Software Requirement Specification
For
Super Smashteroids

Version 1.0
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1 Introduction

1.1 Purpose

This Software Requirements Specification (referred to as *SRS* thereafter) document describes a gaming system's (referred to as *the system* thereafter) functions, features, behaviors, and constraints. This document is intended for both the software development team as well as its customers. It should help

I. Software customer to understand what the system is required to do;
II. Software development team to have a reference to the system's requirements;
III. Create a binding contract between the development team and the customer.

1.2 Scope

The software system will be a gaming system "Super Smashteroids" (referred to as *the game* thereafter) for a wide variety of audiences. The basics of the game is very much similar to the classic 1979 arcade game *Asteroids*. The game will be required to interpret an user's input to provide graphical feedback on the screen of a spaceship moving about, shooting projectiles, and destroying asteroids - essentially allowing the user to "control" a spaceship as appeared on the graphical interface. The system is aimed to provide entertainment to its users by providing a sense of thrill as the user controls the ship, as well as accomplishment by obtaining high scores.

The user will be able to use a computer keyboard to provide control input to the system to "play" the game. The purpose of the game is to control a spaceship to accurately evade and destroy asteroids and aliens that would otherwise destroy the spaceship. The game will be designed to become more difficult over time, as to provide some challenge to the increasingly skilled player. There will also be potential options to view high scores, play 2-player games, save and load games, and change difficulty levels.

1.3 Definitions

1.3.1 customer: the person, or persons, that decide what the requirements of the software system should be.

1.3.2 development team: the developers of the software system, in both coding and design.

1.3.3 user: anyone that uses the software system and provides input whenever needed

1.3.4 player: same as *user,* in the context of the actual game.

1.3.5 game: the playable part of the software system.

1.3.6 SFX: special effects sounds.

1.3.7 spaceship: the player-controllable unit in the game.

1.3.8 power-up: an item obtainable in game by the player to provide additional gameplay advantages.

1.4 References

IEEE. IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications. IEEE Computer Society, 1998.

1.5 Overview

The rest of the document will consist of two parts, the overall description and the specific requirements. The overall description will talk about the project in detail giving perspective, functions, characteristics, constraints and assumptions. The overall description is primarily written for non-developers and is used as a references for the specific requirements.

The second part, specific requirements, is a section written for the developers and contains the software requirements as well as detailed information on the project such as the user interface and other miscellaneous features.

Following this documents guidelines will enable you to produce an almost identical copy of the original game *Asteroids* with some added features like *Super Smashteroids*.

2 Overall Description

2.1 Product Perspective

This system is a remake of the classic 1979 arcade game *Asteroids*. This system is self-contained and does not supplement any other existing software; there are no dependencies on other software other than the common Java Virtual Machine (JVM).

2.2 Product Functions

2.2.1 Main Menu

This will be a screen where the user can enter into the game, high score menu, options menu, or exit the game. This will function through only keyboard input.

2.2.2 Game Play

This will be the main overall function of the product which will allow the user to direct the spaceship around incoming asteroids as well as shoot the asteroids to gain points. The user will also encounter alien ships which will shoot at the user's ship. The user will have the opportunity to pick up randomly dropped temporary power-ups for their ship. The user's score, power-up duration, and lives will all be shown on the screen.

2.2.3 High Scores Menu

The user will be able to view the high scores in this menu. The user can also navigate back to the main menu.

2.2.4 Options Menu

In the options menu the user will be able to select settings for the game. These settings these settings will include music volume, SFX volume, and controls. The user can also navigate back to the main menu.

2.2.5 Exit

This will exit the game.

2.3 Use Cases

2.3.1 Use Case: Select Main Menu Option

- Participating Actors: Initiated by the user
- Entry Condition: The user launches the application
- Flow of Events:
  1. The system is launched.
  2. System presents four choices of the main menu: *Play Game*, *High Scores*, *Options*, and *Exit*.
  3. User selects the choice desired.
- Exit Condition: Submenu appears corresponding to the option.

