Software Engineering Group Projects
Buccaneer Online Board Game
Requirements Specification

Author: C. J. Price
Config Ref: SE.QA.RS-CS22120
Date: 8 February 2017
Version: 1.2
Status: Release

Department of Computer Science
Aberystwyth University
Aberystwyth
Ceredigion
SY23 3DB
Copyright © Aberystwyth University 2016

CONTENTS

1. INTRODUCTION

1.1 Purpose of this Document

This document describes the requirements for the Software Engineering Group Project 2017. It should be read in the context of the CS22120/CC22120 Group Project, taking into account the details of the group project assignment and the group project Quality Assurance (QA) Plan [2].

1.2 Scope

This requirements specification describes the functions needed in a computer program providing an online version of the Waddington's board game Buccaneer, and the attributes that are expected from the finished product. It also describes the requirements for the process of constructing the system.

1.3 Objectives

The objectives of this document are:

- To describe the background to the group project application for 2017 (Buccaneer online board game)

- To provide details of the criteria that the group project product must meet

- To describe the types of interaction with the system which must be supported

2. GENERAL DESCRIPTION

2.1 Product Perspective

Buccaneer is a turn-based board game (similar in idea to Monopoly, from the same publishers). The aim is to sail around the board gaining treasures. The first player to have at least 20 points worth of treasure at their home port is the winner.

The following description of the game is from a Norwegian Website [1]:

The game board shows the ocean with different harbours and islands. The ocean is divided into 20x20 squares. In the middle you'll find Treasure Island. Further out, on each side of the board, lays Pirate Island and Flat Island. Along the edge of the sea (i.e. the game board) you'll find six harbours. Four of which works as the players home towns (London, Genoa, Marseilles and Cadiz) and two that are only meant for trading (Venice and Amsterdam). There are also three bays: Cliff Bay, Anchor Bay and Mud Bay.

There are five different types of treasures:
- *Diamonds, worth 5 points*
- *Rubies, worth 5 points*
- *Gold bars, worth 4 points*
- *Pearls, worth 3 points*
- *Barrels of rum, worth 2 points*

The crew cards shows how many pirates a player has got. Each card can have a value of 1, 2 or 3 pirates. The colour of the card is either red or black. The crew cards are used to tell both how many squares a ship might move and the ship's combat value. The number of squares a ship might move you find by simply adding up the value of all crew cards you currently have on hand. The combat value is found by adding up all black crew cards, all red crew cards and subtracting the total number red cards from the total number of black (or subtracting the black from the red, whichever gives a positive combat value).

When the game starts each player gets a ship and five crew cards. Some additional crew cards and a number of treasures are put on various places on the game board. The rest of the treasures are placed on the Treasure Island and the rest of the crew cards are placed face down on the Pirate Island.

When it is a player's turn he is free to sail wherever he wants (up to the number of squares identical to the value of his crew cards). He might choose to do one of three actions:
1. *Sail to Treasure Island and draw an Chance card*
2. *Sail to another harbour to trade*
3. *Attack another players ship*

When a players arrives at Treasure Island he draws an Chance card and follows the instructions. Examples of Chance cards:
1. *Take two crew cards from Pirates Island*
2. *Receive treasures for a total of six points from Treasure Island and reduce the value of your crew cards to 11 points by taking cards from your hand and placing them on Pirate Island*
3. *Your best pirates have deserted to Pirates Island. Place your best crew card on Pirate Island*

When you arrive at other harbours you might trade. You can exchange treasures and crew cards placed in the harbour with crew cards and treasures you have on your ship. For instance, if there is a pearl in London, and you want it, you might sail there and trade it in crew cards worth of three points. (The same amount of points a pearl is worth (see above)). This also goes for treasures or crew cards placed in other players hometown. When you have three identical treasures in your hometown (for instance three gold bars) you should move them over to the safe zone. Each player has a safe zone in their hometown and treasures placed here can not be traded or stolen.

