



HYDRA PROJECT

Demo

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1. Overview

This document provides a description of how to compile and create the executable of Hydra (section 2).

It then describes the options (through command-line arguments) of running the game with base features and bonus features, in testing and non-testing mode (section 3 and 4).

At the end of the document (section 5), a few demonstration scripts are provided to walkthrough step-by-step for both base and bonus features.

2. Compilation

All source code and required resource files are included in the **hydra.zip** file. After unzipping, an “**images**” folder should exist and contain all image (.xpm) files (required for bonus features, for the safety purpose, they are also included in the **demo.zip** under “**images**” folder). To compile, simply run the “**make**” command and an executable file, **hydra**, will be generated under the same folder where the “**make**” command runs.

3. Run Base Features

3.1 Run without Testing Mode

In order to run the game with only base features, run the executable file, **hydra**, without any command-line argument.

The game will display options first before the game starts. All output generated from base features follow the project specification and will be sent to standard output device (std::cout). Any error messages will be sent to standard error device (std::cerr).

All inputs are case insensitive. For example, both uppercase “J” and lowercase “j” are accepted as valid card suit “Jack”.

3.2 Run with Testing Mode

In order to run the game in testing mode, run the executable file, **hydra**, with the command-line argument: **-testing**:

```
$ ./hydra -testing
```

Testing mode can also be enabled when bonus features are turned on. For example, you can turn testing mode on in GUI display mode.

4. Run with Bonus Features

4.1 Overview of Bonus Features

The following bonus features have been implemented:

- Using Smart Pointers and STL containers
- Grammar improvement
- Allows human players to quit during the game
- Computer players
- GUI display

4.2 Command-line Argument Bonus Features

In addition to “**-testing**” argument (enables testing mode), the following command-line arguments are implemented for the game to run with bonus features:

Command-line argument	Description
-enhancement	It enables all enhancement/bonus features: GUI display, computer players (level 1) with action elapse time of 1000 milliseconds.
-enablebonus	Same as -enhancement option.
-display	It sets basic TEXT display or GUI display. Valid values are: Text or GUI . Defaults to Text.
-computerPlayerLevel	It sets the level of the computer player. The value must be greater than 0. Default to 1, i.e., no computer player.
-cpLevel	It is the same as -computerPlayerLevel flag. It is defined for convenience of typing.
-computerPlayerActionElapseTime	It sets time in milliseconds for simulating how long computer player actions take. It takes into effective when the computerPlayerLevel > 0. The value must be a positive number. Default to 1000 , i.e., 1 second. Zero means no wait.
-cpTime	It is the same as computerPlayerActionElapseTime flag. It is defined for convenience of typing.
-cardsPerPlayer	It sets the number of cards allocated to each player, in range between 5 to 54. Default to 54 cards per player. This value is used only in testing mode.

Please note the following rules for using the command-line arguments:

- All arguments and their values are case insensitive, i.e., “**-cpLevel**” is the same as “**-cplevel**”.
- Arguments can appear in any order.
- Arguments can appear multiple times. When this occurs, the last value specified is the one used

4.3 Using Smart Pointers and STL containers

The program uses smart pointers and STL containers for both base and bonus features. No explicit “delete” is used for releasing allocated memory. There is no command-line argument for this feature. This feature is enabled in both base and bonus features.

4.4 Grammar

The program implements an algorithm to replace the indefinite article “a” with “an” in front of a word that begins with a vowel sound. There is no command-line argument for this feature. This feature is enabled in both base and bonus features.

4.5 Allows Human Players to Quit

Human players can quit during the game. When a player is prompted to accept their turn, they can input “Q” to quit the game. If computer player is not enabled, the player will be removed from the game entirely. If there is only one player remaining, the game terminates. Please refer to the next section regarding computer players.

Additionally, in the Text display mode, if Ctrl+D is detected during the game, the game will be terminated, and no memory leak will occur.

4.6 Computer Players

A computer player is enabled when the computer player level is specified with a value that is greater than 0 through the “-cpLevel”, “-computerPlayerLevel”, “-enhancement” or “-enableBonus” command-line arguments.

Another command-line argument, “-cpTime” or “-computerPlayerActionElapseTime”, is used for simulating the computer player’s thinking time. It is used only when the computer player level is set to 1 or a larger value. The value is specified in milliseconds. For instance, “-cpTime=500” specifies the elapse time of a half second.

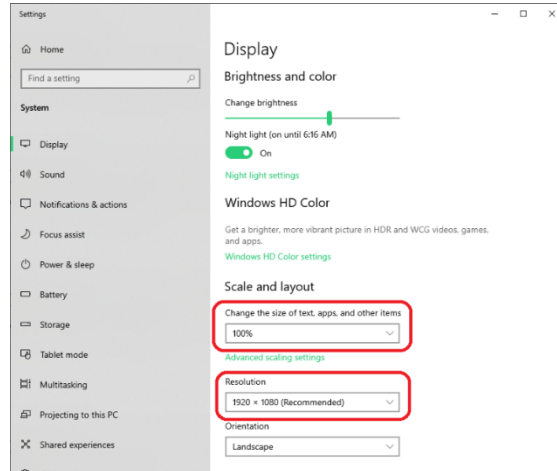
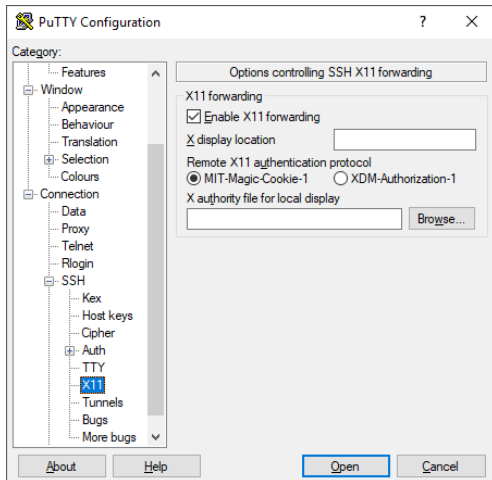
Only two levels of computer playing strategies are implemented. Therefore, any computer player level that is greater than 2, is still valid, and will be treated as level 2.

