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Hydra Project Demo

Running the Executable

This is the walkthrough of the Hydra project, simulating the card game Hydra using C++ code and the Command Line Interface.

This program has the executable called hydra. To run the executable hydra, make sure you are in the same location as the executable, and use the ./hydra command to start playing the regular game (Figure 1). If you want to go into testing mode, run the command ./hydra -testing instead (Figure 2). During the game, to quit, you can always use the key combination Ctrl + D when the user asks input.

```
k7do@ubuntu2004-008:~/cs246/s21/projects/hydra/submission$ ./hydra
```

Figure 1. Run this command to start a regular game

```
k7do@ubuntu2004-008:~/cs246/s21/projects/hydra/submission$ ./hydra -testing
```

Figure 2. Run this command to start a game in Testing Mode

Regular Game

After starting the game, the program will output the following command, instructive about what to do:

```
You just started a game of Hydra.
How many players do you want in the game? There must be more than 1 player for the game to run.
```

Figure 3. Output after starting the game

The player will then be needed to insert an input. If the user input something that is invalid such as a string, the program will output “Invalid Input. Please try again.”:

```
You just started a game of Hydra.
How many players do you want in the game? There must be more than 1 player for the game to run.
lkjfgs
Invalid Input. Please try again.
How many players do you want in the game? There must be more than 1 player for the game to run.
-1
Invalid Input. Please try again.
```

Figure 4. Output when the inputs are invalid (a string and a number less than 2)

If the input is a number bigger than 1 (in this case, 2), the output will start to print out the randomly generated head (taken from player 1's draw pile), alongside the players and their information, like in Figure 5:

```
You just started a game of Hydra.
How many players do you want in the game? There must be more than 1 player for the game to run.
2

Heads:
1: 6S (1)

Players:
Player 1: 53 (53 draw, 0 discard)
Player 2: 54 (54 draw, 0 discard)

Heads:
1: 6S (1)

Players:
Player 1: 53 (53 draw, 0 discard)
Player 2: 54 (54 draw, 0 discard)

Player 2, it is your turn.


Heads:
1: 6S (1)

Players:
Player 1: 53 (53 draw, 0 discard)
Player 2: 53 (53 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve

Player 2, you are holding a 3H. Your move?
```

Figure 5. After the inputting 2 into the number of players, the Heads are printed out and the information about the Players are printed out

After printing the correct necessary information, the program will ask the user for an input. This input must be bigger than -1 and smaller or equal to the maximum number of heads. The current card of the user is printed on the last line, in this case, we can see that Player 2 is currently holding a 3 of Hearts.

```
Player 2, you are holding a 3H. Your move?
1

Heads:
1: 3H (2)

Players:
Player 1: 53 (53 draw, 0 discard)
Player 2: 53 (53 draw, 0 discard)

Player 1, it is your turn.


Heads:
1: 3H (2)

Players:
Player 1: 52 (52 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve
Player 2: 53 (53 draw, 0 discard)

Player 1, you are holding a QD. Your move?
```

Figure 6. Player 2 plays the card 3H onto 6S, and 6S is replaced with 3H. This will then end Player 2's turn as there are only 1 head

Since the card on top of the first head 6 of Spades is bigger than the only card in Player 2's hand (3 of Hearts), we can play 3H on top of the 6S by typing the head index of it, in this case, 1. It will then produce the show below outputs:

As you can see, the card 3 of Hearts have replaced the 6 of Spades on the head, and the card count of head have increased from 1 to 2. As there are only 1 head before this turn, Player 2 just has the only turn, and the next turn will be Player 1's turn.

As Player 1 is currently holding a Queen of Diamonds, and there is only 1 head (with 3 of Hearts on top), which is smaller than Queen of Diamonds. So, we cannot put QD on top of 3H. Now, we can try to reserve this card. However, as we could see, there is only a single head, therefore if we tried to type in 0 – to reserve the card 9H, it will not work, as show below in Figure 7:

```
Heads:
1: 3H (2)

Players:
Player 1: 52 (52 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve
Player 2: 53 (53 draw, 0 discard)

Player 1, you are holding a QD. Your move?
0
Your move is invalid, please play another move

Player 1, you are holding a QD. Your move?
```

Figure 7. As there are only 1 head, Player 1 cannot reserve, and the program notify that the input is not valid and ask for the output again.