If you decide to attack another player you sail up to the same square as him and shouts: "Ready to attack". The players must now reveal their combat values and the player with the highest value wins the battle. The winner might chose between two crew cards or all the treasure on the losing ship.

The group project will produce an on-screen version of the game, where the program acts as board and pieces, card dealer and referee for four human players playing Buccaneer.

2.2 Product Functions

The product will provide the following features:

- It will allow exactly four people to play the game at any one time. They will play on the same computer screen, with the computer prompting each player to make moves as appropriate.

- It will keep track of the players' holdings in terms of cards, treasure and board position.

- It will restrict each player to a maximum of two pieces of treasure on board ship.

- It will display the state of the game to the players onscreen, in an appropriate visual manner.

- It will set up the start position of the game, assigning home ports to players, and dealing crew cards to the players, and crew cards and treasure to the trading ports as appropriate.

- It will deal out cards (both chance cards and crew cards) to players as appropriate, using suitable randomising techniques.

- It will detect a player reaching Treasure Island, Flat Island or Anchor Bay, and take any appropriate action.

- When a player chooses to take a chance card at Treasure Island, it will implement the consequences of the chance card selected.

- It will manage storage and exchange of treasure at the ports according to the rules of the game.

- It will indicate legal moves to a player about to move, based on their crew strength, and allow them to select a legal move to make by clicking on the board.

- It will implement the attacking rules of the game when two ships pass over the same square.

- It will detect when one player has won the game by accumulating 20 points worth of treasure at their home port.

2.3 User Characteristics

Game players are not necessarily computer experts. It is acceptable to assume that they will have some knowledge of standard PCs running Microsoft Windows. In particular, they will be able to use the mouse and keyboard to operate standard Windows-style dialogs.

Users may not have played the Buccaneer board game before, and so the game should guide the user through the choices available to them at any time, without slowing down the speed with which the experienced user can play the game.

3. SPECIFIC REQUIREMENTS

3.1 Functional Requirements

FR1 Player Setup

When the game starts up, it will prompt the users for the name of each of the four players, so that it can use the names to make clear which player is being addressed by the game later on.

FR2 Port Assignment

The four players will be randomly assigned one of the four ports of London, Genoa, Marseilles and Cadiz as their Home Port.

FR3 Crew card management

The game will maintain a pack of 36 crew cards. These are made up of 6 each of 1, 2, or 3 pirates in red or black. They should be randomly sorted originally. When a card is given out, it should be dealt from the top of the pack. As cards are returned to the pack, they should be added to the bottom of the pack.

FR4 Chance card management

The game will maintain a pack of 28 Chance cards. The standard 28 cards are listed in appendix A. Some of these cards may prove impossible to implement during the investigation phase of the project. In that case, the project team may replace them with other chance cards, but all such substitutions should be documented by the project team. The Chance cards should be randomly sorted originally. When a card is given out, it should be dealt from the top of the pack. As cards are returned to the pack, they should be added to the bottom of the pack. Some cards may need to be held by players for a length of time, and the game should deal with that correctly if the project team choose to implement those cards.

FR5 Treasure management

The game contains 20 pieces of treasure of 5 types. There are four each of the following types of treasure:
- Diamonds, worth 5 points
- Rubies, worth 5 points
- Gold bars, worth 4 points
- Pearls, worth 3 points
- Barrels of rum, worth 2 points

All treasure is originally on Treasure Island, and should be assigned elsewhere as appropriate. It is possible for treasure to be assigned to ships, to ports, and to Flat Island. Where all treasure of a specific type has been assigned elsewhere, a request to obtain treasure of that type from Treasure Island should be refused.

FR6 Player management

The game will keep track of the following information for each player:
> The number of cards in the player's hand, and the value of each card.
> The total distance the player can move in a single turn (one square if no crew cards, or the sum of all crew cards in the player's hand).
> The fighting strength of the player (the absolute value of the difference between the red cards in the player's hand and the black cards in the player's hand). This should be calculated, and used in attacks, but not indicated to the players.
> Any Chance cards retained in the player's hand.
> The items of treasure in the player's ship.
> The location and orientation of the player's ship.
> The player's Home Port.

