Software Requirements Specification

Battleship

Project Team 4

Kaitlin Dosch
Connor May
Dominic Ravagnani
Diane Smith
Julia VanLandingham

Table of Contents

Introduction

This section gives a scope description and overview of everything included in this SRS document. Also, the purpose of this document is described and a list of abbreviations and definitions is provided.

Purpose

The purpose of this document is to give a detailed description of the requirements for an online Battleship game. It will define the purpose and complete declaration for the development of the system. It will also explain the constraints on the system, interfaces, and interactions with external applications.

Intended audience

This project is completed in partial fulfillment of the requirements for Otterbein University's COMP 3100 course. This has been implemented under the guidance of a university professor. This product is useful for the entertainment of 1-2 people. This document is primarily intended to be proposed for the product's approval before and a reference during the development process.

Project Scope

The purpose of the online Battleship game is to create a way for a person to play a game of Battleship by themselves or for two people who are unable to play in person (either due to not having the physical game or not being in the same physical location) to play a game of Battleship together via the Internet. The system is based on the board game Battleship with all the same rules and objectives taken from nmsu.edu (outlined in the Overall Description section).

References

"Battleship Board Game Rules: How Do You Play Battleship?" *How Do You Play It*, howdoyouplayit.com/battleship-board-game-rules-play/.

Overall Description

This section gives an overview of the whole system. The basic functions of the system as well as how the system interacts with other systems and software are also outlined.

Product functions

Our software will be modeling the board game Battleship using the following set of rules (see resources above):

<u>Game Objective</u>
The object of Battleship is to try and sink all of the other players before they sink all of your ships. All of the other player's ships are somewhere on a 10 by 10 grid. You try and hit them by calling out the coordinates of one of the squares on the board. The other player also tries to hit your ships by calling out coordinates. Neither you nor the other player can see the other's board so you must try to guess where they are. Each board in the physical game has two grids: the lower (horizontal) section for the player's ships and the upper part (vertical during play) for recording the player's guesses.

<u>Starting a New Game</u>
Each player places the 5 ships somewhere on their board. The ships can only be placed vertically or horizontally. Diagonal placement is not allowed. No part of a ship may hang off the edge of the board. Ships may not overlap with each other.

Once the guessing begins, the players may not move the ships.

The 5 ships are Carrier (occupies 5 spaces), Battleship (4), Cruiser (3), Submarine (3), and Destroyer (2).

<u>Playing the Game</u>
Player's take turns to guess by choosing the coordinates of a tile on the board. The boards will be updated with “hit” or “miss” appropriately. For example, if you call out F6 and your opponent does not have any ship located at F6, the tiles at F6 would be updated with a “miss” icon.

When all of the squares that one of your ships occupy have been hit, the ship will be sunk. When this happens the boards will be updated appropriately and it will be announced that that specific ship has been sunk. For example “Your carrier was sunk.”

As soon as all of one player's ships have been sunk, the game ends. The player with the remaining ships is pronounced the winner of the game.

Specifically, our software will be modeling the above game with the ability to play without a physical board using a computer with the options to play against a computer opponent or another user.

User Characteristics

We expect that the user has basic computer function knowledge and skills as well as some experience using simple GUIs. The user will be able to obtain the required information about their public IP address. We assume that two users that wish to play against each other will be able to communicate outside of this program in order to pass information to obtain network connection.

Dependencies

Our product requires a device capable of running a Java application as well as connecting and communicating with another device over the network.

