

The first run:

```
Please enter a number to choose the difficulty level (1 (easy), 2 (medium), 3 (hard)): 1
  A B C D E F G H I
A 1 4 6 | 3 8 7 | 9 5 2 |
B 9 2 5 | 1 4 6 | 8 7 3 |
C 7 8 3 | 9 5 2 | 6 4 1 |
D 2 5 7 | 6 1 8 | 3 9 4 |
E 6 1 8 | 4 3 9 | 7 2 5 |
F 3 9 4 | 7 2 5 | 1 8 6 |
G   3 2 | 8 7 1 | 4 6 9 |
H 8 6 1 | 2 9 4 | 5 3 7 |
I 4 7 9 | 5 6 3 | 2 1 8 |

If you want to restart this game, fill in 10.
Enter the number you want to fill in: 5
Enter the location you want to fill 5 in: (row col): G A
  A B C D E F G H I
A 1 4 6 | 3 8 7 | 9 5 2 |
B 9 2 5 | 1 4 6 | 8 7 3 |
C 7 8 3 | 9 5 2 | 6 4 1 |
D 2 5 7 | 6 1 8 | 3 9 4 |
E 6 1 8 | 4 3 9 | 7 2 5 |
F 3 9 4 | 7 2 5 | 1 8 6 |
G 5 3 2 | 8 7 1 | 4 6 9 |
H 8 6 1 | 2 9 4 | 5 3 7 |
I 4 7 9 | 5 6 3 | 2 1 8 |

You win!

Do you want to continue to the next game? (y/n)
n

Game ends.
Terminal will be reused by tasks, press any key to close it.
```

I filled in the number and won the game. Then I entered 'n' so that the program terminated.

```
Game 1:
The original game:
 1 4 6 3 8 7 9 5 2
 9 2 5 1 4 6 8 7 3
 7 8 3 9 5 2 6 4 1
 2 5 7 6 1 8 3 9 4
 6 1 8 4 3 9 7 2 5
 3 9 4 7 2 5 1 8 6
 0 3 2 8 7 1 4 6 9
 8 6 1 2 9 4 5 3 7
 4 7 9 5 6 3 2 1 8

Game 1:
The solution:
 1 4 6 3 8 7 9 5 2
 9 2 5 1 4 6 8 7 3
 7 8 3 9 5 2 6 4 1
 2 5 7 6 1 8 3 9 4
 6 1 8 4 3 9 7 2 5
 3 9 4 7 2 5 1 8 6
 5 3 2 8 7 1 4 6 9
 8 6 1 2 9 4 5 3 7
 4 7 9 5 6 3 2 1 8
```

In the text file, both the original game and the solution of the game are printed (0s are the blank in the original game. The zero is difficult to be found in this demo since there is only one zero in the game.)