FR7 Port management

The game will keep track of the following information for each port:
> The number of cards at the port, and the value of each card.
> The items of treasure at the port.
> The player for whom this is the Home port (if any).

FR8 Flat Island management

Cards and treasure can be deposited on Flat Island because of Chance cards. The game will keep track of the following information for Flat Island:
> The number of cards at Flat Island, and the value of each card.
> The items of treasure at Flat Island.

FR9 Board display

The game will display a 20 by 20 square board on screen. Squares are numbered 1 to 20, with the square (1,1) being the bottom left hand corner and the square (20,20) being the top right hand corner. The board has the following notable features:
> Port of Venice at (1,7)
> Port of London at (1,14)
> Port of Cadiz at (14,20)
> Port of Amsterdam at (20, 14)
> Port of Marseilles at (20,7)
> Port of Genoa at (7,1)

[It should be noted that all ports have been moved ONTO the board to simplify implementation]
> Mud Bay at (1,1)
> Anchor Bay at (20,1)
> Cliff Creek at (20,20)
> Flat Island occupies a rectangle with corners (2,16) and (4,19)
> Pirate Island occupies a rectangle with corners (17,2) and (19,5)
> Treasure Island occupies a rectangle with corners (9,9) and (12,12)

All the notable features listed above should be marked in such a way that the players can tell which is which.

The position and orientation of each ship should be visible on the board, and it should be possible to tell which ship belongs to which player, and which port is the Home port for which ship.

The following information should be displayed for each player:
> The total distance the player can move in a single turn.
> The items of treasure in the player's ship.
> The location and orientation of the player's ship (one of 8 principal compass directions).
> The name of the player's Home Port.
> Any Chance cards retained in the player's hand.

The following information should be displayed for each port:
> The items of treasure in the port.
> The number of cards at the port, and the value of each card.
> The name of the player (if any) for whom it is the Home Port.

The following information should be displayed for Flat Island:
> The items of treasure at Flat Island.
> The number of cards at Flat Island, and the value of each card.

FR10 Game setup

Once the players' details have been taken (FR1), and they have been assigned Home Ports (FR2), then each player is dealt five cards from the crew card pack. Each of the Trading ports are dealt two cards, and the value of items

at the port is made up to 8 by adding treasure. For example, if the two cards dealt were a 3 and a 2, making 5, then treasure worth 3 points (a pearl) should be placed at the port. The ships of all four players should be assigned to their Home Ports.

FR11 Taking turns

Each player will be take a turn in order depending on which is their Home Port. The first turn will be given to the player with London as Home Port, then Genoa, then Marseilles, then Cadiz, then London and so on.
In each turn, the player should be given an appropriate choice of doing the following:

      Move their ship
      Turn their ship

Turning the ship is not a choice if there are in a port - they must move.

If they choose to move the ship, then the game should indicate all legal squares that can be moved to during that turn (all squares in the direction that they are facing, or all squares in all directions if they are in port, up to the maximum numbers of squares that the player can move, or until an Island or the edge of the board is reached), and allow the player to select the square to which to move.

If the player chooses to move to a square occupied by another player, then they must attack the other player (see FR12). As it is illegal to attack another player on the coast of Treasure Island or in a port, those squares are not legal choices for a move. If the chosen move takes the player through a square occupied by another player, and that square is not a port or on the coast of Treasure Island, then the other player is asked by the game whether they wish to attack the moving ship. If they do, then the moving player only moves to the square occupied by the other ship, and the attack sequence in FR12 is followed.

After any move not involving an attack or if the player chooses just to turn the ship, the player is asked which direction they wish to turn their ship to, and the ship is turned to their choice, unless they are in a port, where the choice is irrelevant. Illegal choices are any direction in which they cannot move at least one square on the next turn.