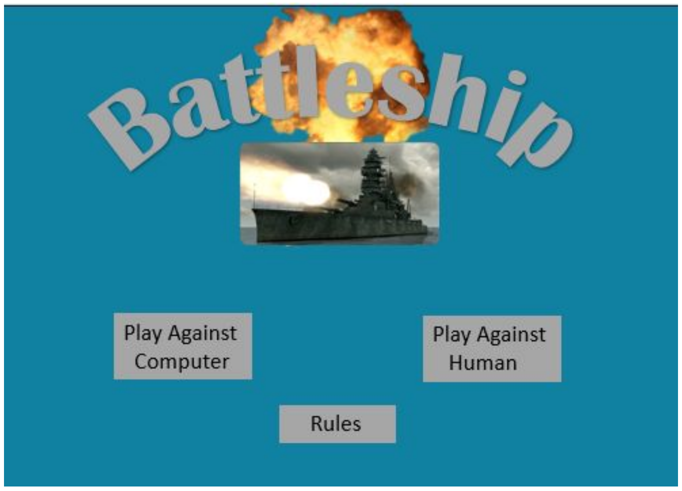
Interfaces

This section contains all the interface requirements for the system. This includes a description of the user interface, hardware interface, software interface, and communication interface along with diagrams of what the user interface will look like.

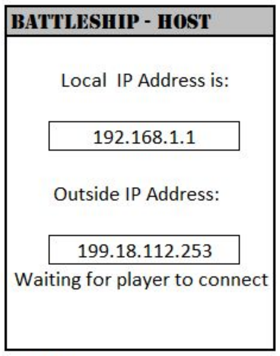
User interfaces

When the product is first launched a menu screen will appear with the name of the game across the top of the screen and three options for the user to choose: “Play against computer,” “Play against human,” and “Rules.” If the rules option is selected a rules screen will pop up with a summary of the rules and a “back” button. If the “Play against human” option is selected a networking connection screen will be shown with two buttons: “Host” and “Join.” If the “Host” button is selected the host’s local and outside IP addresses will be displayed. If the “Join” button is selected an input screen will be displayed for inputting the host’s IP address.

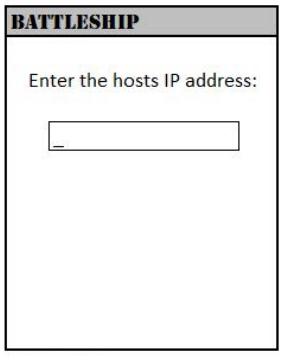
(menu screen and networking screen)