Please note that both “-enhancement” or “-enableBonus” command-line arguments enable the whole package of bonus features with default values, which will set the computer player level to 1 and the computer player action elapse time to 1 second.

4.7 GUI Display

The GUI display is enabled when the “-display=GUI” command-line argument. Alternatively, it can also be enabled through the “-enhancement” or “-enableBonus” command-line arguments.

In order to display GUI, you will need to enable X11 forwarding of your terminal tool. For example, in Putty, you can enable this as shown below.



The GUI display requires the screen resolution of **1600 x 900** pixels. If window is displayed, but the window is cut off, you may need to adjust your screen resolution and scale settings. For example, in Microsoft Windows 10, it can be set in the Settings->Display, as shown above. When you change the Windows display resolution and/or scales, please don't forget to restart Xming server on your computer.

When the GUI display is enabled, all input and output will be performed on the GUI window, not the Linux console.

The layout of GUI window is designed as below:

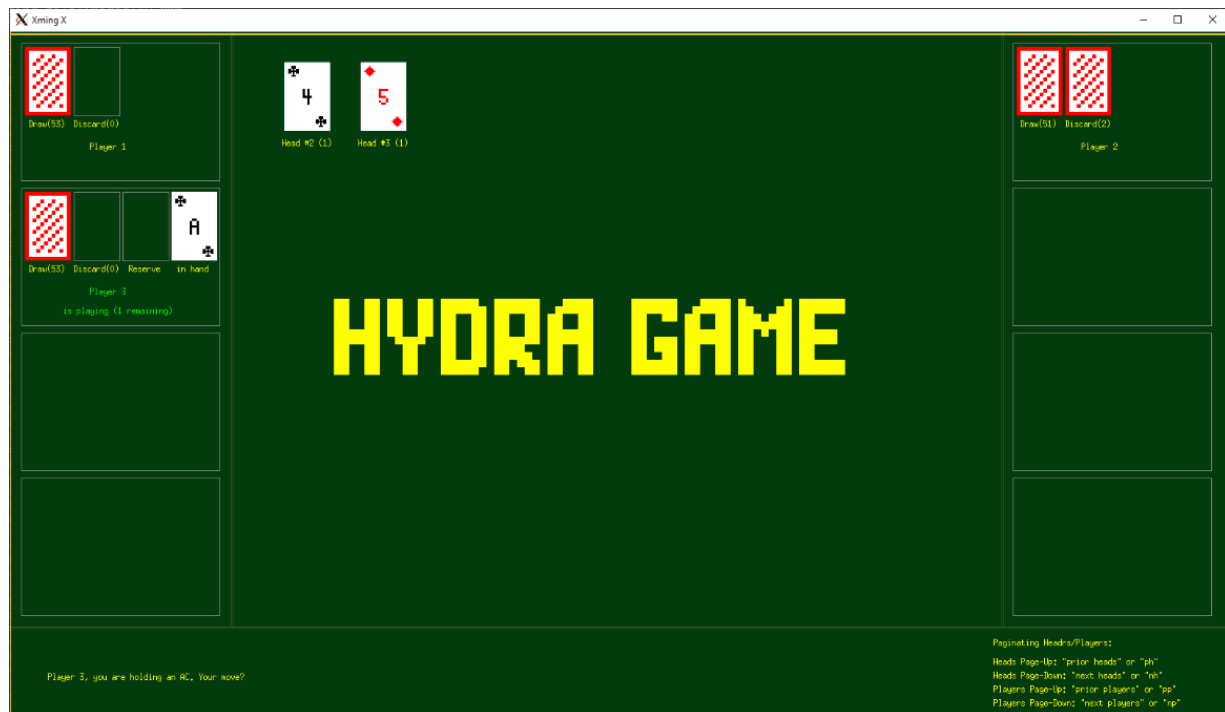
- Middle-top area is for displaying heads, representing the game table.
- Left and right side of top area are reserved for players.
- Bottom section is for displaying messages and error messages and taking input from players.
- Pagination instructions are displayed on the bottom-right section.



The maximum number of heads that can be displayed on the screen is 36 heads (4 rows x 9 columns). The maximum of players that can be displayed on the screen is 8 players (4 players on the left and 4 players on the right). When there are more heads or players in the game, the player can page-up and page-down any time after input the number of players when the player takes an action, i.e., when a player chooses a head or accepts a turn. The pagination instructions are (commands are case-insensitive):

- Page-up heads display: “**prior heads**” or “**ph**”
- Page-down heads display: “**next heads**” or “**nh**”
- Page-up players display: “**prior players**” or “**pp**”
- Page-down players display: “**next players**” or “**np**”

The GUI feature requires all image files to be stored in the “images” folder under the folder where the executable “hydra” runs. If the folder does not exist, or an image file is missing, the program is still able to run with an alternative solution, as shown below. This is an expected behaviour (but it is recommended to resolve the image folder issue for a better display).



5. Demo Scripts

A few test input files have been provided in the demo.zip. The following table describes how to use these scripts to demonstrate base and bonus features of the hydra game.

The command-line argument, “**-cardsPerPlayer**”, can significantly simplify the test is by specifying less cards allocated to each player. The first four test files use “**-cardsPerPlayer=5**”

Test No.	Test File Name	Features to Demonstrate
1	hydra_base1.in	<ul style="list-style-type: none">- Base features,- Testing mode
	Command: ./hydra -testing -cardsPerPlayer=5 < hydra_base1.in	
2	hydra_base2.in	<ul style="list-style-type: none">- Base features,- Testing mode,- Process invalid inputs
	Command: ./hydra -testing -cardsPerPlayer=5 < hydra_base2.in	
3	hydra_bonus_grammar.in	<ul style="list-style-type: none">- Grammar Improvement,- Testing Mode,
	Command: ./hydra -testing -cardsPerPlayer=5 < hydra_bonus_grammar.in	
4	hydra_bonus_player_quit.in	<ul style="list-style-type: none">- Allows player to quit,- No computer player,- Testing mode
	Command: ./hydra -testing -cardsPerPlayer=5 < hydra_bonus_player_quit.in	
5	hydra_bonus_computer_player.in	<ul style="list-style-type: none">- Allows computer player to take over when human player quits,- Computer players play against each other,- Computer playing strategy
	Command: ./hydra -cpLevel=2 -cpTime=250 < hydra_bonus_computer_player.in	

Please note, the game running in GUI display mode reads input from the X11 window. It does not read from std::cin. Therefore, there is no test file provided. However, you may run the game in GUI display mode by specifying the “**-display=GUI**” command-line argument. Please following instructions contained in **section 6.5** to run the game in GUI display mode.

