Requirements

*This section will be split by requirements of the Ivanhoe game and requirements of the implementation.*

Section 1. Implementation Requirements

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| **Code** | **Description** | **Motivation** |
| **IR-01** | The game must be networked | *Project Spec.* |
| **IR-02** | The game must have a GUI | *Project Spec.* |
| **IR-03** | The game must support 2-5 players | *Project Spec.* |
| **IR-04** | A player can chat | Given that the game is networked, communication needs to be readily available |
| **IR-05** | A player can change their name | Enhancement |
| **IR-06** | A player can translate chat from the console | Enhancement |
| **IR-07** | Connected players can play another game | *Project Spec.* |
| **IR-08** | A player can filter profanity | Enhancement |

Section 2. ‘Ivanhoe’ Rules Requirements

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| **Code** | **Description** |
| **FR-01** | A player draws seven cards at the start of a game, and one each turn |
| **FR-02** | A player can start a tournament |
| **FR-03** | A player can play display cards |
| **FR-04** | A player can play action cards |
| **FR-05** | A player can withdraw from a tournament |
| **FR-06** | The last player in a tournament wins the tournament |
| **FR-07** | Only one tournament can occur at a time |
| **FR-08** | When a new tournament starts, all player are considered participating |
| **FR-09** | A player unable to match a tournament’s score is eliminated |
| **FR-10** | Winners of tournament are given a token of that color, or of their choice if the tournament was purple |
| **FR-11** | The winner of a tournament always plays the next turn |
| **FR-12** | A player who withdraws from a tournament with a maiden is his or her display, he or she must discard a token |
| **FR-13** | During a green tournament, all cards in displays have value 1 |
| **FR-14** | A stunned player may only play 1 card each turn |
| **FR-15** | A shielded player’s display is unaffected by his or her opponent’s actions |
| **FR-16** | Two purple tournaments cannot start in a row |
| **FR-17** | A player can use the Ivanhoe card during another player’s turn to cancel an action |
| **FR-18** | A player cannot player non-Ivanhoe cards during an opponent’s turn |
| **FR-19** | A player wins the game if there are 2-3 players and he or she has 5 tokens of different colours |
| **FR-20** | A player wins the game if there 4-5 players and he or she has 4 tokens of different colours |

Use Cases

Section 1. Use Cases

*Contents*

* UC-01 – Player connects to the server lobby
* UC-02 – Player enters the game
* UC-03 – Player plays turn
* UC-04 – Player starts a tournament
* UC-05 – Player plays an action card
* UC-06 – Player plays a display card
* UC-07 – Player wins a tournament
* UC-08 – Player loses a tournament
* UC-09 – Player wins the game
* UC-10 – Player chats to players and server
* UC-11 – Player changes their name
* UC-12 – Player translates their console chat
* UC-13 – Player filters profanity from the chat
* UC-14 – Server begins a connection
* UC-15 – Server shuts down the connection
* UC-16 – Client begins a connection
* UC-17 – Client shuts down the connection

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| UC-01 | Player connects to the server lobby | Traceability |
| Description | The beginning of the initial flow into the game |  |
| Actors | Player, Client, Server |  |
| Triggering Event | * Player presses the connect button |  |
| Pre-Condition | A server exists at the given network location | IR-01 |
| Main Sequence | 1. (GUI) Player configures their settings (name, net location, colour) and presses connect    1. Client seeks to connect at the given location    2. If successful, the Server accepts the connection and stores a new player object 2. (CONSOLE) Player uses the prompts to enter a game at a inputted network location 3. (GUI) Player is presented with the lobby view    1. Client configures the view and opens a chat channel 4. Player may chat and toggle their ready status    1. Server and Client relays chat and sets the ready Boolean for the player based on selection | IR-04 |
| Post-Condition | The player may be ready |  |
| Resulting Event | The player is in the lobby, and can prepare to start the game and chat |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions | Player can fail to connect to the server. If so, they are notified and given a chance to change their settings |  |
| Related |  |  |

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| UC-02 | Players enter the game | Traceability |
| Description | 2-5 players begin a game of Ivanhoe |  |
| Actors | Player, Server, Client |  |
| Triggering Event | A player (the last waiting player) presses the ready button |  |
| Pre-Condition | * 2-5 players are ready and in the lobby * There are no players in the lobby who are not ready | IR-03 |
| Main Sequence | 1. Players enter into the game    1. (GUI) the client’s view changes from lobby to game    2. Server flags those players as in-game    3. Server preps the first turn, and initial game setup       1. Server gives 7 cards to each player.       2. Server determines randomly the starting player       3. Server generates and shuffles the deck    4. Server relays starting information to the player | FR-01 |
| Post-Condition | A player’s turn has started and players have been given cards |  |
| Resulting Event | 2-5 players are in the game, and are ready to play Ivanhoe |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions |  |  |
| Related |  |  |