The program will output, saying your move is invalid, and urge the user to play another move. Since we cannot play it on top of the 3H head and we cannot reserve it, therefore the only last move left is to cutoff head. We will do this by typing in 1, and since the program recognize that QD is bigger than 3H, it will automatically cut off the head with the card 3H on top, take the 2 cards from the oldest head (6S and 3H), and insert them into Player 1's discard pile. The card QD will go into Player 1's discard as well (as seen in the picture below). 2 cards will be drawn from player 1's draw pile and into the Heads. The 2 randomly generated heads are shown below:

```
Heads:
2: QD (1)
3: 8D (1)

Players:
Player 1: 54 (51 draw, 3 discard)
Player 2: 53 (53 draw, 0 discard)

Player 2, it is your turn.


Heads:
2: QD (1)
3: 8D (1)

Players:
Player 1: 54 (51 draw, 3 discard)
Player 2: 52 (52 draw, 0 discard) + 1 in hand, 1 remaining, 0 in reserve

Player 2, you are holding a KS. Your move?
```

Figure 8. The 2 new heads QD and 8D are created by taking 2 cards from Player 1's draw pile, thus Player 1's draw pile reducing to 51 from 53.

Now, since we are holding a King of Spades, which is larger than both QD and 8D, we can either cut head or reserve the card. As the Queen of Diamonds is quite large, we will reserve King of Spades in hopes of a card smaller than Queen of Diamonds by inputting in 0.

```
Player 2, you are holding a KS. Your move?
0

Heads:
2: QD (1)
3: 8D (1)

Players:
Player 1: 54 (51 draw, 3 discard)
Player 2: 52 (52 draw, 0 discard)

Player 2, it is your turn.


Heads:
2: QD (1)
3: 8D (1)

Players:
Player 1: 54 (51 draw, 3 discard)
Player 2: 51 (51 draw, 0 discard) + 1 in hand, 0 remaining, 1 in reserve

Player 2, you are holding a 8S. Your move?
```

Figure 9. The King of Spades is reserved, and Player 2 will play another turn as there are 2 heads which means there are 2 turns.

Now, in the picture above, we see that Player 2 now has the card KS in reserve. Now, a new card is drawn from Player 2's draw pile (8 of Spades). And since the 8 of Spades is smaller or equal than both heads, therefore we will play it onto Head number 3. Even though Player 2 don't have any more turns, but playing a 8S onto 8D will end Player 2's turn immediately, and the King of Spades will be return to the top of Player 2's draw pile:

```
Player 2, you are holding a 8S. Your move?
3

Heads:
2: QD (1)
3: 8S (2)

Players:
Player 1: 54 (51 draw, 3 discard)
Player 2: 52 (52 draw, 0 discard)

Player 1, it is your turn.


Heads:
2: QD (1)
3: 8S (2)

Players:
Player 1: 53 (50 draw, 3 discard) + 1 in hand, 1 remaining, 0 in reserve
Player 2: 52 (52 draw, 0 discard)

Player 1, you are holding a QH. Your move?
```

Figure 10. Player 2 plays 8 of Spades onto the 3rd head, which replaces it and immediately end Player 2's turn.

Here, it's Player 1's turn, with the new card drawn from the draw pile (Queen of Hearts). We can play it onto the 2nd head (Queen of Diamonds), so we will type in 2. This will immediately end Player 1's turn and return to Player 2's turn, as in Figure 11:

```
Player 1, you are holding a QH. Your move?
2

Heads:
2: QH (2)
3: 8S (2)

Players:
Player 1: 53 (50 draw, 3 discard)
Player 2: 52 (52 draw, 0 discard)

Player 2, it is your turn.


Heads:
2: QH (2)
3: 8S (2)

Players:
Player 1: 53 (50 draw, 3 discard)
Player 2: 51 (51 draw, 0 discard) + 1 in hand, 1 remaining, 0 in reserve
```

Figure 11. Player 1's turn end after they play Queen of Hearts onto the Queen of Spades, starting Player 2's turn immediately.