6. Step-by-Step Interaction

This section is an optional to explain the interaction with the game step-by-step. Due to the length of the actual game (i.e., running with 54 cards per player), the following procedures only provide the first few steps of playing the game. **There are also instructions of interacting with the game in GUI display mode, which is helpful for understanding how to play the game in GUI. Please proceed to GUI section 6.5 for more information.**

The following are legends used in the procedures:

- **Red colour:** represents the user input. Particularly, <ENTER> represents the user pressed the ENTER key.
- Black colour: represents the output (to stdout and stderr) generated by the game
- **Blue colour:** are descriptions. They are not part of input and output.

6.1 Run with Base Feature in Testing Mode

When the testing mode is enabled, each time when a card is taken from the draw pile, the value and suit of the card will be asked first. (The suit of the card will not be asked if the input value of the card is “Joker”). This happens at the following points during the game cycle:

- When taking first card from the Player 1’s draw pile to create the first head.
- When taking a card from the current player’s draw pile after the player accepts the turn.
- When taking two cards from a player’s draw pile when cutting-off a head occurs (the value and suit of the card will be asked twice for the two cards for creating two new heads).

If you like to run the game in testing mode interactively, the following script demonstrates the steps in playing the game in Text display mode and testing mode.

```
$ ./hydra -testing -cardsPerPlayer=5 Start the game in testing mode, set the number of cards/player to 5
Game starts:
  Testing mode: Yes
  Display type: Text
  Computer player: No

How many players?
3
Input for creating the first head in testing mode:
Card value?
6
Suit?
D
Heads:
1: 6D (1)

Players:
Player 1: 4 (4 draw, 0 discard)
Player 2: 5 (5 draw, 0 discard)
```

Player 3: 5 (5 draw, 0 discard)

Player 2, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Input for player's next in-hand card in testing mode:

Card value?

5

Suit?

D

Heads:

1: 6D (1)

Players:

Player 1: 4 (4 draw, 0 discard)

Player 2: 4 (4 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve

Player 3: 5 (5 draw, 0 discard)

Player 2, you are holding a 5D. Your move?

1

Heads:

1: 5D (2)

Players:

Player 1: 4 (4 draw, 0 discard)

Player 2: 4 (4 draw, 0 discard)

Player 3: 5 (5 draw, 0 discard)

Player 3, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Input for player's next in-hand card in testing mode:

Card value?

Joker

Heads:

1: 5D (2)

Players:

Player 1: 4 (4 draw, 0 discard)

Player 2: 4 (4 draw, 0 discard)

Player 3: 4 (4 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve

Player 3, you are holding a Joker. Your move?

1

Joker value?

4

Heads:

1: 4J (3)

Players:

Player 1: 4 (4 draw, 0 discard)

Player 2: 4 (4 draw, 0 discard)

Player 3: 4 (4 draw, 0 discard)

Player 1, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Input for player's next in-hand card in testing mode:

Card value?

10

Suit?

H

Heads:

1: 4J (3)

Players:

Player 1: 3 (3 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve

Player 2: 4 (4 draw, 0 discard)

Player 3: 4 (4 draw, 0 discard)

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

1

Input for creating the first head as a result of cut-off head in testing mode:

Card value?

Q

Suit?

S

Input for creating the second head as a result of cut-off head in testing mode:

Card value?

6

Suit?

C

Heads:

2: QS (1)

3: 6C (1)

Players:

Player 1: 5 (1 draw, 4 discard)

Player 2: 4 (4 draw, 0 discard)

Player 3: 4 (4 draw, 0 discard)

Player 2, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Input for player's next in-hand card in testing mode:

Card value?

J

Suit?

D

Heads:

2: QS (1)

3: 6C (1)

Players:

Player 1: 5 (1 draw, 4 discard)

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

Player 3: 4 (4 draw, 0 discard)

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

0

Input for player's next in-hand card in testing mode:

Card value?

10

Suit?

H

Heads:

2: QS (1)

3: 6C (1)

Players:

Player 1: 5 (1 draw, 4 discard)

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

Player 3: 4 (4 draw, 0 discard)

Player 2, you are holding a 10H. Your move?

0

Heads:

2: QS (1)

3: 6C (1)

Players:

Player 1: 5 (1 draw, 4 discard)

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

Player 3: 4 (4 draw, 0 discard)

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

2

Heads:

2: JD (2)

3: 6C (1)

Players:

Player 1: 5 (1 draw, 4 discard)

Player 2: 3 (2 draw, 1 discard)

Player 3: 4 (4 draw, 0 discard)

Player 3, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Input for player's next in-hand card in testing mode:

Card value?

J

Suit?

H

Heads:

2: JD (2)

3: 6C (1)

Players:

Player 1: 5 (1 draw, 4 discard)

Player 2: 3 (2 draw, 1 discard)

Player 3: 3 (3 draw, 0 discard) + 1 in hand, 1 remaining, 0 in reserve

Player 3, you are holding a JH. Your move?

2

Heads:

2: JH (3)

3: 6C (1)

Players:

Player 1: 5 (1 draw, 4 discard)

Player 2: 3 (2 draw, 1 discard)

Player 3: 3 (3 draw, 0 discard)

Player 1, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Input for player's next in-hand card in testing mode:

Card value?

A

Suit?

S

Heads:

2: JH (3)

3: 6C (1)

Players:

Player 1: 4 (0 draw, 4 discard) + 1 in hand, 1 remaining, 0 in reserve

Player 2: 3 (2 draw, 1 discard)

Player 3: 3 (3 draw, 0 discard)

Player 1, you are holding an AS. Your move?

