CSC466 Project Task 4

Game Playing Interface

Abstract

In this task I implemented a function to allow a human to play the game. To do so I created a simple REPL with 4 commands a player can use.

- quit – quit playing the game.
- help – show a help message containing the commands.
- (r column row) – reveal a tile at that coordinate.
- (f column row) – flag a tile at that coordinate.

There are three difficulties that can be chosen with an optional parameter, with the default being easy. Easy is 10x10 with 10 mines, medium is 16x16 with 40 mines, and hard is 24x20 with 99 mines.

Demo

```
[1]> ( load "ms.l" )

;; Loading file ms.l ...

;; Loaded file ms.l

T

[2]> ( play-game )

To reveal a tile enter    | ( r column row) --> ( r a 5 )

To flag a tile enter      | ( f column row) --> ( f e 7 )

To quit playing enter     | quit

To see this message enter | help

Press enter to continue.
```

```
   A B C D E F G H I J
  +--------------------+
0 | # # # # # # # # # # 
1 | # # # # # # # # # # 
2 | # # # # # # # # # # 
3 | # # # # # # # # # # 
4 | # # # # # # # # # # 
5 | # # # # # # # # # # 
6 | # # # # # # # # # # 
7 | # # # # # # # # # # 
8 | # # # # # # # # # # 
9 | # # # # # # # # # # 

>>> Enter move help
To reveal a tile enter    | ( r column row) --> ( r a 5 )
To flag a tile enter      | ( f column row) --> ( f e 7 )
To quit playing enter     | quit
To see this message enter | help
Press enter to continue.
```

```
   A B C D E F G H I J
  +--------------------+
0 | # # # # # # # # # # 
1 | # # # # # # # # # # 
2 | # # # # # # # # # # 
3 | # # # # # # # # # # 
4 | # # # # # # # # # # 
5 | # # # # # # # # # # 
6 | # # # # # # # # # # 
7 | # # # # # # # # # # 
8 | # # # # # # # # # # 
9 | # # # # # # # # # # 

>>> Enter move quit
NIL
[3]> ( play-game 'medium )
To reveal a tile enter    | ( r column row) --> ( r a 5 )
To flag a tile enter      | ( f column row) --> ( f e 7 )
To quit playing enter     | quit
To see this message enter | help
Press enter to continue.
```

```
   A B C D E F G H I J K L M N O P
  +--------------------------------+
 0 | # # # # # # # # # # # # # # # #
 1 | # # # # # # # # # # # # # # # #
 2 | # # # # # # # # # # # # # # # #
 3 | # # # # # # # # # # # # # # # #
 4 | # # # # # # # # # # # # # # # #
 5 | # # # # # # # # # # # # # # # #
 6 | # # # # # # # # # # # # # # # #
 7 | # # # # # # # # # # # # # # # #
 8 | # # # # # # # # # # # # # # # #
 9 | # # # # # # # # # # # # # # # #
10 | # # # # # # # # # # # # # # # #
11 | # # # # # # # # # # # # # # # #
12 | # # # # # # # # # # # # # # # #
13 | # # # # # # # # # # # # # # # #
14 | # # # # # # # # # # # # # # # #
15 | # # # # # # # # # # # # # # # #
```

```
>>> Enter move ( r a 0 )

      A B C D E F G H I J K L M N O P
    +--------------------------------+
  0 | 0 0 0 1 # # # # # # # # # # # #
  1 | 0 1 1 2 # # # # # # # # # # # #
  2 | 0 1 # # # # # # # # # # # # # #
  3 | 1 2 # # # # # # # # # # # # # #
  4 | # # # # # # # # # # # # # # # #
  5 | # # # # # # # # # # # # # # # #
  6 | # # # # # # # # # # # # # # # #
  7 | # # # # # # # # # # # # # # # #
  8 | # # # # # # # # # # # # # # # #
  9 | # # # # # # # # # # # # # # # #
 10 | # # # # # # # # # # # # # # # #
 11 | # # # # # # # # # # # # # # # #