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| UC-03 | Player plays a turn | Traceability |
| Description | The steps for a single turn of one player |  |
| Actors | Player(s), Client, Server |  |
| Triggering Event | * Game starts * A player ends their turn (could be this player) |  |
| Pre-Condition | The player is in the tournament if one exists |  |
| Main Sequence | 1. Server gives player a card, resets the number of cards that player has played this turn 2. Player chooses to play any number of valid cards    1. Server and client determine the validity of these cards    2. Server calculates new high scores 3. Player either withdraws or ends turn    1. (GUI) Client determines which option, depending if that player has the high score | FR-01  FR-02  FR-03  FR-04  FR-05 |
| Post-Condition | The player has ended their turn and a new turn begins |  |
| Resulting Event | The player is eliminated from the tournament if they didn’t set a new highscore |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions | Player has not disconnected from the server |  |
| Related | UC-04, UC-05, UC-06, UC-07, UC-08 |  |

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| UC-04 | Player starts a tournament | Traceability |
| Description | A player chooses the tournament color and begins playing cards |  |
| Actors | Player(s), Client, Server |  |
| Triggering Event | * (CONSOLE) Player sends a start tournament command with a card argument * (GUI) Player clicks on the card they want to start a tournament with |  |
| Pre-Condition | No tournament is running | FR-07 |
| Main Sequence | 1. Player selects the card they want to start the tournament with    1. If the card is a supporter, the player must       1. (GUI) Click on the color from the dropdown menu to select a tournament color       2. (CONSOLE) Send an argument with their command to specify the color    2. The client sends that command to the server 2. (GUI) the client’s view changes to reflect the tournament starting 3. The player now has priority to play cards provided they are now valid with the tournament they started | FR-02  FR-03 |
| Post-Condition | All players are in the tournament | FR-08 |
| Resulting Event | A tournament of a certain colour has been started and all player have been added to it | FR-08 |
| Alternative Scenarios |  |  |
| NFR/Exceptions | A purple tournament cannot occur after another purple tournament | FR-16 |
| Related | UC-05 |  |

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| UC-05 | Player plays an Action card | Traceability |
| Description | Player plays an action card to affect the game |  |
| Actors | Player(s), Client, Server |  |
| Triggering Event | * (CONSOLE) Player sends a play command with a name and targeting arguments * (GUI) Player clicks on the card they want play |  |
| Pre-Condition | * If the card is not the ‘Ivanhoe’ card, it must be that player’s turn * The player must be participating in the tournament | FR-17  FR-18 |
| Main Sequence | 1. Player selects the card they want to play    1. (GUI) by clicking on it    2. (CONSOLE) by typing the play command with targeting arguments 2. (GUI) If the card needs targets the player is shown a menu with options.    1. The Client evaluates validity of turn and tournament    2. The Client sends the command to the server    3. The Server evaluates validity of turn and tournament    4. The Server evaluates validity of the supplied targets 3. If the card is a non-Ivanhoe action card, the Server stores the card for a 2 second delay    1. (GUI) The server notifies the client to display a timer    2. During this time, another player may ‘Ivanhoe’ this action 4. After 2 seconds have passed    1. The Server executes the card on its game state    2. The Server does not modify the displays or hands of shielded players    3. The Server sends an updated game state to its clients 5. (GUI) the client’s view changes to reflect the played card 6. The player now has priority to play cards | FR-04  FR-15 |
| Post-Condition |  |  |
| Resulting Event | A card was played and the displays or hands of players may have changed |  |
| Alternative Scenarios | * The player’s card was cancelled via another player’s Ivanhoe | FR-17 |
| NFR/Exceptions | * The player is unable to play the card on another player’s turn * (CONSOLE) The player supplied inadequate targeting parameters for a card that required one | FR-18 |
| Related |  |  |
| UC-06 | Player plays a Display card | Traceability |
| Description | Player adds card to his or her display |  |
| Actors | Player(s), Client, Server |  |
| Triggering Event | * (CONSOLE) Player sends a play command with a name and targeting arguments * (GUI) Player clicks on the card they want play |  |
| Pre-Condition | * It is the player’s turn * The player must be participating in the tournament * Either the player is STUNNED and they have not played a card yet, or the player is not STUNNED | FR-17  FR-18  FR-14 |
| Main Sequence | 1. Player selects the card they want to play    1. (GUI) by clicking on it    2. (CONSOLE) by typing the play command with card name arguments    3. The Client evaluates validity of turn and tournament    4. The Client sends the command to the server    5. The Server evaluates validity of turn and tournament 2. Given that the play is valid    1. The Server adds the display card to the total    2. The Server updates high scores    3. If the tournament is green the scores are added differently (see rules) 3. (GUI) the client’s display is redrawn to reflect the change 4. The player now has priority to play cards | FR-04  FR-13 |
| Post-Condition |  |  |
| Resulting Event | A card was played and the displays or hands of players may have changed |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions | * The player is unable to play the card on another player’s turn * The player selected a card from a different color | FR-18 |
| Related |  |  |