Networking View



Host view

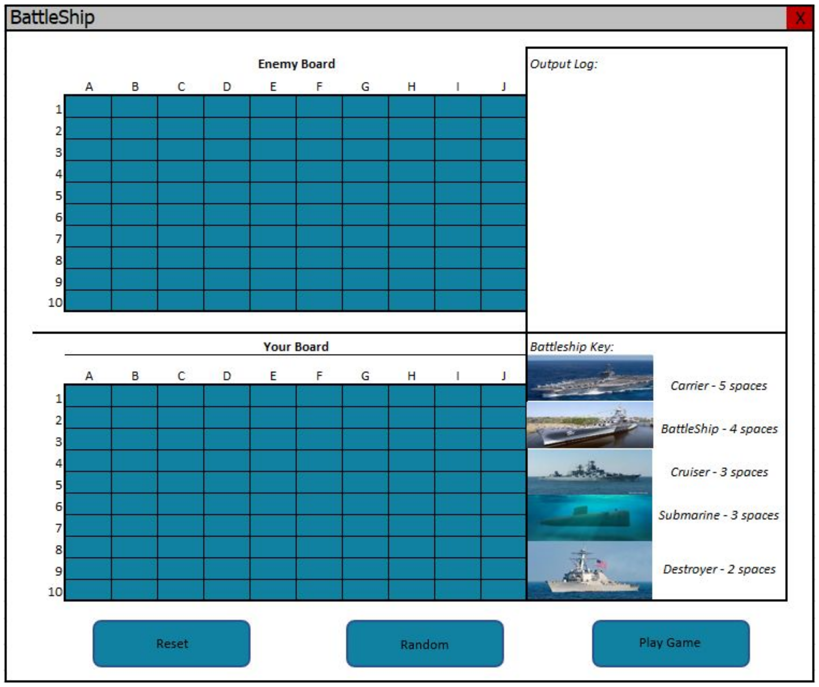


Player to join

Once the connection has been completed or if the “Play against computer” option was selected then the game screen will appear for the placement of ships. Two game boards will be depicted with one on top of the other along the left-hand side of the screen. The top board depicts the enemy’s board while the bottom is the player’s board. In the top right-hand corner of the screen an output log will display the results of a player’s guessing actions when the game is active. Directly below the output log, there is a bank where ships are stored along with their name and length. The user can select a ship for placement by clicking on a ship. Upon selection, the user will then choose the starting tile for the ship and then the ending tile for the ship. The user can only select tiles on their board at this point.

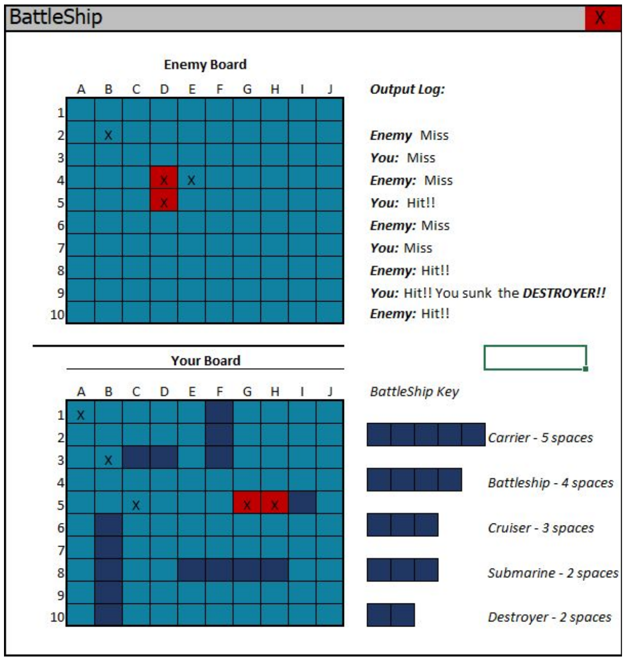
While the user is placing ships there are three buttons: “Reset”, “Random”, and “Play Game”. The “Reset” button allows the user to return all the ships to the bank and restart the ship placement process. Otherwise, a user cannot move a ship after placement without resetting all ships. The “Random” button allows the user to get a random ship placement and they can continue to select this option as many times as they like. Once all five ships have been placed the “Play Game” button will be able to be pressed and that will start the game.

Game board during ship placement



Once the game has started the buttons for ship placement will disappear but the rest of the screen will look the same. In the ship bank the ships can still be selected; however this only makes the informational popup appear. The user can only select tiles on the enemy’s board at this point. When the user selects a tile to drop a bomb onto either a hit or a miss will be registered. If a hit is registered then the tile will turn red with an X and an explosion icon will appear. If a miss is registered the tile will remain blue but will have an X. For all actions, the outcome of the action will be printed to the user’s output log.

