Requirements document

**System Requirements**

**Section 3 & 4 : The rules of property Tycoon and other**

Functional requirements

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| Requirement | Rational | Source Quote |
| The game shall have a minimum of two players. |  |  |
| The game shall have a maximum of six players. |  |  |
| The game shall require each player to have a token representation in game. |  |  |
| The game shall allow the player to choose their token or have it randomly assigned. |  |  |
| The game shall have the following tokens: boot, smartphone, goblet, hat stand, cat, spoon. |  |  |
| The game shall have an infinite amount of money available to the bank. |  |  |
| The game shall not allow the players to borrow money from the bank. |  |  |
| The game shall allow the players to sell properties to the bank. |  |  |
| The game shall shuffle the two packs of cards at the start of the game. |  |  |
| The game shall put used cards onto the bottom of the appropriate deck. |  |  |
| The game shall have the turn player roll two dice on their turn to show the distance they will move. |  |  |
| The game shall move the player clockwise a number of squares equal to their dice roll. |  |  |
| The game shall give the player an additional turn if they roll a double on their turn. |  |  |
| The game shall send a player to jail if they roll three consecutive doubles. |  |  |
| The game shall be able to send a player to jail: the player's token is moved to the "in jail" square and does not pass go. |  |  |
| |  | | --- | | The game board shall consist of spaces which can be: properties, pot luck, opportunity knocks, | |  |   free parking, jail/just visiting, instructions. |  |  |
| The game shall present the player with the top card of the pot luck or opportunity knocks deck when the player  lands on the space associated with it and then carries out the action listed on the card. |  |  |
| The game shall carry out the instructions listed on an instruction space when the player lands on it. |  |  |
| The game shall ensure that no player may purchase a property until they have completed a complete circuit of the board. |  |  |
| The game shall ensure that when a player passes the 'Go' space, they receive £200 from the bank. |  |  |
| The game shall ensure that no player owns any of the properties at the start of the game. |  |  |
| The game shall transfer money from a player to the bank when they purchase an un-owned property and that property is transferred from the bank to the player. |  |  |
| The game shall ensure that if a player lands on a space that contains a property they have not yet purchased, they have the ability to by that property. |  |  |
| The game shall auction a property if it is not yet purchased and the player who landed on the corresponding space did not buy that property. |  |  |
| When a property is auctioned, each player has the ability to make a bid. |  |  |
| The bank must sell an auctioned property to the highest bidder. |  |  |
| The game shall leave auctioned properties unsold if there are no bidders. |  |  |
| The game shall transfer money from a player |  |  |
| The game shall run on both Windows and Mac, if not possible, Windows as priority. |  | The electronic version should be for desktop machines, and ideally should be playable on both Mac and PCs. If this is difficult, then PC development should be preferred. |
| The game shall double rent on properties if the owner owns that whole colour group. |  |  |
| The game shall charge rent when a player lands on a property according to the card when property is improved with houses/hotels |  |  |
| The game shall make players sell game assets to pay rent if they are unable to pay. If the rent total is still not reached, they are bankrupt and removed from the board. |  |  |
| The game shall not allow money borrowing/lending between players, and between a player and the bank |  |  |
| The game shall only allow improving properties when a player have finished moving their token, and completed any property purchase. |  |  |
| The game shall only allow house/hotel purchases on a property where the player owns the whole colour group |  |  |
| The game shall allow a player to sell property back to the bank if they need to raise funds. But, houses/hotels on the property must be sold back first. |  |  |
| The game shall only allow purchases of houses as long as there is not a difference more than 1 house between all the properties in the set. |  |  |
| The game shall allow the purchase of a hotel for 5x the price of one house. |  |  |
| The game shall allow to have at max, 4 houses on one set. and a hotel on another in that set. |  |  |
| The game shall only allow one hotel on any given property. |  |  |
| The game shall allow the raising of funds for a player by mortgaging their properties, the bank provides half of the original cost. |  |  |
| The game shall not allow any rent to be collected while a property is under mortgage. |  |  |
| The game shall allow the player to sell a mortgaged property to the bank, sold for half the original property price shown on the card. |  |  |
| The game shall put any fines paid into the free parking space in the centre of the board. |  |  |
| The game shall reward a given player with all money in free parking when they land on it. |  |  |
| The game shall allow a player to exit jail by paying £50. This £50 is added to free parking. |  |  |
| The game shall move a player who has exitted jail to the 'just visiting' space and the player turn ends. |  |  |
| The game shall allow a player to stay in jail, giving up their turn for the next 2 rounds. |  |  |
| The game shall not allow rent to be collected while a player is in jail. |  |  |
| The game shall move the player to 'just visiting' if they opt to stay in jail and the two rounds have passed. |  |  |
| The game shall allow the player to exit jail and move to 'just visiting' if they have a 'get out of jail free' card. The player turn ends, and the card is then placed at the bottom of the appropriate pile. |  |  |
| The game shall allow a player exiting jail to take their turn as normal the next round. |  |  |
| The game shall begin with each player having £1,500. |  | At the outset of the game, each player has £1,500 in cash. |
| The game's turn order shall play clockwise. |  |  |