 12 | # # # # # # # # # # # # # # # #
 13 | # # # # # # # # # # # # # # # #
 14 | # # # # # # # # # # # # # # # #
 15 | # # # # # # # # # # # # # # # #
```

```
>>> Enter move ( f c 2 )

      A B C D E F G H I J K L M N O P
    +--------------------------------+
  0 | 0 0 0 1 # # # # # # # # # # # #
  1 | 0 1 1 2 # # # # # # # # # # # #
  2 | 0 1 > # # # # # # # # # # # # #
  3 | 1 2 # # # # # # # # # # # # # #
  4 | # # # # # # # # # # # # # # # #
  5 | # # # # # # # # # # # # # # # #
  6 | # # # # # # # # # # # # # # # #
  7 | # # # # # # # # # # # # # # # #
  8 | # # # # # # # # # # # # # # # #
  9 | # # # # # # # # # # # # # # # #
 10 | # # # # # # # # # # # # # # # #
 11 | # # # # # # # # # # # # # # # #
 12 | # # # # # # # # # # # # # # # #
 13 | # # # # # # # # # # # # # # # #
 14 | # # # # # # # # # # # # # # # #
 15 | # # # # # # # # # # # # # # # #
```

```
>>> Enter move ( r a 4 )

      A B C D E F G H I J K L M N O P
    +--------------------------------+
  0 | 0 0 0 1 X # # # # # # # # # # #
  1 | 0 1 1 2 # # # # # # X # # X # #
  2 | 0 1 > # # # X # # # # # # # # #
  3 | 1 2 # # # # # X # # # # X X # #
  4 | X # # # X # X # # # # # X # # #
  5 | X X X # # # # X X # X # # # # #
  6 | # # # X # # # # # # # # # X # #
  7 | # # # X # # # # X # # # # X X #
  8 | X # # # # # # # # # # # # # # X
  9 | X # # # X # # # # X # # X X # #
 10 | # # X # # # # # # # # # # # # #
 11 | # # X # # # # # # # X # # # # #
 12 | # # # # # # # # # # # # X # # #
 13 | # # X # # # # # # # # # # # # #
 14 | # # # X # # # # # # # X X # # #
 15 | # # # # # # # # # # X # # # # #

A mine has been hit, GAME OVER!
NIL
[4]> ( play-game 'hard )
To reveal a tile enter    | ( r column row) --> ( r a 5 )
To flag a tile enter      | ( f column row) --> ( f e 7 )
```

```
To quit playing enter     | quit
To see this message enter | help
Press enter to continue.

      A B C D E F G H I J K L M N O P Q R S T U V W X
    +-----------------------------------------------+
 0  | # # # # # # # # # # # # # # # # # # # # # # # #
 1  | # # # # # # # # # # # # # # # # # # # # # # # #
 2  | # # # # # # # # # # # # # # # # # # # # # # # #
 3  | # # # # # # # # # # # # # # # # # # # # # # # #
 4  | # # # # # # # # # # # # # # # # # # # # # # # #
 5  | # # # # # # # # # # # # # # # # # # # # # # # #
 6  | # # # # # # # # # # # # # # # # # # # # # # # #
 7  | # # # # # # # # # # # # # # # # # # # # # # # #
 8  | # # # # # # # # # # # # # # # # # # # # # # # #
 9  | # # # # # # # # # # # # # # # # # # # # # # # #
10  | # # # # # # # # # # # # # # # # # # # # # # # #
11  | # # # # # # # # # # # # # # # # # # # # # # # #
12  | # # # # # # # # # # # # # # # # # # # # # # # #
13  | # # # # # # # # # # # # # # # # # # # # # # # #
14  | # # # # # # # # # # # # # # # # # # # # # # # #
15  | # # # # # # # # # # # # # # # # # # # # # # # #
16  | # # # # # # # # # # # # # # # # # # # # # # # #
17  | # # # # # # # # # # # # # # # # # # # # # # # #
18  | # # # # # # # # # # # # # # # # # # # # # # # #
19  | # # # # # # # # # # # # # # # # # # # # # # # #
```

```
>>> Enter move quit
NIL
[5]> ( play-game 'easy )
To reveal a tile enter    | ( r column row) --> ( r a 5 )
To flag a tile enter      | ( f column row) --> ( f e 7 )