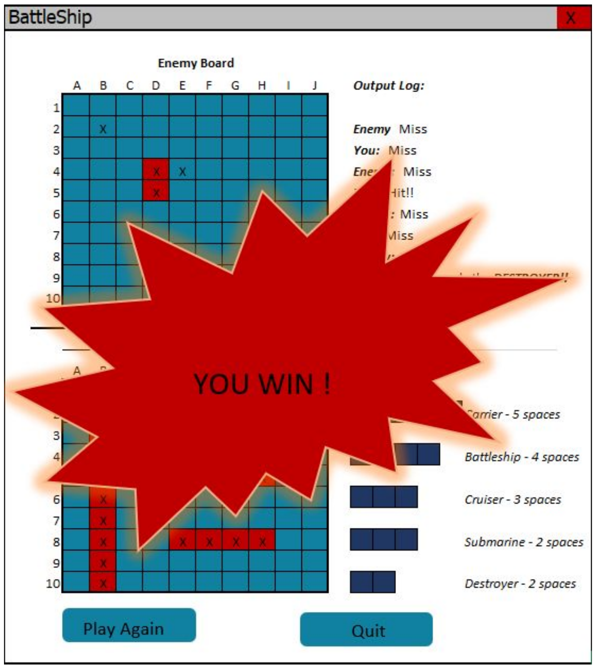
Game board during gameplay



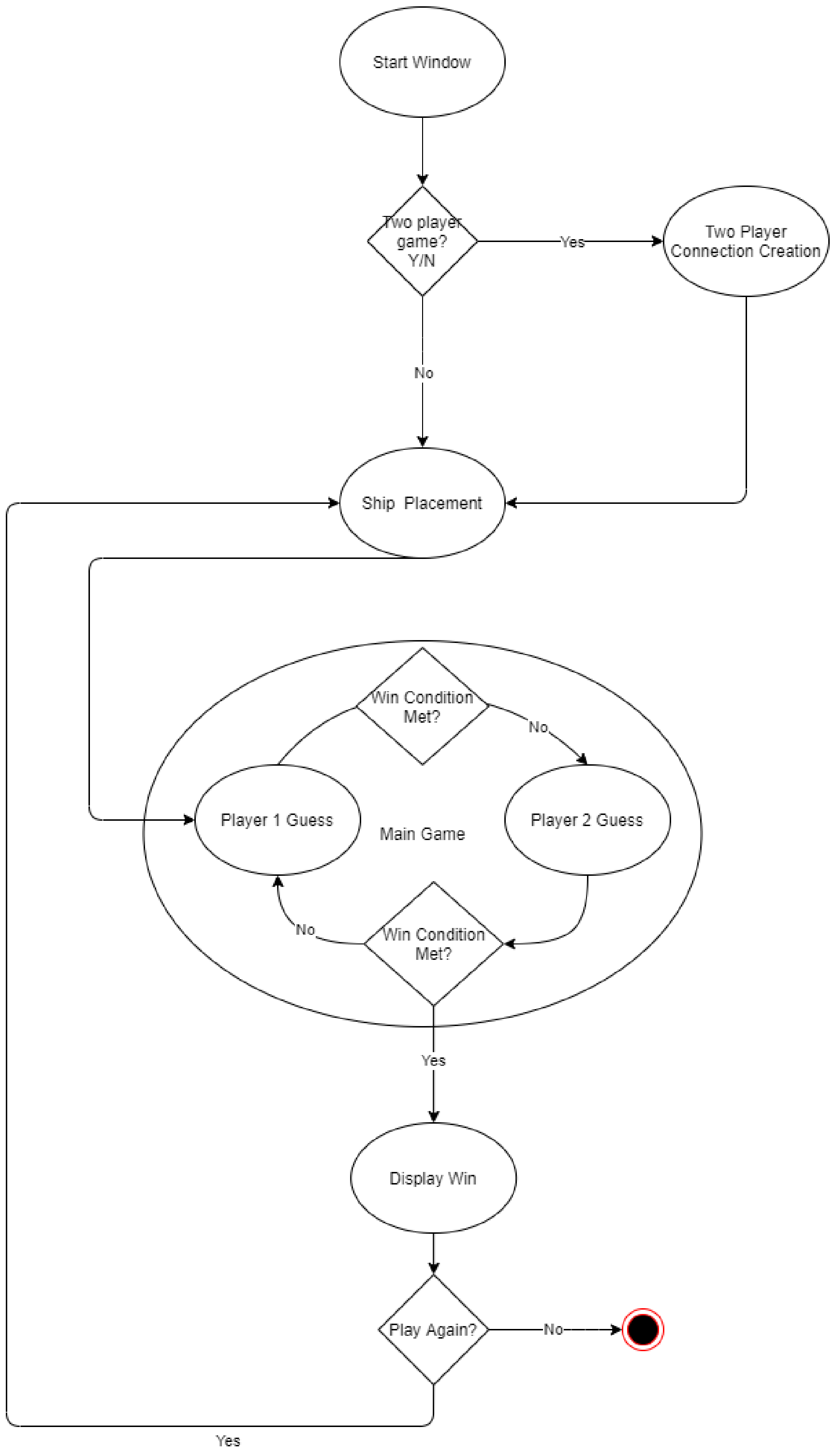
```
Enemy  Miss
You:  Miss
Enemy:  Miss
You:  Hit!!
Enemy: Miss
You: Miss
Enemy: Hit!!
You: Hit!! You sunk  the DESTROYER!!
Enemy: Hit!!
```