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| UC-07 | Player wins a tournament | Traceability |
| Description | The scenario where a player wins a tournament |  |
| Actors | Player(s), Client, Server |  |
| Triggering Event | Another player leaves the tournament, or at the beginning of each end of turn |  |
| Pre-Condition | The winner is the last participating member of a tournament |  |
| Main Sequence | 1. Player is participating in the tournament, and has any number of cards in his or her display 2. Another player withdraws or is eliminated from the tournament    1. Server checks if there is only one player left in the tournament       1. If so, the Server declares the last player the winner       2. The Server clears all display cards       3. The Server notifies the Client to prompt the user for a token if the tournament was purple.       4. The Server gives the winner a token of their choice (purple tournament) or a token matching the colour of the tournament | FR-05  FR-09  FR-10 |
| Post-Condition | The system checks the number of tokens on the winner |  |
| Resulting Event | Player gets a token and the tournament ends. The winner starts a new turn | FR-11 |
| Alternative Scenarios | The player is the only member left connected to the server, in which case they win tournaments at the end of their turn |  |
| NFR/Exceptions |  |  |
| Related | UC-06, UC-05, UC-08 |  |

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| UC-08 | Player loses a tournament | Traceability |
| Description | The steps for when a player is unable to compete for the tournament |  |
| Actors | Player(s), Client, Server |  |
| Triggering Event | Player sends a withdraw or end turn command from the console or GUI |  |
| Pre-Condition | A player does not have the highscore for the game, and is participating in the tournament | FR-09 |
| Main Sequence | 1. Player is participating in the tournament, and has any number of cards in his or her display 2. It becomes that player’s turn    1. (The system will allow this if the last player has the high score) 3. The player is unable (withdraw), or chooses not to (end turn) play cards to match the last turn’s highscore    1. (GUI) the Client chooses which command is sent 4. The player’s is no longer in the current tournament    1. The Server removes the cards in that player’s display    2. The Server removes that player from the tournament participants    3. If that player had a maiden card in his or her display       1. The Server prompts the player to discard a token       2. The Server removes the selected token | FR-09  FR-05  FR-12 |
| Post-Condition | The player is no longer in the tournament |  |
| Resulting Event | If there is only one player left in the tournament, they win the tournament | FR-06 |
| Alternative Scenarios |  |  |
| NFR/Exceptions | Player plays enough cards in order to raise their high score and remain in the tournament |  |
| Related | UC-06, UC-07 |  |

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| UC-09 | Player wins the game | Traceability |
| Description | The final case before a new game starts, a player has completed the win game requirement |  |
| Actors | Player(s), Client, Server |  |
| Triggering Event | A tournament ends |  |
| Pre-Condition | A player receives the last token for a winning requirement (see rules) | FR-19  FR-20 |
| Main Sequence | 1. A tournament ends and the player is declares the winner 2. The player receives a token    1. The server checks if this would satisfy end game conditions, if true    2. The server executes an end game procedure       1. The server destroys the game state       2. The server removes players from the in-game state 3. (GUI) The players are presented with an end game screen which shows the tokens that player received and their name 4. (GUI) A player may press a button to return to the lobby 5. (CONSOLE) The players are shown a message indicating the end of game and those players are added to a new lobby | FR-10 |
| Post-Condition | There is no game and only waiting players |  |
| Resulting Event | The game has finished, and players are ready to start a new one | IR-07 |
| Alternative Scenarios |  |  |
| NFR/Exceptions |  |  |
| Related | UC-07 |  |

