Object Oriented Software Engineering Project

Analysis Report

CS 319 Project: Saving Humanity

Group 24

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Table of Contents

1. Introduction

We are planning to create a game called “Saving Humanity”. This is a game inspired by an atari game called Tank 1990. It is a simple and basic game which the player will try to destroy all of the enemy tanks in different levels.

There will be some new features and designs different from the base game(Tank 1990) which will make the game more enyojable and challenging.

The player or players will use a keyboard while playing this game.

This report contains an overview, list of powerups and bad powerups, functional and non-functional requirements, use case diagram for the game and the explanation of the use cases of the game.

This game will be implemented using Java.

2. Game Overview

Saving Humanity is a game with two player modes. Single-player mode is a mode where there are three levels with different map designs and different enemies. The purpose of this mode is to destroy all of the enemies without getting destroyed in each level as quickly as possible and with as much remaining health as possible. There will be three different enemies with different fire ranges, different healths, different speeds and different damages. Each level consists of one type of enemy.

Map designs are different for each level but there are some common points in all of the map designs. In each map, there are walls which you can destroy by firing at them and there are walls which you cannot destroy. Maps have some water tiles which a player can fire through but cannot go through. Maps also have some grass tiles which makes the player invisible to the enemy tanks.

Dead enemies drop “question marks”. These question marks consist random powerups or bad powerups. There are many different powerups and bad powerups a player can get from these “questions marks”. They can be obtained by going over them.

The game has a highscore system for singleplayer scores. These scores are calculated based on how much time the user has spent to finish the game and the remaining health of the player’s tank. The top ten highscore is shown in the game.

The multiplayer mode of the game allows at most four people to play together using the same keyboard. There will be two different submodes of the multiplayer mode. One of them is the deathmatch mode where all of the players will be rivals with each other. The other one is the team deathmatch mode where players form teams and teams will be rivals with other team. There are only one map design for both of the multiplayer modes.

During both singleplayer game and multiplayer game the players can pause the game and then continue afterwards.

2.1. Powerups

- Increase fire range: This powerup increases the fire range of the player's tank. It lasts 10 seconds.
- Increase health: This powerup increases the health of the player's tank. It lasts 10 seconds.
- Increase speed: This powerup increases the speed of the player's tank. It lasts 10 seconds.
- Increase damage: This powerup increases the damage of the player's tank. It lasts 10 seconds.
- Random destroyer: This powerup destroys a randomly chosen enemy tank.
- Immortality: This powerup makes the player's tank invincible to enemy tanks when obtained. It lasts 5 seconds.

2.2 Bad Powerups

- Neutralizer: This bad powerup counters increase fire range, increase health, increase speed and increase damage powerups. If a player gets more than one 'increase' powerup, neutralizer cancels every one of them.
- Rooted: When the player's tank get 'Rooted', the tank cannot move but it can still fire in the direction it was facing before obtaining this bad powerup. It lasts 5 seconds.
- Broken: When this bad powerup is obtained, the player's tank cannot fire but it can still move to any direction. It lasts 10 seconds.
- Confuse: When this bad powerup is obtained, the player's tank moves to the opposite direction, the player intends to. It lasts 10 seconds.

3. Requirements

3.1. Functional Requirements

- Play Singleplayer Mode:

In the game, player controls a tank and needs to fight with enemy tanks. User will be able to control the tank using keyboard. Arrow keys will allow user to move the tank whereas space key can be used for shooting bullets. Player will have only one life. The main victory condition is to destroy all enemy tanks without getting destroyed. Game is lost when player's tank is destroyed.

There will be a chance to get random powers from destroyed enemy tanks, they could be either beneficial or disadvantageous powers that are described in the above section.

- Play Multiplayer Mode:

This game allows multiple players to play simultaneously. Multiplayer supports up to four players. In the team deathmatch mode multiplayer mode friendly fire is set to on by default. All four players will play via same keyboard since the multiplayer mode is hotseat.

There is not any highscore calculation for the multiplayer modes. In multiplayer modes, the bad powerups and the 'Random Destroyer' powerup is disabled.

- Set Volume On or Off:

During the game, user can open or close the in-game sounds. There will be an icon on the right up corner indicating whether the sound is on or off. User can turn on or turn off the sound either by clicking on that icon or pressing the “Q” key.

- View Help:

This page contains the required information for game mechanics, good and bad powerups, map elements, tank types and their attributes.

- Pause Game:

During game, player can pause the game and continue afterwards by pressing the “P” button.

- View Highscore:

When the game is succesfully completed, the system will calculate the player’s highscore and save it to the system if it is in the top ten.
The highscoring formula is:
Total Score(S) = 1000 – Total Time(seconds) + Health Left, if S > 0
S = 0 , otherwise

3.2. Non-Functional Requirements

- Game Performance:

Since the graphical requirements are low for the game, almost every computer can run this application with 120 FPS. It is more than enough to perceive the effects smooth enough. The game will have sounds, visual effects such as explosions. We will try our best to keep performance high enough while using all these effects.

- Smooth Graphics:

We will enable the anti-aliasing in-game to provide smooth graphics inside the game. If we can achieve the performance goals, the effects and animations will be also smooth. We will try to use various effects to make the game more alive and one of our main aim is to keep graphical smoothnes while adding different kind of effects.

- User-Friendly GUI:

One of our aim is also to keep the user interfaces simple and powerful. We will try to hide irrelevant details from the game to keep playability as high as possible. Besides that, we aim to make game graphics colorful and eye-friendly.