2.3.2 Use Case: Play Game

- Participating Actors: User
- Entry Condition: User selects *Play Game* option from *Select Main Menu Option* use case.
- Flow of Events:
  1. System starts (or continues) a game.
  2. System lets the user play the game and verifies:
     2.1. If the user has no more lives remaining:
        2.1.1. Follow the user case *Save High Score*
        2.1.2. System presents “Game Over” message to the user.
        2.1.3. Follow the use case *Select Main Menu Option*.
     2.2. If 2.1 does not occur, go back to step 2.
- Alternative Flow of Events (desirable implementation):
  1. System prompts user for number of players participating.
  2. User selects 1-player or 2-player.
  3. System prompts user for difficulty options.
  4. User selects difficulty option.
  5. Systems starts the game and verifies:
     5.1.If the user has no more lives remaining:
        5.1.1. System presents “Game Over” message to the user.
        5.1.2. Follow the user case *Save High Score*
        5.1.3. Follow the use case *Select Main Menu Option*.
     5.2. If 5.1 does not occur, go back to step 5.
- Exit Condition: User loses all lives or presses the pause key.

2.3.3 Use Case: View High Scores

- Participating Actors: Initiated by the user
- Entry Condition: User selects the *High Scores* option from the main menu
- Flow of Events:
  1. System presents a list of high scores in descending order along with corresponding player names and time (optional: include difficulty) as well as a *Back* option.
  2. User views high scores.
  3. If the user selects the *Back* option, the user is redirected to the *Select Main Menu Option* use case.
- Exit Condition: User selects the *Back* option.

2.3.4 Use Case: Change Settings

- Participating Actors: Initiated by the user
- Entry Condition: User selects the *Options* option from *Select Main Menu Option* use case.
- Flow of Events:
  1. System displays three options: *Music Volume*, *SFX Volume*, and (desirable) *Controls*.
  2. If the user selects *Music Volume*:
     2.1. System prompts the music volume levels to be adjusted.
     2.2. User adjusts the music volume.
     2.3. System applies the new setting to the application.
     2.4. If the user selects *Previous Menu*, go back to step 1.
  3. If the user selects *SFX Volume*:
     3.1. System prompts the SFX volume levels to be adjusted.
     3.2. User adjusts the SFX volume.
     3.3. System applies the new setting to the application.
     3.4. If the user selects *Previous Menu*, go back to step 1.
  4. If the user selects *Controls*:
     4.1. System presents different control schemes.
     4.2. User selects one control scheme.
     4.3. System applies the new setting to the application.
     4.4. If the user selects *Previous Menu*, go back to step 1.
- Exit Condition: User selects the *Back* option.
- Quality Requirements:
  - Selection of options should be simple and can be done without training.
  - System should save the settings for the remainder of the application session.

- (Desirable) System should save the settings to a settings profile for future use.

2.3.5 Use Case: Pause Game Options

- Participating Actors: Initiated by user
- Entry Condition: The user presses the pause key during a game.
- Flow of Events:
  1. System pauses the current game.
  2. System presents two options: *Resume* and *Quit*.
  3. If the user selects *Resume*, go to use case *Play Game*
  4. If the user selects *Quit*:
     4.1. System prompts for confirmation
     4.2. If the user selects *Yes*, exit the game and go to *Select Main Menu* Options without saving high score.
     4.3. If the user selects *No*, return to step 2.
- Exit Condition: User presses Esc to return to the game.

2.3.6 Use Case: Save High Score

- Participating Actors: Initiated by system
- Entry Condition: The user loses all lives in the *Play Game* use case.
- Flow of Events:
  1. System queries the score obtained by the user.
  2. System prompts the user to enter a *nickname.*
  3. The user enters the player name.
  4. System saves the high score in a database.
- Exit Condition: the user is returned to *Select Main Menu* Options.

2.4 User Characteristics

The game should be useable by any users, regardless of age, education, or experience. No special knowledge or skills should be assumed on the part of the users, and users with little computer experience should be able to use this game with no problem. Other than simple controls for moving and attacking, users should not be expected to learn a set of commands in order to start using the game.

2.5 Constraints

- Regulatory Policies: None
- Hardware Limitations: Unknown
- Interfaces to other Applications: Java Runtime Environment, or Java Virtual Machine, would most likely be needed to run this application.
- Parallel Operation: We will be constrained by a dual-threaded operation, one thread dedicated for graphics and one thread for the remainder.
- Audit Functions: None
- Control Functions: None
- Higher-order Language Requirements: Java is the proposed language.
- Signal handshake protocols: None
- Reliability requirements: None
- Criticality of the application: None
- Safety and security considerations: This product will not access or exchange any user information.