Then we can restart and run the program again.

```
n
Game ends.
Terminal will be reused by tasks, press any key to close it.
■ Executing task: /bin/zsh -c ./build/Debug/out/Debug
Please enter a number to choose the difficulty level (1 (easy), 2 (medium), 3 (hard): 1
A B C D E F G H I
A 8 2 1 | 3 7 6 | 4 9 5 |
B 9 4 7 | 5 8 1 | 6 2 3 |
C 3 5 6 | 9 2 4 | 8 7 1 |
D 2 3 4 | 8 5 9 | 1 6 7 |
E 7 6 9 | 4 1 2 | 3 5 8 |
F 1 8 5 | 7 6 3 | 9 4 2 |
G 6 9 8 | 2 3 7 | 5 4 |
H 4 7 3 | 1 9 5 | 2 8 6 |
I 5 1 2 | 6 4 8 | 7 3 9 |
If you want to restart this game, fill in 10.
Enter the number you want to fill in: 1
Enter the location you want to fill in: (row col): G H
A B C D E F G H I
A 8 2 1 | 3 7 6 | 4 9 5 |
B 9 4 7 | 5 8 1 | 6 2 3 |
C 3 5 6 | 9 2 4 | 8 7 1 |
D 2 3 4 | 8 5 9 | 1 6 7 |
E 7 6 9 | 4 1 2 | 3 5 8 |
F 1 8 5 | 7 6 3 | 9 4 2 |
G 6 9 8 | 2 3 7 | 5 1 4 |
H 4 7 3 | 1 9 5 | 2 8 6 |
I 5 1 2 | 6 4 8 | 7 3 9 |
You win!
Do you want to continue to the next game? (y/n)
y
Please enter a number to choose the difficulty level (1 (easy), 2 (medium), 3 (hard): 1
A B C D E F G H I
```

```
You win!
Do you want to continue to the next game? (y/n)
y
Please enter a number to choose the difficulty level (1 (easy), 2 (medium), 3 (hard): 1
A B C D E F G H I
A 4 1 7 | 8 9 2 | 3 5 6 |
B 8 9 2 | 5 3 | 4 1 7 |
C 5 6 3 | 4 7 1 | 8 2 9 |
D 1 2 5 | 7 4 9 | 6 3 8 |
E 9 7 6 | 1 3 8 | 2 4 5 |
F 3 4 8 | 2 6 5 | 7 9 1 |
G 7 8 1 | 9 2 4 | 5 6 3 |
H 6 5 4 | 3 1 7 | 9 8 2 |
I 2 3 9 | 5 8 6 | 1 7 4 |
If you want to restart this game, fill in 10.
Enter the number you want to fill in: 6
Enter the location you want to fill in: (row col): B D
A B C D E F G H I
A 4 1 7 | 8 9 2 | 3 5 6 |
B 8 9 2 | 6 5 3 | 4 1 7 |
C 5 6 3 | 4 7 1 | 8 2 9 |
D 1 2 5 | 7 4 9 | 6 3 8 |
E 9 7 6 | 1 3 8 | 2 4 5 |
F 3 4 8 | 2 6 5 | 7 9 1 |
G 7 8 1 | 9 2 4 | 5 6 3 |
H 6 5 4 | 3 1 7 | 9 8 2 |
I 2 3 9 | 5 8 6 | 1 7 4 |
You win!
Do you want to continue to the next game? (y/n)
n
Game ends.
Terminal will be reused by tasks, press any key to close it.
```

For this time, I entered 'y', played two games, and terminated the program.

The text file continued to record those two new games. (Game 2 and game 3)

P.S. It is small here. I have attached the text file to have a better look.

```
9 2 3 1 4 6 8 7 5
7 8 3 9 5 2 6 4 1
2 5 7 6 1 9 3 8 4
6 1 8 4 3 9 7 2 5
3 9 4 7 2 5 1 8 6
8 3 2 6 7 1 4 9 8
8 6 1 2 9 4 5 3 7
4 7 5 6 8 3 2 1 9
Game 1:
The original game:
1 2 3 4 5 6 7 8 9
9 2 3 1 4 6 8 7 5
7 8 3 9 5 2 6 4 1
2 5 7 6 1 9 3 8 4
6 1 8 4 3 9 7 2 5
3 9 4 7 2 5 1 8 6
5 3 2 8 7 1 4 9 8
8 6 1 2 9 4 5 3 7
4 7 5 6 8 3 2 1 9
Game 2:
The original game:
8 7 3 1 2 9 4 6 5
9 4 7 5 9 1 6 2 3
3 5 6 2 4 8 7 1
2 3 4 6 5 9 1 8 7
7 6 8 4 1 2 3 5 8
1 8 5 7 6 3 9 4 2
6 9 8 2 7 5 1 4
4 7 3 1 9 5 2 8 6
5 1 2 6 4 8 7 3 9
Game 2:
The solution:
8 7 3 1 2 9 4 6 5
9 4 7 5 9 1 6 2 3
3 5 6 2 4 8 7 1
2 3 4 6 5 9 1 8 7
7 6 8 4 1 2 3 5 8
1 8 5 7 6 3 9 4 2
6 9 8 2 7 5 1 4
4 7 3 1 9 5 2 8 6
5 1 2 6 4 8 7 3 9
Game 3:
The original game:
8 9 2 6 5 3 4 1 7
3 6 3 8 7 1 4 2 9
1 2 5 7 9 6 8 3
9 7 8 1 3 8 2 4 5
3 4 8 2 6 5 7 9 1
7 8 1 9 2 4 5 6 8
6 5 4 3 1 7 9 8 2
2 3 9 5 8 6 1 7 4
Game 3:
The solution:
8 9 2 6 5 3 4 1 7
3 6 3 8 7 1 4 2 9
1 2 5 7 9 6 8 3
9 7 8 1 3 8 2 4 5
3 4 8 2 6 5 7 9 1
7 8 1 9 2 4 5 6 8
6 5 4 3 1 7 9 8 2
2 3 9 5 8 6 1 7 4
```

In this way, all of the games (including the puzzle and the answer) are saved in this text file, with consistent orders.