- Extensibility:

Since there could be future features to be added to the game, we aim to provide an infrastructure that allows us to add new power-ups easily, add new maps to the game easily. Therefore, it would take less time when new features are meant to be added.

4. System Models

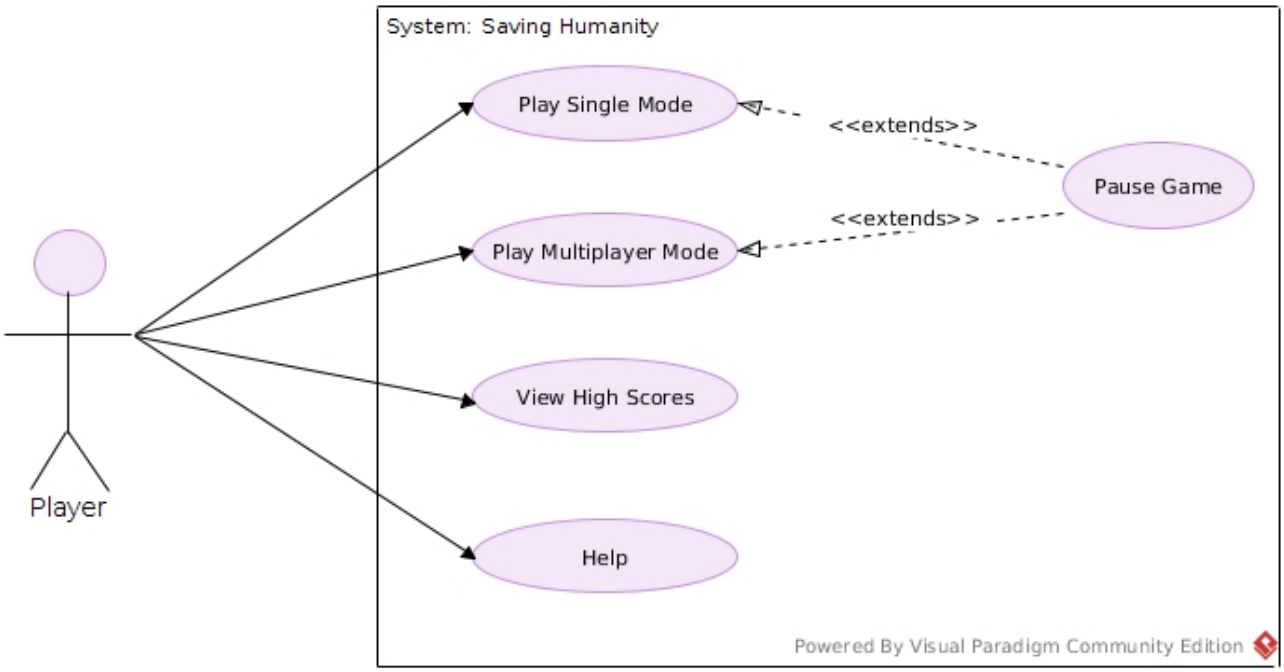

Figure 1 – Use case diagram of the game

4.1 Use Case Explanations

Use Case 1: Play Single Mode
Actors: Player
Entry condition: Player has already opened the game.
Exit condition:
-Player completes all of the levels.
-Player loses the game.
-Player chooses to exit the game.
Main Flow:
1-Game starts.
2-Player selects singleplayer mode.
3-Game loads the first level of singleplayer mode.
4-Player tries to destroy all enemies without wasting lives to pass all the levels.
5-After succeeding all levels, game calculates the score by considering time and health.
6-If the calculated score is greater than the lowest of the top ten, game put this player into high score list.
7-Game finishes.
Alternative Flow:
-Player's tank is destroyed. (Jump to step 7).
-Player decides to exit the game.

Use Case 2: Play Multiplayer Mode
Actors: Two, three or four players on the same computer
Entry condition: Player has already opened the game.
Exit condition: One player or one team beats the other one(s).
Main Flow:
1-Game starts.
2-Player selects multiplayer mode.
3-Game asks for which multiplayer mode to play.
4-Players choses the mode.
5-Game asks how many player will attend.
6-Player selects the number of players.
7-Game starts according to the mode and number of players chosen.
8-Players try to destroy the other ones according to the game mode chosen.
9-A player's or team's tank(s) are destroyed.
10-Game finishes
Alternative Flow:
-One of the players chooses to exit the game.

Use Case 3: View High Scores
Actors: Player
Entry Condition: Player has already opened the game.
Exit Condition: Player closes "View High Scores".
Main Flow:
1-Player selects "View High Scores".
2-Game shows best ten score on screen.
3-Player exit from this screen.

Use Case 4: Help
Actors: Player
Entry Condition: Player has already opened the game.
Exit Condition: Player closes "Help".
Main Flow:
1-Player selects "Help".
2-Useful information is given on the screen.
3-Player closes the screen.

Use Case 5: Pause Game
Actors: 1-4 Players
Entry Condition: Single or Multiplayer mode has opened. Players are playing the game.
Exit Condition:
-A player selects to continue the game, OR
-A player chooses to exit the game.
Main Flow:
1-A player presses the button to pause the game.
2-Game pauses.
3-A player presses the button again
4-Game continues.
Alternative Flow:
-A player presses the button to pause the game.
-Game pauses.
-A player selects to exit the game.