Bilkent University

Department of Computer Engineering

Object Oriented Software Engineering Project

Project Short-Name: Space Despot

Analysis Report

Cihangir Mercan, Çağdaş Han Yılmaz, Fırat Sivrikaya, Gökçe Şakir Özyurt

Supervisor: Prof. Dr. Uğur Doğrusöz

Progress Report
Oct 14, 2016

This report is submitted to the Department of Computer Engineering of Bilkent University in partial fulfillment of the requirements of the Object Oriented Software Engineering Project, course CS319.

Contents

Analysis Report

Project short-name: Space Despot

1 Introduction

Space Despot is an arcade game in which player controls a spaceship that moves upwards in a space through different levels. In the space, where player can move horizontally and vertically, there will be various space objects that try to destroy spaceship by attacking to it. Player's goal will be making his way up to the top by avoiding these space objects or shooting them similar to the game that we are influenced [1].

2 Overview

Player will start game by choosing between three types of spaceships, which are Fighter, Panzer and Lightning (Section 2.1). There will be three levels. With each passing level, the vertical space length will increase and the space objects (Section 2.2) will become harder to avoid. If player shoots these space objects, they might drop power-ups or coins. Power-ups (Section 2.3) will make spaceship more powerful by giving it various specialties. Coins will help player to buy upgrades (Section 2.4) for the spaceship at the end of each level. These upgrades improve spaceship's attributes.

Player’s score will depend on how many levels passed, how many objects destroyed, how many power-ups collected and how many upgrades bought. If player passes all three levels or loses all of spaceship’s health points (HP), game will be over. Then, player will be asked to give a name for the score. This score can be shown at the high scores.