2.6 Assumptions and Dependencies

No assumptions or dependencies have been identified.

3 Specific Requirements

3.1 In-Game Features

3.1.1 Controls for Player Controlled Spaceship:

This feature will allow the player to control the spaceship in the game. By default, this will be done using the WASD keys.

#	Difficulty	Priority	Description
3.1.1.1	Medium	Essential	Player movement will be divided into two parts: speed control keys and directions keys.
3.1.1.2	Medium	Essential	The W and S keys will determine the speed of the spaceship. Pressing W will accelerate the ship (up to max speed) and pressing the S key will act as a brake, slowing the ship down until it comes to a rest. The S key will not put the ship into reverse once it stops moving.
3.1.1.3	Medium	Essential	The W key will need to remain pressed to continue moving forward. Failure to do so will make the ship decelerate until rest.
3.1.1.4	Medium	Essential	Meanwhile, the A and D keys will control the direction of the ship. Pressing A will rotate the ship in a counter-clockwise direction and pressing D will rotate the ship clockwise.
3.1.1.5	Medium	Essential	The ship will continue rotating while these two keys are pressed, and will immediately stop rotating when they stop being pressed.

3.1.2 Shooting:

This feature will allow the player to shoot projectiles at the asteroids and aliens. By default this will be done with the spacebar.

#	Difficulty	Priority	Description
3.1.2.1	Medium	Essential	After the spacebar is pressed by the user, a single shot of the current weapon will be launched from the front of the spacecraft in the direction it is currently facing. The speed will be a fixed rate for all projectiles.
3.1.2.2	Medium	Essential	The projectile will travel until it comes into contact with an asteroid or alien, or until it reaches the end of the screen, at which point it will disappear (no wrap-around).

3.1.3 Hit Detection - Spaceship:

To allow the player controlled spaceship to react to being hit by an alien projectile or asteroid.

#	Difficulty	Priority	Description
3.1.3.1	Medium	Essential	When the player's ship is hit by a projectile or asteroid, there will be an explosion animation.
3.1.3.2	Medium	Essential	Player will lose a life when this happens. More details in 3.1.17.

3.1.4 Hit Detection - Asteroid:

To detail the reaction of asteroids getting hit by the player, the player's projectiles, aliens, alien projectiles and other asteroids.

#	Difficulty	Priority	Description
3.1.4.1	Medium	Essential	Reaction to player's ship: Asteroid will be destroyed as outlined in Asteroid Physics, and will cause the destruction of the player's ship and cause them to lose a life.

3.1.4.2	Medium	Essential	Reaction to player projectiles: Asteroid will be destroyed following the procedure in Asteroid Physics.
3.1.4.3	Medium	Essential	Reaction to aliens: Contact between asteroids and aliens will cause nothing to happen. Aliens will pass over asteroids and asteroids will pass under aliens.
3.1.4.4	Medium	Essential	Reaction to alien projectiles: Alien projectiles will cause no reaction from asteroids.
3.1.4.5	Medium	Essential	Reaction to other asteroids: No reaction will occur unless desirable feature 3.1.10 is implemented.

3.1.5 Hit Detection - Alien:

To detail the reaction of aliens being hit by the player, the player's projectiles, other aliens, other alien's projectiles and asteroids.

#	Difficulty	Priority	Description
3.1.5.1	Medium	Essential	Reaction to player: Alien and player are destroyed with respective explosion animations.
3.1.5.2	Medium	Essential	Reaction to player projectiles: Alien is destroyed with accompanying explosion animation.
3.1.5.3	Medium	Essential	Reaction to other aliens: No reactions.
3.1.5.4	Medium	Essential	Reaction to other aliens' projectiles: No reaction.
3.1.5.5	Medium	Essential	Reaction to asteroids: Contact between asteroids and aliens will cause nothing to happen. Aliens will pass over asteroids and asteroids will pass under aliens.

3.1.6 Alien AI:

To dictate what the aliens do when they are on the game screen.

#	Difficulty	Priority	Description
3.1.6.1	Difficult	Essential	Aliens will fly around the game screen following their programmed random path.
3.1.6.2	Difficult	Essential	Single projectiles will be launched at the player at regular intervals, with increasing frequency for harder difficulty settings.
3.1.6.3	Difficult	Essential	Aliens will stay on screen until destroyed by the player.