2

Input for player's next in-hand card in testing mode:

Card value?

K

Suit?

C

Heads:

2: AS (4)

3: 6C (1)

Players:

Player 1: 3 (3 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve

Player 2: 3 (2 draw, 1 discard)

Player 3: 3 (3 draw, 0 discard)

Player 1, you are holding a KC. Your move?

2

Heads:

2: KC (5)

3: 6C (1)

Players:

Player 1: 3 (3 draw, 0 discard)

Player 2: 3 (2 draw, 1 discard)

Player 3: 3 (3 draw, 0 discard)

Player 2, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Input for player's next in-hand card in testing mode:

Card value?

9

Suit?

S

Heads:

2: KC (5)

3: 6C (1)

Players:

Player 1: 3 (3 draw, 0 discard)

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

Player 3: 3 (3 draw, 0 discard)

Player 2, you are holding a 9S. Your move?

2

Input for player's next in-hand card in testing mode:

Card value?

K

Suit?

H

Heads:

2: 9S (6)

3: 6C (1)

Players:

Player 1: 3 (3 draw, 0 discard)

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

Player 3: 3 (3 draw, 0 discard)

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

2

Input for creating the first head as a result of cut-off head in testing mode:

Card value?

Joker

Input for creating the second head as a result of cut-off head in testing mode:

Card value?

3

Suit?

D

Heads:

3: 6C (1)

4: 2J (1)

5: 3D (1)

Players:

Player 1: 3 (3 draw, 0 discard)

Player 2: 6 (6 draw, 0 discard)

Player 3: 3 (3 draw, 0 discard)

Player 3, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Input for player's next in-hand card in testing mode:

Card value?

5

Suit?

C

Heads:

3: 6C (1)

4: 2J (1)

5: 3D (1)

Players:

Player 1: 3 (3 draw, 0 discard)

Player 2: 6 (6 draw, 0 discard)

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

Player 3, you are holding a 5C. Your move?

3

Input for player's next in-hand card in testing mode:

Card value?

4

Suit?

C

Heads:

3: 5C (2)

4: 2J (1)

5: 3D (1)

Players:

Player 1: 3 (3 draw, 0 discard)
Player 2: 6 (6 draw, 0 discard)
Player 3: 1 (1 draw, 0 discard) + 1 in hand, 1 remaining, 0 in reserve

Player 3, you are holding a 4C. Your move?

3

Input for player's next in-hand card in testing mode:

Card value?

3

Suit?

C

Heads:

3: 4C (3)

4: 2J (1)

5: 3D (1)

Players:

Player 1: 3 (3 draw, 0 discard)

Player 2: 6 (6 draw, 0 discard)

Player 3: 0 (0 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve

Player 3, you are holding a 3C. Your move?

3

Player 3 wins!

6.2 Run with Base Feature Without Testing Mode

The following script demonstrates the steps in playing the game in Text display mode but not in testing mode.

\$./hydra

Game starts:

Testing mode: No

Display type: Text

Computer player: No

How many players?

2

Heads:

1: 9D (1)

2 players and the first head are created. A card is automatically taken from the first player and placed on the first head.

Players:

Player 1: 53 (53 draw, 0 discard)

Player 2: 54 (54 draw, 0 discard)

Player 2, it is your turn. ('Q' to quit, Enter to continue)

<ENTER> The current player pressed <ENTER> key to accept the turn.

Heads:

1: 9D (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 4C. Your move?

1

Heads:

1: 4C (2)

Players:

Player 1: 53 (53 draw, 0 discard)

Player 2: 53 (53 draw, 0 discard)

Player 1, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Heads:

1: 4C (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 QC. Your move?

1

Heads:

2: 3H (1)

The cut-off head occurs. The first head is added to the discard pile of the player.

3: 8D (1)

Two new heads are created.

Players:

Player 1: 52 (50 draw, 2 discard)

Player 2: 53 (53 draw, 0 discard)

Player 2, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Heads:

2: 3H (1)

3: 8D (1)

Players:

Player 1: 52 (50 draw, 2 discard)

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

Player 2, you are holding an 8D. Your move?

0

Put the card in reserve

Heads:

2: 3H (1)

3: 8D (1)

Players:

Player 1: 52 (50 draw, 2 discard)

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

Player 2, you are holding a 9S. Your move?

0 Swap the card in hand with the card in Reserve.

Heads:

2: 3H (1)

3: 8D (1)

Players:

Player 1: 52 (50 draw, 2 discard)

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

Player 2, you are holding an 8D. Your move?

3

Heads:

2: 3H (1)

3: 8D (1)

Players:

Player 1: 52 (50 draw, 2 discard)

Player 2: 52 (51 draw, 1 discard)

Player 1, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

Heads:

2: 3H (1)

3: 8D (1)

Players:

Player 1: 51 (49 draw, 2 discard) + 1 in hand, 1 remaining, 0 in reserve

Player 2: 52 (51 draw, 1 discard)

Player 1, you are holding a 5D. Your move?

1 Head 1 is not a valid head no, as it has been cut off.

Invalid input, please try again . . .

Player 1, you are holding a 5D. Your move?

3

Heads:

2: 3H (1)

3: 5D (2)

Players:

Player 1: 50 (48 draw, 2 discard) + 1 in hand, 0 remaining, 0 in reserve

Player 2: 52 (51 draw, 1 discard)

Player 1, you are holding a JD. Your move?

3

Invalid input, please try again . . .

Player 1, you are holding a JD. Your move?

2

Heads:

3: 5D (2)

4: QD (1)

5: AS (1)

Players:

Player 1: 50 (46 draw, 4 discard)

Player 2: 52 (51 draw, 1 discard)

Player 2, it is your turn. ('Q' to quit, Enter to continue)

<ENTER>

[... .. **Game continues**]

Heads:

3: 3S (3)

4: 4H (2)

5: 6S (5)

Players:

Player 1: 47 (43 draw, 4 discard)

Player 2: 47 (46 draw, 1 discard) + 1 in hand, 1 remaining, 0 in reserve

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

3

Joker value?