To quit playing enter     | quit
To see this message enter | help
Press enter to continue.

       A B C D E F G H I J
     +---------------------+
   0 | # # # # # # # # # # #
   1 | # # # # # # # # # # #
   2 | # # # # # # # # # # #
   3 | # # # # # # # # # # #
   4 | # # # # # # # # # # #
   5 | # # # # # # # # # # #
   6 | # # # # # # # # # # #
   7 | # # # # # # # # # # #
   8 | # # # # # # # # # # #
   9 | # # # # # # # # # # #
```

```
>>> Enter move ( r a 0 )

      A B C D E F G H I J
    +--------------------+
  0 | 1 # # # # # # # # #
  1 | # # # # # # # # # #
  2 | # # # # # # # # # #
  3 | # # # # # # # # # #
  4 | # # # # # # # # # #
  5 | # # # # # # # # # #
  6 | # # # # # # # # # #
  7 | # # # # # # # # # #
  8 | # # # # # # # # # #
  9 | # # # # # # # # # #
```

```
>>> Enter move ( r j 0 )

      A B C D E F G H I J
    +--------------------+
  0 | 1 # # # # # # # # 1
  1 | # # # # # # # # # #
  2 | # # # # # # # # # #
  3 | # # # # # # # # # #
  4 | # # # # # # # # # #
  5 | # # # # # # # # # #
  6 | # # # # # # # # # #
  7 | # # # # # # # # # #
  8 | # # # # # # # # # #
  9 | # # # # # # # # # #
```

```
>>> Enter move ( r a 9 )

      A B C D E F G H I J
    +--------------------+
  0 | 1 # 1 0 0 0 1 # # 1
  1 | # # 2 1 0 0 1 2 2 1
  2 | # # # 2 1 0 0 0 0 0
  3 | # # # # 1 0 0 0 0 0
  4 | # # 2 1 1 0 1 1 1 0
  5 | 1 1 1 0 0 0 1 # 3 2
  6 | 0 0 0 1 1 1 1 2 # #
  7 | 0 0 0 1 # 1 0 1 2 2
  8 | 0 0 0 1 1 1 0 0 0 0
  9 | 0 0 0 0 0 0 0 0 0 0
```

```
>>> Enter move ( f e 7 )

      A B C D E F G H I J
    +--------------------+
  0 | 1 # 1 0 0 0 1 # # 1
  1 | # # 2 1 0 0 1 2 2 1
  2 | # # # 2 1 0 0 0 0 0
  3 | # # # # 1 0 0 0 0 0
  4 | # # 2 1 1 0 1 1 1 0
  5 | 1 1 1 0 0 0 1 # 3 2
  6 | 0 0 0 1 1 1 1 2 # #
  7 | 0 0 0 1 > 1 0 1 2 2
  8 | 0 0 0 1 1 1 0 0 0 0
  9 | 0 0 0 0 0 0 0 0 0 0
```

```
>>> Enter move ( f i 6 )

      A B C D E F G H I J
    +--------------------+
  0 | 1 # 1 0 0 0 1 # # 1
  1 | # # 2 1 0 0 1 2 2 1
  2 | # # # 2 1 0 0 0 0 0
  3 | # # # # 1 0 0 0 0 0
  4 | # # 2 1 1 0 1 1 1 0
  5 | 1 1 1 0 0 0 1 # 3 2
  6 | 0 0 0 1 1 1 1 2 > #
  7 | 0 0 0 1 > 1 0 1 2 2
  8 | 0 0 0 1 1 1 0 0 0 0
  9 | 0 0 0 0 0 0 0 0 0 0
```

```
(...)
>>> Enter move ( r a 3 )

      A B C D E F G H I J
    +--------------------+
  0 | 1 # 1 0 0 0 1 > > 1
  1 | # # 2 1 0 0 1 2 2 1
  2 | # # > 2 1 0 0 0 0 0
  3 | 1 # # > 1 0 0 0 0 0
  4 | 1 > 2 1 1 0 1 1 1 0
  5 | 1 1 1 0 0 0 1 > 3 2
  6 | 0 0 0 1 1 1 1 2 > >
  7 | 0 0 0 1 > 1 0 1 2 2
  8 | 0 0 0 1 1 1 0 0 0 0
  9 | 0 0 0 0 0 0 0 0 0 0
```

```
>>> Enter move ( r a 2 )

      A B C D E F G H I J
    +---------------------+
  0 | 1 # 1 0 0 0 1 > > 1
  1 | 1 2 2 1 0 0 1 2 2 1
  2 | 0 1 > 2 1 0 0 0 0 0
  3 | 1 2 # > 1 0 0 0 0 0
  4 | 1 > 2 1 1 0 1 1 1 0
  5 | 1 1 1 0 0 0 1 > 3 2
  6 | 0 0 0 1 1 1 1 2 > >
  7 | 0 0 0 1 > 1 0 1 2 2
  8 | 0 0 0 1 1 1 0 0 0 0
  9 | 0 0 0 0 0 0 0 0 0 0
```

```
>>> Enter move ( r c 3 )

      A B C D E F G H I J
    +--------------------+
  0 | 1 # 1 0 0 0 1 > > 1
  1 | 1 2 2 1 0 0 1 2 2 1
  2 | 0 1 > 2 1 0 0 0 0 0
  3 | 1 2 3 > 1 0 0 0 0 0
  4 | 1 > 2 1 1 0 1 1 1 0
  5 | 1 1 1 0 0 0 1 > 3 2
  6 | 0 0 0 1 1 1 1 2 > >
  7 | 0 0 0 1 > 1 0 1 2 2
  8 | 0 0 0 1 1 1 0 0 0 0
  9 | 0 0 0 0 0 0 0 0 0 0

You win!
NIL
```