In Figure 12, we can see that its Player 2's turn now, and they now now has a King of Spades that the reserves return to the top of the draw pile from the last turn, from Figure 9. It is bigger than all the cards on top of the heads, therefore it cannot be play on top of them. The only 2 options for Player 2 is to either cut head or reserve the card. We will then decide what to do in Figure 13:

```
Player 2, you are holding a KS. Your move?
0

Heads:
2: QH (2)
3: 8S (2)

Players:
Player 1: 53 (50 draw, 3 discard)
Player 2: 51 (51 draw, 0 discard)

Player 2, it is your turn.


Heads:
2: QH (2)
3: 8S (2)

Players:
Player 1: 53 (50 draw, 3 discard)
Player 2: 50 (50 draw, 0 discard) + 1 in hand, 0 remaining, 1 in reserve

Player 2, you are holding a QD. Your move?
```

Figure 12. We will reserve the King of Spades as all the heads is smaller. Now, we then get another Queen of Diamonds to use. and reserve the card by typing 0:

Player 2 have drawn a Queen of Diamonds. Even though we can play it on the 2nd Head, but we will again retain the King of Spades. So, we will then swap will the King of Spades by inputting 0 and cut off the oldest head. It now produced 2 new heads after the 8 of Spades head. (Figure 13)

```
Player 2, you are holding a QD. Your move?
0

Player 2, you are holding a KS. Your move?
2

Heads:
3: 8S (2)
4: QD (1)
5: 3H (1)

Players:
Player 1: 53 (50 draw, 3 discard)
Player 2: 52 (49 draw, 3 discard)

Player 1, it is your turn.


Heads:
3: 8S (2)
4: QD (1)
5: 3H (1)

Players:
Player 1: 52 (49 draw, 3 discard) + 1 in hand, 2 remaining, 0 in reserve
Player 2: 52 (49 draw, 3 discard)

Player 1, you are holding a 10H. Your move?
```

Figure 13. WE reserve the Queen of Diamonds and play the King of Spades.

After playing for a while, the 2 players get to the following position:

```
Player 1, it is your turn.


Heads:
10: 4D (4)
11: KD (3)
12: AS (2)
13: 6D (3)
14: 8S (3)
15: 3S (2)
16: JH (1)
17: 6C (2)
18: 3D (1)
19: 7H (1)

Players:
Player 1: 30 (24 draw, 6 discard) + 1 in hand, 9 remaining, 0 in reserve
Player 2: 56 (29 draw, 27 discard)

Player 1, you are holding a AH. Your move?
12

Heads:
10: 4D (4)
11: KD (3)
12: AH (3)
13: 6D (3)
14: 8S (3)
15: 3S (2)
16: JH (1)
17: 6C (2)
18: 3D (1)
19: 7H (1)

Players:
Player 1: 30 (24 draw, 6 discard)
Player 2: 56 (29 draw, 27 discard)

Player 2, it is your turn.
```

Figure 14. Player 1 plays the Ace of Hearts onto another Ace of Hearts, and since they are equal, Player 2 turn starts immediately after even though user 1 have 9 more turns.

Player 1 have 9 turns remaining after playing the card AH. As the 12th Head with the card AH on top is of equal value with the other AH, therefore we will play it and end Player 1's turn immediately, starting Player 2's turn consequently. The 2 AH shows that the 2 card decks are shuffled together. This also shows that the Ace cards is universal.

After a while, we get to position where Player 1 is low on cards. This means that they are closer to victory, compared to Player 2. (Figure 14)

```
Player 1, it is your turn.


Heads:
18: 8H (6)
19: 4D (4)
20: QD (4)
21: 8H (3)
22: 8S (2)
23: JC (5)
24: 8C (3)
25: 8D (2)
26: 4H (1)
27: 4H (1)
28: 5C (1)
29: KC (1)
30: 6S (1)
31: 3H (1)
32: 6S (1)
33: 7D (1)
34: KS (1)
35: AH (1)

Players:
Player 1: 0 (0 draw, 0 discard) + 1 in hand, 15 remaining, 0 in reserve
Player 2: 69 (64 draw, 5 discard)

Player 1, you are holding a 3S. Your move?
19
Player 1 wins!
```

Figure 15. Player 1 wins after playing the card 3S into the 19th head, and have no remaining card left anywhere.