If at this point the player is on a square adjacent to Treasure Island, the sequence in FR13 is followed.
If at this point the player is on a square adjacent to Flat Island, the sequence in FR14 is followed.
If at this point the player is on a square representing a port, the sequence in FR15 is followed.

FR12 Attacking Rules

When a player chooses to attack another player, then the game should compare the fighting strength of the two players and announce which player is the winner.

If the loser has treasure in their ship, then the winner is awarded the treasure. If the winner cannot accommodate the treasure in their ship (a ship can take a maximum of two pieces of treasure, and they may already have some), then the extra treasure is returned to Treasure Island).

If the loser does not have treasure, but does have cards, then the two lowest value cards in the loser's hand are given to the winner, or one card if the loser only has one card.

The loser is then allowed to make a legal move up to the maximum squares that they can move, in any direction, followed by a change of direction. They must move at least one square.

The winner remains in the direction they were already moving/facing.

FR13 Treasure Island

When the end of a player's turn leaves them adjacent to the coast of Treasure Island, they are dealt the top card from the Chance card pack, and the game will do what it says. Details of what the game should do for each Chance card are given in Appendix A.

FR14 Flat Island

When the end of a player's turn leaves them adjacent to the coast of Flat Island, they are awarded any treasure there (as long as they have room in their ship: if they only have room for one extra piece of treasure, it should be the most valuable one on Flat Island). Any cards on Flat Island are added to the player's hand.

FR15 Arriving at a port

When a player arrives at their Home Port, any treasure in their ship is unloaded.

When a player arrives at another port, they can trade if the port contains any treasure or cards to trade. They should be shown the values of each of their own cards and treasure, and of the available cards and treasure in the port, and be able to select cards and treasure to trade of equivalent value on each side. When they have done this (they might choose NOT to trade at this point), the game should check that the two sets of choices have equivalent value, and make the trade. If the port is the Home port of a different player, any cards deposited at that port should be immediately added to the other player's hand (this is a change from the original rules designed to simplify how the game is played). The stock at the port, in the player's ship and in each player's hand is updated appropriately.

If certain Chance cards are implemented, it may also be possible for the player to use a Chance card from their hand at this point.

FR16 Anchor Bay

This is only an issue if Chance cards 25 and 26 (Kidd's chart) are implemented. If they are, then the game needs to recognise when Anchor Bay is reached, check if the player holds one of the relevant cards, and if so exchange it for treasure (subject to the maximum of two items of treasure in the ship).

FR17 Detection of end of game

When a player reaches their Home Port, the game should check how much treasure is in the Home Port (including any that was in the ship when the player arrived). If the player has at least 20 points of treasure at their Home Port, then they have won, and the game is finished. The game should announce that fact and give the players the choice of terminating or starting another game.

3.2   External Interface Requirements

EIR1Appearance of Interface
The user interface should use Microsoft Windows standards for the appearance of scroll bars, buttons, menus, etc where appropriate.

3.3   Performance Requirements

PR1 Response of program to user input
Any user input should be appropriately reflected on the screen within one second.

PR2 Target computer for system
All software produced should run correctly on standard PCs in the Department

3.4   Design Constraints

DC1 Use of JAVA
It is corporate policy to use Java on all major new developments, and so Java will be used for all coding on this project.

3.5   Other Requirements

The project will be developed in line with the group project QA plan, detailed in [2].

Appendix A - List of chance cards

There are a number of general considerations that repeat in the Implementation Notes. They are discussed before the details of the specific cards, and referred to in the implementation notes as C1, C2 etc.

C1 - Taking crew cards. The game assigns the specified number of crew cards from where is specified (crew card pack or another player) to the player's hand. There may not be enough crew cards available to take as many as specified. If that is the case, then the player is assigned all the cards available. Crew cards from the pack are dealt from the top. Crew cards from another player are the lowest valued cards available.