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| UC-10 | Player chats to players and server | Traceability |
| Description | Players can use the console to send and receive messages to the server and the other players |  |
| Actors | Player(s), Client, Server |  |
| Triggering Event |  |  |
| Pre-Condition | A player is connected to the server and in the lobby or game view |  |
| Main Sequence | 1. Player types a message into the console box and presses enter    1. Client sends this message to the server    2. (CONSOLE), the Server checks if the message is a command.       1. If the message is a command, the server evaluates it.       2. Else, the Server broadcasts this message to the every player 2. Player receives a message from another player or the server    1. Client waits for a message from another entity    2. Client prints a received message to the console.    3. (GUI), the message is displayed in a colour corresponding to its type (INFO, CHAT, ERROR) | IR-04 |
| Post-Condition |  |  |
| Resulting Event | The console contains one or messages |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions | Player must be connected to the server |  |
| Related |  |  |

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| UC-11 | Player changes name | Traceability |
| Description | Players can change their in game username |  |
| Actors | Player, Client, Server |  |
| Triggering Event | Player presses a button or executes a command |  |
| Pre-Condition | A player is in the game view, or operating out of GUI mode |  |
| Main Sequence | 1. (GUI) Player presses the ‘Change Name’ button 2. (CONSOLE) Player executes a set name command    1. Client prompts the player for a new name and send this to the server    2. Server changes the name if no other player has that name | IR-05 |
| Post-Condition | The player’s name was changed |  |
| Resulting Event | Each player sees an updated name for that player |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions | Player cancels the operation if they are in GUI mode |  |
| Related |  |  |

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| UC-12 | Player translates their console chat name | Traceability |
| Description | Players can change the chat language |  |
| Actors | Player, Client |  |
| Triggering Event | Player presses a button or executes a command |  |
| Pre-Condition | A player is in the game view, or operating out of GUI mode |  |
| Main Sequence | 1. (GUI) Player presses the ‘Translate’ button    1. Player is prompted for a new language 2. (CONSOLE) Player executes a translate command    1. Client prompts the player for a language | IR-06 |
| Post-Condition |  |  |
| Resulting Event | The player sees certain words translates through chat |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions | Player cancels the operation if they are in GUI mode |  |
| Related |  |  |

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| UC-13 | Player filters profanity in the chat | Traceability |
| Description | Players can replace bad language in the chat with stars |  |
| Actors | Player, Client |  |
| Triggering Event | Player presses a button or executes a command |  |
| Pre-Condition | A player is in the game view, or operating out of GUI mode |  |
| Main Sequence | 1. (GUI) Player toggles the ‘Censor’ button 2. (CONSOLE) Player executes a censor command    1. Client begins to censor predetermined language and replaces it with stars | IR-08 |
| Post-Condition |  |  |
| Resulting Event | The player has filtered profanity from the chat |  |
| Alternative Scenarios | The player disables this filter via repeating this command |  |
| NFR/Exceptions |  |  |
| Related |  |  |

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| UC-14 | Server begins a connection | Traceability |
| Description | A server for the game can be started |  |
| Actors | Server |  |
| Pre-Condition | No server is running on the machine |  |
| Main Sequence | 1. The server operator executes the server program | IR-01 |
| Post-Condition |  |  |
| Resulting Event | The server is ready to receive clients |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions | The server machine has no network connection |  |

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| UC-15 | Server shuts down the connection | Traceability |
| Description | Server can abort the game and disconnect its clients |  |
| Actors | Server |  |
| Triggering Event |  |  |
| Pre-Condition | The server is running |  |
| Main Sequence | 1. The server operator issues a shutdown command | IR-01 |
| Post-Condition | No server is running |  |
| Resulting Event | Each client receives a network error |  |
| Alternative Scenarios | The server malfunctions, or loses network connection |  |

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| UC-16 | Client begins a connection | Traceability |
| Description | A client can be started on a machine |  |
| Actors | Client, Player |  |
| Main Sequence | 1. A player starts the client program | IR-01 |
| Post-Condition |  |  |
| Resulting Event | The client is put into the lobby |  |
| Alternative Scenarios |  |  |
| NFR/Exceptions | The client machine has no network connection |  |

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| UC-15 | Client shuts down the connection | Traceability |
| Description | Client can exit the game via shutdown |  |
| Actors | Client, Player |  |
| Triggering Event |  |  |
| Pre-Condition | The client is running |  |
| Main Sequence | 1. The player issues a shutdown command | IR-01 |
| Post-Condition |  |  |
| Resulting Event | The server is aware of the disconnect, notifies players, and attempts to continue the game is one is in progress |  |
| Alternative Scenarios | The client malfunctions, or loses network connection |  |

Section 2. Use Case Diagram

The following diagram captures the standard operation of Ivanhoe.