When a player wins “You win” is displayed across their board and “You lose” is displayed for the other player across their board. Two buttons will appear at the bottom of the screen: “Play again” and “Quit”. When the “Quit” button is selected the program will close the program for all users. When the “Play again” option is selected the game will begin again back at the ship placement screen. If there are two players the system will wait until both players have chosen to play again to start a new game.

Game Board - Win view



```
Enemy  Miss
You:  Miss
```



Activity Diagram

Above is an activity diagram showing different actions and decisions the player can make. This is another representation of the windows we have discussed, showing how the different decisions will lead to different windows and actions.

Hardware interfaces

Users are expected to have a mouse, keyboard, and monitor.

Software Interfaces

Users should be running Windows 10 and should have Java 8 or higher installed.

Communications interfaces

The software will need to communicate through a TCP socket protocol. Our user will need to be able to find their public IP address to be able to use the multiplayer.

Functional Requirements

This section describes the features required to be implemented. Each requirement will be labeled with a number ID and name. The first number will be the section it is in and the second will be the number of the actual requirement.

GUI Requirements

ID: FR1.1
Display Start Screen
Description: Display start screen
Dependencies: None

ID: FR1.2
Rules
Description: Display rules screen by user clicking button
Dependencies: FR1.1

ID: FR1.3
Select Opponent
Description: Display options to user to select two player or singleplayer mode
Dependencies: FR1.1

ID: FR1.4
Display network screen
Description: Display network screen for host/join options
Dependencies: FR1.3
ID: FR1.5

Display IP address:
Description: Display the host’s IP address
Dependencies: FR1.4, FR3.1

ID: FR1.6
Input IP address:
Description: Display input screen for IP address input
Dependencies: FR1.4

ID: FR1.7
Connect to other user
Description: Connect to other user
Dependencies: FR1.5, FR1.6

ID: FR1.8
Display connection status
Description: Display the status of the connection to other user
Dependencies: FR1.7

ID: FR1.9
Display ship placement screen
Description: Display the ship placement screen
Dependencies: FR1.3, FR1.7

ID: FR1.10
Output text to log
Description: Write text to output log
Dependencies: None

ID: FR1.11
Select a Ship to place
Description: User selects which type of ship they would like to place
Dependencies: FR1.9

ID: FR1.12
Select a start coordinate
Description: User selects the beginning tile for their ship
Dependencies: FR1.11, FR2.5

ID: FR1.13
Select an end coordinate
Description: User selects the ending tile for their ship
Dependencies: FR1.11, FR2.5

ID: FR1.14
Display opponent quits game message
Description: Display message that the opponent quit
Dependencies: FR2.16, FR3.3

ID: FR1.15
Confirm an individual ship's placement
Description: User confirms a ship's placement before moving on to another ship
Dependencies: FR1.12, FR1.13

ID: FR1.16
Display placed ship
Description: Display ship on board after it has been placed
Dependencies: FR1.15

ID: FR1.17
Reset ships
Description: Remove all ships from the board
Dependencies: None

ID: FR1.18
Display random ship placement
Description: Display a random legal placement of ships
Dependencies: FR2.14