C2 - Selecting treasure or cards. A number of chance cards allow the player to select either treasure to a certain value, or a number of crew cards. The player should be allowed to select which they want. However, if there are no crew cards in the pack, or no treasure on Treasure Island, then there is no choice, and the player can be told this and assigned the other choice. Another possibility is that the exact treasure cannot be chosen or there are not enough cards. The player should be informed of this before they make their choice. If the player chooses treasure, they can only have two pieces of treasure in their ship at any time.

Card number	Text on card	Implementation Notes
1	Your ship is blown 5 leagues (5 squares) off the coast of Treasure Island. If your crew total is 3 or less, take 4 crew cards from Pirate Island. If the square you are blown to is already occupied, move one square further)	The player is moved 5 squares away from the nearest side. If they are at a corner square of the island they are moved away diagonally. After the move, they are given a choice of which direction they wish to face. C1 applies.
2	Present this card to any player who must then give you 3 crew cards. This card must be used at once then returned to the Chance card pack.	The player is given a choice of which of the other three players gives them crew cards. C1 applies.
3	You are blown to Mud Bay. If your crew total is 3 or less, take 4 crew cards from Pirate Island.	Move player's ship to nominated square. C1 applies. Allow player to select orientation of ship.
4	You are blown to Cliff Creek. If your crew total is 3 or less, take 4 crew cards from Pirate Island.	Move player's ship to nominated square. C1 applies. Allow player to select orientation of ship.
5	You are blown to your Home Port. If your crew total is 3 or less, take 4 crew cards from Pirate Island.	Move player's ship to nominated square. C1 applies. Empty ship of any treasure.
6	You are blown to the nearest port in the direction you are heading. If your crew total is 3 or less, take 4 crew cards from Pirate Island.	You would need to use the orientation of the player's ship to calculate which port. A simpler possibility would be to replace this card with "You are blown to Amsterdam…". C1 applies.
7	One treasure from your ship or 2 crew cards from your hand are lost and washed overboard to the nearest ship. If 2 ships are equidistant from yours you may ignore this instruction.	The game must calculate nearest ship from the number of non-land squares needed to reach the other ship. If two ships are equally nearest, then nothing should be done. If there is treasure in the player's ship and room for extra treasure in the other player's ship, assign least valuable treasure to the other player, otherwise take two lowest value cards from player's hand and assign them to the other player (or one card if only one card in player's hand).
8	One treasure from your ship or 2 crew cards from your hand are lost and washed overboard to Flat Island.	Take least valuable treasure if any, otherwise take two lowest value cards from player's hand and assign to Flat Island.