Code

```
( defun play-game ( &optional difficulty &aux move )
    ( cond
        ( ( or ( null difficulty ) ( equal difficulty 'easy ) ) ( generate-board
10 10 10 ) )
        ( ( equal difficulty 'medium ) ( generate-board 16 16 40 ) )
        ( ( equal difficulty 'hard ) ( generate-board 24 20 99 ) )
    )
    ( help-message )
    ( loop
        ( display-board )
        ( format t ">>> Enter move " )
        ( setf move ( read ) )
        ( cond
            ( ( equal move 'quit ) ( return nil ) )
            ( ( equal move 'help ) ( help-message ) )
            ( ( or ( not ( listp move ) ) ( < ( length move ) 3 ) ) ( format t
"Invalid Move!~%" ) )
            ( ( equal ( car move ) 'r )
                ( if ( reveal ( second move ) ( third move ) )
                    ( progn
                        ( display-board )
                        ( format t "A mine has been hit, GAME OVER!" )
                        ( return nil ) ) ) )
            ( ( equal ( car move ) 'f ) ( flag ( second move ) ( third move ) ) )
            ( t ( format t "Invalid Move!~%" ) )
        )
        ( if ( win-p )
            ( progn
                ( display-board )
                ( format t "You win!~%" )
                ( return nil )
            )
        )
    )
)
( defun reveal ( column row &aux value )
    ( if ( null *board* ) ( return-from reveal ) )
    ( setf value ( + ( * row ( board-width *board* ) ) ( position column
*letters* ) ) )
    ( reveal-tiles ( list ( nth value ( board-tiles *board* ) ) ) '() )
)
```

```
( defun flag ( column row &aux value )
    ( if ( null *board* ) ( return-from flag ) )
    ( setf value ( + ( * row ( board-width *board* ) ) ( position column
*letters* ) ) )
    ( setf ( tile-flag ( nth value ( board-tiles *board* ) ) ) T )
)
( defun help-message ()
    ( format t "To reveal a tile enter    | ( r column row) --> ( r a 5 ) ~%" )
    ( format t "To flag a tile enter      | ( f column row) --> ( f e 7 ) ~%" )
    ( format t "To quit playing enter     | quit~%")
    ( format t "To see this message enter | help~%")
    ( format t "Press enter to continue.")
    ( read-line )
)

( defun win-p (&aux v)
    ( setf v 0 )
    ( dotimes ( n ( length ( board-tiles *board* ) ) )
        ( if ( tile-revealed ( nth n ( board-tiles *board* ) ) ) ( setf v ( + v 1
) ) )
    )
    ( = v ( - ( length ( board-tiles *board* ) ) ( board-mines *board* ) ) )
)
```