2 **Announce a face value of "2" for Joker**

Heads:

3: 2J (4)

4: 4H (2)

5: 6S (5)

Players:

Player 1: 47 (43 draw, 4 discard)

Player 2: 46 (45 draw, 1 discard) + 1 in hand, 0 remaining, 0 in reserve

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

[... .. **Game continues until a winner is generted**]

6.3 Player quits the Game (without computer player)

The following script demonstrates the scenario where there are 3 players with no computer player is specified. This scenario is not running in testing mode.

(Please note, the player can quit only at the point when he/she accepts a turn, i.e., not when he/she chooses a head or announce a Joker value.)

```
$ ./hydra
Game starts:
  Testing mode: No
  Display type: Text
  Computer player: No

How many players?
3
Heads:
1: 6D (1)

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

Player 2, it is your turn. ('Q' to quit, Enter to continue)
<ENTER> Player 2 accepts the turn and starts playing ...

[... .. Game continues ... ..]

Heads:
2: AS (2)
3: 6D (2)

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

Player 2, it is your turn. ('Q' to quit, Enter to continue)
Q Player 2 enters "Q" to quit the game. Since there are still 2 players left in the game, the game continues.
Player 2 quits, move to the next player ...

Heads:
2: AS (2)
3: 6D (2)

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

Player 3, it is your turn. ('Q' to quit, Enter to continue)

Q Player 3 enters “Q” to quit the game. Since there is only 1 player (Player 1) left in the game, the game terminates.

Player 3 quits, only one player left, the game terminates.

6.4 Player quits the Game and Computer Player takes over in Text display mode

The following script demonstrates the scenario where 3 players in the game. Computer player is turned on through the command-line argument. After the first round, each player quits the game, and computer player takes over to play in the game until a winner is claimed.

```
$ ./hydra -cplevel=1 -cptime=500
```

Game starts:

Testing mode: No

Display type: Text

Computer player: Level 1

Computer player action elapse time: 0

How many players?

3

Heads:

1: KC (1)

Players:

Player 1: 53 (53 draw, 0 discard)

Player 2: 54 (54 draw, 0 discard)

Player 3: 54 (54 draw, 0 discard)

Player 2, it is your turn. ('Q' to quit, Enter to continue)

<ENTER> Player 2 accepts the turn and starts playing ...

[... .. **Game continues**]

Player 1, it is your turn. ('Q' to quit, Enter to continue)

Q Player 1 input “Q” to quit the game. The computer player takes over.

Player 1 quits, replaced by computer player ...

Heads:

1: QH (3)

Players:

Computer Player 1: 52 (52 draw, 0 discard) + 1 in hand, 0 remaining, 0 in reserve

Player 2: 53 (53 draw, 0 discard)

Player 3: 53 (53 draw, 0 discard)

Computer Player 1, you are holding an 8H. Your move? **Please note that the indefinite article “an” is used in front of the vowel sounding “8H”**

1

Heads:

1: 8H (4)

Players:

Computer Player 1: 52 (52 draw, 0 discard)

Player 2: 53 (53 draw, 0 discard)

Player 3: 53 (53 draw, 0 discard)

Player 2, it is your turn. ('Q' to quit, Enter to continue)

Q Player 2 inputs "Q" to quit the game. The computer player takes over.

Player 2 quits, replaced by computer player ...

Heads:

1: 8H (4)

Players:

Computer Player 1: 52 (52 draw, 0 discard)

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

Player 3: 53 (53 draw, 0 discard)

Computer Player 2, you are holding a KD. Your move?

1

Heads:

2: 6S (1)

3: 10D (1)

Players:

Computer Player 1: 52 (52 draw, 0 discard)

Computer Player 2: 53 (50 draw, 3 discard)

Player 3: 53 (53 draw, 0 discard)

Player 3, it is your turn. ('Q' to quit, Enter to continue)

Q Player 3 inputs "Q" to quit the game. The computer player takes over.

[... ... From now on, all players are computer players. The game are played by the three computer players until a winner is created.]

Heads:

17: 5H (8)

18: KD (6)

19: 2S (1)

20: 7H (3)

21: 7C (6)

22: 8D (6)

23: 8S (6)

24: 8H (4)

25: 2D (4)

26: 8C (3)

27: 8D (1)

28: 3C (3)

```
29: 10D (3)
30: QC (1)
31: 10H (2)
32: 4D (1)
33: 7D (1)
```

Players:

Computer Player 1: 0 (0 draw, 0 discard) + 1 in hand, 9 remaining, 0 in reserve

Computer Player 2: 22 (22 draw, 0 discard)

Computer Player 3: 33 (2 draw, 31 discard)

Computer Player 1, you are holding a 5C. Your move?

20

Player 1 wins! **Player 1 wins. Game over.**

6.5 Run with GUI with Computer Player Feature

In this scenario, the game runs in GUI display mode with the computer player specified through the command-line argument “-cpLevel”. The testing mode is not enabled in this scenario.

Enter the following command to start the game in GUI display mode:

```
$ ./hydra -display=gui -cplevel=1
```

Game starts:

Testing mode: No

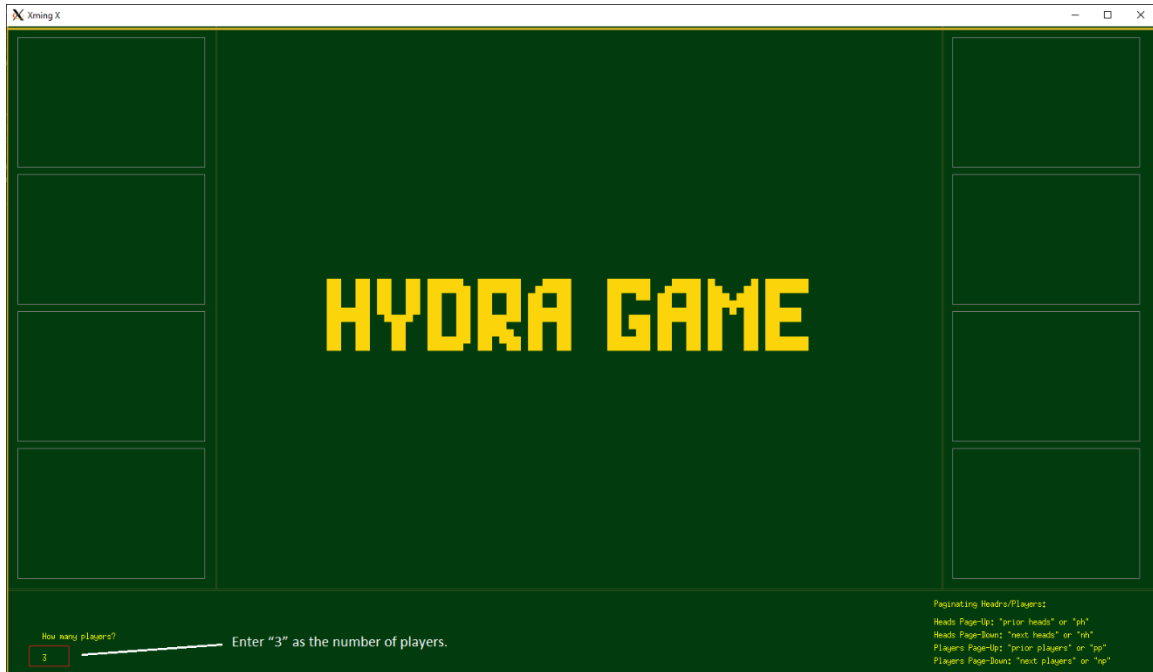
Display type: GUI

Computer player: Level 1

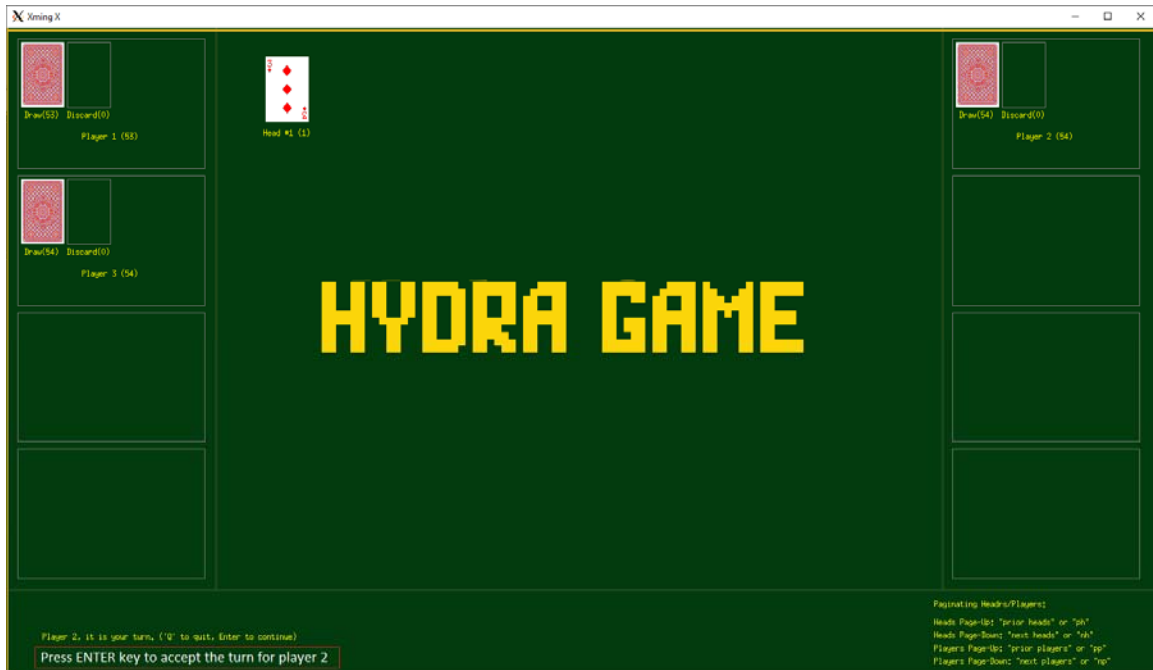
Computer player action elapse time: 1000

Please operate on GUI window . . .

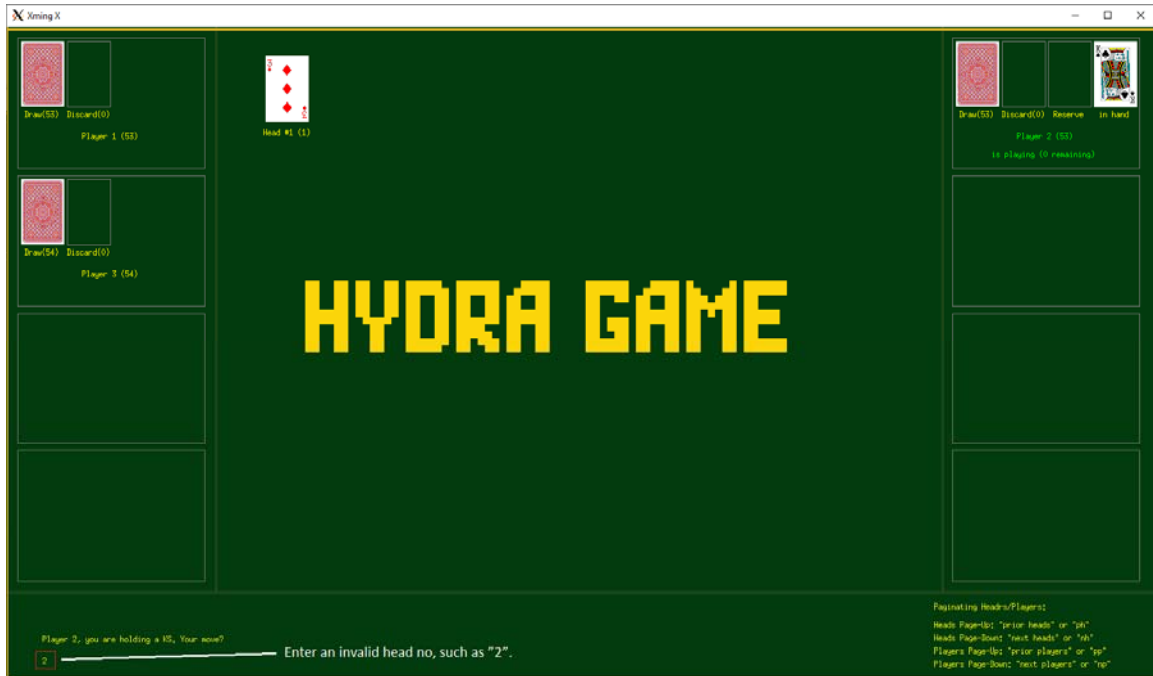
From now on, all input and output will be on the GUI window. Click on the GUI Window and enter “3” as the number of players, as shown below:



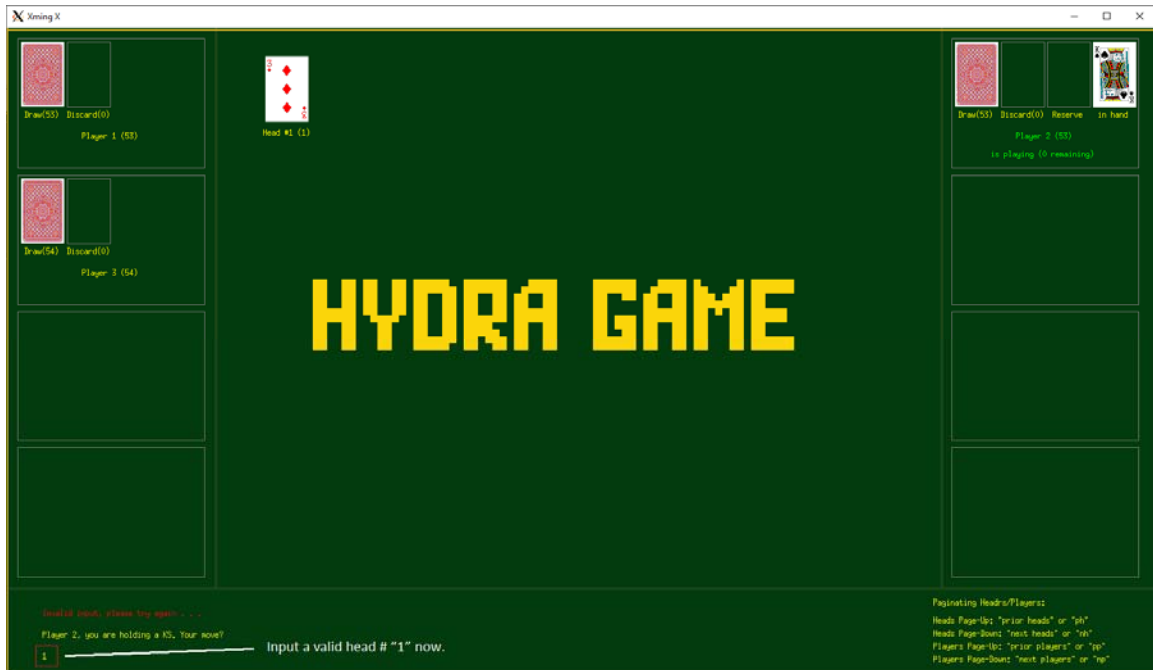
Then 3 players and the first head are displayed on the screen. Press ENTER key to accept the turn for player 2.



The game refreshes players' piles and player 2's in-hand card. Then it asks player 2 to choose a head no. Input an invalid head no, such as "2", and then press ENTER key.