3.1.7 Asteroid Behaviour:

To specify the behaviour of the asteroids in game.

#	Difficulty	Priority	Description
3.1.7.1	Medium	Essential	Asteroids will enter the screen from all sides randomly.
3.1.7.2	Medium	Essential	They will have random velocities greater than 0 and less than MAX SPEED directed into the playing field.
3.1.7.3	Medium	Desirable	They will wrap around if at the edge of the screen.
3.1.7.4	Medium	Essential	Asteroids travel in a straight line.

3.1.8 Power-Ups:

To add variety for the player and allow for easier destruction of targets.

#	Difficulty	Priority	Description
3.1.8.1	Medium	Desirable	These ship upgrades will be dropped randomly from destroyed aliens.
3.1.8.2	Medium	Desirable	Player must pick them up within 10 seconds of them dropping.
3.1.8.3	Medium	Desirable	They will only last 30 seconds, after which the ship will return to normal.

3.1.8.4	Medium	Desirable	Power-ups include: Scattershot Laser beam Shield
3.1.8.5	Medium	Desirable	If multiple powers ups are obtained at the same time, these scenarios may occur: If it's the same power-up, the time of the new power-up will be added to the remaining amount of time. If it's a different power-up, the new will replace the old and the power-up timer will be reset.
3.1.8.6	Medium	Desirable	To pick up a power up, the player must move the ship over the graphical icon of the power-up.

3.1.9 Bombs:

Allows the player to drop bombs that can destroy multiple enemies at the same time.

#	Difficulty	Priority	Description
3.1.9.1	Medium	Desirable	Bombs will be dropped randomly from destroyed aliens.
3.1.9.2	Medium	Desirable	Player must pick them up within 10 seconds of them dropping.
3.1.9.3	Medium	Desirable	Will drop less frequently than the upgrades in section 3.1.8.
3.1.9.4	Medium	Desirable	Will remain with the player until they are used with the B key.
3.1.9.5	Medium	Desirable	Player can hold up to 3 bombs at once.
3.1.9.6	Medium	Desirable	Bombs picked up after that limit is reached will grant the player 50 points.

3.1.10 Collision Physics for Asteroids:

To more realistically simulate the collision of multiple asteroids.

#	Difficulty	Priority	Description
3.1.10.1	Difficult	Optional	When two or more asteroids come into contact with each other their will collide.

3.1.10.2	Difficult	Optional	Their reaction to this collision will depend upon their speed, size and direction and will alter their respective speeds and directions.
3.1.10.3	Difficult	Optional	Colliding asteroids will not cause them to be destroyed or split into smaller fragments.

3.1.11 Loading/Saving Game State:

Allow the player to save and load their current game.

#	Difficulty	Priority	Description
3.1.11.1	Difficult	Optional	This will be an option found in the in-game pause menu and will be initiated from there.
3.1.11.2	Difficult	Desirable	Will allow the player to store up to 3 saves.
3.1.11.3	Difficult	Desirable	The player will be able to name their save, and a time stamp will be automatically generated and displayed with the save.
3.1.11.4	Difficult	Desirable	Upon loading the game, the player will be given a 3 second period before the game starts.
3.1.11.5	Difficult	Desirable	During this 3-second period, the player will be able to see the playing field but everything will be frozen in place.

3.1.12 Asteroid Physics:

Incorporates an aspect of realism into the game.

#	Difficulty	Priority	Description
3.1.12.1	Medium	Essential	An asteroid that has been hit will split into two pieces that travel at the same speed as the parent asteroid but one split asteroid will travel in a random direction ϕ where $0° \leq \phi \leq 45°$ and 0° is the direction in which the parent asteroid was initially travelling. The other split asteroid will also travel in a random direction Θ where $-45° \leq \Theta \leq 0°$ and 0° is the direction in which the parent asteroid was initially travelling. When any asteroid flies off the screen, it will reappear on the opposite side or corner of the screen travelling in the same direction with the same speed.

3.1.13 Spaceship Physics:

Incorporates an aspect of realism into the game.

