

Requirements and Analysis Document

for Space Dodger

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Version 3

1 Introduction

The goal of the project is to create a game that takes place in space where the objective is for the player to avoid different types of damaging projectiles, pick up items with benefits or disadvantages and survive as long as possible. The player then gets points based on how long they can survive.

A few properties of the game:

- The player controls a spaceship which can move on the x- and y-axis of a playing field.
- The projectiles and items move in randomized or scripted directions over the playing field.
- On collision with damaging projectiles the player loses health.
- When the player picks up a beneficial item it strengthens the player in some way.
- When the player picks up a disadvantageous item it weakens the player in some way.
- When the player's health reaches zero the game is over.
- The points are based on the time the player survives.
- If the player quits the game before dying, their points won't be saved.
- The game saves a list of top scores locally.

1.2 Definitions, acronyms, and abbreviations

- Unit test: a unit test tests a specific functionality in the code and determines a specific behaviour or state.
- Health - A value representing the player's remaining life.
- High score: A list with the top scoring rounds a player has played.
- Power up: A game object the player can pick up that gives a temporary advantage.
- Character: The entity controlled by the player during the game.
- Game Over: The player's health reaches zero and the game round is therefore ended.
- Wraparound: The playing field has no walls. If the player moves their character off screen the character appears on the opposite side and continues in the same direction.
- Laser beam: A laser beam that fills the playing field from either top to bottom or from side to side, forcing the player to utilize the wraparound to avoid taking damage.
- Debuff: A game object that gives the player a disadvantage.

2 Requirements

2.1 Finished User Stories

Story Identifier: 1

Story Name: Visible playable character

Description

As a player I want to see my character so that I can see where its position in the game is.

Confirmation

Functional

- Can I see the image of my character?
- Does the character and its image share the same position?

Non-functional

Availability:

- Can I always see my character?
- Do I always see the correct image for my character?

Security:

- Can the image for my character be changed while playing?

Story Identifier: 2

Story Name: Visible playing field

Description

As a player I want to see the playing field where my character is located.

Confirmation

Functional

- Is the image for the playing field visible?
- Does the image cover the whole playing field?

Story Identifier: 3

Story Name: Movable character

Description

As a player I want to be able to move my character so that I can avoid hazards or obstacles.

Confirmation

Functional

- Can I move my character vertically?
- Can I move my character horizontally?
- Can I move my character diagonally?

Non-functional

Availability:

- Can I always move my character?

Security:

- Can something else move my character?

Story Identifier: 4

Story Name: Wraparound

Description

As a player I want my character to appear on the opposite side of the playing field when going over its edge so that I don't get trapped in a corner.

Confirmation

Functional

- Does the character change its position to the opposite side of the playing field?
- Does the image of the character change its position to the opposite side of the playing field?
- Does the character appear on each side when it's only partly over the edge?

Story Identifier: 5

Story Name: Moving asteroids

Description

As a player I want the asteroids to move over the playing field so that the game becomes challenging.

Confirmation

Functional

- Do the asteroids change coordinates?
- Do the asteroids move in a continuous path?

Story Identifier: 6

Story Name: Collision with asteroid

Description

As a player I want the asteroid to disappear on collision with my character, so that it is obvious that a collision has happened and also making the game look better visually.

Confirmation

Functional

- Is the projectile gone after a collision with the player's character?

Story Identifier: 7

Story Name: Visible health

Description

As a player I want to be able to see how much health I have so that I am able to determine how well I'm doing and how much health I lose when I collide with asteroids.

Confirmation

Functional

- Can I see the health bar?
- Does the health bar show the correct amount of health?

Story Identifier: 8

Story Name: Game Over screen

Description

As a player I want to receive a Game Over screen when my health reaches zero so that it's clear that the simulation adheres to the rules of the game.

Confirmation**### Functional**

- Do I get a game over screen when my health reaches zero?
- Does the simulation end when my health reaches zero?

Non-functional**Security:**

- Can something end the game before my health reaches zero?
- Can something change the screen to the game over screen before my health reaches zero?

Story Identifier: 9

Story Name: Visible timer

Description

As a player I want to be able to see how much time has passed when I'm playing a game round, making it easier to determine how well I'm doing.

Confirmation**### Functional**

- Can I see the timer?
- Does the timer count up from zero?
- Does the timer start at zero when the game round starts?

Non-functional**Availability:**

- Can I always see the timer as long as a game round is active?

