Requirements

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

Section 1. Implementation Requirements

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

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

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
	  a. Client seeks to connect at the given location
	  b. 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
	  a. Client configures the view and opens a chat channel
	4. Player may chat and toggle their ready status
	  a. 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		

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
	    a. (GUI) the client's view changes from lobby to game
	    b. Server flags those players as in-game
	    c. Server preps the first turn, and initial game setup
	        i. Server gives 7 cards to each player.
	        ii. Server determines randomly the starting player
	        iii. Server generates and shuffles the deck
	    d. 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		

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
	    a. Server and client determine the validity of these cards
	    b. Server calculates new high scores
	3. Player either withdraws or ends turn
	    a. (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	

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
	   a. If the card is a supporter, the player must
	      i. (GUI) Click on the color from the dropdown menu to select a tournament color
	      ii. (CONSOLE) Send an argument with their command to specify the color
	   b. 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	

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
	   a. (GUI) by clicking on it
	   b. (CONSOLE) by typing the play command with targeting arguments
	2. (GUI) If the card needs targets the player is shown a menu with options.
	   a. The Client evaluates validity of turn and tournament
	   b. The Client sends the command to the server
	   c. The Server evaluates validity of turn and tournament
	   d. 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
	   a. (GUI) The server notifies the client to display a timer
	   b. During this time, another player may 'Ivanhoe' this action
	4. After 2 seconds have passed
	   a. The Server executes the card on its game state
	   b. The Server does not modify the displays or hands of shielded players
	   c. 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	7. Player selects the card they want to play
	   a. (GUI) by clicking on it
	   b. (CONSOLE) by typing the play command with card name arguments
	   c. The Client evaluates validity of turn and tournament
	   d. The Client sends the command to the server
	   e. The Server evaluates validity of turn and tournament
	8. Given that the play is valid
	   a. The Server adds the display card to the total
	   b. The Server updates high scores
	   c. If the tournament is green the scores are added differently (see rules)
	9. (GUI) the client's display is redrawn to reflect the change
	10. 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		

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
	    a. Server checks if there is only one player left in the tournament
	        i. If so, the Server declares the last player the winner
	        ii. The Server clears all display cards
	        iii. The Server notifies the Client to prompt the user for a token if the tournament was purple.
	        iv. 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	

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
	   a. (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
	   a. (GUI) the Client chooses which command is sent
	4. The player's is no longer in the current tournament
	   a. The Server removes the cards in that player's display
	   b. The Server removes that player from the tournament participants
	   c. If that player had a maiden card in his or her display
	      i. The Server prompts the player to discard a token
	      ii. 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	

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
	    a. The server checks if this would satisfy end game conditions, if true
	    b. The server executes an end game procedure
	        i. The server destroys the game state
	        ii. 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	

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
	    a. Client sends this message to the server
	    b. (CONSOLE), the Server checks if the message is a command.
	        i. If the message is a command, the server evaluates it.
	        ii. Else, the Server broadcasts this message to the every player
	2. Player receives a message from another player or the server
	    a. Client waits for a message from another entity
	    b. Client prints a received message to the console.
	    c. (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		

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
	    a. Client prompts the player for a new name and send this to the server
	    b. 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		

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
	    a. Player is prompted for a new language
	2. (CONSOLE) Player executes a translate command
	    a. Client prompts the player for a language and send this choice to the server
		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		

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 a. 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		

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	

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	

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	

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.