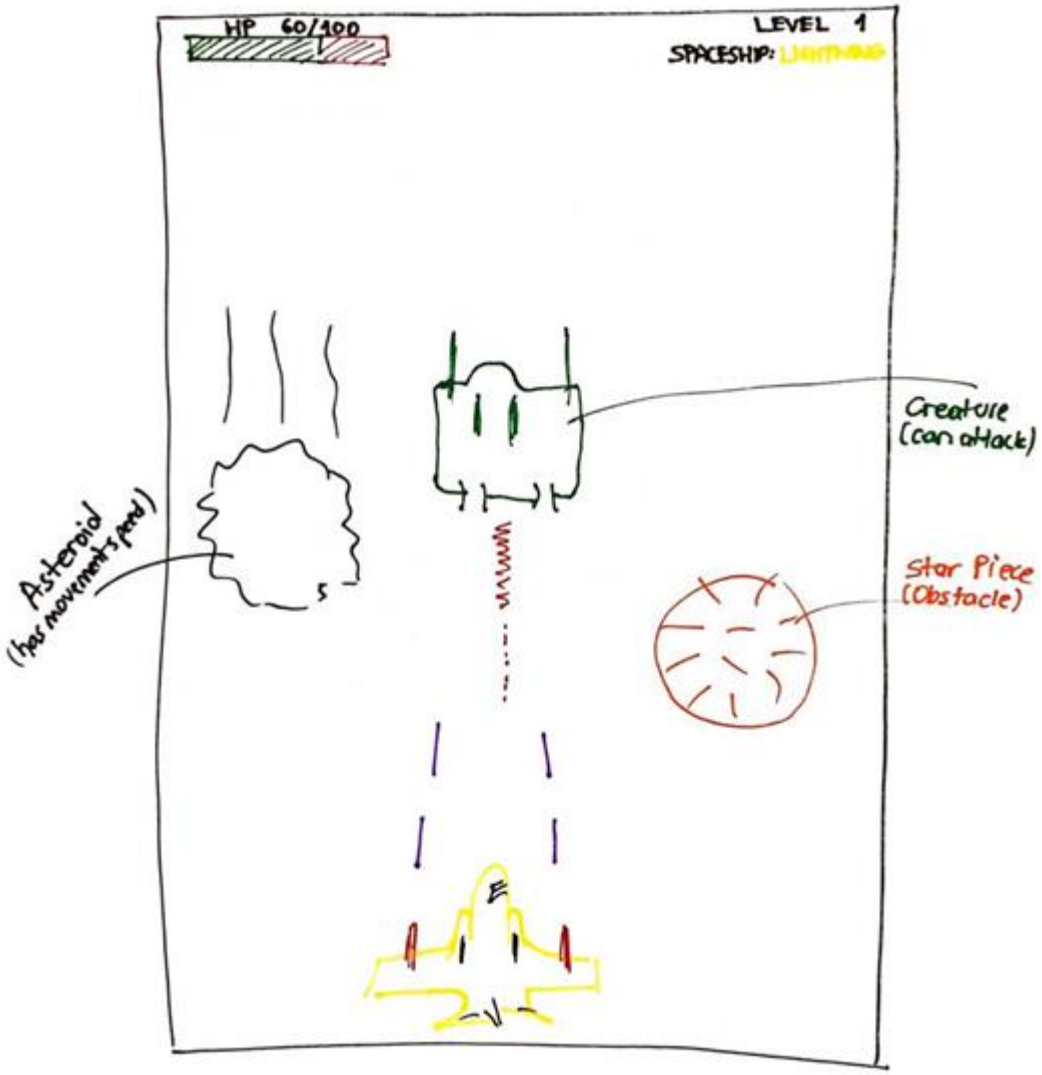

Figure 1 - Overview

2.1 Spaceships

2.1.1 Fighter

Fighter spaceship has the advantage in attack damage as it has the most attack damage compared to other spaceships. Its movement speed is medium but its HP is low. Fighter is advised to beginner players.

Base Stats

- HP: 75
- Movement Speed: 100
- Attack Damage: 20

2.1.2 Panzer

Panzer spaceship can withstand more damage due to having more HP than the other two spaceships. However, its heaviness makes it less volatile so it will have the lowest speed. Panzer deals medium damage. Panzer is advised to intermediate and advanced players.

Base Stats

- HP: 150
- Movement Speed: 50
- Attack Damage: 15

2.1.3 Lightning

Lightning spaceship is the most advantageous spaceship in terms of its movement speed. Its swiftness enables player to deal with creatures and obstacles more easily. However, it is not advised to players who prefer to get in combat with mobs frequently, since it

has the lowest attack damage compared to other spaceships. Also, it has medium HP. Lightning is advised to intermediate and advanced players.

Base Stats

- HP: 100
- Movement Speed: 150
- Attack Damage: 10

2.2 Space Objects

2.2.1 Mobs

Mobs will have their own HP which makes them vulnerable to the user attack. They will also have a unique movement speed in addition to the background speed. So, they will try to damage the spaceship by shooting or crushing into it. There are three types of mobs: creatures, asteroids and bosses.

- Creatures

Creatures are simple objects that try to deal damage to spaceship by shooting.

Stats

- HP: 40
- Movement Speed: 100
- Attack Damage: 20

- Asteroids

Asteroids are objects that appear from different directions. They will try to crush into spaceship rapidly and do damage.

Stats

- HP: 20
- Movement Speed: 200
- Attack Damage: 40

- Bosses

At the end of each level, player will face bosses in order to finish level. They will have better attributes than the other mobs and will require player to try harder.

Stats of Boss #1

- HP: 300
- Movement Speed: 300
- Attack Damage: 30

Stats of Boss #2

- HP: 450
- Movement Speed: 250
- Attack Damage: 60

Stats of Boss #3

- HP: 600
- Movement Speed: 200
- Attack Damage: 90

2.2.2 Obstacles

Obstacles don’t have HP, which means they cannot be destroyed by the player. They don’t have movement speed, they move as the game background moves. Also, they don’t have attack abilities. When in contact with spaceship, the spaceship gets destroyed and

the game ends for the player. Obstacles can be dodged by moving the spaceship to the appropriate positions in the map. There are two types of obstacles: stars and black holes.

- Stars

Stars are obstacles that cause spaceship to get destroyed immediately when in contact. There is more than one type of stars but they only differ in colors.

