sunlight. Players can also use a shovel to remove plants if needed. Each lane features a single-use lawnmower, pool cleaner, and roof cleaner positioned at the left end, which activates to eliminate zombies if they reach that point. However, if a zombie reaches the end of a lane without an available cleaner, the player loses the level and must restart or exit.

In "Zombie Warframe," players strategically defend their home from invading zombies by planting various defensive plants. At the start of each level, players select plants from their inventory using

seed packets. These plants possess unique abilities, such as attacking zombies, generating sunlight (the in-game currency), or providing defensive barriers. Sunlight is crucial for planting, collected by clicking on sun icons that randomly appear on the lawn or using sun-producing plants like Sunflowers. Players place their chosen plants on the gridded lawn, strategically positioning them to counter waves of incoming zombies, each with different abilities and vulnerabilities. The game's controls primarily involve mouse interaction, with players using the mouse to navigate menus, select plants, and place them on the grid. Clicking is used to collect sunlight, select plants, and interact with in-game elements like zombies and special abilities. Keyboard shortcuts may also be available for certain actions, such as pausing the game or accessing menus. Overall, "Plants vs. Zombies" offers accessible mechanics and controls, making it enjoyable for players of all skill levels.

Implementation:

You are required to design and implement the game using Object Oriented Programming. Remember, this project is the perfect opportunity to impress your instructors with your understanding of the OOP concepts. Apparently, a better design of the concepts/classes in the game gets more marks as marks will be deducted for the incorrect design and implementation of the game. A starter code is provided for reference of the sfml library in C++.

Submission

Deadline to submit the design of the concepts/classes involved in the game is **April, 2024 at PM.** You can improve the design afterwards, if needed. The submission should be made on google forms as a PDF document and should contain proper figures and explanation of the design. The deadline to submit the implementation and updated design document is

Features to be implemented

Plants

The player places different types of plants on individual squares of the grid to defend their suburban home from zombies. Each plant has a different type of characteristics which are described below.

1. **Peeshooter:**

   The Peashooter plant is the simplest of plants, shooting only one pea at a time. Each pea is launched after a certain interval, and this drop time interval varies for each Peashooter. To acquire a Peashooter, you'll need to spend 100 sun, the in-game currency.

2. **Sunflowers:**

   Sunflower is another type of plant that will produce one sun every 10 seconds. To acquire a Sunflower, you'll need to spend 100 sun, the in-game currency.

3. **Repeater:**

   Repeater is another type of plant that will shoot 2 peas every 2 seconds. To acquire a repeater, you'll need to spend 200 sun, the in-game currency.

4. **Wall-nut:**

   The Wall-nut plant capable of rolling, blocks off zombies except for flying zombies and protects your other plants. The currency to obtain a Wall-nut plant is 50 sun.

5. **Snow Pea:**

   Snow pea shoots frozen peas that damage and slow the enemy and will drop only one bomb but its speed will be fast. It will freeze the zombie for some seconds.

6. **Cherrybomb:**

   The Cherry Bomb will kill all zombies around. Acquiring a Cherry Bomb requires 150 sun.

7.Fume-shroom:

It is capable of spraying fumes, able to damage every zombie that is hit by fumes. It costs 75 sun. It has limited range and is only triggered by and having effect on zombie appearing in 4 spaces front of it.

Zombie

There will be multiple types of zombies that have different attributes, in particular, speed, damage tolerance, and abilities which are described below.

1. **Simple Zombie**

   Just a normal zombie that will only move forward and will appear after a certain interval. Their speed is slow and will destroyed if get three hits of pea.

2. **Football Zombie**

   Football zombies can move left and right and have double protection from helmets. Their speed is normal.

3. **Flying Zombie**

   Flying zombies can fly through any plant on the field. It can't eat the plant either. Their speed is normal.

4. **Dancing Zombie**

   Dancing Zombie able to summon other zombies from the ground and can move diagonally. Their speed is high.

Lives

There will be a total of three available lives. If any zombie reaches the house, then one life will be destroyed.