ID: FR1.19
Confirm final ship placements
Description: User confirms the final placement of all ships
Dependencies: FR1.15

ID: FR1.20
Game screen
Description: Display game screen
Dependencies: FR1.19

ID: FR1.21
Display hit or miss
Description: Update the appropriate tile to display the hit or miss
Dependencies: FR2.7

ID: FR1.22
Output result of guess in log
Description: Update all results of the user’s guess in the log
Dependencies: FR1.10, FR2.7

ID: FR1.23
Display Win/Lose Screen
Description: Display win or lose screen appropriately.
Dependencies: FR2.13

ID: FR1.24
Wait for both players play again
Description: Wait for both players to select “Play again” at the end of a game in two player mode
Dependencies: None

Game Mechanics Requirements

ID: FR2.1
Initialize an AI opponent
Description: Initialize a computer generated opponent
Dependencies: None

ID: FR2.2
Track player turns
Description: Track which player’s turn it is
Dependencies: None

ID: FR2.3
Start ship placement phase
Description: Start the ship placement process
Dependencies: None

ID: FR2.4
Generate random ship placement
Description: Generate a random legal placement of all ships
Dependencies: FR2.10

ID: FR2.5
Check if a ship’s placement is legal
Description: Verify that a ship’s placement is legal
Dependencies: FR2.10

ID: FR2.6
Clear stored ships
Description: Reset all ships current placements
Dependencies: FR2.10

ID: FR2.7
Check for hit/miss
Description: Check if the guess was a hit or a miss
Dependencies: FR2.10

ID: FR2.8
Disable game board
Description: Disable all the buttons of the game board
Dependencies: None

ID: FR2.9
Enable game board
Description: Enable the buttons on the opponent’s board where a hit/miss has not occurred.
Dependencies: FR2.11

ID: FR2.10
Store ship placements
Description: Store the positions of every placed ship
Dependencies: FR1.15

ID: FR2.11
Store hits/misses
Description: Store the location of all hits and misses
Dependencies: FR2.7

ID: FR2.12
Check for sunk ship
Description: Check if all tiles of a ship have been hit
Dependencies: FR2.10, FR2.11

ID: FR2.13
Check if a player has won
Description: If all of one player’s ships have been sunk, the other player wins
Dependencies: FR2.12

ID: FR2.14
Quit
Description: Quit the program
Dependencies: FR3.3

ID: FR2.15
Opponent quits game
Description: Return to start screen
Dependencies: None

Network Requirements

ID: FR3.1
Get IP address
Description: Obtain host IP address
Dependencies: None

ID: FR3.2
Connect
Description: Client connect to host
Dependencies: FR3.1

ID: FR3.3
Send guess
Description: Send hit/miss at a location over network to opponent
Dependencies: FR2.7, FR3.2

ID: FR3.4
Receive guess
Description: Receive guess over network from opponent
Dependencies: FR3.3

ID: FR3.5
Send ship sunk
Description: Send which ship has been sunk to the opponent
Dependencies: FR2.12, FR3.2

ID: FR3.6
Receive ship sunk
Description: Receive which ship has been sunk from the opponent
Dependencies: FR3.5

ID: FR3.7
Send win
Description: Send that player has won the game to the opponent
Dependencies: FR2.13, FR3.2

ID: FR3.8
Receive win
Description: Receive that the opponent has won the game
Dependencies: FR3.7

Non-Functional Requirements

Performance requirements

All actions should execute almost instantaneously. After all information is input, connection between host and client should occur in less than 0.05 seconds.

Safety requirements

Users may suffer from eye strain when viewing a screen for extended periods of time, and may suffer from joint pain in their hands from the repetitive motion of clicking and typing.

Security requirements

This is a low security application, no specific security measures are required.

Software quality requirements

The software needs to have consistent format and user experience from window to window. If used for approximately an hour every day, then the software should crash no more than two times a week. Code should be easily readable and well documented including comments throughout as well as method and class comments.