#	Difficulty	Priority	Description
3.1.13.1	Medium	Essential	When thrusters are engaged, spaceship will accelerate for one second in the direction it is facing before attaining a maximum speed. As soon as the thruster key is let go of, the spaceship will decelerate in the direction it is facing for three seconds before coming to a complete stop. When the spaceship flies off the edge of the screen it will continue its flight on the opposite side or corner of the screen.

3.1.14 Alien Physics:

Incorporates as aspect of realism into the game.

#	Difficulty	Priority	Description
3.1.14.1	Difficult	Essential	When thrusters are engaged, aliens will accelerate for one seconds in the direction they are facing before attaining a maximum speed. Thrusters will engage according to the actions given by Alien AI. Aliens will not travel beyond the edge of the screen once they have appeared.

3.1.15 Flying Saucer Types:

Adds some variability to the game to make it less repetitive.

#	Difficulty	Priority	Description
3.1.15.1	Medium	Optional	Different flying saucers or “aliens” will require various amounts of spaceship bullets to destroy and will also impede the player’s progress in different ways.

3.1.16 Bonus Life Drops:

Grants a bonus life to the user.

#	Difficulty	Priority	Description
3.1.16.1	Medium	Essential	After a certain number of points have been achieved, an extra life drop will appear randomly on the screen and if the spaceship touches this icon the user is granted an extra life.

3.1.17 Ship Destruction:

What happens when the player's ship get destroyed.

#	Difficulty	Priority	Description
3.1.17.1	Medium	Essential	When the player's ship gets hit by aliens, alien projectiles or asteroids it will be destroyed (see Spaceship Graphics).
3.1.17.2	Medium	Essential	Destruction results in the player losing a life.
3.1.17.3	Medium	Essential	The player will respawn and be given a 3 second grace period where they will be invincible.
3.1.17.4	Medium	Essential	If the player reaches zero lives, a game over is reached and they will be brought to the game over screen.

3.1.18 Game Over Menu:

The screen shown when the player has no lives left.

#	Difficulty	Priority	Description
3.1.18.1	Medium	Essential	When the player reaches zero lives, they the screen will fade away and provide this new screen.
3.1.18.2	Medium	Essential	This screen will display a "GAME OVER" message and provide the player with information on their game (score, time alive, if a high score was reached).
3.1.18.3	Medium	Essential	The player will need to press enter to continue
3.1.18.4	Medium	Essential	If a high score was reached they will be brought to the high score menu 3.1.19 otherwise they will be brought to the main menu 3.3.1

3.1.19 Save High Score Input:

Allows player to input their high score information.

#	Difficulty	Priority	Description
3.1.19.1	Medium	Essential	Player will be asked to input their three character nickname for the high score list.
3.1.19.2	Medium	Essential	This nickname along with the high score will be saved into a database for future access.
3.1.19.3	Medium	Essential	After this information is entered, the player will be brought to the main menu 3.3.1

3.1.20 Sounds:

To detail what sounds will be playing during the game.

#	Difficulty	Priority	Description
3.1.20.1	Medium	Essential	There will be pleasant, distinct sounds played corresponding to some actions.
3.1.20.2	Easy	Essential	Pressing the Esc key once more while already in the pause menu will resume the game.
3.1.20.3	Medium	Desirable	There will be background music for the game and menu.
3.1.20.4	Easy	Essential	There will be sound for shooting (for every shot).
3.1.20.5	Easy	Essential	There will be sound for player moving (continuous as thrust is held).
3.1.20.6	Easy	Essential	There will be sound for asteroid destruction.
3.1.20.7	Easy	Essential	There will be sound for the presence of aliens.
3.1.20.8	Easy	Desirable	There will be sound of menu selection tones.
3.1.20.9	Easy	Desirable	There will be sound for player ship destruction.
3.1.20.10	Easy	Essential	There will be sound for Game Over.
3.1.20.11	Easy	Essential	There will be sound for alien ship destruction.
3.1.20.12	Easy	Desirable	There will be sound for previous high score beat.
3.1.21.13	Easy	Desirable	There will be sound for power-up pick up.

3.1.21 Pause Menu:

This is available in case the player needs to pause the game for a period of time, or wants to access some options in the middle of the game.

#	Difficulty	Priority	Description
3.1.21.1	Easy	Essential	By pressing the Esc key, the player can pause the game and open up another menu with options to resume the game, change settings, or exit the game and return to the main menu screen.
3.1.21.2	Easy	Essential	Pressing the Esc key once more while already in the pause menu will resume the game.

