CS 250 Final Project - GoFish Specification

Van Tran / vct

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Introduction

This is the Z specification for the card game, GoFish. However, be aware that this is not the conventional version of the game. There will be minor modifications to the game that will be mentioned throughout this specification.

Rules

1. Game has two players
2. General deck of 52 cards
3. Game starts with each player dealt 7 cards from the shuffled deck. The rest are stockpiled for drawing.
4. The person who didn't deal the cards gets the first turn.
5. During a player's turn (also known as fishing). The player asks the opposing player if they have a certain card (suit doesn't matter). The player fishing must have at least one card in the rank of the card request.
6. The opposing player will then hand over the card that matches the request. However, if the defending player does not have the card, they will say 'GoFish', and the fishing player will draw a card from the stockpile deck. If the deck is empty, there is no drawing phase.
7. At any time that any of the players obtain two of the same cards, either during the drawing (go fishing), dealing, or successful request, the pair of cards can be removed from the hand. 8. Once either of the scenarios has passed, the roles will be swapped, and the defender will become the fisher and the fisher is now the defender.
9. The turns will continue until a player no longer has any cards left in their hand.

There are two players in this game. At any given time, there is a defender and a fisher. Player 1 will always begin as the fisher.

$$PLAYERS ::= p1 \mid p2$$

Of course, we must have cards to play the game. Numbers 1, 11, 12, and 13 represents, Ace, Jack, Queen, and King respectively.

$$CARD == 1 \,..\, 13$$

Every game has a deck of 52 cards. There are 4 duplicates of each of the 13 different cards.

Deck

$$deck : \text{seq}\, CARD$$
$$card\_count : \mathbb{N}$$
$$card\_count \leq 52$$

Each player has an identity (player 1 or player 2) to differentiate between. Each player has a hand of cards, with no more than 13 cards because 14 would mean you have a match.

Player

$$identity : PLAYERS$$
$$hand : \mathbb{P}\, CARD$$
$$card\_count : \mathbb{N}$$

$$card\_count \leq 13$$

Cards will have to be drawn from the deck throughout the game. Cannot draw anymore cards when the deck no longer has cards.

Draw_Card

$$\Delta Player$$
$$\Delta Deck$$

$$card\_count \neq 0$$

$$MATCH ::= same \mid different$$

$$match : CARD \times CARD \rightarrow MATCH$$

$$\forall\, card1, card2 : CARD \bullet$$
$$(card1 = card2 \land match(card1, card2) = same) \lor$$
$$(card1 \neq card2 \land match(card1, card2) = different)$$

Match

$$\Delta Player$$
$$card1?, card2? : CARD$$

$$\forall\, i : \mathbb{N} \bullet \quad (card1? = i) \Leftrightarrow (card2? = i) \land \quad hand' = hand \setminus \{i\}$$
$$card\_count' = card\_count - 2$$

Player_Turn

$$fisher, defender : Player$$

$$fisher.identity \neq defender.identity$$

Victory

$$\Xi Player$$

$$card\_count = 0$$

There is a deck of cards 52 cards