Story Identifier: 10

Story Name: Menu

Description

As a player I want to be able to choose between different options of a main menu to start the game, see high scores or quit, depending on what I want to do.

Confirmation**### Functional**

- Can I see the buttons "Play", "High Score" and "Quit" in the main menu?
- Can I click the button "Play" and start the game?
- Can I click the button "Highscores" and see the best rounds?
- Can I click the "Quit" button and exit the game?
- Can I click the "Back" button and go back to the previous menu?

Story Identifier: 11

Story Name: Postgame menu

Description

As a player, when I get game over, I want to be able to choose if I want to try again or go back to the main menu.

Confirmation**### Functional**

- Can I see the menu after a game round has ended?
- Can I see the buttons "Try again" and "Main menu" in the post game menu?
- Can I click the "Main menu" button and go back to the main menu?
- Does a new game round start when I press "Try again"?

Story Identifier: 12

Story Name: Select character

Description

As a player I want to be able to select a character from a few different options so that I can get some variety.

Confirmation**### Functional**

- Can I see a selection of characters in the menu before the simulation starts?
- Can I click on a button for each character?

Story Identifier: 13

Story Name: Varied asteroids

Description

As a player I want to experience asteroids of different speed and sizes so that the game becomes more varied.

Confirmation

List all acceptance criteria; you should be able to test/confirm these.

Functional

- Do asteroids have different speed values?
- Do asteroids have different sizes?

Story Identifier: 14

Story Name: Exit game

Description

As a player I want to be able to exit the game at any time in case I want to quit before a game round has ended.

Confirmation**### Functional**

- Can I at any point exit the application?

Story Identifier: 17

Story Name: Visual and auditory feedback

Description

As a player I want to clearly see and hear when I take damage from a collision, so that I know that a collision has occurred.

Confirmation**### Functional**

- Is there any kind of graphical cue that indicates that I have collided with an asteroid?
- Can I hear a sound that indicates that I have collided with an asteroid?

Story Identifier: 18

Story Name: High scores

Description

As a player I want to be able to see my five top scores, so that I know when I beat my record score.

Confirmation**### Functional**

- Can I see my five top scores in the high score menu?

Story Identifier: 19

Story Name: Increasing game difficulty

Description

As a player I want the asteroids to increase their speed with time so that the game becomes more challenging.

Confirmation**### Functional**

- Do the asteroids become faster with time?

Story Identifier: 20

Story Name: Temporary shield

Description

As a player I want a powerup that shields me from taking any damage from the next collision with an asteroid, so that there is a bonus to aim for.

Confirmation**### Functional**

- Do I avoid damage from the next collision with an asteroid?
- Can I see a shield around the spaceship?

Story Identifier: 21

Story Name: Background music

Description

As a player I want to hear background music while I'm playing, so that the entertainment value increases.

Confirmation**### Functional**

- Can I hear a music track constantly being played in the background?

Story Identifier: 22

Story Name: Visible score

Description

As a player, I want to see my score when the game is over, so I know how well I did.

Confirmation**### Functional**

- Can I see my score when the game is over?

Story Identifier: 23

Story Name: Slow debuff

Description

As a player I want to be able to get debuffed so that my spaceship's speed is slowed down, so that the game gets more difficult.

Confirmation

List all acceptance criteria; you should be able to test/confirm these.

Functional

- Is the spaceship's speed slower after colliding with the debuff?

2.2 Unfinished User Stories

Story Identifier: 15

Story Name: Pause

Description

As a player I want to be able to pause the game during an active round in case I need to do something else and continue my round later.

Confirmation**### Functional**

- Can I pause the game during an active round?

This user story was mostly finished and implemented but later scrapped due to time constraints and unfixed bugs.

Story Identifier: 16

Story Name: See picked up power ups

Description

As a player I want to be able to see my picked up power ups so that I don't have to keep track of them myself.

Confirmation.**### Functional**

- Can I see which and what amount of power ups I have for the whole duration that I have them?
- Do I see the correct type and amount of power ups?
- Do I stop seeing a power up when its duration has ended?

Non-functional

Availability:

Security:

This user story is partially finished, the user's character is surrounded by a shield when a shield power up has been picked up, the shield is then removed when the shield has absorbed its set amount of collisions with asteroids, and the hp bar is refilled the correct amount when a hp power up is picked up. However the current amount of shields, which are stackable, is not displayed to the user.

Story Identifier: 24

Story Name: Scenario selection

Description

As a player I want to be able to select different game scenarios/levels in the menu so I don't have to play the same scenario every time.