At the end, Player 1 has the card 3S left, and there are a lot of Heads that is bigger than 3S, and they chooses to play 3S onto the 19th Head, with card value 4D, which is larger than 3S. Player 1 have no more cards in both the draw pile, discard pile and the reserve and in hand, therefore Player 1 wins this game. Adding up all the cards, we get 108 cards (2 deck of 54 cards), which means that no cards were loss. (Figure 15)

Testing Mode

Each time the draws a card or get card from reserve, the user will be asked to input the new value of the card in. The user can type in A,2-10,J,Q,K and then a suit (S, H, D, C), or just input in a "Joker" string (which will be automatically initialized with value 2 if it was drawn from the draw pile)).

```
k7do@ubuntu2004-004:~/cs246/s21/projects/hydra/submission$ ./hydra -testing
Testing mode is on
You just started a game of Hydra.
How many players do you want in the game? There must be more than 1 player for the game to run.
3
How many cards should each player have?
14
You are in testing mode, please type in a card value?
Joker

Heads:
1: 2J (1)

Players:
Player 1: 13 (13 draw, 0 discard)
Player 2: 14 (14 draw, 0 discard)
Player 3: 14 (14 draw, 0 discard)

Heads:
1: 2J (1)

Players:
Player 1: 13 (13 draw, 0 discard)
Player 2: 14 (14 draw, 0 discard)
Player 3: 14 (14 draw, 0 discard)

Player 2, it is your turn.

You are in testing mode, please type in a card value?
```

Figure 16. When start playing test mode, the user was asked for the number of cards each can have, and also the Joker when drawn from the drawpile will have the value 2.

Here, when we withdraw a Joker from Player 1's draw pile and set it as a head, the value Joker with value 2 is automatically set, shown in the first head of the Figure 16 above. In the same image, we can see that we can create the game so that there are more than 2 players (3,…,n players).

Enhancement(s)

Number of Players a user can have in testing mode

When starting testing mode, the program will ask the number of cards each player has. This will make testing edge cases faster and more efficient. The card limit must be bigger than 0 and less than 54 per player though. This also shown in Figure 15.

Optional Cutoffs

Even though in the following situation, its Player 2's turn and Player 2 can play a card onto multiple heads (13, 16, 19,etc…). However, we designed the program so that you can cutoff when you play a card onto another card that is of lower value. In this case, Player 2 has the card 7S, and he plays it on the 15th Head, which has the card 3S on top, and since 7S is bigger than 3S, we can play 7S on 3S, and the user will cut off the oldest head (Head 13th gone in Figure 17). Two additional heads (26 and 27 appears while the other ones remaining the same). This is shown in Figure 17.

```
Player 2, it is your turn.


Heads:
13: JC (7)
14: 7S (4)
15: 3S (2) <-
16: 10C (2)
17: 5D (3)
18: 3C (2)
19: 7H (1)
20: KH (1)
21: 8H (3)
22: JD (1)
23: 2C (2)
24: 8C (3)
25: 10D (1)

Players:
Player 1: 16 (10 draw, 6 discard)
Player 2: 60 (13 draw, 47 discard) + 1 in hand, 12 remaining, 0 in reserve

Player 2, you are holding a 7S. Your move?
15

Heads:
14: 7S (4)
15: 3S (2)
16: 10C (2)
17: 5D (3)
18: 3C (2)
19: 7H (1)
20: KH (1)
21: 8H (3)
22: JD (1)
23: 2C (2)
24: 8C (3)
25: 10D (1)
26: 4H (1)
27: 4H (1)

Players:
Player 1: 16 (10 draw, 6 discard)
Player 2: 66 (11 draw, 55 discard)
```

Figure 17. Optional Head cut, Player 2 chooses to cut head even though there are multiple heads available to play on.