The game displays an error message and asks the player 2 to input again. Input “1” now and then press ENTER key.

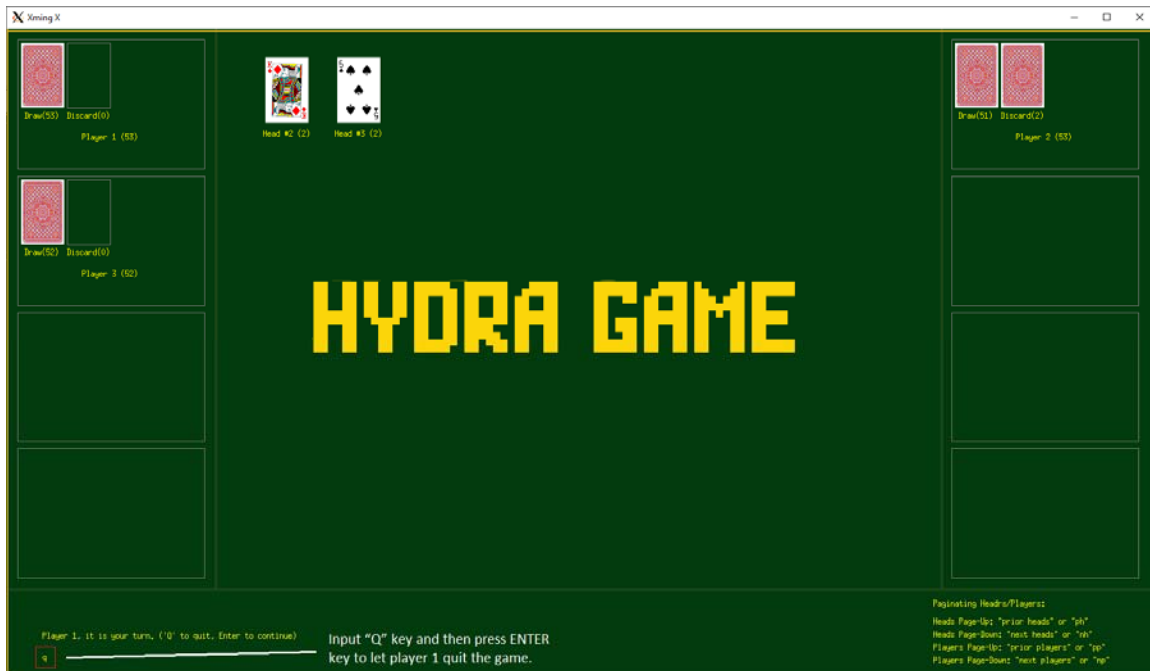


The player 2's turn ends, the game asks Player 3 to accept the turn.

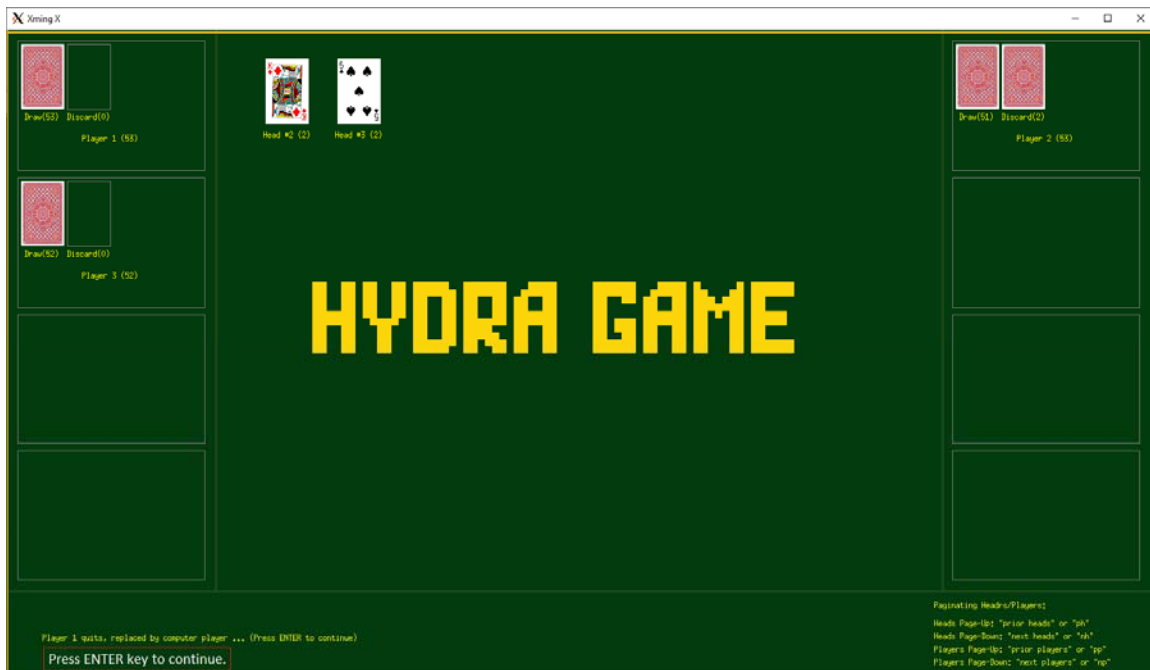
Repeat above steps until the game over and a winner is generated.

Alternatively, a player can quit the game when the game asks the player to accept a turn. The next steps are for both players to quit the game and let computer players take over and continue to play the game.

At a certain point, when a player is asked to accept a turn (in this example, it's player 1), input "Q" key and then press ENTER key to let player 1 quit the game.