Confirmation**### Functional**

- Did the correct scenario run when I selected it in the menu?

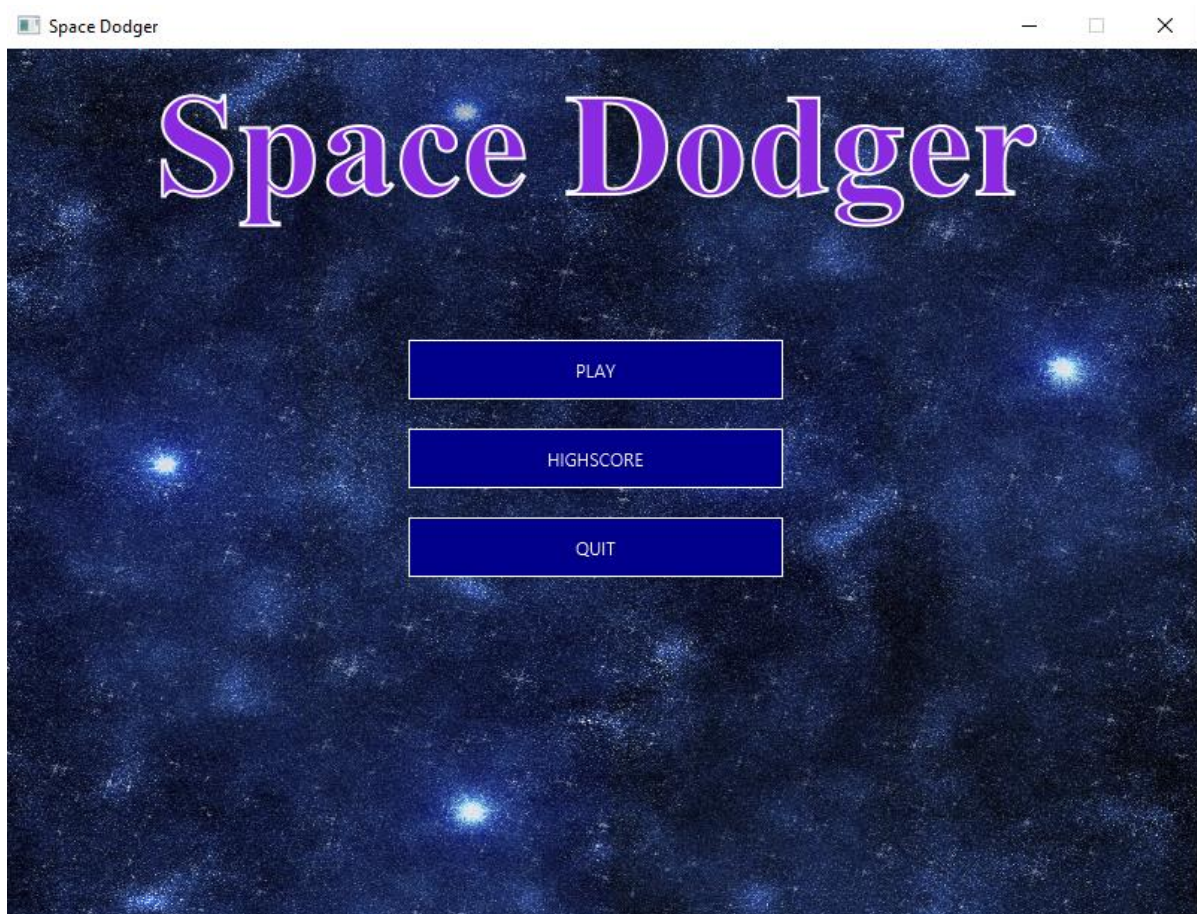
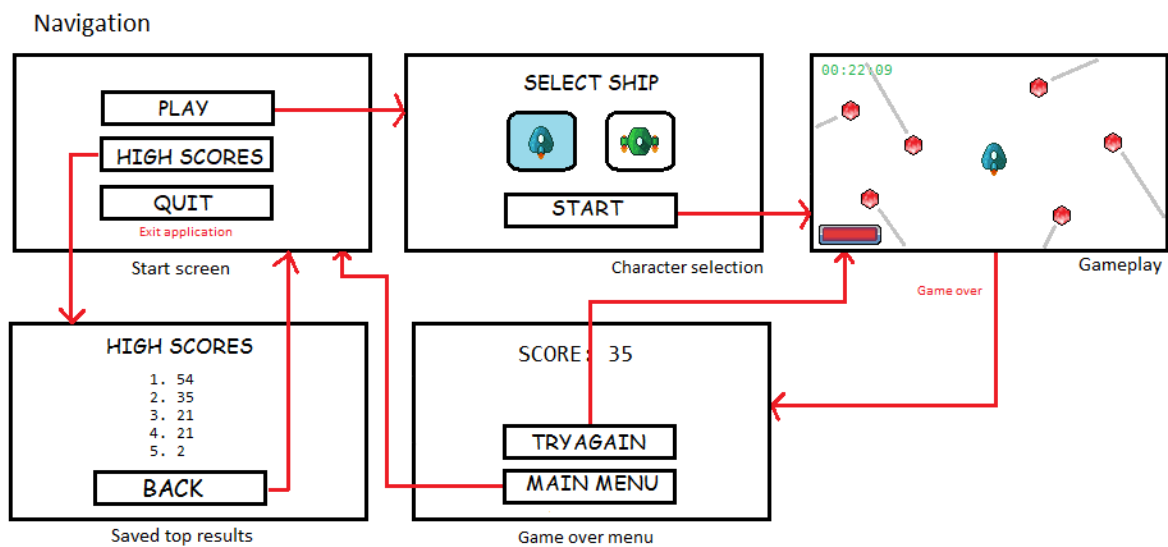
This user story is partially implemented, we have created two different game scenarios that utilize different spawn patterns for projectiles, but there is currently no way of selecting scenarios on runtime. This has to be done in the call to the `waveManager.projectileSpawner` method in the game loop.