3.1.22 Scoring:

To specify what actions score points and how many points they score. Score is kept to input into the high score page and kept for player records.

#	Difficulty	Priority	Description
3.1.22.1	Easy	Essential	Points will be awarded to the player after the destruction of asteroids and aliens
3.1.22.2	Easy	Desirable	There will be a tiered points system, for example: - Small asteroids will provide: 10 points - Medium asteroids will provide: 20 points - Large asteroids will provide: 40 points - Aliens will provide: 100 points - Extra bombs will provide 50 points
3.1.22.3	Easy	Desirable	Score will be counted and calculated in game and displayed on the HUD
3.1.22.4	Medium	Desirable	Score will be compared to the current high score list and saved at the end of each round if it has made it onto that list

3.1.23 Increasing Difficulty

To provide the player with more challenge over time.

#	Difficulty	Priority	Description
3.1.23	Medium	Desirable	No matter where, or what difficulty, the player starts, the game will become increasingly more difficult (more asteroids and aliens) relating to how long they stay alive.

3.2 Game Graphic Features

3.2.1 Asteroid Graphics:

Adds to the enjoyment of the game through visual quality and complexity of the asteroid animations.

#	Difficulty	Priority	Description
3.2.1.1	Difficult	Essential	Upon being hit by the spaceship's projectile, the asteroids will split into smaller steroids instead of simply disappearing.
3.2.1.2	Difficult	Desirable	There will be more than two levels of reduction of asteroid sizes.

3.2.2 Alien Graphics:

Adds to the enjoyment of the game through visual quality and complexity of the alien animations.

#	Difficulty	Priority	Description
3.2.2.1	Medium	Essential	Aliens will fire projectiles in the same manner as the spaceship but the projectile will have a different colour to distinguish it from the spaceship's projectiles.

3.2.3 Bonus Drop Graphics:

Adds to the enjoyment of the game through visual quality and complexity of the power-up animations.

#	Difficulty	Priority	Description
3.2.3	Difficult	Desirable	Any power-up that drops will flash for a few seconds before disappearing, unless the spaceship comes in contact with them in time.

3.2.4 Spaceship Graphics:

Adds to the enjoyment of the game through visual quality and complexity of the spaceship animations.

#	Difficulty	Priority	Description
3.2.4.1	Difficult	Desirable	Pressing the thruster key will change the animation of the spaceship to one that appears to have its rockets or thrusters on.
3.2.4.2	Difficult	Desirable	Upon being hit by an alien's bullet or asteroid, the spaceship will explode into many pieces.
3.2.4.3	Difficult	Desirable	When the shoot key has been pressed, a small projectile will emit from the front of the spaceship and travel in a straight line until it hits the edge of the screen, where it will disappear, or hit an asteroid or alien.

3.2.5 Environment Graphics:

Adds to the enjoyment of the game through visual quality and complexity of the background image.

#	Difficulty	Priority	Description
3.2.5	Easy	Essential	The background image will be a still image as to not confuse the player by having too many objects on the screen moving at once. Default will be black.

3.2.6 Menu Graphics:

Adds to the enjoyment of the game through visual quality and complexity of the menu screens.

#	Difficulty	Priority	Description
3.2.6	Medium	Essential	Clicking any of the menu buttons will immediately display the next screen.

3.2.7 Heads Up Display Graphics:

Provides the user with information about the current game being played.

#	Difficulty	Priority	Description
3.2.7	Medium	Desirable	A number of objects will always be visible on the screen while the player is in control of the spaceship. These include how many lives are remaining, the player's score, the player's current power-up and how much time they have before it expires, bomb inventory and the current wave level being played.

3.3 Main Menu Features, Options, and Game Modes

3.3.1 Main Menu UI:

First thing the player can interact with when starting the game. Will outline some simple rules and allow the player to select what happens next.

#	Difficulty	Priority	Description
3.3.1.1	Easy	Essential	Will feature 4 options for the user to select from: START GAME (3.3.2), HIGH SCORES (3.3.6), OPTIONS (3.3.5), and EXIT (3.3.7)
3.3.1.2	Easy	Essential	Navigation will be performed with the arrow keys and selection will be done with the enter key.