Other cases

Here, we have the user set the value of the Joker to an Ace, which is universal and can be played anywhere. (Figure 16)

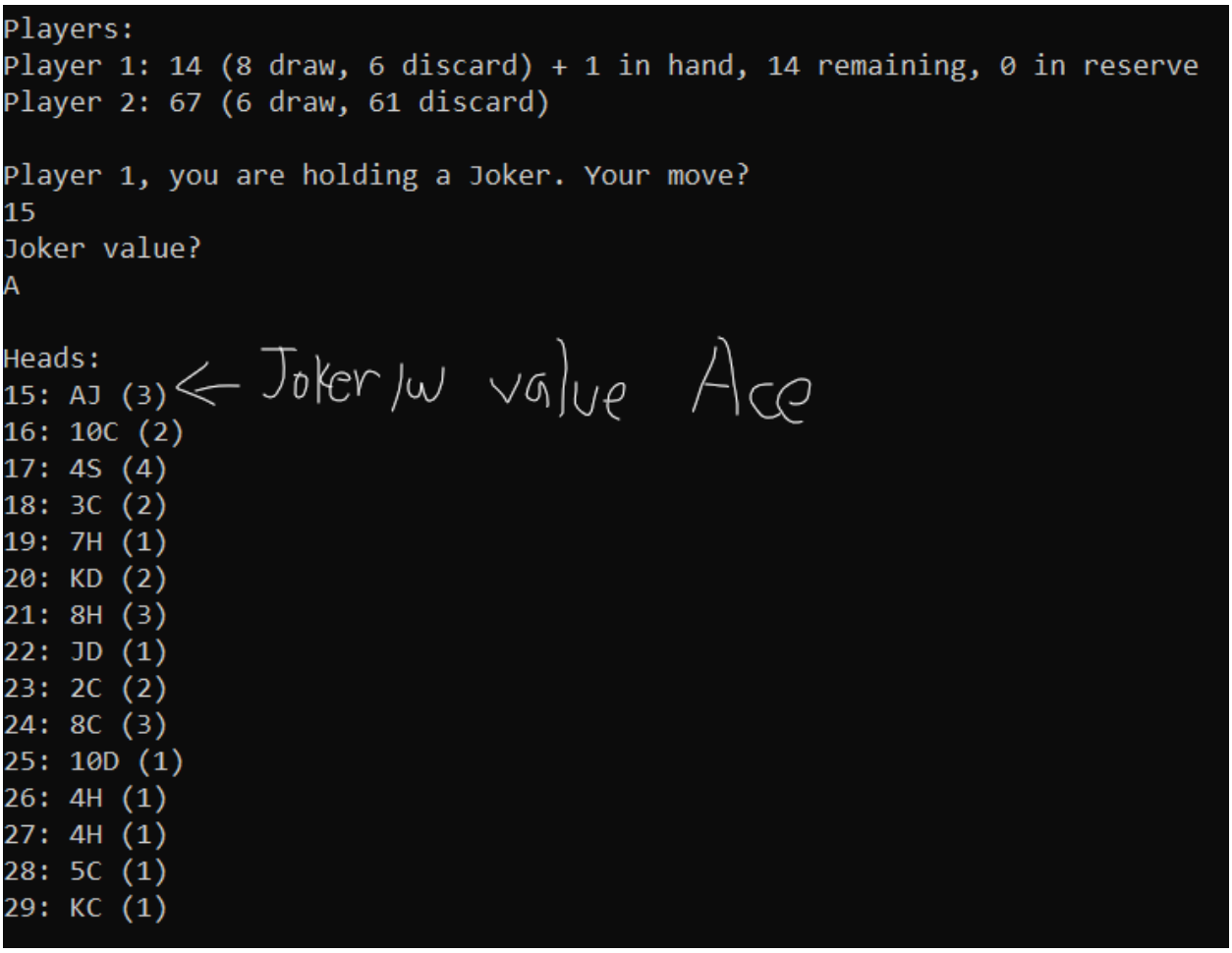

Figure 15. The user can set the value of the Joker card to any value, including an Ace.