Levels:

1. **Level 1: Beginner's Garden**

   Description:

   - Welcome to Verdantia! Players are introduced to the basics of gameplay in a peaceful garden setting. The sun is shining, and everything seems tranquil until the first wave of zombies approaches.

Objectives:

- Plant sunflowers to generate sunlight.
- Defend against incoming zombies using pea shooters.
- Use lawnmowers strategically as a last line of defense.

Challenges:

- Limited plant selection.
- Slow zombie waves to ease players into gameplay mechanics.

Rewards:

- Wall nut unlocked for future use.

2. **Level 2: Zombie Outskirts**

Description:

- The zombies are getting tougher as they approach the outskirts of Verdantia. Players must adapt quickly to the increasing threat.

Objectives:

- Introduce new zombie types: Simple zombies, FootBall Zombies, Flying Zombies, Dancing Zombies.
- Use wall-nuts for additional defense against stronger zombies.

Challenges:

- Faster zombie waves with more resilient enemies.
- Limited resources requiring strategic use of cherry bombs.

Rewards:

- Cherry Bomb unlocked for future use.

3. **Level 3: Sunflower Fields**

Description:

- The vast sunflower fields of Verdantia provide ample sunlight, but players must learn to manage their resources efficiently as the zombie threat escalates.

Objectives:

- Focus on sunflower placement for optimal sunlight production.
- Introduce offensive plants like snow peas and repeaters to counter stronger zombie waves.

Challenges:

- Limited space for planting, requiring careful placement of sunflowers and offensive plants.
- Increasingly aggressive zombie waves with more varied enemy types.

Rewards:

- Repeater unlocked for future use.

4. **Level 4: Foggy Forest**

Description:

- A dense fog blankets the forest, reducing visibility and making it difficult to plan defenses. Players must adapt their strategies to overcome this new challenge.

Objectives:

- Introduce plants like PeeShooter, Sunflowers, walk nut , snow pea, cherrybomb and Repeters to clear fog and enhance offensive capabilities.
- Learn to anticipate zombie movements despite limited visibility.

Challenges:

- Reduced visibility due to fog, making it harder to plan defenses.
- Zombies emerge unexpectedly from the fog, requiring quick reactions.

Rewards:

- Snow Pea unlocked for future use.

5. **Level 5: Nighttime Siege**

Description:

- The zombies launch a nighttime assault, and players must fend them off with limited sunlight and new nocturnal plants.

Objectives:

- Introduce SnowPea, which can be planted during the night.
- Defend against waves of zombies while managing limited resources.

Challenges:

- Limited sunlight production, requiring reliance on nocturnal plants.
- More aggressive zombies that are harder to defeat during the night.

Rewards:

- Fume-shroom unlocked for future use.

6. **Level 6: Rooftop Rampage**

Description:

- The battle moves to the rooftops of Verdantia's buildings, where space is limited and zombies attack from above.

Objectives:

- Defend against zombies attacking from multiple lanes on the rooftop.

- Introduce plants like cherryBomb, which can attack zombies in multiple lanes.

Challenges:

- Limited space for planting due to rooftop setting.
- Zombies attacking from roof, requiring versatile defenses.

Reward:

- Player gets an extra life.

Screens Your game should have following screens:

- Game Menu screen
- Instructions screen
- Main Screen for GamePlay
- Pause Screen/Functionality
- High Score and Players Names Display
- End screen

File handling

You are required to store the scores of all the players that have played the game using file handling. You need to store the name, and the highest score of a particular player in a file in a sorted format (descending order). The top three players would receive badges according to their position. The badge of the top three players of the game needs to be displayed while they are playing the game.

Bonus

1. As a bonus task, you are required to store the state of the game at any given instance. Whenever the game is paused and closed, it should be resumed in the same state from where it was paused. The state includes the position of the plants, zombies, pea and all other features.

2. Other than the above specified bonus tasks, you can come up with other interesting and creative ideas. The instructors will decide if an implementation is worth bonus marks or not.

References:

Visit the link and download the game to get an idea of the project features:
https://www.youtube.com/watch?v=XENla8M3910