Non-Functional requirements

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| The game shall be 'fun to play', and a 'colourful and intuitive' UI, reflecting that of the original game. |  | The game should be fun to play and have a colourful and intuitive interface that reflects the spirit and character of the original board game. |

**Section 5: Core elements of the software system**

Functional Requirements

*Requirement Rational Source Quote*

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| The software shall be able to have one or more players in the game controlled by the autonomous agent. | This will enhance the gaming experience. | “An agent that can take the role of 1 or more of the players.” |
| The software shall be able to have all players controlled by the autonomous agent. | This will provide a means of testing our software. | “However, it also provides the possibility for fully autonomous play when all of the players are provided by the program.” |
| The software shall be able to import initial data for the pot luck and opportunity knocks cards. | This allows the game to be more customizable. | “.....a means of initialising it with data on the board layout, the “pot luck” and “opportunity knocks” cards and the details about the various properties (the data that is currently on the cards in the physical version of the game.” |
| The software shall be able to import initial data for properties. | This allows the game to be more customizable. | “As this data will be loaded on start-up from external files….” |
| The software shall be able to display current worth of each player at any time. | A vital component of the game. | “…..current worth of each of the players and the property assets that they own. This should be available for all to see as it is the current board game version.” |

Non - Functional Requirements

*Requirement Rational Source Quote*

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| The software should be able to run at high speed when all players are autonomous. | Ensures the game is enjoyable. | “Such simulations could be performed at high speed.” |
| The software shall be easily customised. | Will give users more freedom to enhance the gaming experience. | “….this means that the game is easily customised….” |

**Section 6: The game player agent**

Functional Requirements

*Requirement Rational Source Quote*

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| The autonomous agent shall be capable of making any choices that the user is able to make. | The purpose of the agent is to be an effective substitute for an actual player. | “The game player agent should be able to play the game to the same extent that a human player would.” |
| The autonomous agent shall not be able to stop playing before it is bankrupt. | Has the potential of ruining the game. | “A game player agent may not opt to retire from the game.” |

**Section 7: Integrity of the game**

Functional Requirements

*Requirement Rational Source Quote*

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| The software shall ensure that the bank has an infinite amount of money. | The bank must always be able to operate otherwise the game would end early. | “The bank is always able to pay the players. In the board game version, the bank can issue IOUs or generate new notes to ensure that game play can continue.” |
| Players shall not be able borrow or lend money to each other. | Could decrease the competitiveness of the game. | “Player may not borrow or lend money to one another.” |
| The software shall ensure that properties are never allocated to a player if their assets aren't decremented accordingly. | A vital component of the game. | “All assets procured from the bank must be paid for in cash. The bank does not provide credit.” |
| The software shall ensure that the probability of the dice producing a number between 1 and 6 is the same. | A vital component of the game. | “The dice used in the game must be fair with each dice have an equal probability of landing on one of its six sides.” |

Non - Functional Requirements

*Requirement Rational Source Quote*

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| The software shall ensure that the user interface displays all information about properties owned by a player or available. | Allows players to track their progress relative to other players and plan their next move. | “The range of properties available for sale by the bank, and owned by players, is a matter of public record and that information must be available to all players at all times.” |

**Section 8:**

Non - Functional Requirements

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| The software should be organised to ensure that the NetBeans file hierarchies are preserved. |  | “The range of properties available for sale by the bank, and owned by players, is a matter of public record and that information must be available to all players at all times.” |

Testing Strategy

We will perform both unit testing and systems level testing, according to the following:

1. Unit testing – we will test methods against the requirements document and reasonable input parameters, to ensure that all requirements have been met

2. Systems testing – we’ll test the system as a whole against the user requirements, to ensure all required functionality of the system is provided. This will be done by using a known input (provided by the user) and running our system for …………………. rounds, ………….. .