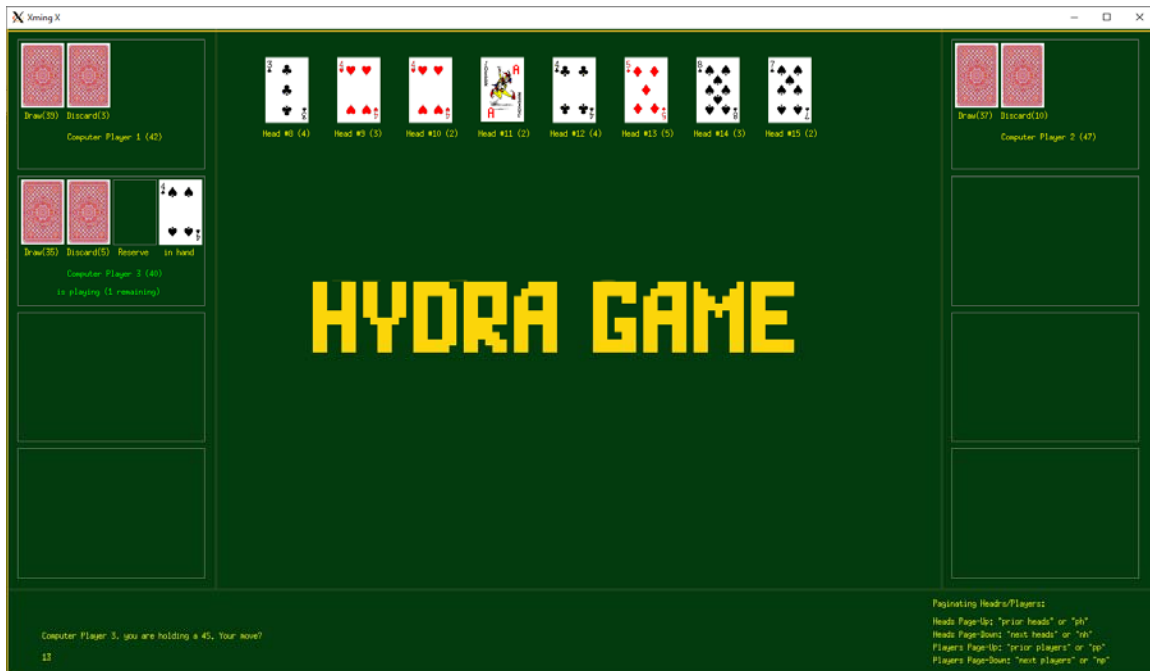


The window displays that a computer player takes over. Press ENTER key to continue.



Then the computer player will play the turn for player 1. When the turn ends, the game ask player 2 to accept a new turn. At this point, the two human player left in the game can continue playing with the computer player.

Assume at certain point, we let both human players quit and computer players then take over. So all three players in the game are computer player. They will play with each other, as shown below:



The game continues until a winner is generated, as shown below. Press ENTER key to terminate the game.