3.3.2 Start Game:

Allow the player to select how their current game will be played.

#	Difficulty	Priority	Description
3.3.2.1	Easy	Essential	Player will be brought here by selecting START GAME from the main menu
3.3.2.2	Easy	Essential	Two additional buttons will be on the screen to allow the player to go back to the MAIN MENU (3.3.1) or PLAY GAME
3.3.2.3	Medium	Desirable	Player will be able to select difficulty and number of players here

3.3.3 Player Selection:

The user will have a choice between playing solo or with a friend.

#	Difficulty	Priority	Description
3.3.3.1 1-Player	Easy	Essential	Selecting single player will commence regular play with a single ship controlled by the player
3.1.1.2 2-Player	Medium	Desirable	Selecting 2-player will commence a non-simultaneous 2 player game. Players will play until they reach a game over, at which point the second player will begin play. Once the first player dies, the game over screen is played with an indication that the next player will need to press enter before their own game starts. When the second player loses, a game over screen is displayed but no option for playing again will be present. Instead, they will be brought to the score screen after pressing enter. Both their scores will be displayed along with the game declaring a winner based on who has the highest score.

3.3.4 Game Difficulty Selection Menu:

Allows the player to select a desired difficulty setting to match their skill level in the game.

#	Difficulty	Priority	Description
3.3.4	Easy	Desirable	The player may choose between three difficulty settings: Easy, Medium, or Hard. Depending on which setting is selected, the player will begin the game at different levels of the game. If the Easy setting is chosen, the player will begin the game at Level 0. If the Medium setting is chosen, the player will begin at Level 5. If the Hard difficulty is chosen, the player will begin at Level 9.

3.3.5 Options:

Allows the player to change some settings of the game.

#	Difficulty	Priority	Description

3.3.5	Easy	Desirable	Upon entering the Options menu through either the main menu screen or the in-game pause menu, the player is given the option to mute or unmute the sound FX, mute or unmute the background music, and change the key bindings between WASD and the arrow keys.

3.3.6 High Score/Statistics:

Shows the high score screen.

#	Difficulty	Priority	Description
3.3.6	Difficult	Essential	This screen shows the top ten high scores ever achieved by players playing on the computer being used. The screen will list the players' names, their scores, and how long they took to achieve that score. This list will be sorted by the score, with the highest score on top. There will be three different tabs showing different pages of the high score screen, and each tab will correspond to the difficulty level played when the high score was achieved.

3.3.7 Exit:

#	Difficulty	Priority	Description
3.3.7	Essential	Essential	Terminates the application.

3.4 External interface requirements

3.4.1 User interfaces

This software requires the use of the keyboard not only to play the game but to interact with the menus as well. The user must navigate through the main menu screens before starting gameplay.

3.4.2 Hardware interfaces

No hardware interface requirements.

3.4.3 Software interfaces

This software should run on any up-to-date operating system that supports Java. Java must be installed on the computer running the game.

3.4.4 Communications Interfaces

No communication interface requirements.

3.5 Performance requirements

The program should take no more than 3 seconds to show the main menu screen. It should also take no more than 3 seconds for the game to start upon clicking either “Single Player” or “Two Player”. After gameplay has begun, the spaceship should respond to each input from the user almost immediately.

3.6 Design Constraints

This software is designed to be playable by people of all ages and skill levels.

3.7 Software System Attributes

3.7.1 Reliability

This software should never lag or crash on its own accord. Any program errors should occur only as a result of the operating system on which it runs.

3.7.2 Availability

This software should be free to run on any computer with Java installed.

3.7.3 Security and Privacy

This software should not collect nor distribute any data or information from the user or from the computer on which it is installed.

3.7.4 Maintainability

This software should keep an up to date an accurate version history. Any bug fixes or new releases should be implemented on entirely separate software releases as opposed to patch updates.

3.7.5 Portability

This software should be able to be brought anywhere on any storage device large enough to hold the program.

3.7.6 Safety

This software should warn the user of the risks associated with epileptic players playing video games.

3.7.7 Training-related requirements

This software should not require any training to be able to play the game. The instructions should be displayed on the main screen and the features of the game should be learned as the user plays through the game.

3.8.8 Packaging Requirements

The software should be packaged with proper documentation in some form of text file.

3.9 Other requirements

There are no other requirements