2.3 Definition of Done

A user story is considered done when:

- The code compiles and is runnable.
- All tests that affect the current user story must go through.
- All other group members have reviewed the code and approved it.
- The code should be uploaded on github and ready to be merged into master.

2.4 User interface



High Scores

1: 51
2: 49
3: 17
4: 16
5: 15
6: 15
7: 12
8: 11
9: 6
10: 5

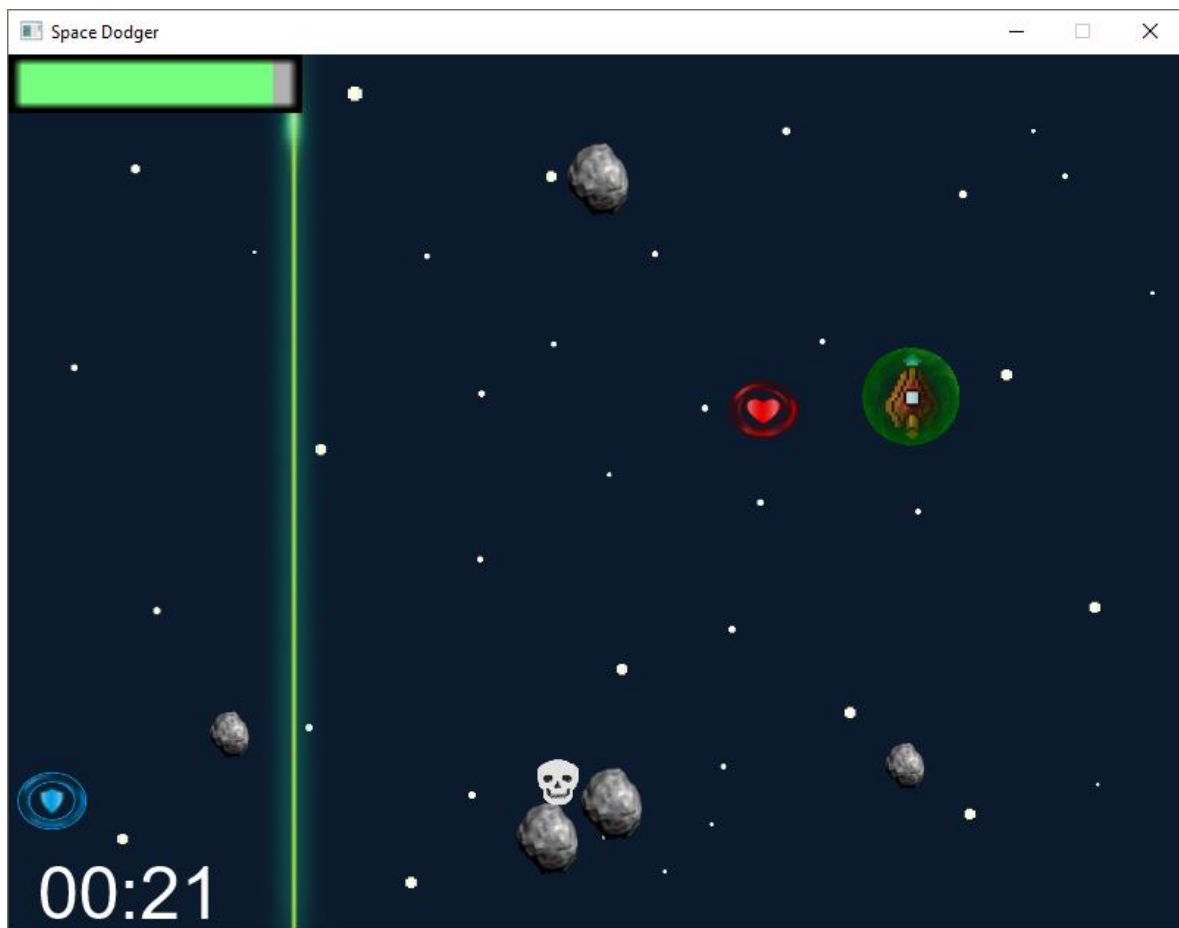
BACK

Characters

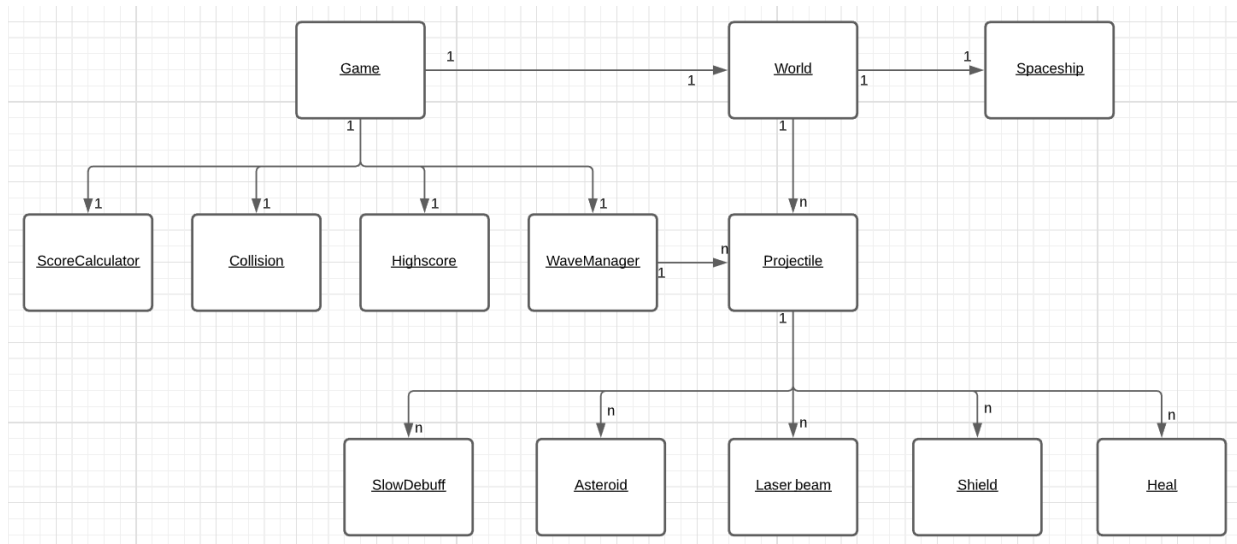


START

BACK



3 Domain model



3.1 Class responsibilities

Game: Creates all game objects except the spaceship. Updates the game.

World: Creates the spaceship and handles wrap around method.

Highscore: is responsible for showing the top scores in the history of the game.

Collision: Handles the collisions between all game objects.

WaveManager: is responsible for managing the amount of projectiles on the screen and also waves of asteroids or powerups.

ScoreCalculator: is responsible for calculating the score.

Projectile: is responsible for determining basic behaviors to the different kinds of projectiles.

Asteroid: is responsible for assigning values to the different kinds of asteroids.

Laser beam: is responsible for assigning values regarding the laser beam's direction and if the laser beam is vertical or horizontal.

Shield: is responsible for collision and movement behaviors for the projectile that gives a shield status in case of collision with the spaceship.

Heal: is responsible for collision and movement behaviors for the projectile that gives health points in case of collision with the spaceship.

SlowDebuff: is responsible for collision and movement behaviours for the projectile that slows the speed of the spaceship down in case of collision with the spaceship.

Spaceship: is responsible for the character's direction and health points.

4 References

JavaFX: <https://openjfx.io/>