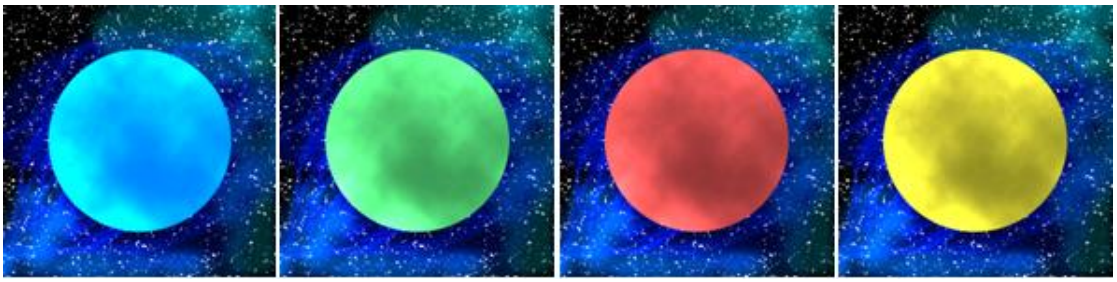

Figure 1 - Stars can have different colors

- Black Holes

Black holes are obstacles that devour the spaceship when in contact. Since their size is quite larger than the stars, they are harder to avoid. Hence, they occur more rarely than the stars.

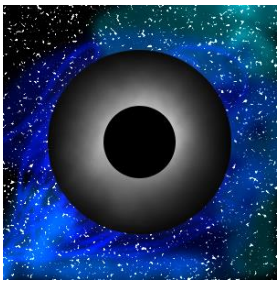

Figure 3 - Black Hole

2.3 Power-Ups

Power-ups drop when mobs are destroyed. Player can only hold one power-up at a time. If player collects new power-up, it will

overwrite the previous one. Player will be able to activate these power-ups by pressing Space. There are four types of power-ups.

2.3.1 Invulnerability

It will make spaceship invulnerable for 3 seconds when it is activated.

2.3.2 Laser Gun

It will generate a laser ray that instantly kills mobs along the line. If it hits boss, it will make three times more damage than the base attack damage of spaceship.

2.3.3 Hyper Drive

It will increase the spaceship's speed by %100 for five seconds.

2.3.4 Repair

It will recover the spaceship's HP by %25 of its max HP.

2.4 Upgrades

Upgrades can be done at the end of each level with coins. Coins drop when mobs are destroyed or they randomly appear at the space with varying amounts.

2.4.1 Maximum Health

It will increase spaceship's max HP by %5. It costs 1500 gold. It can be bought maximum of 10 times.

2.4.2 Attack Damage

It will increase spaceship's attack damage by %5. It costs 1250 gold. It can be bought maximum of 20 times.

2.4.3 Movement Speed

It will increase spaceship's base movement speed by %5. It costs 1000 gold. It can be bought maximum of 20 times.

3 Functional Requirements

- Player can move horizontally and vertically with arrow keys.
- Player can shoot by pressing X.
- Player can use power-ups by pressing Space.
- Player can set key for shooting and using power-ups from the settings.
- Player can enable/disable sound from the settings.
- Player can access help menu which contains information about gameplay and controls.
- Player can see top ten high scores.
- Player can pause the game.

4 Non-functional Requirements

- Game will be designed and implemented by applying the principles that we learn during class. We will try to create most possible optimized game. We are aiming to decrease the input lag as much as possible in order to enhance gameplay experience.
- Game will have a good-looking and attractive user interface. Besides, we will work a lot for the smoothness.

- Game will be suitable for extensions. It will be easy to add new features and functionalities to the game in the future.

5 Pseudo-functional Requirements

- Game will be implemented using Java.
- Game images will be designed using Adobe Photoshop.

6 System Models

6.1 Use-Case Model

Use-Case 1

Play

Primary Actor: Player

Main Success Scenario

1. Player clicks "Play" button.
2. After three seconds countdown, the game starts.
3. Player passes all levels.
4. The system asks for a name for the score gained.
5. Player enters the name.
6. If the score is at the top ten scores, it is placed to high scores.
7. The system redirects user to the main menu.

Alternate Flow

3a. Player loses all health points at any level.

- 3a1. The system displays game-over message.
- 3a2. The system redirects player to the step 4.

5a. Player does not enter the name and returns to the main menu.

- 5a1. The system does not save the score.
- 5a2. The system redirects player to the main menu.

Use-Case 2

Pause

Primary Actor: Player

Main Success Scenario

1. Player presses P and pause the game during the game.
2. The system displays pause menu.
3. Player presses "Continue" button.
4. The game continues.