9	Your most valuable treasure on board or if no treasure, the best crew card from your hand is washed overboard to Flat Island.	Take most valuable treasure if any, otherwise take highest value cards from player's hand and assign to Flat Island.
10	The best crew card in your hand deserts for Pirate Island. The card must be placed there immediately.	Take highest value card from player's hand and return to crew card pack.
11	Take treasure up to 5 in total value, or 2 crew cards from Pirate Island.	C2 applies.
12	Take treasure up to 4 in total value, or 2 crew cards from Pirate Island.	C2 applies.
13	Take treasure up to 5 in total value, or 2 crew cards from Pirate Island.	C2 applies.
14	Take treasure up to 7 in total value, or 3 crew cards from Pirate Island.	C2 applies.
15	Take 2 crew cards from Pirate Island.	C1 applies
16	Take treasure up to 7 in total value and reduce your ship's crew to 10, by taking crew cards from your hand and placing them on Pirate Island.	Limit of 2 treasures applies. If crew total is greater than 10, then it should be reduced until it is less than or equal to 10 by returning cards to the pack. It should be as high as possible after this operation (i.e. if it is 11, then crew card with value 1 should be removed rather than a crew card of value 2, for example).
17	Take treasure up to 6 in total value and reduce your ship's crew to 11, by taking crew cards from your hand and placing them on Pirate Island.	Limit of 2 treasures applies. If crew total is greater than 11, then it should be reduced until it is less than or equal to 11 by returning cards to the pack. It should be as high as possible after this operation.
18	Take treasure up to 4 in total value, and if your crew total is 7 or less, take 2 crew cards from Pirate Island.	Limit of 2 treasures applies. If crew total is 7 or less, C1 applies.
19	Exchange all crew cards in your hand as far as possible for the same number of crew cards from Pirate Island.	Return all player's cards to bottom of pack, and deal same number from top of pack.
20	If the ship of another player is anchored at Treasure Island, exchange 2 of your crew cards with that player. Both turn your cards face down and take 2 cards from each others hands without looking at them. If there is no other player at Treasure Island, place 2 of your crew cards on Pirate Island.	If more than one other player is adjacent to Treasure Island, let player with Chance card choose which player to swap with. Game will then randomly select two cards from each player's hand and exchange them. If one of the players has less than two cards, then they will give the maximum number of cards that they have available. If no other player is anchored at Treasure Island, then the game will return the player's lowest two cards to the pack.
21	Long John Silver *(Keep this card)*. When you arrive at a port where there are crew for sale, you may exchange Long John for up to 5 crew in value. If you land at a Port where Long John has been left, you may take him on payment of one treasure to the Port. Once Long John has been played, he is not returned to the pack.	This card should be recorded as held by the player. When they sail to a port that is not their Home Port, then it should be offered as a trading option, but only for crew. I would simplify it by returning the card to the pack of Chance cards after use.
22	Yellow fever! An epidemic of yellow fever strikes all ships and reduces the number of crew. Every player with more than 7 crew cards in their hand must bury the surplus crew cards at once on Pirate Island. He is at liberty to choose which of his cards shall be buried there.	The number of cards in each player's hand is checked. Any players with more than 7 cards have the remainder returned to the pack. The game should select the lowest cards and return them.

23	Doubloons *(Keep this card)*. This card may be traded for crew or treasure up to value 5 in any port you visit.	This card should be recorded as held by the player. When they sail to a port that is not their Home Port, then it should be offered as a trading option, and returned to the pack of Chance cards after use.
24	Pieces of eight *(Keep this card)*. This card may be traded for crew or treasure up to value 4 in any port you visit.	This card should be recorded as held by the player. When they sail to a port that is not their Home Port, then it should be offered as a trading option, and returned to the pack of Chance cards after use.
25	Kidd's chart *(Keep this card)*. You may sail to the far side of Pirate Island, on to the square marked with an anchor. Land this chart there, and take treasure up to 7 in total value from Treasure Island.	This card should be recorded as held by the player. When they arrive at Anchor Bay, treasure from Treasure Island should be put in their ship and the card returned to the pack.
26	Kidd's chart *(Keep this card)*. You may sail to the far side of Pirate Island, on to the square marked with an anchor. Land this chart there, and take treasure up to 7 in total value from Treasure Island.	This card should be recorded as held by the player. When they arrive at Anchor Bay, treasure from Treasure Island should be put in their ship and the card returned to the pack.
27	Take treasure up to 5 in total value, or 3 crew cards from Pirate Island.	C2 applies.
28	Take 2 crew cards from Pirate Island.	C1 applies.

References

[1] http://www.brikkerogbrett.com/games/pirat.shtml *[Sadly, link is no longer active]*. The most useful active link to Buccaneer info is : http://www.g8lof.co.uk/buccaneer.html.

[2] Software engineering group projects - quality assurance plan. Technical Report SE.QA.01, Aberystwyth University, 2016.

DOCUMENT HISTORY

Version	*CCF No.*	*Date*	*Changes made to document*	*Changed by*
1.0	N/A	20/12/16	N/A - original version	CJP
1.1	N/A	02/02/17	Scott Jones pointed out part of EIR3.5 missing	CJP
1.2	N/A	08/02/17	Matt Forsey pointed out some coordinates are wrong in FR9, and I also updated FR6 to make it explicit that fighting strength is not displayed.	CJP