Alternate Flow

3a. Player presses "Settings" button.

3a1. The system redirects player to the settings menu.

3b. Player presses "Quit" button.

3b1. Player enters a name for the score or directly returns to the main menu.

Use-Case 3

Next Level

Primary Actor: Player

Main Success Scenario

1. Player successfully passes one of levels.
2. The system displays menu for next level.
3. Player does upgrades for the spaceship with coins.
4. Player presses "Next Level" button.
5. The game continues with the new level.

Alternate Flow

3a. Player does not do upgrades and save coins.

3a1. Player goes to step 4.

4a. Player presses "Quit" button.

4a1. Player enters a name for the score or directly returns to the main menu.

Use-Case 4

Help

Primary Actor: Player

Main Success Scenario

1. Player clicks "Help" button.
2. The system displays information about gameplay and controls.
3. Player returns to main menu.

Use-Case 5

Settings

Primary Actor: Player

Main Success Scenario

1. Player clicks "Settings" button.
2. Player sets new key for shooting and disable sound.
3. Player returns to main menu.

Alternate Flow

2a. Player does not change anything in settings.

2a1. Player goes to step 3.

Use-Case 6

High Scores

Primary Actor: Player

Main Success Scenario

1. Player clicks "High Scores" button.
2. The system displays top ten high scores.
3. Player returns to main menu.

6.1.2 Use-Case Diagram

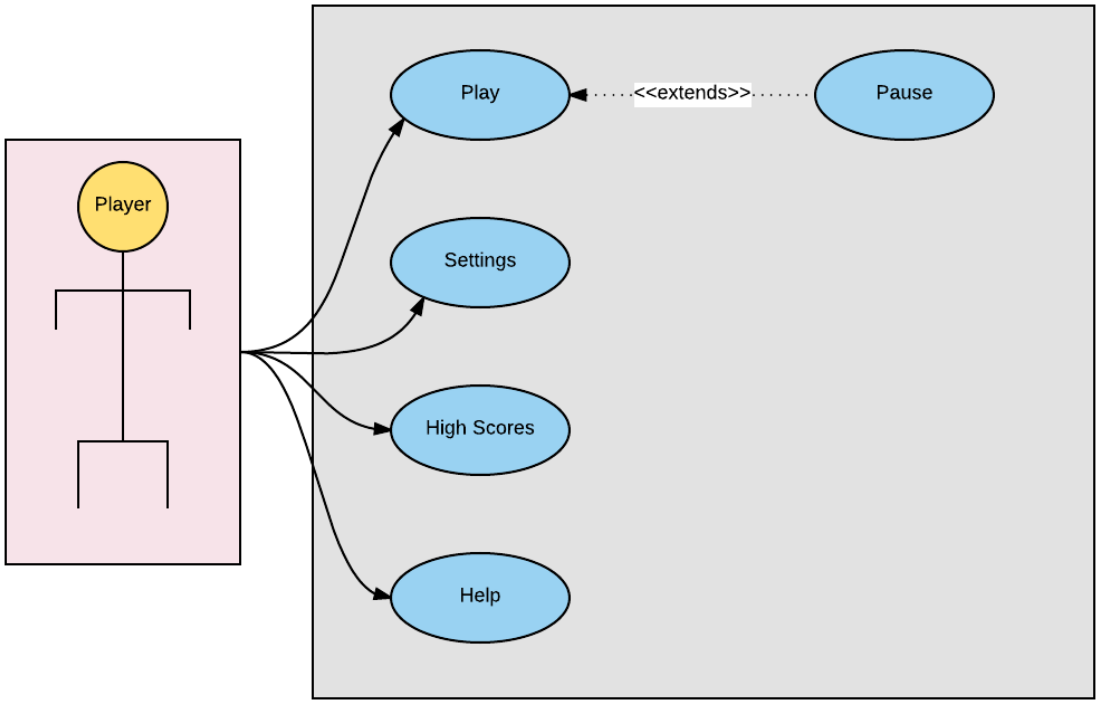

Figure 4 - Use-Case Diagram

7 References

[1] Space Impact. https://en.wikipedia.org/wiki/Space_Impact [Accessed: Oct 15, 2016].